**U.S. Agency for International Development**
**INITIAL ENVIRONMENTAL EXAMINATION AMD No. 3**

AgBiz Extension
**USAID/Macedonia**

## A. PROGRAM AND ACTIVITY DATA

| | |
|---|---|
| **PROJECT NAME:** | AgBiz |
| **ASSISTANCE OBJECTIVE:** | 4. Economic Growth |
| **PROGRAM AREA:** | 4.5 Agriculture |
| **COUNTRY:** | Macedonia |
| **ORIGINATING OFFICE** | Economic Growth |
| **DATE:** | January 27, 2012 |
| **IEE AMENDMENT:** Yes☒ No ☐ | 2011 update of 2008 PERSUAP for two-year AgBiz project extension. The purpose of this IEE amendment is to evaluate and update the list of Macedonia-approved and EU-approved pesticides so the project has guidance on what can and cannot be used with USAID assistance by sub-contractors. |
| **DCN OF ORIGINAL IEE:** | DCN of Original IEE: 2006-MAC-006<br>DCN of Original PERUSAP: 2008-MAC-007<br>DCN of AMD #1: 2009-MAC-008<br>DCN of AMD #2: 2011-MAC-007 |
| **IMPLEMENTATION START:** | January 01, 2012 |
| **IMPLEMENTATION END:** | June 17, 2013 |
| **LOP AMOUNT:** | $8,189,960 |
| **CONTRACT/AWARD # IF KNOWN:** | EDH-I-00-05-00006-00 TO#3 |

**Environmental Media and/or Human Health Potentially Impacted** (check all that apply):
None ☐ Air ☒ Water ☒ Land ☒ Biodiversity ☐ Human health ☒ Other ☐

**Environmental Action Recommended:**

| | | | |
|---|---|---|---|
| Categorical Exclusion: | ☐ | Positive Determination: | ☐ |
| Negative Determination: | ☐ | Deferral: | ☐ |
| Neg. Deter. with Conditions: | ☒ | Exemption: | ☐ |

## B. BACKGROUND

In June, 2011 AgBiz was extended by USAID/Macedonia for two years for the AgBiz project implemented by Tetra-Tech/ARD. The total ceiling increase of the subject award is $2,340,000 from $5,850,000 to $8,190,000 and the period of performance for this Task Order will extend from June 18, 2011 to June 17, 2013. The overall objective of the two-year cost extension is to increase incomes for all participants in selected Macedonian agricultural value chains by increasing sales (domestic and exports), improving productivity, enhancing the agricultural business environment, and increasing access to finance.

AgBiz will build off of the existing capacity and expertise of Macedonian professionals and lead firms and farms to create a new understanding in the market for imbedded business development services and fee-based service delivery. The provision of the services will be delivered sustainably by local partners well beyond the anticipated graduation of the USAID Macedonia program. AgBiz Extension will focus on two value chains—fresh fruits and vegetables (FF&V) and processed vegetables (PV); emphasis will be on the lower levels of the value chains, with a view to increasing product quality and quantity to meet demand, and to raising the critical mass of stakeholders in the targeted value chains and increasing the use of service providers and the development of sustainable packages of services.

Implementation will contribute to the achievement of USAID/Macedonia's Economic Growth Assistance Objective Three: *Increasing Job Creating Private Sector Growth in Targeted Sectors* and the Intermediate Results 3.1: *Improved Business Environment in Critical Areas* and 3.2: *Key Private Sector Capacities Strengthened*.

Thus, the AgBiz Extension has three primary modifications from the original AgBiz Project:

- Focus only on the fresh fruits and vegetables, and processed vegetables value chains;
- Place more emphasis on lower (production) levels within the value chains to increase the quality and quantity of production to satisfy current and anticipated demand; including increasing the number of participants in targeted value chains; and
- Increase the use of local agricultural development service providers to manage entire AgBiz components.

AgBiz extension components include: Direct Value Chain Development Work; and Indirect Value Chain Development Work. Five of the AgBiz Direct Value Chain Development Work components will be implemented through subcontracts with business service providers called Lead Facilitators. These are: EPICENTAR, MCG, Innovation to Business/!2b, CeProSARD, and Export Market Plans/MAFWE.

To accomplish this—and do it well—all project and subcontractors including local trainers will need to be well-versed in all of the crops, important pests of each crop and specific IPM measures used to prevent and treat each pest of each crop. Further, these same project subcontractors and local trainers will need to understand important characteristics and restrictions of pesticides registered in Macedonia and EU, as well as those most likely to be encountered on project-assisted farms. This includes potential impacts on human health, environment and natural resources. These are analyzed in Table 1 and the non-approved pesticide active ingredients that should not be promoted by subcontractors to project beneficiaries or used on project-supported farms with USAID assistance, as well as exceptions, are listed below and in the PERSUAP.

Moreover, since the use of pesticides carries particular risks, project and local trainers will need to understand best practices for pesticide safety including storage, transportation, handling, use (including

application rates), and disposal of pesticides. These best practices are either detailed or linked to websites in the PERSUAP.

## C. PESTICIDE ACTIVE INGREDIENTS NOT APPROVED BY EPA OR THIS PERSUAP[1]

### Insecticide AIs

- *Adoxophyes orana* (not EPA registered)
- alpha-cypermethrin (not EPA registered)
- aluminum phosphide (RUP, too toxic)
- chromafenozide (not EPA registered)
- cyromazine (known water pollutant)
- ethoprop(hos) (RUP, too toxic)
- fenoxycarb (known carcinogen)
- formetanate (too toxic)
- *Helicoverpa armigera* NPV (not EPA registered)
- lauric acid (not EPA registered)
- magnesium phosphide (RUP, too toxic)
- methyl decanoate (not EPA registered)
- methyl octaonate (not EPA registered)
- oleic acid (not EPA registered)
- oxamyl (RUP, too toxic)
- pelargonic acid (not EPA registered)
- phosphane/phosphine (RUP, too toxic)
- *Spodoptera exigua* NPV (not EPA registered)
- *Spodoptera littoralis* NPHV (not EPA registered)
- sulfuryl fluoride (RUP, too toxic)
- *Tagetes* (Marigold) oil (not EPA registered)
- *Melaleuca alternifolia* (tea tree) oil (not EPA registered)
- teflubenzuron (not EPA registered)
- triflumuron (not EPA registered)
- urea (not EPA registered)
- *Lecanicillium muscarium* (not EPA registered)

### Miticide/Acaricide AIs

- cyflumetofen (not EPA registered)
- fenazaquin (too toxic)
- formetanate (too toxic)
- lauric acid (not EPA registered)
- methyl decanoate (not EPA registered)
- methyl octaonate (not EPA registered)
- oleic acid (not EPA registered)
- pelargonic acid (not EPA registered)
- *Tagetes* (Marigold) oil (not EPA registered)

[1] See Table 1; Pesticide AIs approved by EU/Macedonia, but not by EPA or USAID regulations; use caution with other EU-approved pesticides.

**Nematicide AIs**

- ethoprop(hos) (RUP, too toxic)
- fenamiphos/phenamiphos (RUP, too toxic)
- fosthiazate (RUP, too toxic)
- oxamyl (RUP, too toxic)
- *Paecilomyces fumosoroseus* (not EPA registered)

**Rodenticide AIs**

- aluminum phosphide (RUP, too toxic)
- calcium phosphide (not EPA registered)
- magnesium phosphide (RUP, too toxic)

**Fungicide AIs**

- 2-phenylphenol (not EPA registered)
- 8-hydroxyquinoline (not EPA registered)
- ametoctradin (not EPA registered)
- amisulbrom (not EPA registered)
- *Ampelomyces quisqualis* (not EPA registered)
- *Aureobasidium pullulans* (not EPA registered)
- *Bacillus amyloliquefaciens* (not EPA registered)
- benalaxyl (not EPA registered)
- benalaxyl-M (not EPA registered)
- benthiavalicarb (not EPA registered)
- bixafen (not EPA registered)
- bupirimate (not EPA registered)
- captan (known carcinogen)
- cyflufenamid (not EPA registered)
- diethofencarb (not EPA registered)
- dithianone (not EPA registered)
- dodemorph (not EPA registered)
- epoxiconazole (not EPA registered)
- etridiazole/terrazole (known carcinogen)
- fenpropidin (not EPA registered)
- fenpropimorph (not EPA registered)
- fenpyrazamine (not EPA registered)
- fluopyram (not EPA registered)
- fluquinconazole (not EPA registered)
- flusilazole (not EPA registered)
- flutriafol (not EPA registered)
- fluxapyroxad (not EPA registered)
- folpet (known carcinogen)
- fuberidazole (not EPA registered)
- iprovalicarb (not EPA registered)
- isopyrazam (not EPA registered)
- maneb (known carcinogen)

- mepanipyrim (not EPA registered)
- meptyldinocap (not EPA registered)
- metrafenone (not EPA registered)
- penconazole (not EPA registered)
- pencycuron (not EPA registered)
- penflufen (not EPA registered)
- penthiopyrad (not EPA registered)
- *Phlebiopsis gigantea* (not EPA registered)
- picoxystrobin (not EPA registered)
- potassium iodide (not EPA registered)
- potassium phosphite (not EPA registered)
- potassium thiocyanate (not EPA registered)
- prochloraz (not EPA registered)
- propamocarb (not EPA registered)
- propineb (not EPA registered)
- proquinazid (not EPA registered)
- pyriofenone (not EPA registered)
- *Pythium oligandrum M1* (not EPA registered)
- sedaxane (not EPA registered)
- silthiofam (not EPA registered)
- tolclofos-methyl (not EPA registered)
- triazoxide (not EPA registered)
- tribasic copper sulfate (not EPA registered)
- *Trichoderma atroviride* (not EPA registered)
- *Trichoderma viride/lignorum* (not EPA registered)
- valifenalate/valiphenal (not EPA registered)
- *Verticillium albo-atrum/dahliae* (not EPA registered)

**Algicide AI**

- quinoclamine (not EPA registered)

**Bactericide AIs**

- aluminium sulphate (not EPA registered)
- *Aureobasidium pullulans* (not EPA registered)

**Herbicide AIs**

- aclonifen (not EPA registered)
- amidosulfuron (not EPA registered)
- aminotriazole/amitrole (known carcinogen)
- azimsulfuron (not EPA registered)
- beflubutamid (not EPA registered)
- bifenox (not EPA registered)
- carbetamide (not EPA registered)
- chlorotoluron (not EPA registered)
- cinidon ethyl (not EPA registered)

- cycloxydim (not EPA registered)
- diflufenican (not EPA registered)
- dimethachlor (not EPA registered)
- diuron (known carcinogen)
- ethoxysulfuron (not EPA registered)
- florasulam (not EPA registered)
- flupyrsulfuron-methyl (not EPA registered)
- flurochloridone (not EPA registered)
- haloxyfop R methyl (not EPA registered)
- haloxyfop (P) methyl (not EPA registered)
- ioxynil (not EPA registered)
- iron sulphate (not EPA registered)
- isoproturon (not EPA registered)
- isoxaflutole (RUP, too toxic)
- lauric acid (not EPA registered)
- lenacil (not EPA registered)
- metamitron (known carcinogen)
- metazachlor (not EPA registered)
- methyl decanoate (not EPA registered)
- methyl octaonate (not EPA registered)
- metobromuron (not EPA registered)
- metosulam (not EPA registered)
- oleic acid (not EPA registered)
- oxadiargyl/oxadiargil (not EPA registered)
- oxadiazon (known carcinogen)
- oxasulfuron (not EPA registered)
- pelargonic acid (not EPA registered)
- penoxsulam (known water pollutant)
- pethoxamid (not EPA registered)
- picolinafen (not EPA registered)
- profoxydim (not EPA registered)
- propaquizafop (not EPA registered)
- prosulfocarb (not EPA registered)
- pyridate (not EPA registered)
- quinmerac (not EPA registered)
- quinoclamine (not EPA registered)
- s-metolachlor (known water pollutant)
- sulcotrione (not EPA registered)
- tepraloxydim (not EPA registered)
- thiencarbazone (not EPA registered)
- tritosulfuron (not EPA registered)

**PESTICIDE AIs NOT APPROVED BY EU**

See PERSUAP ATTACHMENT 13

**D. RECOMMENDED ENVIRONMENTAL ACTIONS**

**1. Recommended Environmental Threshold Determinations:**

A Negative Determination with Conditions is recommended for activity that is related to pesticide training, promotion, distribution and use, especially during GlobalGAP training, under this amendment pursuant to 22 CFR 216.3(a)(2)(iii).

**2. Conditions**

- Do not use pesticides containing Active Ingredients that are not Macedonia, EU, EPA or PERSUAP approved.
- Refer to Table 1 in the attached PERSUAP for approved AIs (coded Green).
- Use pesticide safe use practices, training and safety equipment following GlobalGAP.
- Produce pest management plans for each AgBiz target crop.
- Implementation of the following recommendations (in the **MITIGATION and REPORTING MEASURES** table below) of best practices and GAPs from the PERSUAP are conditions for any assistance to farmers that might include training on, discussing or promotion of the use of pesticide inputs.

**MITIGATION and REPORTING MEASURES**

| Actions/Activities | Start | End | Who | Budget |
|---|---|---|---|---|
| Reiterating Pesticide Regulations and Restrictions | | | | |
| Ensure that Subcontractors do not propose the use of pesticide products containing active ingredients not EPA registered, RUP, too toxic, known carcinogen or known water pollutant, shaded red in Table 1 (PER Factors A, E, J) | | | | |
| Ensure that Subcontractors do not promote or use locally-available insecticides containing banned POPs or PIC chemicals like insecticide endosulfan/Thiodan (PER Factor J) | | | | |
| Ensure that Subcontractors do not promote or use fumigant aluminum phosphide to treat stored grain or produce (instead use trained and equipped fumigation services) (PER Factor D) | | | | |
| Promote the least toxic pesticides for each crop protection situation (PER Factor B) | | | | |
| Check for any movement by EU or MAFWE on new registrations of pesticides, including natural pesticides, and obtain this new pesticide registration information to benefit Subcontractors extension staff and reporting to USAID (PER Factors A, B, G, J, K, L) | | | | |
| Pesticide Risk Awareness and Mitigation | | | | |
| Provide annual training for Subcontractors and | | | | |

| Actions/Activities | Start | End | Who | Budget |
|---|---|---|---|---|
| their served beneficiary farmers using the IPM and pesticide safety training topic list in Annex 8 (Factors A, B, C, D, E, F, G, K) | | | | |
| Ensure that Subcontractor encourage farmers and farmer associations or cooperatives to each have 1 or 2 sets of PPE for the group to share; and encourage them to assign a responsible PPE caretaker for each group (PER Factors D, E, L) | | | | |
| Ensure that Subcontractors train farmers to use PPE and apply pesticides only when there is no wind or rain in the late afternoon or night when bees do not forage and it is cooler, or early morning if there is no dew present (PER Factors D, E, K, L) | | | | |
| Good Agriculture Practices and IPM | | | | |
| Have Subcontractors extension staff promote pest-specific crop-pest-IPM-pesticide information with farmers for field use, validation, modification or adaptation (PER Factor C, H, K, L) | | | | |
| Use IPM information to produce crop-specific production PMPs, and then field reference guides or posters for farmers to use to anticipate and manage pests, diseases and weeds (PER Factor C) | | | | |
| Have Subcontractor extension staff promote the use of artisanal natural chemicals listed in Annexes 1, 4 and 5, as available (PER Factors B, H, I) | | | | |
| Follow GlobalGAP standards and website http://www.epa.gov/oppfead1/labeling/lrm/chap-13.htm for empty container disposal and pesticide record-keeping (PER Factors D, J, K, L) | | | | |
| During Subcontractor training, promote use of electrostatic and sleeve-boom sprayers that can reduce spray drift (PER Factor D) | | | | |
| Natural Resources Protection | | | | |
| Use GAPs, erosion control and low aquatic toxicity pesticides near known protected areas and do not use pesticides within 30 meters of open water (PER Factor G, H) | | | | |
| Consider the use of botanical, microbial or biological controls near protected areas and species (PER Factor G) | | | | |
| Protect honeybees by spraying in late afternoon or night, and warn beekeepers of impending spray operations (PER Factor G) | | | | |
| On sandy soil with a high water table (less than 2 | | | | |

| Actions/Activities | Start | End | Who | Budget |
|---|---|---|---|---|
| meters) do not use herbicides or other pesticides with water pollution potential (PER Factor G, H) | | | | |
| Near waterways, consider pesticides that both have low aquatic toxicity, no pollution potential and break down quickly; and do not apply when rain is imminent (PER Factor G, H) | | | | |
| Project Management Responsibilities | | | | |
| Define and assure safe pesticide use practices following GlobalGAP standards, and audit AgBiz/Subcontractor-assisted farmer's use of each best practice (PER Factors K, L) | | | | |
| Keep copies of the current list of pesticide AIs analyzed by this PERSUAP at all AgBiz and Subcontractor centers (Table 1, PER Factors A, D, J) | | | | |
| Collect and keep copies of MSDSs for each commercial pesticide that farmers are likely to use at each Subcontractor center (PER Factors A, B, E, G) | | | | |
| Keep PERSUAP recommendation implementation records and report on them in Annual Reports, under a heading titled "Environmental Compliance and Best Practices" (PER Factor K, L) | | | | |
| Provide for SUAP implementation and use | | | | |

**E. MANDATORY INCLUSION OF ENVIRONMENTAL COMPLIANCE REQUIREMENTS IN SOLICITATIONS, AWARDS, BUDGETS AND WORKPLANS**

- Appropriate environmental compliance language shall be included in solicitations and awards for this activity with an appropriate level of funding and staffing to satisfy the environmental compliance requirements, especially where potentially toxic pesticides are concerned, as set forth in this IEE amendment. Environmental mitigation and monitoring requirements shall also be included in solicitations and awards.
- The implementing partner will incorporate conditions set forth in this IEE amendment in to their work plans.
- The USAID Mission will include indicators for environmental compliance as part of the project's performance monitoring plan.

## F. LIMITATIONS OF THE IEE:

This IEE does not cover activities involving:

1. Classes of actions normally having a significant effect on the environment pursuant to 22 CFR 216.2(d)(1):

i. Programs of river basin development;

ii. Irrigation and water management;
iii. Agricultural land leveling;
iv. Drainage projects;
v. Large scale agricultural mechanization;
vi. Resettlement Projects;
vii. New land development;
viii. Penetration road building and road improvement;
ix. Powerplants;
x. Potable water and sewerage projects.

2. Activities affecting endangered species or introducing exotic species;
3. Support to extractive industries (e.g. mining and quarrying);
4. Support for activities that promote timber harvesting;
5. Construction, reconstruction, rehabilitation, or renovation work;
6. Activities involving support to industrial enterprises, and regulatory permitting.
7. Potential activity components dealing with privatization of industrial facilities or infrastructure with heavily polluted property;
8. Project preparation, project feasibility studies, and infrastructure investments for projects that may have a potentially significant impact on the environment;
9. Procurement or use of genetically modified organisms (GMOs);
10. DCA or GDA programs.

Any of the above actions would require an amendment to the IEE approved by the E&E Bureau Environmental Officer (EE/BEO).

**G. REVISIONS**

Pursuant to 22 CFR 216.3(a)(9), if new information becomes available that indicates that activities covered by the IEE might be considered "major" and their effect "significant," or if additional activities are proposed that might be considered "major" and their effect "significant," this IEE amendment will be reviewed and, if necessary, revised by the Mission Environmental Officer (MEO) with concurrence by the EE/BEO. It is the responsibility of the USAID AOTR to keep the MEO and BEO informed of any new information or changes in the activity that might equire revision of the IEE.

## H. RECOMMENDED ENVIRONMENTAL THRESHOLD DECISIONS FOR AGBIZ USE OF PESTICIDES

***Negative Determination*with conditions: All subcontractors and AgBiz shall follow all recommendations in the attached PERSUAP.**

- Do not use pesticides containing Active Ingredients that are not Macedonia, EU, EPA or PERSUAP approved.
- Refer to Table 1 in the attached PERSUAP for approved AIs (coded Green).
- Use pesticide safe use practices, training and safety equipment following GlobalGAP.
- Produce pest management plans for each AgBiz target crop.

Implementation of the recommendations (in the **MITIGATION and REPORTING MEASURES** table) of best practices and GAPs from the PERSUAP are conditions for any assistance to farmers that might include training on, discussing or promotion of the use of pesticide inputs.

The terms and conditions of the original IEE and subsequent Amendments shall remain in effect.

**USAID Approval of Recommended Environmental Threshold Decision:**

Approval:

_____ _____
Robert Wuertz, Mission Director Date

Clearance: _____ _____
Yasmeen Thomason, Mission Environmental Officer Date

Clearance: _____ _____
Meri Cuculoska, Originator/Preparer & COTR Date

**Concurrence:**

_____ _____
William Gibson, E&E Bureau Environmental Officer Date

**Distribution:**
IEE & Project File
Mission Environmental Officer (to distribute to COTR/AOTR)

# 2012 Updtae to
# Pesticide Evaluation Report
# & Safer Use Action Plan (PERSUAP)

An Update of the Original 2008 AgBiz PERSUAP Prepared For:

**TetraTech ARD Macedonian Agribusiness (AgBiz) Activity**

**Original Funding Period: FY 2007 – FY 2010**
**Extension Period: FY 2011 – FY 2013**

Dates of Preparation:
**December 21, 2011 to January 10, 2012**

Prepared By:

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DRAFT

**Acronyms used in AgBiz PERSUAP**

| | |
|---|---|
| AI | Active Ingredient |
| ADI | Average Daily Intake |
| AgBiz | Macedonian Agribusiness Program |
| AID | US Agency for International Development (also known as USAID) |
| ANE | Asia and Near East Bureau of USAID |
| BEO | Bureau Environmental Officer |
| BRC | British Retail Consortium |
| BSC | Business Service Center |
| CBD | Convention on Biological Diversity |
| CFR | Code of Federal Regulations |
| CIA | Central Intelligence Agency |
| COP | Chief of Party |
| CTO | Cognizant Technical Officer |
| EA | Environmental Assessment |
| EC | European Commission |
| $EC_{50}$ | Effective Concentration to kill 50% of a population |
| EIA | Environmental Impact Assessment |
| EIS | Environmental Impact Statement |
| EPA | US Environmental Protection Agency (also known as USEPA) |
| EPAs | Economic Partnership Agreements |
| EU | European Union |
| EUREPGAP | European Good Agricultural Practices (also known as EUROGAP) |
| EXTOXNET | Oregon State University Ecotoxicology Network Pesticides Website |
| FAO | Food and Agriculture Organization (part of UN) |
| FLO | Fairtrade Labeling Organization |
| GAP | Good Agriculture Practice |
| GDP | Gross Domestic Product |
| GUP | General Use Pesticide |
| Ha | Hectare |
| HACCP | Hazard Analysis Critical Control Point |
| HT | Highly Toxic |
| IEE | Initial Environmental Examination |
| IFDC | International Fertilizer Development Center |
| IFOAM | International Federation of Organic Agriculture Movements |
| IGR | Insect Growth Regulator |
| IOAS | International Organic Accreditation Service |
| IPM | Integrated Pest Management |
| ISO | International Standards Organization |
| $LC_{50}$ | Lethal Concentration to kill 50% of a population |
| Km | Kilometer |
| Kg | Kilogram |
| $LD_{50}$ | Lethal Dose to kill 50% of a population |
| LOP | Life of Project |
| MAFWE | Ministry of Agriculture, Forestry and Water Economy |
| M&E | Monitoring and Evaluation |
| MEO | Mission Environmental Officer |
| MRL | Maximum/Minimum Residue Level/Limit |
| MSDS | Material Safety Data Sheet |
| MT | Moderately Toxic |

| | |
|---|---|
| NAT | Not Acutely Toxic |
| NEPA | National Environmental Policy Act (USA) |
| NGO | Non-Governmental Organization |
| OP | Organophosphate (a class of pesticides) |
| OPIC | Overseas Private Investment Corporation |
| PAN | Pesticide Action Network |
| PER | Pesticide Evaluation Report |
| PERSUAP | Pesticide Evaluation Report and Safe Use Action Plan |
| pH | log of Hydrogen concentration, measure of acidity |
| PHI | Pre-Harvest Interval |
| PIC | Prior Informed Consent (a treaty, relates to pesticides) |
| POPs | Persistent Organic Pollutants (a treaty, relates to toxic pesticides) |
| PNT | Practically Non-Toxic |
| PPE | Personal Protection Equipment |
| PVO | Private Volunteer Organization |
| R&D toxin | Reproductive and Developmental toxin |
| Reg 216 | Regulation 216 (USAID Environmental Procedures) |
| REI | Re-Entry Interval (safety period after pesticide spraying) |
| RUP | Restricted Use Pesticide |
| S | Solution (a pesticide formulation) |
| SOW | Scope of Work |
| SPS | Sanitary and Phytosanitary |
| ST | Slightly Toxic |
| SUAP | Safe Use Action Plan |
| U | Unlikely to be toxic |
| UC | University of California |
| UN | United Nations |
| UNEP | United Nations Environment Program |
| UNFAO | United Nations Food and Agriculture Organization |
| UNWHO | United Nations World Health Organization |
| USAID | United States Agency for International Development |
| USEPA | US Environmental Protection Agency (also known as EPA) |
| VHT | Very Highly Toxic |
| WHO | World Health Organization |
| WTO | World Trade Organization |
| WWW | World Wide Web |

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**2011 Macedonia Updated AgBiz PERSUAP Executive Summary**

This 2011 update the original 2008 PERSUAP ensures that implementation of recommendations made therein ensure the Program's full adherence to USAID's Environmental Compliance Regulations and Procedures.

Critically, this update analyzes current Macedonian lists of pesticides active ingredients established according to EU and analyzed by EPA registration and risks (human health and environment) information systems to identify new additions, changes and information made available since the original 2008 PERSUAP was conducted. This update covers the evaluation of the pesticide active ingredients registered by EU and Macedonia and provides a matrix of these pesticide active ingredients by pesticide types; classes; EPA and WHO acute human toxicity classifications; chronic human health toxicity issues; groundwater contamination potential and toxicities to fish, honeybees, birds, amphibians, earthworms, mollusks, crustaceans, aquatic insects, and plankton.

In all, this 2011 update analyzes 433 Macedonia- and EU-approved (or pending imminent approval) pesticide active ingredients (AIs), broken down as follows: 1 soil treatment/fumigant; 96 insecticides; 31 miticides; 3 molluscicides; 10 nematicides; 8 rodenticides; 141 fungicides; 1 algicide; 8 bactericides and 134 herbicides. To make management and use of this information easier, these lists are further broken down by color designation (Green = accepted by EU and EPA; Beige = pending acceptance by EU and accepted by EPA; Yellow = caution, some RUP products are known to exist; Red = do not use, not registered in any product by EPA, or contained in very toxic Class I pesticides, or known carcinogen, or known water pollutant). In addition, this updated PERSUAP compiles 745 pesticide AIs not approved by EU for use in any pesticide product in any EU member country, or countries applying for membership.

Results from the pesticide analyses herein are used to inform and guide Lead Facilitator Activity Descriptions and make environmental impact determinations and recommendations on any mitigation measures that must be undertaken to ensure compliance with USAID environmental rules and regulations.

The AgBiz program has been supported under the Rural and Agricultural Incomes with a Sustainable Environment Plus (RAISE PLUS) Indefinite Quantity Contract (IQC).

1. This new study has been performed in order for the TT/ARD Macedonia AgBiz Program two-year extension to comply with the requirements of 22 Code of Federal Regulations (CFR) 216 as prescribed in the project's environmental documentation, Initial Environmental Examination DCN: 2006-MAC-006 for SO 1.3, and more recent and specific Environmental Due Diligence (EDD) and Pollution Prevention Assessment (PPA) determinations, and to seek the approvals of the Macedonia USAID Mission Environmental Officer (MEO) and the Europe and Eurasia (E&E) Bureau Environmental Officer (BEO) for activities relating to the use of pesticides by grant recipient companies.

2. This study removes gathered wild food products from the 2008 list and recognizes value-added agricultural products existing in value chains:

- fresh fruits and vegetables (FF&V)
- processed vegetables (PV)

3. This study recognizes a growing list of recognized production constraints and pests of these crops, listed herein.

4. In 2008, the following companies, which in one way or other would have some linkage to pesticide choice, use, and impact, have already received or were being considered for receiving AgBiz grant assistance: Agrohemija in Skopje (central offices) and Strumica (sorting and packaging centre), Agros 2004 in Kolchani, Popova Kula Winery in Kapija, Susara Lars in Stip**,** Tikves in Kavadarci, and possibly Bovin in Negotino. Of these, Susara Lars, which sources produce for dehydration from any farmers, likely has the least amount of control over production and inputs—with the exception that they purchase pesticides and give them to some contract growers along with other technical assistance.

5. Now, in 2011, the following groups have been or will be subcontracted: EPICENTAR, MCG, Inovation to Business/!2b, CeProSARD, and MAFWE/production of Export Market Plans.

6. Notably, many of the company agronomists interviewed for the 2008 study were trained under the very rigorous Yugoslav plant protection and extensions systems, which at their time, were some of the best in the world. They understand the crops, production constraints, many Integrated Pest Management (IPM) tactics, pesticides and pesticide risk mitigation issues. However, there were still some gaps which this PERSUAP update attempts to address and fill.

7. Notably, in 2008, several of the agribusiness companies receiving grants were already promoting and using numerous Integrated Pest Management (IPM) tools and techniques. None of these IPM measures were, at that time, reported in AgBiz program monitoring and reporting documents. These should continue to be monitored and reported to USAID in AgBiz reporting instruments, as they represent significant agriculture best management practices which mitigate risks from pesticides.

8. Using a systems approach in 2008, the entire pesticide system in Macedonia was analyzed for risk and to determine a risk profile, within which to evaluate AgBiz Subcontractor and beneficiary activities. Much of this same information and findings apply to this 2011 update.

9. And, as in 2008, the impacts of additional systems that reduce risk are researched by this report, as follows: International Trade & Markets, Standards and Certification Systems like Good Agriculture Practices (GAPs), Codes of Conduct, Sanitary and Phytosanitary (SPS) Barriers, and World Trade Organization (WTO) membership.

## PESTICIDE ACTIVE INGREDIENTS NOT APPROVED BY EPA OR THIS PERSUAP[2]

### Insecticide AIs

- *Adoxophyes orana* (not EPA registered)
- alpha-cypermethrin (not EPA registered)
- aluminum phosphide (RUP, too toxic)
- chromafenozide (not EPA registered)
- cyromazine (known water pollutant)
- ethoprop(hos) (RUP, too toxic)
- fenoxycarb (known carcinogen)
- formetanate (too toxic)
- *Helicoverpa armigera* NPV (not EPA registered)
- lauric acid (not EPA registered)
- magnesium phosphide (RUP, too toxic)

[2] See Table 1; Pesticide AIs approved by EU/Macedonia, but not by EPA or USAID regulations—highlighted in Red; use caution with other EU-approved pesticides.

- methyl decanoate (not EPA registered)
- methyl octaonate (not EPA registered)
- oleic acid (not EPA registered)
- oxamyl (RUP, too toxic)
- pelargonic acid (not EPA registered)
- phosphane/phosphine (RUP, too toxic)
- *Spodoptera exigua* NPV (not EPA registered)
- *Spodoptera littoralis* NPHV (not EPA registered)
- sulfuryl fluoride (RUP, too toxic)
- *Tagetes* (Marigold) oil (not EPA registered)
- *Melaleuca alternifolia* (tea tree) oil (not EPA registered)
- teflubenzuron (not EPA registered)
- triflumuron (not EPA registered)
- urea (not EPA registered)
- *Lecanicillium muscarium* (not EPA registered)

**Miticide/Acaricide AIs**

- cyflumetofen (not EPA registered)
- fenazaquin (too toxic)
- formetanate (too toxic)
- lauric acid (not EPA registered)
- methyl decanoate (not EPA registered)
- methyl octaonate (not EPA registered)
- oleic acid (not EPA registered)
- pelargonic acid (not EPA registered)
- *Tagetes* (Marigold) oil (not EPA registered)

**Nematicide AIs**

- ethoprop(hos) (RUP, too toxic)
- fenamiphos/phenamiphos (RUP, too toxic)
- fosthiazate (RUP, too toxic)
- oxamyl (RUP, too toxic)
- *Paecilomyces fumosoroseus* (not EPA registered)

**Rodenticide AIs**

- aluminum phosphide (RUP, too toxic)
- calcium phosphide (not EPA registered)
- magnesium phosphide (RUP, too toxic)

**Fungicide AIs**

- 2-phenylphenol (not EPA registered)
- 8-hydroxyquinoline (not EPA registered)
- ametoctradin (not EPA registered)
- amisulbrom (not EPA registered)

- *Ampelomyces quisqualis* (not EPA registered)
- *Aureobasidium pullulans* (not EPA registered)
- *Bacillus amyloliquefaciens* (not EPA registered)
- benalaxyl (not EPA registered)
- benalaxyl-M (not EPA registered)
- benthiavalicarb (not EPA registered)
- bixafen (not EPA registered)
- bupirimate (not EPA registered)
- captan (known carcinogen)
- cyflufenamid (not EPA registered)
- diethofencarb (not EPA registered)
- dithianone (not EPA registered)
- dodemorph (not EPA registered)
- epoxiconazole (not EPA registered)
- etridiazole/terrazole (known carcinogen)
- fenpropidin (not EPA registered)
- fenpropimorph (not EPA registered)
- fenpyrazamine (not EPA registered)
- fluopyram (not EPA registered)
- fluquinconazole (not EPA registered)
- flusilazole (not EPA registered)
- flutriafol (not EPA registered)
- fluxapyroxad (not EPA registered)
- folpet (known carcinogen)
- fuberidazole (not EPA registered)
- iprovalicarb (not EPA registered)
- isopyrazam (not EPA registered)
- maneb (known carcinogen)
- mepanipyrim (not EPA registered)
- meptyldinocap (not EPA registered)
- metrafenone (not EPA registered)
- penconazole (not EPA registered)
- pencycuron (not EPA registered)
- penflufen (not EPA registered)
- penthiopyrad (not EPA registered)
- *Phlebiopsis gigantea* (not EPA registered)
- picoxystrobin (not EPA registered)
- potassium iodide (not EPA registered)
- potassium phosphite (not EPA registered)
- potassium thiocyanate (not EPA registered)
- prochloraz (not EPA registered)
- propamocarb (not EPA registered)
- propineb (not EPA registered)
- proquinazid (not EPA registered)
- pyriofenone (not EPA registered)
- *Pythium oligandrum M1* (not EPA registered)
- sedaxane (not EPA registered)
- silthiofam (not EPA registered)

- tolclofos-methyl (not EPA registered)
- triazoxide (not EPA registered)
- tribasic copper sulfate (not EPA registered)
- *Trichoderma atroviride* (not EPA registered)
- *Trichoderma viride/lignorum* (not EPA registered)
- valifenalate/valiphenal (not EPA registered)
- *Verticillium albo-atrum/dahliae* (not EPA registered)

**Algicide AI**

- quinoclamine (not EPA registered)

**Bactericide AIs**

- aluminium sulphate (not EPA registered)
- *Aureobasidium pullulans* (not EPA registered)

**Herbicide AIs**

- aclonifen (not EPA registered)
- amidosulfuron (not EPA registered)
- aminotriazole/amitrole (known carcinogen)
- azimsulfuron (not EPA registered)
- beflubutamid (not EPA registered)
- bifenox (not EPA registered)
- carbetamide (not EPA registered)
- chlorotoluron (not EPA registered)
- cinidon ethyl (not EPA registered)
- cycloxydim (not EPA registered)
- diflufenican (not EPA registered)
- dimethachlor (not EPA registered)
- diuron (known carcinogen)
- ethoxysulfuron (not EPA registered)
- florasulam (not EPA registered)
- flupyrsulfuron-methyl (not EPA registered)
- flurochloridone (not EPA registered)
- haloxyfop R methyl (not EPA registered)
- haloxyfop (P) methyl (not EPA registered)
- ioxynil (not EPA registered)
- iron sulphate (not EPA registered)
- isoproturon (not EPA registered)
- isoxaflutole (RUP, too toxic)
- lauric acid (not EPA registered)
- lenacil (not EPA registered)
- metamitron (known carcinogen)
- metazachlor (not EPA registered)
- methyl decanoate (not EPA registered)
- methyl octaonate (not EPA registered)

- metobromuron (not EPA registered)
- metosulam (not EPA registered)
- oleic acid (not EPA registered)
- oxadiargyl/oxadiargil (not EPA registered)
- oxadiazon (known carcinogen)
- oxasulfuron (not EPA registered)
- pelargonic acid (not EPA registered)
- penoxsulam (known water pollutant)
- pethoxamid (not EPA registered)
- picolinafen (not EPA registered)
- profoxydim (not EPA registered)
- propaquizafop (not EPA registered)
- prosulfocarb (not EPA registered)
- pyridate (not EPA registered)
- quinmerac (not EPA registered)
- quinoclamine (not EPA registered)
- s-metolachlor (known water pollutant)
- sulcotrione (not EPA registered)
- tepraloxydim (not EPA registered)
- thiencarbazone (not EPA registered)
- tritosulfuron (not EPA registered)

**PESTICIDE AIs NOT APPROVED BY EU**

See PERSUAP ATTACHMENT 13

**1. Recommended Environmental Threshold Determinations:**

A Negative Determination with Conditions is recommended for activity that is related to pesticide training, promotion, distribution and use, especially during GlobalGAP training, under this amendment pursuant to 22 CFR 216.3(a)(2)(iii).

**2. Conditions**

- Do not use pesticides containing Active Ingredients that are not Macedonia, EU, EPA or PERSUAP approved.
- Refer to Table 1 in the attached PERSUAP for approved AIs (coded Green).
- Use pesticide safe use practices, training and safety equipment following GlobalGAP.
- Produce pest management plans for each AgBiz target crop.
- Implementation of the recommendations (in the **MITIGATION and REPORTING MEASURES** table below) of best practices and GAPs from the PERSUAP are conditions for any assistance to farmers that might include training on, discussing or promotion of the use of pesticide inputs.

**AGBIZ MITIGATION and REPORTING MEASURES**

| Actions/Activities | Start | End | Who | Budget |
|---|---|---|---|---|

| Actions/Activities | Start | End | Who | Budget |
|---|---|---|---|---|
| Reiterating Pesticide Regulations and Restrictions | | | | |
| Ensure that Subcontractors do not propose the use of pesticide products containing active ingredients not EPA registered, RUP, too toxic, known carcinogen or known water pollutant, shaded red in Table 1 (PER Factors A, E, J) | | | | |
| Ensure that Subcontractors do not promote or use locally-available insecticides containing banned POPs or PIC chemicals like insecticide endosulfan/Thiodan (PER Factor J) | | | | |
| Ensure that Subcontractors do not promote or use fumigant aluminum phosphide to treat stored grain or produce (instead use trained and equipped fumigation services) (PER Factor D) | | | | |
| Promote the least toxic pesticides for each crop protection situation (PER Factor B) | | | | |
| Check for any movement by EU or MAFWE on new registrations of pesticides, including natural pesticides, and obtain this new pesticide registration information to benefit Subcontractors extension staff and reporting to USAID (PER Factors A, B, G, J, K, L) | | | | |
| Pesticide Risk Awareness and Mitigation | | | | |
| Provide annual training for Subcontractors and their served beneficiary farmers using the IPM and pesticide safety training topic list in Annex 8 (Factors A, B, C, D, E, F, G, K) | | | | |
| Ensure that Subcontractor encourage farmers and farmer associations or cooperatives to each have 1 or 2 sets of PPE for the group to share; and encourage them to assign a responsible PPE caretaker for each group (PER Factors D, E, L) | | | | |
| Ensure that Subcontractors train farmers to use PPE and apply pesticides only when there is no wind or rain in the late afternoon or night when bees do not forage and it is cooler, or early morning if there is no dew present (PER Factors D, E, K, L) | | | | |
| Good Agriculture Practices and IPM | | | | |
| Have Subcontractors extension staff promote pest-specific crop-pest-IPM-pesticide information with farmers for field use, validation, modification or adaptation (PER Factor C, H, K, L) | | | | |

| Actions/Activities | Start | End | Who | Budget |
|---|---|---|---|---|
| Use IPM information to produce crop-specific production PMPs, and then field reference guides or posters for farmers to use to anticipate and manage pests, diseases and weeds (PER Factor C) | | | | |
| Have Subcontractor extension staff promote the use of artisanal natural chemicals listed in Annexes 1, 4 and 5, as available (PER Factors B, H, I) | | | | |
| Follow GlobalGAP standards and website http://www.epa.gov/oppfead1/labeling/lrm/chap-13.htm for empty container disposal and pesticide record-keeping (PER Factors D, J, K, L) | | | | |
| During Subcontractor training, promote use of electrostatic and sleeve-boom sprayers that can reduce spray drift (PER Factor D) | | | | |
| Natural Resources Protection | | | | |
| Use GAPs, erosion control and low aquatic toxicity pesticides near known protected areas and do not use pesticides within 30 meters of open water (PER Factor G, H) | | | | |
| Consider the use of botanical, microbial or biological controls near protected areas and species (PER Factor G) | | | | |
| Protect honeybees by spraying in late afternoon or night, and warn beekeepers of impending spray operations (PER Factor G) | | | | |
| On sandy soil with a high water table (less than 2 meters) do not use herbicides or other pesticides with water pollution potential (PER Factor G, H) | | | | |
| Near waterways, consider pesticides that both have low aquatic toxicity, no pollution potential and break down quickly; and do not apply when rain is imminent (PER Factor G, H) | | | | |
| Project Management Responsibilities | | | | |
| Define and assure safe pesticide use practices following GlobalGAP standards, and audit AgBiz/Subcontractor-assisted farmer's use of each best practice (PER Factors K, L) | | | | |
| Keep copies of the current list of pesticide AIs analyzed by this PERSUAP at all AgBiz and Subcontractor centers (Table 1, PER Factors A, D, J) | | | | |
| Collect and keep copies of MSDSs for each commercial pesticide that farmers are likely to use at each Subcontractor center (PER Factors A, B, E, | | | | |

| Actions/Activities | Start | End | Who | Budget |
|---|---|---|---|---|
| G) | | | | |
| Keep PERSUAP recommendation implementation records and report on them in Annual Reports, under a heading titled "Environmental Compliance and Best Practices" (PER Factor K, L) | | | | |
| Provide for SUAP implementation and use | | | | |

**Justification for 2011 Updated AgBiz PERSUAP**

**Protecting the Environment in the USA and Overseas: NEPA**

When large-scale environmental issues became apparent in the USA, the National Environmental Policy Act (NEPA) was created in 1970 to deal with them. It established a national policy to protect the environment, created a Council on Environmental Quality (CEQ), and required that environmental impact statements be prepared for major federal actions having a significant effect on the environment. The Clean Air Act was established later that year.

During the early 1970s, CEQ developed a comprehensive environmental program which included, among others, amendments to the Federal Water Pollution Control Act, the Toxic Substances Control Act, forerunners to the Resource Conservation and Recovery Act, and the Safe Drinking Water Act as well as amendments to the pesticides legislation. No such regulations existed to deal with US Government activities overseas.

**NEPA Extends to USG Activities Overseas**

Although the USA had NEPA to guide risk reduction for development activities at home, no such guidelines were envisioned for US Government's activities overseas. That was, until 1975, when five Pakistani Ministry of Health workers funded and supplied by a USAID anti-malaria pesticide spray campaign died, and another 2,800 were sub-lethally poisoned and hospitalized. Following a high-profile lawsuit by environmental groups, USAID chose to develop regulations to reduce and/or mitigate risks to human health and safety in its programs, and to protect the environment. The environmental regulations that were codified by USAID were adapted directly from NEPA to mitigate such risks, and were written under Title 22 of the Code of Federal Regulations (CFR) for Foreign Assistance, Part 216.

The Pakistani poisonings could have been avoided or greatly reduced with risk awareness, risk reduction training and the use of personal protective equipment (PPE).

Part 216 (also called Regulation 216) of 22 CFR finds that certain environmental compliance procedures and a process must be followed on overseas projects to:

- create modern state-of-the-art development,
- achieve optimal economic results with every dollar invested,
- avoid harming people in both our partner countries and the US,
- avert unintended negative economic growth,
- reinforce practical civil society and democracy through transparency and public participation,
- reduce diplomatic incidents,
- engender public trust and confidence in USAID,
- comply with the law, and
- represents good business

Now, following Regulation 216, all USAID activities are subject to analysis and evaluation via—at minimum—an Initial Environmental Examination (IEE), and—at maximum—an Environmental Assessment (EA). Pesticides are considered special due to the risks inherent with their use, and thus require special attention.

Because of the extra risks presented by pesticides, a large part of Regulation 216—part 216.3—is devoted to pesticide use and safety. Part 216.3 requires that 12 pesticide factors be analyzed and

recommendations be written to mitigate risks, with training and monitoring. Further, in the early 1990s, USAID adopted the philosophy and practice of Integrated Pest Management (IPM) as official policy. IPM is strongly promoted and required in Regulation 216.3. And, since the early 2000s, IPM is now being included as an integral part of Good Agriculture Practices (GAPs) increasingly being adopted as the best management practices in agriculture.

**Government-Regulated Reduction of Risk from Pesticide Use**

In the USA, the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) was enacted in 1947—during the rush to develop synthetic pesticides—giving the United States Department of Agriculture (USDA) responsibility for regulating the production and sales of pesticides. Then, in 1972, FIFRA underwent a major revision and the responsibility for pesticide regulation was transferred to the Environmental Protection Agency (EPA), where emphasis was shifted from strict regulation of production and sales to protecting environment and public health by examining acute and chronic health risks, ground water contamination and environmental impact. Over time, most other countries—Macedonia included—have developed similar regulations for safe use. Regulation 216 refers to pesticide analyses and decisions made by the EPA, which for years were state-of-the-art.

**Market-Driven Reduction of Risk from Pesticide Use = Good Business**

Since protecting the environmental became regulated, businesses have begun to discover that it also represents business opportunities. Market demand and food safety (protection of market) are the present drivers for standards and certification systems like Organic, GlobalGAP, and HACCP. These systems deal heavily with pesticide safety. Imagine the risk to the Macedonian export market of a shipment of tomatoes that result in illness like that being experienced in USA tomato market presently.

**Justification for Additional Environmental Analysis of AgBiz Grantee Activities**

Environmental Due Diligence (EDD) activities performed to comply with USAID regulations, and at the request of the Mission Environmental Officer (MEO) at USAID Skopje and the Europe and Eurasia (E&E) Bureau Environmental Officer (BEO) in Washington, found that agricultural production activities involving pesticides and linked to local AgBiz grantees should receive additional analysis, because of the risks they present. Generally such an analysis is performed for pesticide training and residue issues as well as actual farmer purchase and use.

**The PERSUAP**

In the late 1990s, USAID Bureau for Africa developed a tool to analyze the pesticide system from import, through use, to disposal in any given country or territory. This 'systems approach' creates a pesticide risk profile and determines relative risk factors based upon this profile. The tool is called a "Pesticide Evaluation Report and Safer Use Action Plan" (PERSUAP), which examines a pesticide system in a country and is submitted as an amendment to the project IEE (usually the umbrella IEE that is put into place when a project commences) or an Environmental Assessment.

The PERSUAP focuses on the particular circumstances of the AgBiz program being studied, the pesticide system within which the AgBiz program operates, the risk management choices available, and how a risk management plan would be implemented by AgBiz in the field. Further details about what to include in a PERSUAP are given below.

**Pesticide Risk Management**

In the USA, when the Environmental Protection Agency (EPA) registers pesticide products for use, it specifies the manner in which the product can be "safely" used (that is, with an acceptably small risk), including safety equipment needed when applying the pesticide, how to apply it, the allowed uses, storage, transport, and disposal. The context in which EPA makes these registration decisions is important to note. An extensive system of capabilities and resources exist in the USA that help give EPA confidence these specifications will be followed and the product will be used appropriately—and safely. These include a 97% literacy rate—meaning most of the population can read labels; close control by EPA over the content of the pesticide label; training requirements and programs for those pesticide products that require applicator certification—like for Restricted Use Pesticides (RUPs) and Fumigants some of which are EPA acute toxicity class I or II pesticides; worker protection requirements; occupational safety regulations; and relatively effective federal, state and local enforcement mechanisms.

In other countries like Macedonia, a local-level analysis and evaluation such as a PERSUAP is needed for pesticide use because farmers and other field workers in these countries are unlikely to have a high rate training (or literacy) in order to adequately understand risks of using pesticides, and implement means to reduce these risks. They may not be able to read or understand pesticide labels. And, like in 1976, dangerous formulations of pesticides, those containing very toxic byproducts, or adultered products with unknown or low quality components may enter the country and be used by unsuspecting project staff or grant recipients.

In allowing the use of certain pesticides in its overseas programs, USAID cannot rely on the same societal capabilities and resources that the USEPA does to assure appropriate use of the pesticide products. The preparation of a PERSUAP gives an AgBiz program manager the opportunity to consider practical actions by which to *reduce the risks* of using pesticide products in a program in Macedonia, taking into consideration the context in which the products will be used, the particular elements of the program, and the different capacities of the partners and stakeholders involved. Further, the application of PERSUAP recommendations helps prepare subcontractors and beneficiaries to be able to more rapidly adopt GlobalGAP and Organic principles.

**Components of a PERSUAP**

A PERSUAP basically consists of two parts, a "PER" and a "SUAP." The Pesticide Evaluation Report (PER) section uses the information collected on the pesticide system in Macedonia to inform stakeholders and partners of the levels and types of risk likely to be found, and sets the stage for the specific pesticide analysis. It then analyzes integrated pest and pesticide management options in Macedonia by vetting

these through Regulation 216's special section (216.3) on Pesticide Procedures with 12 informational elements.

The Safer Use Action Plan (SUAP) puts the conclusions reached in the PER into recommendations for plans of action, including assignment of responsibility to appropriate parties connected with the pesticide program. This PERSUAP supporting an IEE for agriculture production activities for local consumption and regional export markets is being submitted, specifically to address uses of pesticides, as listed below.

The Scope of Work for this 2011 Updated PERSUAP is found in Attachment 1.

**Republic of Macedonia Country and Agriculture Background**

The Republic of Macedonia sits in Southeastern Europe in the middle of the Baltic Peninsula, with Greece and Albania to the south and west, and Kosovo, Serbia and Bulgaria to the north. With a total population of slightly more than 2 million people, Macedonia, in 2007, had an impressive growth of 5.1%. Since then, it, along with the rest of emerging market countries in Eastern Europe as well as Western Europe and the rest of the world, suffered one of the greatest economic downturns in history.

The Republic of Macedonia's terrain is characterized by mountainous territory covered with deep basins and valleys; three large lakes, each divided by a frontier line; country bisected by the Vardar River. Republic of Macedonia's climate is characterized by warm, dry summers and autumns; relatively cold winters with heavy snowfall.

Natural resources include low-grade iron ore, copper, lead, zinc, chromite, manganese, nickel, tungsten, gold, silver, asbestos, gypsum, timber, and arable land. Serbia and Montenegro are primary export partners, followed by Germany, Greece, Italy, Bulgaria and Croatia. Import partners are primarily Russia, Germany and Greece.

According to the Country Profile of Macedonia given by the European Commission3, "About 49% of the total area of the former Yugoslav Republic of Macedonia, or 1.16 million hectares, is agricultural land, split almost evenly between cultivable land and pastures. Further 37% of the land is forest, while the rest includes lakes and urban areas. The majority of the cultivable land is arable land, vineyards and orchards represent 7% (40.000 ha) and meadows 60.000 ha.

The country is largely hilly and mountainous; the combination of Continental and Sub-Mediterranean climate, characterized by long, warm summers and short, not too severe winters, provides fertile soil and generally excellent conditions for production of a range of food products. The structure of the agricultural sector is characterized by small sized family farms - around 80% of agriculture holdings are estimated to be 2.5 – 2.8 ha on average; they are owned or leased, and are highly fragmented into small parcels. The state firms, generally much larger, are mostly not operating or in difficulties often due to not finalized state of privatization. The majority of pastures is still owned by the state and managed by the Public Enterprise of Pastures.

Almost the totality of the Gross Agricultural Output (80%) is generated by crop production, where vegetables are the main contributors. Tomatoes, peppers, melons and watermelons dominate the vegetable production and make the Former Yugoslav Republic of Macedonia a net exporter of processed vegetables. Other important agricultural products are fruit, cereals, tobacco and grapes, for wine production as well as for direct consumption. Livestock output has a lesser importance; dairy farming with cow milk production dominates the sub sector.

The agriculture sector plays an important role in the country's economy, its contribution to GDP accounts for 12% and is relatively stable; together with food processing the percentage increases to 16%. As in many Western Balkan countries, almost half the population lives in rural areas. Officially, one fifth of the working force is employed in agriculture, but the real figure is probably double. Agriculture has always served as a shock absorber for the socio economic and structural changes in industry and other sectors of the economy.

The agri-food processing industry has always played an important role in the Former Yugoslav Republic of Macedonia. Over the last 10 years of privatization, the industry suffered from political changes and

[3] http://ec.europa.eu/agriculture/enlargement/countries/fyrom/profile_en.pdf

difficulties in adaptation to market economy. The recovery and market-oriented focus is gaining ground. Rural development policy remains in the interest of the Former Yugoslav Republic of Macedonia, which as a candidate country can benefit for the IPARD financial assistance. The national IPARD program was approved by Commission in end 2007. Its general objective is "to improve competitiveness of agricultural holdings and the food industry and bringing them into compliance with Community standards."

An Interim Agreement governing the trade aspects of the SAA is in force since 2001. This agreement gives free access to EU markets for almost all the country's agricultural products. Exceptions remained for sensitive products such as wine, baby beef, sugar, fisheries and fish products, for which tariff quotas have been agreed. Regarding the market access for EU products, the SAA allows for the complete elimination of tariffs for the non-sensitive products and the gradual liberalization till 2011 for the mid-sensitive products. For the most sensitive products custom protection will remain. The Former Yugoslav Republic of Macedonia joined the Central European Free Trade Agreement in 2006 and become a member of the World Trade Organization (WTO) in April 2003."

**Introduction to AgBiz**

The development challenges for the AgBiz Project in Macedonia in 2008 are described below, in ARD's own words, borrowed from their corporate website, as follows. Following this is a new, updated description of AgBiz as it stands in 2011.

In the past decade Macedonia has implemented numerous structural reforms, such as privatization and trade liberalization. With the signing of the European Union (EU) Stabilization and Association Agreement several years ago, Macedonia is now investing much effort to harmonize its legislation and agricultural practices with those of the EU. Despite these efforts, Macedonia must still address weaknesses before it can achieve a competitive, thriving agricultural and agribusiness sector. Such weaknesses include low productivity, a sizable trade imbalance for agriculture products, and a lack of supportive agricultural policies. These weaknesses require a series of parallel reforms that will work toward an overall improvement in the agricultural and agribusiness sector."

The goal of the Macedonia Agribusiness Activity (AgBiz), awarded to ARD under the RAISE-PLUS IQC, was to increase economic growth in Macedonia through expanded, *environmentally sustainable production* and sales of value-added agricultural products by enabling producers and processors to compete regionally and globally. This produced greater incomes for these processors and producers, and ultimately higher revenues for government. By developing effective support systems for producers and by strengthening the linkages among producers, processors, and their markets, the project has better enabled agribusiness to locate and meet market demand. Better market linkages reduced transaction costs and increase producers' and processors' capacity to understand and meet the demands of their customers.

The potential accession of Macedonia to the EU in 2011 created the need to help Macedonian agribusinesses become more competitive to both successfully compete in regional and local markets in an era of more open borders, and to capitalize on enhanced access to EU markets brought about by membership in the EU. AgBiz's work will therefore also focus on EU accession related competitiveness enhancement. Since AgBiz is USAID's last agriculture-related project in Macedonia, AgBiz will place emphasis on creating legacy institutions that can carry on agribusiness growth stimulation activities post-AgBiz.

**2008 Approach**

This program focused on the development of market linkages among producers, traders, and processors.

This will require the development or enhancement of small- and medium-sized enterprises (SMEs), including cooperatives, to serve as aggregators, and producer counterparts to traders and processors.

By supporting growth in the Macedonian economy, MAA:

- Better enabled agribusinesses to understand, identify, and enter new export food markets;
- Increased producers' and processors' capacity to understand and meet market demand for value-added food products;
- Enhanced market linkages between producers, processors, and traders;
- Improved business management and operations throughout agribusiness integrated supply chains and value chains; and
- Produced greater incomes for agricultural producers and processors, and create new employment opportunities.

By developing effective support systems for producers and by strengthening the linkages among producers, processors, and their markets the project better enabled agribusiness to locate and meet market demand. Better market linkages reduced transaction costs and increase producers' and processors' capacity to understand and meet the demands of their customers.

**2011 Approach**

In June, 2011 AgBiz was extended for two years and the overall objective of the two-year cost extension is to increase incomes for all participants in selected Macedonian agricultural value chains by increasing sales (domestic and exports), improving productivity, enhancing the agricultural business environment, and increasing access to finance. AgBiz will build off of the existing capacity and expertise of Macedonian professionals and lead firms and farms to create a new understanding in the market for imbedded business development services and fee-based service delivery. The provision of the services will be delivered sustainably by local partners well beyond the anticipated graduation of the USAID Macedonia program. AgBiz Extension will focus on two value chains—fresh fruits and vegetables (FF&V) and processed vegetables (PV); emphasis will be on the lower levels of the value chains, with a view to increasing product quality and quantity to meet demand, and to raising the critical mass of stakeholders in the targeted value chains and increasing the use of service providers and the development of sustainable packages of services.

Implementation will contribute to the achievement of USAID/Macedonia's Economic Growth Assistance Objective Three: *Increasing Job Creating Private Sector Growth in Targeted Sectors* and the Intermediate Results 3.1: *Improved Business Environment in Critical Areas* and 3.2: *Key Private Sector Capacities Strengthened*.

Thus, the AgBiz Extension has three primary modifications from the original AgBiz Project:

- Focus only on the fresh fruits and vegetables, and processed vegetables value chains;
- Place more emphasis on lower (production) levels within the value chains to increase the quality and quantity of production to satisfy current and anticipated demand; including increasing the number of participants in targeted value chains; and
- Increase the use of local agricultural development service providers to manage entire AgBiz components

**AgBiz Extension Components**

**Direct Value Chain Development Work**

Five of the AgBiz components will be implemented through subcontracts with business service providers called Lead Facilitators. These are:

### Increased productivity, competitiveness, and sales for fresh fruit and vegetables

The main objective under FF&V VC component is to work with FF&V value chain stakeholders to increase incomes for all participants in the supported VC from top to bottom using a broad-based approach that includes farmers, aggregators, input suppliers, cooling and packing facility owners and traders, processors, and exporters. This will be realized primarily by improving productivity and competitiveness at all levels of the value chain, strengthening market presence and by enhancing the business environment and improving access to finance. These enhancements achieved via sustainable linkages between Lead Actors and producers in the targeted VC will in turn increase domestic and/or international sales and increase purchases from smallholder producers, therefore increasing participants' incomes.

In order to achieve improved productivity and competitiveness and better domestic and export sales for the FF VCs, LF will use an approach of directly involving the producers in the process of improvement of their end product, resulting in better quality and potentially quantity to be able to be sold on the market in accordance with specific market demands per product through immediate intervention to the supporting actors. Creating vertical Supply Chain Integration in the VCs' is an essential aspect to be utilized in the implementation of the activities for achieving the overall objective.

EPICENTAR is responsible for implementation of this component under supervision of AgBiz team.

### Increased productivity, competitiveness, and sales for processed vegetables

The main objective under PV VC component is to work with PV value chain stakeholders to increase incomes for all participants in the supported VC from top to bottom using a broad-based approach that includes farmers, aggregators, input suppliers, cooling and packing facility owners and traders, processors, and exporters. This will be realized primarily by improving productivity and competitiveness at all levels of the value chain, strengthening market presence and by enhancing the business environment and improving access to finance. These enhancements achieved via sustainable linkages between Lead Actors and producers in the targeted VC will in turn increase domestic and/or international sales and increase purchases from smallholder producers, therefore increasing participants' incomes.
The proposed activity package will generate a number of outcomes that are critical for achieving AgBiz program objectives, as well as the specific program firm-level performance indicators, such as increased sales from the supported PV VC, especially exports, increased purchase from the producers, increased number of new exporters, and new varieties of products produced and marketed. By facilitating the adoption of an Integrated Supply Chain Concept, activities aim to address production quality, productivity and efficiency of the processors and primary vegetable producers; upgrade value chain services, improve management and production practices, strengthen horizontal and vertical linkages and increase competitiveness of the supported PV VC. The planned activities will also support further association strengthening and directly contribute to enhanced market presence of PV products.

MCG is responsible for implementation of this component under supervision of AgBiz team.

### Enhanced access to finance

The overall objective of this AgBiz component is increased Access to Finance within the Agricultural sector, more specifically serving the needs of FF&V and PV value chain participants to access adequate and favorable financing.
The NGO Innovation Center was selected to implement this component that will address issues of accessing finance by firms and farmers in the PV and FF&V Value Chains. This will be done through utilization of the Macedonia Competitiveness Project (MCP) pool of Financial Consultants, educational events and dissemination of AtF information tools.

Innovation Center is responsible for this component under supervision of the AgBiz team.

### Organizational capacity building for advocacy

The overall objective of this AgBiz component is to strengthen Public Private Dialogue and enhance the advocacy capacity of the AgBiz supported VCs. The Lead Facilitator will work with PV and FF&V value chain stakeholders, government bodies and other relevant entities to increase the organizational and advocacy capacity of private sector associations, and develop an effective methodology for efficient and effective public private dialogue, thus creating successful policy and institutional reform initiatives and measures that will reduce constraints to increased VC productivity and competitiveness.

CeProSARD is responsible for implementation of this component under supervision of AgBiz team.

### Development of value chain export strategies and plans

The overall objective is to establish a process and develop Export Marketing Plans for both VCs that will enable a more coordinated approach to export promotion and will enhance the capacity of Invest Macedonia to facilitate and gradually take over the managing of Export promotion. This should be done by involving the PV and FF&V value chain stakeholders, Invest Macedonia, government bodies and other relevant entities. The component will be managed by the AgBiz DCoP for Public Sector Liaison & Access to Finance.

However, the work under this component is postponed until the GoM comes to some conclusions regarding reconstruction of Invest Macedonia and creates the necessary circumstances for cooperation with AgBiz.

### Indirect Value Chain Development Work

The remaining three components will be managed by AgBiz staff with implementation of specific activities subcontracted out to local business service providers. These are:

#### Support for the Agency for Foreign Investment and Export Promotion (Invest Macedonia)

The planned support to Invest Macedonia for capacity building of its employees regarding export promotion depends on the recent developments of restructuring the agency and potential selection of agriculture as their priority. When this is clarified, AgBiz will include IM in its VC activities regarding Export Promotion and, in coordination with Investment Development and Export Advancement Support (IDEAS), Agbiz will develop suitable capacity building activities for the IM staff.

#### Policy and institutional reform needs identification, prioritization, and development

Both VC Lead Facilitators will have daily communication and close relations with the VC participants from all levels. They are expected to identify Policy and Institutional Reform Needs that obstruct the competitive development of the Value Chains. The identified PIRNs will be carefully reviewed and prioritized by AgBiz. The selected issues that are characterized as an obstacle for the current business operations will be addressed by engaging BSPs to analyze it, include all stakeholders and recommend solutions for improvement to the relevant institutions or policy makers. Other entities for identification of PIRNs are the non-VC LFs and AgBiz staff.

#### Support for Ministry of Agriculture, Forestry and Water Economy strategic planning and policy making

The support to the Ministry of Agriculture, Forestry and Water Economy will be executed by direct assistance to the Minister's cabinet for updating and/or developing long term documents such as strategies, plans and assessments that are linked to enabling better business environment for the AgBiz supported VCs. The MAFWE proposed a set of activities that were discussed and coordinated with their departments and relevant experts. During AWPW the proposed activities were accepted.

**Macedonia AgBiz Target Value Chain Crops and Major Macedonia pests for each crop**

The following list of crops and pests was formed by researching the 2005 "Legislative regulation registers of licensed legal entities and approved plant protection products in the Republic of Macedonia" for common pests of each crop as wella as new crop production recommendations made by AgBiz for target crops.

**Crops: Value-added agricultural products exist in value chains:**

- fresh fruits and vegetables (FF&V)
- processed vegetables (PV)

| Crops | Pests |
|---|---|
| Apples | *Venturia inequalis*<br>*Podosphera leucotricha*<br>*Phytophtora spp.*<br>*Erwinia amylovora*<br>*Quadriaspidiotus perniciosus*<br>*Eriosoma lanigerum*<br>*Dysaphis plantaginea*<br>*Cydia pomonella*<br>*Lithocoletis spp.*<br>*Panonicus ulmi*<br>*Tetranychus urticae*<br>weeds |
| Cabbage<br>Cauliflower | *Aleurodes brassicae*<br>*Alternaria solani*<br>*Brevicoryne brassicae*<br>*Broard leaved weeds*<br>*classical weeds*<br>*Delia radicum*<br>*Elateridae*<br>*Eshinochola spp.)*<br>*GrylIotalpa gryllotalpa*<br>*Melolothidae*<br>*Memestra brassicae*<br>*Noctuidae*<br>*Peronospora brassicae*<br>*Peronospora parasitica*<br>*Pieris brassicae*<br>*Pieris spp.*<br>*Plutelia maculipennis*<br>*Plutella xulostella* |
| Cucurbits (cucumber, zucchini, watermelon) | *Aphididae*<br>*Erysiphe cichorachearrum*<br>*Erysiphe spp.*<br>*Pseidoperonospora cubensis*<br>*Psylla pyri* |

| | |
|---|---|
| | *Sphaerotheca fuliginea*<br>*Tetranychus urticae,*<br>*Trialeurodes vaporariorum,*<br>*Venturia inaegualis*<br>*Venturia pirina* |
| Figs | *Ceroplastes rusci* |
| Garlic, onions, leeks | *Alternaria solani*<br>*Alternaria spp.*<br>*Anarsia spp.*<br>Annual weeds<br>*Botrytis cinerea*<br>Broad-leaved weeds<br>*Ceratitis capitata*<br>*Cydia molesta*<br>*Elateridae*<br>*GrylIotalpa gryllotalpa*<br>*Hylemia spp.*<br>*Melolothidae,*<br>*Monilija laxa*<br>*Noctuidae*<br>*Peronospora destructor*<br>*Peronospora schleideni*<br>*Perpnospora tabacina*<br>*Phytophthora infestans*<br>*Plasmospora vitikola,*<br>*Pseudoperonospora humuli*<br>*Sclerotinia sclerotiorum*<br>*Stigmina carporphylla*<br>*Venturia spp.* |
| Peppers | annual weeds<br>*Aphis fabae,*<br>*botrytis cinera,*<br>*Brevicoryne brassicae,*<br>broad-leaved weeds,<br>*Cercospora capsici,*<br>*Colletotrichium loeosporides,*<br>*Elateridae,*<br>*Erwinia carotovora,*<br>*Fusarium oxysporum,*<br>*Gryllotalpa gryllotalpa,*<br>*Leptinotarsa decemlineata,*<br>*Levaillila taurica,*<br>*Mamestra spp.,*<br>*Meligethes aeneus,*<br>*Phytophthora capsici,*<br>*Pieris spp.,*<br>*Rhizoctonia solani,*<br>*Trips spp.,*<br>*Verticilium albo-atrum,*<br>*Xanthomonas campestris,* |

| | |
|---|---|
| Grapes | *Botritis cinerea,*<br>*Coniella diplodiella*<br>*Condida*<br>*Pithium*<br>*Klocera*<br>*Acetobacterium tumefasciens biovar*<br>*Gloeosporium ampelophagum*<br>*Chlamidospora*<br>*Stereum hirsitum*<br>*Phelenus ignarius*<br>*Eutypa armeniaca*<br>*Byctiscus betulae*<br>*Otiorrynhus sulcatus*<br>*Boarmia rhomboidaria*<br>*Noctua pronuba*<br>*Carpocapsa pomonella*<br>*Clysia ambignuella*<br>*Colomerus vitis,*<br>*Empoasca vitis*<br>*Erioplins vitis,*<br>*Erwinia amylovora,*<br>*Eupoecillia ambiguella,*<br>*Guignardia Bidwellii,*<br>*Heliothis spp.,*<br>*Hoplacampa spp.*<br>*Hoplacampa spp.,*<br>*Lobesia botrana,*<br>*Nyponomeuta spp.*<br>*Phomopsis viticola,*<br>*Pseudopezicula tracheiphila,*<br>*Aphidae*<br>*Plazmospora viticola,*<br>*Polychros botrana,*<br>*Psylla spp.,*<br>*Scaphoideus titanus*<br>suckers (unwanted growth on the vines)<br>*Trips spp.,*<br>*Flavescens doree*<br>*Halticinae,*<br>*Uncinula nekator (Erysiphe necator),*<br>weeds |
| Tomatos | *Trialeuroides vaporiarum,*<br>*Phytophtora infestans* |

**Macedonia Pesticide Active Ingredients**

Table 1, attached at the end of this report, cross-references the 2010 Macedonia and October 2011 EU lists of registered pesticides and analyzes them for registration by EPA and acceptance by USAID.

**Macedonia Pesticide System Risk Profile Indicators**

Generally there are groups of factors which increase the risk profile of a pesticide system in a country and those that reduce the risk profile. To some degree, both groups of factors are present in the Macedonian pesticide system, with a significant number of the latter. Since a relatively low level of risk in the small- to medium-holder sector was encountered on this intensive trip, the factors that reduce the risk profile are discussed first, immediately below, followed by those that increase risk.

**Factors found that reduce risks from pesticides**

Reduced risk inherent in the cropping and input systems found in Macedonia

- The relatively small and scattered land holdings with intercropping, rotation and mixtures of different types of crops in field matrices increase biodiversity which, in general, leads to lower risk from production constraints (pests and diseases), and thus lower needs for use of pesticides. These intercropping and crop rotation practices are basic good agriculture practice (GAP) and integrated pest management (IPM) tactics.

- With few exceptions, low levels of pests and diseases inherent in these diverse and rotated field systems may not as likely reach economically damaging levels (that require pesticides to control or manage them) as large acreages of monocultures grown in highly developed countries.

- The relatively high cost of purchasing inputs in any significant quantity, which makes them unaffordable for most small-holder farmers (since most inputs are petroleum-based, costs will likely increase further in the near future) to buy, store and apply.

- The relatively (compared with more developed counties) low quantities of inputs used by small-holder farmers, and in general used when absolutely required when a pest or disease outbreak is imminent or present. Use of pesticides on an as-needed basis is an IPM principle.

- The fact that most small-holder farmers do not currently spray pesticides on a calendar basis for 'prevention', except to some limited extent with fungicides. Not spraying pesticides on a calendar basis, unless absolutely needed, is an essential building block of an IPM system.

- The increasing availability and use of small, single-use sachets and bottles of pesticides (as opposed to one and five liter bottles) with labels containing important and potentially life-saving information (in Macedonian) that are marketed by the formal pesticide importer/distributor sector. This helps resolve the on-farm pesticide quantity storage issues.

- The fact that no illegal or internationally banned products or active ingredients from the chlorinated hydrocarbon group were found in any of the farm input stores or distributors visited.

- The fact that the labeling and packaging integrity of all pesticide containers from importers/distributors was sufficiently sound.

- The fact that all new pesticide bottles are required to have fiscal stamp labels that seal their caps reduces the negative impact of illegal and substandard products

- The fact that store audits are performed routinely by government inspectors, indicating a level of pesticide registration enforcement present.

- The fact that MSDSs are accompanying high-quality products from American and European pesticide companies at the retail level.

- The fact that very few products were seen from questionable and sub-standard companies in Asia.

- The fact that the registration system is being harmonized with EU regulations, which are some of the more stringent in the world.

- The fact that Macedonia will, in many cases, have to follow European standards systems in order to reach European markets.

- Only one expired product was encountered in one (of the many) farm shops visited.

- The fact that most of the pesticide shop-keepers understood many crop production constraints, pesticides/dosages to use against the constraints, risks that come with pesticide use, and the need for PPE (though this needs to increase).

- Farmers generally understood that pesticides present a health risk through storage, mixing, use, cleanup and disposal, even if they do not use PPE.

- There was no evidence from farmers of pesticides losing their efficacy, due to product adulteration, low quality generic ingredients, or development of resistance (this may in fact be due to the low use rates of pesticides to date and the fact that pesticide rotation is roundly recommended).

- There was little to no field evidence of human, domestic animal or environmental poisoning (like fish kills) collected from interviews with pesticide sector actors.

- Standards and certification systems like GlobalGAP, British Retail Consortium—BRC, Organic, and International Organization for Standardization—ISO for agricultural production, processing and export are present and provide a small but growing structure of sector best practices.

- The fact that pesticides are, in general, not being subdivided at the farm store from bulk containers to small plastic bags or bottles without labels.

- The fact that most pesticide containers contained labels written in Macedonian.

- Some commercial farms are in the process of developing, in Macedonian, best practices fact sheets on GAPs, constraints, and constraint management for each crop (though this needs to increase).

- Analytic chemistry ability to test for pesticide residue levels in food. In 2001, Kendrovski et al[4] reported on the contamination of agricultural products and food in Macedonia, including biological and chemical contamination. Accordingly, only organochlorine and organophosphate pesticides are monitored for regularly, while carbamates and herbicides have been tested for in

[4] Kendrovski V, Stikova E, and Kolevska L. *Contamination Of Food In Macedonia,* Arh Hig Rada Toksikol 2001:52:69–73

some rice crops. Of about 10,000 food samples taken per year, about one-tenth of one percent was found to contain insecticide residues above the Maximum Permitted Concentration.

Some samples contained isomers of restricted or banned organochlorine insecticides lindane and hexachlorocyclohexanes, which is expected for highly persistent organochlorines. The report concludes that the large number of value chain elements makes it difficult for proper enforcement of uniform or sufficient residue testing. Nevertheless and significantly, of the samples taken, the amount of pesticide contamination detected has decreased since the mid-1990s.

Next, several factors that increase the risk profile from pesticides were discovered, as follows:

**Factors that increase risks from pesticides**

Increased risk inherent in the cropping and input systems found in Macedonia

- Lack of knowledge by small-holder farmers of all of the human health risks of pesticides and lack of understanding of risks specific to different types or classes of pesticides. This could be especially serious with very acutely toxic or high risk pesticides (see Table 1) like insecticides azinphos-methyl, dichlorvos (DDVP), endosulfan, methomyl, monocrotophos, oxamyl, oxydemeton-methyl, parathion and terbufos; miticide fenazaquin; fumigants aluminum phosphide (used as fungicide) and zinc phosphide (used as rodenticide); fungicide captan; and herbicide paraquat. None of these products should be purchased or used by program Subcontractor and beneficiary farmers.

- Lack of knowledge by small-holder farmers of all of the environmental risks—especially aquatic toxicity—of pesticides and lack of understanding of risks specific to different types or classes of pesticides, like synthetic pyrethroids all of which are restricted use pesticides in the USA.

- Lack of sufficient proper pest and beneficial insect identification ability among farmers.

- Lack of availability (and perhaps affordability) of PPE for individual farmer use when mixing and applying pesticides.

- Use of broad-spectrum pesticide products that can damage beneficial insects or soil microbes.

- No pesticide shops visited had an appropriate fire extinguisher and emergency phone numbers listed. These are recommended standard operating procedures for pesticide shops.

- Pesticide Manufacture/Formulation. The organic chemical-producing factory/plant OHIS Skopje located near the village of Lisice posed are particularly significant risk to food production in its vicinity.

**Conclusion:** Some of these issues with pesticides in Macedonia can increase the risk for errors to occur, and thus the risks that farm family members may be acutely or slowly poisoned and/or their environment may become polluted and damaged. Thus the pesticide risk profile for Macedonia is somewhat higher than might be encountered in some more developed countries, though it is rapidly changing for the better as EU rules are adopted. Extra care will be needed with emphasizing and implementing mitigation measures that work.

**Impacts of International Trade & Markets, Certification Schemes, Codes of Conduct, SPS Barriers, WTO membership**

Market-drive trade is considered in this section because worldwide it is having a growing influence on the adoption of best practices in agriculture production, including protection of environmental resources and human health.

**International trade in the general agricultural/horticultural products by the country with specific emphasis on project-targeted commodities**

Agricultural products from Macedonia are being used and exported for both local and international markets and provide a valuable share of the value added to the economy.
According to the Macedonian State Statistical Office[5] the gross value added of agriculture, including forestry and hunting, accounted for 11.0% of total GDP in 2006. Around 20% of employment is related to the agricultural sector[6] and half of the country's area is agricultural land (1.26 million ha), out of which 560 000 ha is cultivated land[7].

In a report of the Commission of the European Union3 it was stated that "Subsistence and semi-subsistence farming is a significant feature of the country's agriculture which is dominated by small and highly fragmented family farms. The average size of agricultural land per household is 1.4 ha and it is made up of small parcels of land of 0.3-0.5 ha and used mainly for self-sufficiency and only small surpluses are marketed locally. Individual farmers own or lease 80% of cultivable land and the rest is owned by the state and leased by agricultural enterprises and farmers. In terms of quantities produced, private holdings are more important than agricultural enterprises.

The performance of agricultural sector is constrained by several factors and the development of the sector has not been among the key priorities addressed since the country became independent. Considering the importance of the sector in terms of GDP and employment, the Government expenditure in the sector is rather low. Before the membership of the WTO the country's policy in the agricultural and food sectors was based on high import protection and restrictive trade barriers. State interventions were criticized for lack of coherence causing income insecurity for farmers. After joining the WTO the country has introduced a new methodology for delivering budgetary support based on payments per ha and/or per animal head. The biggest recipient sectors are barley, lamb, cattle breeding, maize and establishment of new vineyards and orchards.

However, a more strategic approach is needed in order to tackle the most pertinent problems. Primary production is hindered by such constraints as inefficient use of land due to land fragmentation and a large share of abandoned arable land, lack of irrigation and dependency on weather conditions due to low technology production systems and lack of quality inputs such as fertilizers. Agricultural enterprises face various constraints such as lack of collection, distribution and management systems for fresh products. The quality of the products suffers from a lack of infrastructure for processing, labeling, packing and marketing. The country is a WTO and a CEFTA member and has signed ten FTAs, including one with EFTA. It is also a member of CEFTA and has concluded an SAA with the EU. According to the SAA the country has unlimited duty-free access to the European Community for its exports of all basic agricultural products with some exceptions (beef, wine and sugar under tariff-rate quota). However, the country has only one dairy and eight slaughterhouses that are granted a license to export to the EU and therefore the

[5] http://www.stat.gov.mk/pdf/2007/3.1.7.07.pdf
[6] http://www.stat.gov.mk/pdf/2008/2.1.8.19.pdf
[7] http://ec.europa.eu/enlargement/pdf/mipd_fyrom_2007_2009_en.pdf

capacity to benefit from the free trade agreements is low. Instead of benefiting from the agreements the country is facing pressure, for example, as regards large imported quantities of cereals.

Apart from the problems in the agricultural sector, development in rural areas is constrained by lack of basic infrastructures and services. Rural areas suffer from poverty, high unemployment and lack of alternative living sources to agriculture. Agricultural sector is also challenged by such environmental issues as agricultural land management and land preservation, treatment of agricultural and animal waste, water management, lack of proper irrigation systems and lack of training for farmers on environmental issues."

**Regional or international trade in the project commodities**

- fresh fruits and vegetables (FF&V)
- processed vegetables (PV)

The EU is the most important trading partner for Macedonia. The main other trading partners are Serbia and Montenegro, Croatia, Bosnia and Herzegovina, and Turkey. As a consequence of the various constraints facing the agricultural sector the Republic of Macedonia is a net importer of agricultural and food products. However, the situation has improved and the country is moving towards a positive balance with the EU with regard to basic agricultural products. In 2005 the EU exported to the Republic of Macedonia around 130 million € of basic agricultural products, where the country exported to the EU around 114 million €.

Despite constraints, the agricultural sector has many advantages due to the climatic and geographical conditions that are favorable especially for horticultural crop. The soil is fertile, the country is having a range of micro-climates and natural upland pastures. The country's competitive advantages in agriculture lie in labor-intensive sectors and the most performing sectors are tobacco, lamb, beverages (wine, mineral water and spirits), vegetables and fruits. These products are also the country's main agricultural exports.

**Codes of conduct, treaties and international conventions that apply to target commodities, crop protection products and systems with rates of implementation success where they do apply**

According to the Food and Agriculture Organization, over the past twenty years, there has been growing public awareness of environmental and social issues in agricultural production and trade. Several food safety crises and animal disease epidemics have intensified concerns over intensive agricultural practices. Consumers have now become more knowledgeable about labor conditions and about the problems faced by small farmers due to low commodity prices.

There are an increasing number of industry-wide and company codes of conduct, some of which reach far down the commodity chain to producers. In addition, consumers' concerns have given rise to any number of certification and/or labeling initiatives, some led by NGOs and others led by the business sector. Social and environmental certification and labeling are market-oriented mechanisms; they use market incentives to encourage management improvements above the minimum level required by law, to implement laws that are otherwise difficult to enforce, or to suggest a framework where formal laws may not exist. They very often refer to international treaties and conventions, sometimes translating them into verifiable standards for direct implementation by producers and/or traders. With this approach, voluntary certification programs are complementary to (inter) governmental regulatory frameworks and to labor unions, but do not—and can not—replace these.

**Three relevant conventions and codes of conduct on pesticides and pesticide use include:**

- The Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade. Under the PIC procedure, the secretariat provides all participating countries with detailed information on the risks the chemicals pose, allowing them to decide whether to accept future imports. If any country does choose to ban or restrict substances on the PIC list, which contains presently 31 chemicals, exporting countries are advised and must immediately inform their exporters, industry and customs departments. Macedonia is a party to the Rotterdam Convention.
- International Code of Conduct on the Distribution and Use of Pesticides, of which the Revised Version was adopted by the United Nations FAO Council in November 2002. The objectives of the Code are to set forth responsibilities and establish voluntary standards of conduct for all public and private entities engaged in or affecting the distribution and use of pesticides, particularly in countries where there is no or there is an inadequate national law to regulate pesticides. Macedonia has been a member country of FAO since 8 November 1993. It participated in the 'Second Questionnaire' relating to the ICCDUP, which sets out to assess the level of implementation of the code of conduct by government bodies. By participating in the questionnaire system, Macedonia is increasing its awareness of responsible use and handling of pesticides.
- The Stockholm Convention is a global treaty to protect human health and the environment from persistent organic pollutants (POPs). POPs are chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of living organisms and are toxic to humans and wildlife. In implementing the Convention, Governments will take measures to eliminate or reduce the release of POPs into the environment. Macedonia became a signatory to the Stockholm Convention on May 23, 2001 and ratified it on March 19, 2004 (Official Gazette of the Republic of Macedonia No.17/2004)

**Status of pesticide regulations in the European Union**

In 2005, the European Union Directorate General for Health and Consumers "… started a Community-wide review process for all active ingredients used in plant protection products within the European Union. In a review process based on scientific assessments, each applicant had to prove that a substance could be used safely regarding human health, the environment, ecotoxicology and residues in the food chain. This program will be completed by 2008."[8]

Macedonia has not been a member of the EU, however, it is a candidate country, with entry to the EU envisaged around 2012. Information on pesticides toxicity and use restrictions of products from the EU can be found through the following mechanism.

The Commission of the European Communities, in collaboration with member countries of the EC, is responsible for the registration of pesticide active ingredients (also referred to as active substances) for use in all EC member countries. Individual member countries, called Member States, are responsible for the registration in their country of specific pesticide products (active ingredient percentage by weight plus inert ingredients) containing active ingredients authorized for use by the Commission.

**EU MRLs for food products for human consumption**

According to http://ec.europa.eu/food/plant/protection/pesticides/index_en.htm

"All foodstuffs intended for human or animal consumption in the European Union (EU) are now subject to a maximum residue level (MRL) of pesticides..."

[8] http://ec.europa.eu/food/plant/protection/evaluation/index_en.htm

The act governing MRLs in the EU is "Regulation (EC) No 396/2005" and will become fully applicable on the 2 September 2008. The Regulation establishes the MRLs of pesticides permitted in products of animal or vegetable origin that are intended for human or animal consumption. The objective of the regulation is to ensure that pesticide residues in foodstuffs do not constitute an unacceptable risk for consumer and animal health.

Before the establishment of this regulation, each Member State applied its own maximum residue levels for pesticides. This regulation repealed all previous EU directives, and implements a harmonised umbrella for MRLs amongst EU Member States.

*Specific levels*

Specific MRLs are listed as part of the regulation and include;

- Annex II: MRLs already established by previous directives
- Annex III: Temporary MRLs which are yet to be harmonised across all EU Member States.

**Standards and Certification Systems that Reduce Risk**

National Standards and Codes:

Central to the control and use of pesticides in Macedonia is the "Law on Plant Protection" which is fully harmonized with the EU Council Directive concerning the placing of plant protection products on the market" (91/414/EEC). The Macedonian Law on Plant Protection covers;

- Lists of harmful organisms
- Establishing protected zones in the Republic of Macedonia
- Establishing register for producers, processors, importers and distributors
- Introducing plant passports
- Monitoring, prognosis and application of biological measures
- Collecting, use and data exchange
- Public services and public authorizations
- Establishing expert council
- Conducting phytosanitary control inland and at the border posts, and inspection supervision over the implementation and enforcement of the provisions of this Law
- Establishing of State Phytosanitary Laboratory (SPL)
- Plant Protection Department as a central organ for coordination and implementation of the Law

Organic Production:

According to the organisation 'Organic Europe'[9], by 2006, about 500 hectares were under organic management in Macedonia. This constitutes about 0.4 % of the total land area being used for agriculture. With the growing market for organic products, many countries have developed national organic regulations to be able to protect producers and consumers against misleading organic claims. The FAO/WHO Codex Alimentarius Commission has formulated guidelines for labelling of organically produced food, with a view to harmonizing national regulations.

The most pertinent national legislation related to organic production in Macedonia is;

- The 'Law on Organic Agricultural Production' (2004), which regulates the general provisions related to the production, processing, marketing and labelling of organic production and applies to all types of organic agricultural products. The Law also provides the basic conditions for inspection and certification of organic agriculture.

Organic production is a holistic management of the agro-ecosystem, emphasizing biological processes, soil health, and minimizing the use of non-renewable resources. This includes maintenance of soil fertility through the use and recycling of organic materials. Normally, the use of synthetic fertilizers and pesticides is prohibited. The International Federation of Organic Agriculture Movements (IFOAM) has formulated IFOAM Basic Standards, on which organic certifiers can base their standard, with a view of international harmonization. The International Organic Accreditation Service (IOAS) accredits certification bodies that have organic certification programs that comply with the IFOAM standards. During the last revision of the IFOAM Basic Standards, the standards for ecosystem management were

[9] http://www.organic-europe.net/country_reports/macedonia/default.asp#stats

strengthened. There are ongoing discussions on whether the standards should also include criteria for labour conditions and other social issues, to which currently only a very general reference is made.

Fair Trade Initiatives:

The fair trade initiatives try to provide better market access and better trading conditions to small farmers. This includes a price premium for producers to be invested in social and environmental improvements. For larger production units an additional aim is to improve the conditions for workers. The Fairtrade Labelling Organizations (FLO) International is an umbrella organization of 17 national fair trade labelling initiatives, but producers and traders are also represented on the board. FLO has developed production criteria, both socially and environmentally oriented, differentiated for smallholder production and plantations. In addition, it has developed standards for trade, with which traders licensed by FLO have to comply. Complementary to the generic standards, there are product specific standards. Currently FLO standards exist for coffee, tea, cocoa, cane sugar, honey, fresh fruit, fruit juices, bananas, and rice. Standards for wine and cut flowers are being developed. From January 2003 the certification unit will be a legally independent certification body. Macedonia does not yet participate internationally in any of the FLO International crops.

**Import - export certification authorities / companies present in the country**

Phyto-Sanitary Certification

A phyto-sanitary certificate is a document issued by most countries' Ministry (Department) of Agriculture, or comparable government body, which verifies the quality of a produce shipment, and which many countries require for the import of unprocessed plant products.

There are a select number of global organizations which verify national phyto-sanitary certification systems. In 1963, FAO and the WHO created the Codex Alimentarius Commission to develop international standards and guidelines for food traded on the global market. The commission aims to protect the health of consumers, ensure fair trade practices in the food trade, and promote coordination of all food standards work undertaken by international governmental and non-governmental organizations.

The Codex Alimentarius system (of which Macedonia is a member) presents a unique opportunity for all countries to join the international community in formulating and harmonizing food standards and ensuring their global implementation. It also allows them a role in the development of codes governing hygienic processing practices and recommendations relating to compliance with those standards.

It is not possible to import or export agricultural produce from Macedonia from/to international markets without a phyto-sanitary certificate. Imports/exports arriving at the Macedonian border are under customs' control and supervision until the shipment's status is determined. The phytosanitary certificate is a required part of the Single Administrative Document (SAD) when the products are either agricultural or food products.

Imports of agricultural and food products may require import licenses from the Ministry of Health or Ministry for Agriculture. Items requiring import license are listed in the Official Gazette of the Republic of Macedonia No. 58/04. Sanitary Officers of the respective agencies conduct inspection of the goods and authorize Customs to proceed with entry if all is in order. Goods are then customs cleared with the payment of the import duties.

Seed Certification

There are also international efforts, mostly led by FAO, to develop a system of seed certification so that only high quality seed is sold to and planted by farmers instead of potentially diseased seed, as can occur with farmers saving seed from season to season.

Macedonia has a law protecting the quality of seed material (The Law on Seeds and Planted Materials for Agricultural Plants - 2006). The Ministry of Agriculture is the central authority for seed control, with a special department for seeds. Improved varieties are used extensively in wheat, tobacco and the main vegetable crops, but less for rice and maize. Production, processing and supply activities require a license from the Ministry. Private seed marketing has existed in Macedonia since before the 1990s.

Produce Certifying Companies

The following companies operate with or in Macedonia, among other countries:

- CERES GmbH – Germany
- IMO INST FUR MARKTÃ–COLOGIECH - Switzerland and Liechtenstein

## AgBiz Pesticide Evaluation Report (PER)

**This part of the PERSUAP report addresses pesticide choices, environmental and human health issues, biodiversity, conservation, and recommendations according to the 12 Regulation 216.3 "Pesticide Procedures"**

**Pesticide procedures element a: USEPA registration status of the proposed pesticides.**

Implementing partners of USAID working overseas are effectively limited to using pesticide active ingredients registered in the US by the EPA for the same *or similar* uses. Emphasis is placed on *similar use* because a few of the pest species found overseas are not present in the USA, and therefore pesticides may not be registered for the exact same use, but often are registered for similar pests and pest situations.

"EPA Registration Status" possibilities of formulated products include: never registered, active registration, and cancelled registration. Moreover, some AIs are labeled for "restricted use pesticides". In the USA, AIs in restricted use pesticides (RUP) are for retail sale to, and use by, only certified applicators or persons under their direct supervision, and only for those purposes covered by the applicator's certification. There are various reasons which are determined by the EPA why a particular pesticide is classified as restricted. These criteria involve the EPA's determination that the pesticide may be hazardous to human health or to the environment *even when used according to the label*.

Pesticide AIs in specific products must also be registered for specific uses by the target country; often for target countries in Europe, EU/EC regulations are being mirrored and followed to accommodate regional trade in agricultural products. One caveat is that pesticides that have lost active registration status are often permitted to clear the retail system, and can be found on farm shop shelves for 2-3 years as this clearing process ensues. The risk is that a product suddenly banned or cancelled by EU/EC for serious environmental or human health risk issues may be used during this clearing period and ultimately—if tested—detected upon import from the target country, risking shipment rejection.

Pesticides, by necessity, are poisons, but the acute toxicity and hazards (risks) of different compounds vary greatly. Acute toxicity refers to the inherent intoxicating ability of a pesticide product whereas hazard refers to the risk of poisoning when the pesticide is used or applied. Pesticide hazard depends not only on toxicity but also on the chance (or risk) of exposure to toxic amounts of the pesticide. Both of these are influenced by formulation and concentration.

Pesticide Product Concentration and Formulation

Pesticides are registered in the US as formulated products (active ingredient—the toxin that kills—in a certain concentration, usually much less than 100%—plus additives like carriers, emulsifiers, stabilizers, enhancers, adhesives and other ingredients, formulated as either an Emulsifiable Concentrate, Granule, Wettable Powder, or other formulation) and also (rarely) as just the technical active ingredient (AI, close to 100% without most of the above additives).

EPA versus WHO Acute Toxicity Classification Systems

EPA classification shows actual toxicity of the formulated market products—which take formulation types and concentrations into account—and which are usually less and (rarely) more toxic than the active ingredients alone and, in turn, are more representative of actual risks encountered in the field. By contrast, the WHO acute toxicity classification system is based on the active ingredient only (see Attachment 2 for a comparison of EPA and WHO acute toxicity classification systems).

Local Government Pesticide Regulations and Registration

Pesticide products must be registered by the government of the country in which activities are planned. The Government of Macedonia has, for the past several years, annually updated its list of registered pesticides and uses. Most recently, the regulations for use and for allowable pesticide products are being harmonized and mirroring those found in the EU, to accommodate regional trade.

**Analysis**

As of 2008, any pesticide registered for use in Macedonia must be on the EU registered pesticides list – thus by default the required information was the same.

As discussed above in the country analysis, risks with pesticide importation, sale, and use come from several sources:

- importation generally through Bulgaria of unregistered, substandard, and occasionally pirated trademark products from some (not all) companies in China, India and Pakistan in what can be called the informal or illegal sector;
- use by AgBiz project beneficiaries of very highly acutely toxic pesticides (terbufos, for example);
- importation and use of unacceptably toxic products by both the informal and formal sectors;
- use by AgBiz project beneficiaries of USEPA-designated Restricted Use Products (RUPs), many of which—especially synthetic pyrethroids—are highly damaging to aquatic environments and aquatic biodiversity.

**Issue: Pesticide AIs not approved by EU**

See PERSUAP ATTACHMENT 13

**Issue: Products containing active ingredients not EPA-registered**

Products containing the following active ingredients—identified in rural and urban farm stores and with major distributors in Macedonia—should not be used by AgBiz or its subcontractors and beneficiaries—regardless of EU registration status, as they are either cancelled for use in the USA or they have not yet been evaluated for risk by EPA. Furthermore, some of the more risk-prone AIs will undoubtedly be de-listed from EU registration in the near future, so their use should be avoided as many alternate products are available (there are some 250 pesticides registered for use in Macedonia, ergo a plethora of choices exist). At the same time, some newer products may clear EPA testing and be approved, thus this document—considered to be a living document—will require updating and amending over time.

**Insecticide AIs not EPA registered**

- *Adoxophyes orana* (not EPA registered)
- alpha-cypermethrin (not EPA registered)
- chromafenozide (not EPA registered)
- *Helicoverpa armigera* NPV (not EPA registered)
- lauric acid (not EPA registered)
- methyl decanoate (not EPA registered)
- methyl octaonate (not EPA registered)
- oleic acid (not EPA registered)
- pelargonic acid (not EPA registered)

- *Spodoptera exigua* NPV (not EPA registered)
- *Spodoptera littoralis* NPHV (not EPA registered)
- *Tagetes* (Marigold) oil (not EPA registered)
- *Melaleuca alternifolia* (tea tree) oil (not EPA registered)
- teflubenzuron (not EPA registered)
- triflumuron (not EPA registered)
- urea (not EPA registered)
- *Lecanicillium muscarium* (not EPA registered)

**Miticide/Acaricide AIs not EPA registered**

- cyflumetofen (not EPA registered)
- lauric acid (not EPA registered)
- methyl decanoate (not EPA registered)
- methyl octaonate (not EPA registered)
- oleic acid (not EPA registered)
- pelargonic acid (not EPA registered)
- *Tagetes* (Marigold) oil (not EPA registered)

**Nematicide AIs not EPA registered**

- *Paecilomyces fumosoroseus* (not EPA registered)

**Rodenticide AIs not EPA registered**

- calcium phosphide (not EPA registered)

**Fungicide AIs not EPA registered**

- 2-phenylphenol (not EPA registered)
- 8-hydroxyquinoline (not EPA registered)
- ametoctradin (not EPA registered)
- amisulbrom (not EPA registered)
- *Ampelomyces quisqualis* (not EPA registered)
- *Aureobasidium pullulans* (not EPA registered)
- *Bacillus amyloliquefaciens* (not EPA registered)
- benalaxyl (not EPA registered)
- benalaxyl-M (not EPA registered)
- benthiavalicarb (not EPA registered)
- bixafen (not EPA registered)
- bupirimate (not EPA registered)
- cyflufenamid (not EPA registered)
- diethofencarb (not EPA registered)
- dithianone (not EPA registered)
- dodemorph (not EPA registered)
- epoxiconazole (not EPA registered)
- fenpropidin (not EPA registered)
- fenpropimorph (not EPA registered)

- fenpyrazamine (not EPA registered)
- fluopyram (not EPA registered)
- fluquinconazole (not EPA registered)
- flusilazole (not EPA registered)
- flutriafol (not EPA registered)
- fluxapyroxad (not EPA registered)
- fuberidazole (not EPA registered)
- iprovalicarb (not EPA registered)
- isopyrazam (not EPA registered)
- mepanipyrim (not EPA registered)
- meptyldinocap (not EPA registered)
- metrafenone (not EPA registered)
- penconazole (not EPA registered)
- pencycuron (not EPA registered)
- penflufen (not EPA registered)
- penthiopyrad (not EPA registered)
- *Phlebiopsis gigantea* (not EPA registered)
- picoxystrobin (not EPA registered)
- potassium iodide (not EPA registered)
- potassium phosphite (not EPA registered)
- potassium thiocyanate (not EPA registered)
- prochloraz (not EPA registered)
- propamocarb (not EPA registered)
- propineb (not EPA registered)
- proquinazid (not EPA registered)
- pyriofenone (not EPA registered)
- *Pythium oligandrum M1* (not EPA registered)
- sedaxane (not EPA registered)
- silthiofam (not EPA registered)
- tolclofos-methyl (not EPA registered)
- triazoxide (not EPA registered)
- tribasic copper sulfate (not EPA registered)
- *Trichoderma atroviride* (not EPA registered)
- *Trichoderma viride/lignorum* (not EPA registered)
- valifenalate/valiphenal (not EPA registered)
- *Verticillium albo-atrum/dahliae* (not EPA registered)

**Algicide AI not EPA registered**

- quinoclamine (not EPA registered)

**Bactericide AIs not EPA registered**

- aluminium sulphate (not EPA registered)
- *Aureobasidium pullulans* (not EPA registered)

**Herbicide AIs not EPA registered**

- aclonifen (not EPA registered)
- amidosulfuron (not EPA registered)
- azimsulfuron (not EPA registered)
- beflubutamid (not EPA registered)
- bifenox (not EPA registered)
- carbetamide (not EPA registered)
- chlorotoluron (not EPA registered)
- cinidon ethyl (not EPA registered)
- cycloxydim (not EPA registered)
- diflufenican (not EPA registered)
- dimethachlor (not EPA registered)
- ethoxysulfuron (not EPA registered)
- florasulam (not EPA registered)
- flupyrsulfuron-methyl (not EPA registered)
- flurochloridone (not EPA registered)
- haloxyfop R methyl (not EPA registered)
- haloxyfop (P) methyl (not EPA registered)
- ioxynil (not EPA registered)
- iron sulphate (not EPA registered)
- isoproturon (not EPA registered)
- isoxaflutole (RUP, too toxic)
- lauric acid (not EPA registered)
- lenacil (not EPA registered)
- metazachlor (not EPA registered)
- methyl decanoate (not EPA registered)
- methyl octaonate (not EPA registered)
- metobromuron (not EPA registered)
- metosulam (not EPA registered)
- oleic acid (not EPA registered)
- oxadiargyl/oxadiargil (not EPA registered)
- oxasulfuron (not EPA registered)
- pelargonic acid (not EPA registered)
- pethoxamid (not EPA registered)
- picolinafen (not EPA registered)
- profoxydim (not EPA registered)
- propaquizafop (not EPA registered)
- prosulfocarb (not EPA registered)
- pyridate (not EPA registered)
- quinmerac (not EPA registered)
- quinoclamine (not EPA registered)
- sulcotrione (not EPA registered)
- tepraloxydim (not EPA registered)
- thiencarbazone (not EPA registered)
- tritosulfuron (not EPA registered)

**AgBiz Beneficiary Mitigation Recommendations**

- AgBiz and its subcontractors and beneficiaries do not use products containing these active ingredients, and use one of the many alternate products.

**Issue: Restricted Use Pesticides (RUPs), very high acute toxicity, and human health issues**

The US Environmental Protection Agency has developed a system for dealing with pesticides with inordinate risks to human health and/or environment for various uses. In the USA, farmers who wish to purchase and use RUPs must receive (and pay for) specialized training and certification to increase awareness of the risks and ways that can be used to mitigate these risks. These *Certified Applicators*, or those under their direct supervision, must follow the pesticide label instructions and only use the product for purposes covered under their certification. Further, in the USA, some states may require that certain active ingredients not listed on the Federal list be classified as "restricted" in their states due to local conditions, generally related to environmental concerns.

There are various reasons which are determined by the EPA why a particular pesticide is classified as restricted. These criteria involve the EPA's determination that the pesticide may be hazardous to human health or to the environment *even when used according to the label*.

Regulation 216, under section 216.3b, Pesticide Procedures, part 1, Project Assistance, subpart (i) recognizes Restricted Use Pesticides as follows (italics inserted):

> "When a project includes assistance for procurement or use, or both, of pesticides registered for the same or similar uses by USEPA *without restriction*, the Initial Environmental Examination for the project shall include a separate section evaluating the economic, social and environmental risks and benefits of the planned pesticide use to determine whether the use may result in significant environmental impact."

Several of the pesticides found with distributors and in rural farm stores in Macedonia, and included in the AgBiz Program Pesticides Decision Matrix (Table 1, with WHO and EPA acute toxicities of only Ia or Ib and I, respectively as well as some products banned or targeted strongly by environmental groups in several countries) contain active ingredients, with the possible exception of copper compounds, that are either too toxic for farmers to use, known carcinogens, or known water pollutants, as follows:

**Insecticide AIs RUP, too toxic, known carcinogens or known water pollutants**

- aluminum phosphide (RUP, too toxic)
- cyromazine (known water pollutant)
- ethoprop(hos) (RUP, too toxic)
- fenoxycarb (known carcinogen)
- formetanate (too toxic)
- magnesium phosphide (RUP, too toxic)
- oxamyl (RUP, too toxic)
- phosphane/phosphine (RUP, too toxic)
- sulfuryl fluoride (RUP, too toxic)

**Miticide/Acaricide AIs RUP, too toxic, known carcinogens or known water pollutants**

- fenazaquin (too toxic)
- formetanate (too toxic)

**Nematicide AIs RUP, too toxic, known carcinogens or known water pollutants**

- ethoprop(hos) (RUP, too toxic)
- fenamiphos/phenamiphos (RUP, too toxic)
- fosthiazate (RUP, too toxic)
- oxamyl (RUP, too toxic)

**Rodenticide AIs RUP, too toxic, known carcinogens or known water pollutants**

- aluminum phosphide (RUP, too toxic)
- magnesium phosphide (RUP, too toxic)

**Fungicide AIs RUP, too toxic, known carcinogens or known water pollutants**

- captan (known carcinogen)
- etridiazole/terrazole (known carcinogen)
- folpet (known carcinogen)
- maneb (known carcinogen)

**Herbicide AIs RUP, too toxic, known carcinogens or known water pollutants**

- aminotriazole/amitrole (known carcinogen)
- diuron (known carcinogen)
- isoxaflutole (RUP, too toxic)
- metamitron (known carcinogen)
- oxadiazon (known carcinogen)
- penoxsulam (known water pollutant)
- s-metolachlor (known water pollutant)

**AgBiz Subcontractors and Beneficiaries Mitigation Recommendations**

- AgBiz and its subcontractors and beneficiaries do not use products containing these active ingredients, and use one of the many alternate products.

**Issue: High acute toxicity**

All pesticide products that have at least acute WHO and/or EPA toxicity ratings of II (see Table 1) for at least some products that contain the stated active ingredient are considered to be too toxic for use without training and proper use of PPE.

**AgBiz Subcontractors and Beneficiaries Mitigation Recommendations**

- Do not use products containing active ingredients with WHO and/or EPA Class II (see Table 1, MSDS, Label) acute toxicity ratings until farmers have received sufficient (to set or change behavior in favor of best safe use practices) training and use PPE.
- AgBiz Subcontractor and beneficiary projects continue to work with groups linked to farm stores that have received and utilize best practices training.
- AgBiz subcontractors and beneficiaries continue to source pesticides from well-managed stores that do not sell illegal or products containing very highly toxic active ingredients.

**Additional Recommendations for Mitigation**

- For AgBiz subcontractor and beneficiary farmers to use the accepted (allowable by this PERSUAP) pesticide products with USAID resources or subcontractor resources, in the short term, users will require training and refresher training in pesticide safe use, emphasizing which products are recommended and which should not be used, and why.
- IPM tools and tactics may ultimately reduce the need for the quantities of pesticides used presently. For AgBiz subcontractor and beneficiary farmers to learn about IPM techniques being used in developed and other countries, before the beginning of each field season provide training and refresher training introducing these IPM practices as possibilities for future season use.
- AgBiz subcontractors and beneficiaries obtain from pesticide importers/distributors Material Safety Data Sheets (MSDSs) for pesticide products that will be used extensively on project crops.
- By crop, and if possible crop phenology, subcontractor companies produce quick reference guides for all of the anticipated major or primary pests/production constraints, GAPs and IPM measures that can be used to strengthen and protect the crop, pesticides to be used on the project for each anticipated pest, with use rates, safety measures, environmental concerns, restricted entry interval (REI) and minimum/maximum residue levels/limits (MRLs) for export and local consumption.
- AgBiz annually update any changes to the list of pesticides proposed for use and communicate these changes to USAID with a note that an amendment to this PERSUAP will be necessary.

**<u>Pesticide procedures element b</u>: Basis for Selection of Pesticides**

This generally refers to the environmental and economic rationale for choosing a particular pesticide. In general, best practices dictate that the least toxic pesticide that is effective is selected. The bases for selection of each pesticide are most often the following: availability, effectiveness (efficacy), and price. A reputable manufacturer/importer/distributor, human safety, and environmental safety are other factors that could influence the choice of pesticides for Macedonian farmers.

**Analysis**

AgBiz implementing partners indicated that the most important bases for pesticide selection in Macedonia are ‘cost’ and ‘efficacy’. Other reasons mentioned as being less important by agronomists and farm managers included ‘worker safety (toxicity levels)’ and ‘environmental safety’. Product quality was indirectly identified as a selection factor by workers in agrochemical stores.

**Issue**

Macedonian farm agronomists and managers directly involved with the AgBiz Program were found to have a high level of understanding of both pesticide use and identification of local pests. This is possibly a legacy of the Yugoslav system where large cooperatives had dedicated teams of well educated agronomists controlling all aspects of cropping. Interviews and field experiences with some small local farmers revealed an opposing situation - where little knowledge was present of pesticides or pests. These farmers relied upon the knowledge and services of agronomists in the agrochemical stores (also referred to as agricultural pharmacies) for pesticide selection and pest identification. Under Macedonian law, pesticides and other agrochemicals can only be sold in registered ‘agricultural pharmacies’, where a trained agronomist is present.

Since cost and efficacy are the important factors associated with the selection of pesticides on these farms, workers are continually trying to locate the most effective active ingredient at the lowest price.

Particular active ingredients are available under a variety of product names, however, there is a question as to the quality of some product names imported from less developed countries or countries with less arduous product quality control systems. This in turn means that there may be products being used which may contain unwanted by-products of the manufacturing process and allow unmeasured environmental and human risk associated with their use. Additionally, there is an issue of lowered efficacy of such pesticide products. Interviews with agronomists from agricultural pharmacies indicated that there is a clear distinction in quality between Western European and American products as compared with products from less developed nations.

Interviews with agronomists additionally indicated that risk to human health is a less important selection factor and made scarce mention of environmental factors.

**AgBiz Subcontractor and Beneficiary Mitigation Recommendations**

Companies receiving contracts from and working with the AgBiz Program should consider:

- During pesticide safety training of subcontractors and beneficiaries and their farmers, include additional pesticide selection factors discussion, using information and materials in this PERSUAP, material found in MSDSs and pesticide labels, and material found on pest management websites (e.g. University of California IPM site[10]), can emphasize the importance of these additional pesticide selection factors. Companies that buy produce from smaller farms should ensure that the farmers from these farms are included in the trainings.
- Beneficiary agronomists perform basic simple economic analyses comparing pesticides to determine the most effective choice—while simultaneously selecting pesticides with low health and environmental impact potential and pesticides from the most reputable and reliable pesticide companies.
- Beneficiaries choosing and recommending that their farmers use pesticides with low human and environmental risk profiles (see decision matrix in Table 1, MSDSs, and Labels).
- Promote the use of more microbial, botanical and naturally-derived pesticides, as practical

**<u>Pesticide procedures element c</u>: Extent to which the proposed pesticide use is, or could be, part of an IPM program.**

IPM philosophy and use are USAID policy—USAID promotes the training, development and use of integrated approaches to pest management (IPM) tools and tactics whenever possible. This section discusses the extent to which the proposed pesticide use is incorporated into an overall IPM strategy, and if not, how it can be.

**First Objective for IPM: Growing a Healthy Crop**

Good crop management can strongly affect IPM, and good agronomic or cultural practices—or best management practices for agriculture (currently called GAPs) are the most basic and often the most important prerequisites for an effective IPM program. Growing a healthy crop optimizes both its yield potential and capacity to prevent, tolerate, or compensate for pest damage.

[10] http://www.ipm.ucdavis.edu/index.html

Increasingly, IPM tools and techniques are becoming a subset of GAPs. The use of GAPs ensure the production of strong, vigorous plants (that can resist or tolerate pest damage), while IPM focuses on decreasing risks from certain pest and other constraints to production.

**GAPs** emphasize maintaining proper plant health, and thus *prevention* of problems, through use of:

- Quality hybrid pest- and constraint-resistant treated seed;
- Proper land preparation and tillage such as sowing in raised-bed plantings;
- Soil fertility testing, monitoring and management;
- Water and soil moisture testing and management to avoid salinity, bacterial and chemical contaminants and soil-borne diseases;
- Nutrient management through use of combinations of biological and mineral fertilizers;
- Organic matter management through use of manures, composting, and mulching;
- Proper pesticide choice, storage, use and disposal.

**IPM** is a philosophy and practice of considering and using any and all possible pest management techniques and tools including:

- Pest scouting, monitoring and identification for precision decision-making;
- Cultural methods promote pest avoidance and a healthy plant that can better tolerate or resist pests. These methods include, but are not limited to, use of resistant varieties, early/late plantings/harvestings, crop rotation, pruning, destruction of crop residues and pest refuge plants near fields, and GAP practices.
- Natural pest control by encouraging and protecting local and introduced parasitoids, predators, and pest diseases by, among others, planting predator-attracting plants/flowers;
- Mechanical weed or insect pest control using manual and machine practices;
- Chemical practices such as use of *judicious, knowledgeable, and safe application* of synthetic and 'natural' (derived from nature; extracted from plants, microbes, and other organisms) pesticides.

IPM can also include use of: natural chemical methods (by using attractants, repellents, sterilants and growth inhibitors), genetic methods (propagation and release of sterile or genetically incompatible pests), and regulatory means (plant and animal quarantines, suppression and eradication programs) to the extent possible while permitting the safe integration of pesticides with farmers' traditional cropping and pest management systems.

The strongest selling points for IPM beyond the health and environmental benefits are:

- IPM is more effective then synthetic pesticides *in the long run*
- IPM is less damaging to essential soil health and nutrient cycling
- IPM generally requires less capital (but more labor) investment
- IPM can be used preventatively to eliminate or minimize the need for "responsive" controls (that is, applying pesticides after a pest outbreak occurs and much damage already has been done).

A General IPM Planning and Design Protocol developed by FAO scientists and extensionists for horticulture is attached as Attachment 6.

**General GAP/IPM Tools and Tactics which may be tried in Macedonia**

Soil nutrient, texture and pH testing
Plant leaf analyses

Pest resistant/tolerant seed
Seed treatment with pesticides
Raised-bed planting technique
Soil sterilization using black plastic and sunlight
Follow seeding rate & thinning recommendations for certain vegetables
Soil moisture measurements and management via drip irrigation
Use of organic mulch
Use of plastic mulch (note however, risks to environment from leftover pieces in the soil)
Use of organic fertilizers/soil structure amendments (manure, compost)
Use of purchased mineral fertilizers
Combinations of organic and mineral fertilizers
Crop rotation with and use of green manure crops
Crop rotations among different families of vegetables
Early/late plantings/harvestings to avoid pests
Use of trap crops to trap and destroy pests
Weekly field scouting to assess pest levels/damage
Ability of farmers to correctly identify pests
Ability of farmers to correctly identify predators, parasites and pest diseases
Pruning and sanitation of diseased plants
Do things to encourage predator/parasite build-up
Planting parasite-attracting plants on field margins
Mechanical weed control by hand hoe
Use of herbicides for weed control
Exclude insect pests by using vegetable tunnels and micro-tunnels
Mechanical insect control by hand picking larvae, pupae or adults
Use of insecticides for insect control
Use of fungicides for control of fungus
Spot treatment of pest hotspots with insecticides, miticides or fungicides
Use of pheromone traps to monitor moth levels
Use of pheromone traps to reduce overall moth levels
Use of pheromone inundation to confuse moth mating
Crop stalks and residue destruction at end of season
Apply local plant extracts (neem, pyrethroid, other) to kill pests

**Analysis**

Of these possible GAP and IPM techniques, interviews with company agronomists and some farmers show what tools and techniques AgBiz subcontractors and beneficiaries are using, planning to use, *and are not* using (see Questionnaires and Responses in Attachment 7):

- Soil nutrient, texture and pH testing—yes by company that does irrigation consulting
- Pest resistant/tolerant seed/plant variety—yes
- Seed treatment with pesticides—yes, except for grapes
- Soil moisture measurements—yes, on some larger farms/corporate farms
- Use of natural fertilizers (manure, compost)—yes, except for grapes; sheep manure is generally purchased and used up by veggie farmers. One winery had its own sheep farm and thus its own manure source
- Use of purchased mineral fertilizers—yes
- Combinations of organic and mineral fertilizers—yes for veggies, sometimes for grapes
- Crop rotation—yes, yearly for veggies; every 25-30 years grapes rotated with grains

- Use of green manure crops—no
- Early/late plantings/harvestings to avoid pests—not possible for grapes, grapes picked according to sugar, use refractometer to determine.
- Use of trap crops to trap and destroy pests—no
- Pruning and sanitation of diseased plants/trees—yes for grape growers; not yet, but know that should be, for veggies
- Planting parasite-attracting plants on field margins—no
- Farmer ability to correctly identify pests—for grapes, farmers do not know early symptoms of downy mildew
- Use of parasitoids to attack major pests—no, one grape agronomist knows that one can buy these, but they are not used
- Use of pheromone traps to monitor moth levels—yes for grape growers; no for veggies
- Use of pheromone traps to reduce overall moth levels—yes for grape growers; no for veggies
- Use of pheromone inundation to confuse moth mating—yes for grape growers; no for veggies
- Weekly field scouting to assess pest levels/damage—yes, continuous checking while working fields
- Ability of farmers to correctly identify pests—no
- Ability of farmers to correctly identify predators, parasites and pest diseases—no
- Do things to encourage predator/parasite build-up—no
- Planting parasite-attracting plants on field margins—no
  Mechanical weed control by hand hoe—yes, to clean up between rows after tillage
- Use of herbicides for weed control—yes
- Exclude insect pests by using vegetable tunnels and micro-tunnels—yes, but mostly used to extend the growing season
- Mechanical insect control by hand picking larvae, pupae or adults—not practical
- Use of insecticides for insect control—yes
- Use of fungicides for control of fungus—yes
- Spot treatment of pest hotspots with insecticides, miticides or fungicides—yes
- Crop stalks and residue destruction at end of season—yes
- Apply local plant extracts (neem, pyrethroid, garlic, chili peppers, other) to kill pests—no

The overall conclusion is that several of the AgBiz beneficiary agronomists and farmers, whether or not they understand the IPM philosophy fully, do know about and use numerous GAP and IPM tools and tactics. Additional tools and tactics could be added to the repertoire of each, through research and training.

**AgBiz Subcontractor and Beneficiary Mitigation Recommendations**

- AgBiz investigate the use of additional GAP and IPM techniques from the above list as well as from the UC Davis IPM website for additional project crop-pest combinations
- During training and field visits by AgBiz, enhance understanding of and emphasis on Integrated Pest Management (IPM) philosophy, tools and techniques, with pesticide use as a last resort
- GAP/IPM plans and/or technical sheets can be written by Subcontractor and beneficiary agronomists and farmers for the each crop to be protected, by pests, as practical
- IPM tools and tactics may ultimately reduce the need for the quantities of pesticides used presently. For AgBiz Subcontractor and beneficiary farmers to learn about IPM techniques being used in developed and other countries, prior to the coming 2012 field season provide training and refresher training introducing these IPM practices as possibilities for future season use.

Training will introduce Subcontractor and beneficiary farmers to: IPM philosophy, tools and tactics used commercially on the same crops in the USA and other countries.

**Pesticide procedures element d: Proposed method or methods of application, including the availability of application and safety equipment.**

This section examines how the pesticides are to be applied and the measures to be taken (training, use of PPE) to ensure safe use.

**Analysis**

Although there are a wide variety of crops included under the five value chains of the AgBiz Program, most grape pesticides are applied using tractor-drawn fan mist/atomizer blowers. Most vegetables are applied using tractor-drawn boom sprayers. Some pesticides are being applied using backpack sprayers; however, this method of application is usually limited to 'spot' applications of specific chemicals such as herbicides for areas missed by boom applications.

Field visits indicated that leading farm agronomists and farm workers are aware of the need to wear PPE, but in practice this equipment is rarely used to entirety. Interviews indicate that some farm workers have received training in safe use and handling of pesticides, PPE and disposal of pesticide packaging.

**Issue**

Some likely reasons that many Macedonian farm workers do not use PPE to reduce pesticide exposure risks include:

1. Farmer workers either discredit or do not completely understand the potential health risks associated with pesticides;
2. Climatic conditions (particularly heat) make it uncomfortable to use the equipment (despite the fact that it is recommended that many pesticides should be applied very early in the morning when it is cool and there is a lack of wind);
3. PPE equipment is not easily available outside the major metropolitan centers such as Skopje;
4. Another possibility is that farmers do not understand either the warning labels or pictograms provided with the pesticides since there is a high level of illiteracy among older rural generations in Macedonia.

International best practices for safe use of pesticides require that appropriate PPE is used. Most pesticide companies, on each pesticide label, either list or put pictograms showing PPE that is required for use of that certain product. Standards and certification systems for trade in agricultural commodities also require the use of appropriate PPE. Training should emphasize these facts as well as pictogram deciphering. Groupings of farmers (via communes, cooperatives and associations) can purchase PPE for use or rental by members, thus reducing the per-farm cost of ownership. Some general mitigation measures to ensure safe pesticide use are contained in Attachment 8.

**AgBiz Sucontractor and Beneficiary Mitigation Recommendations**

Subcontract companies receiving funds under the AgBiz program need to provide a plan which will:

- Ensure that protective clothing (carbon-filter respirator mask, gloves, long-sleeved shirt and pants or Tyvec outfit, boots, and goggles if indicated on the label) are available to farm workers involved with pesticide use. This clothing should be carefully selected to provide an optimum

balance of worker comfort and protection[11]. Examples of safety equipment to be used for each type of pesticide are found in Attachment 9)

- Each Subcontractor and beneficiary company that is associated with pesticide use, identify a staff member who will ensure the proper storage, use and maintenance of PPE. This involves making sure that the equipment is cleaned and checked for damage regularly, that the equipment is not taken away from the farm, and that workers are correctly using the equipment.
- Set out a schedule for continuous training in safe handling and use of pesticides – including aspects such as types and classes of pesticides, human and environmental risk associated with pesticides, use and maintenance of PPE, understanding information on labels and proper disposal of packaging.
- Ensure that children are kept away from the field while spraying is occurring and kept out after spraying has occurred.

**Pesticide procedures element e: Any acute and long-term toxicological hazards, either human or environmental, associated with the proposed use, and measures available to minimize such hazards.**

This section of the PERSUAP examines the acute and chronic toxicological data associated with the proposed pesticides. In addition to hazards (risk), this section also discusses measures designed to mitigate any identified toxicological hazards, such as training of applicators, use of protective clothing, and proper storage.

**Analyses**

AgBiz Subcontractor and beneficiary companies and farmers were asked: Have there been any pesticide human poisonings related to the crops you work on in your region? They responded that they were aware of none. One farm shop keeper in Skopje had heard of poisonings related to the use of Lannate (methomyl) a high-risk insecticide, and proceeded to bring out a bottle hidden under the shelf—it is supposed to be banned in Macedonia.

A pesticide decision matrix containing information on acute and chronic human and environmental toxicological risks are listed for each pesticide active ingredient in Table 1. There are several ways to mitigate exposure to humans. Some of the best examples are outlined below.

**Issue**

Acute and long-term toxicological hazards—both human and environmental—associated with the AgBiz project's Subcontractor and beneficiary's proposed uses, as well as measures available to minimize such hazards will remain a challenge.

**Mitigation of Human Toxicological Exposures**

Most pesticide poisonings result from careless handling practices or from a lack of knowledge regarding the safe handling of pesticides. The time spent learning about safer procedures and how to use them is an investment in the health and safety of oneself, one's family, and others. Pesticides can enter the body in

[11] Particularly, farm workers may wish to use light, disposable overalls. Many brand names exist - such as the brand name 'Tyvek® Coveralls' and are available in personal protective equipment stores (лицна заштитна опрема).

four major ways: through the skin, the mouth, the nose, and the eyes. A checklist is given below to help avoid these various routes of overexposure to pesticides.

*To avoid dermal (skin) exposure*

- Check the label for special instructions or warnings regarding dermal exposure
- Use recommended protective clothing and other equipment as listed on the label
- Do not re-enter the area until deposit has dried or re-entry interval is past

*To avoid oral (mouth) exposure*

- Check the label for special instructions or warnings regarding oral exposure
- Never eat, drink, or smoke, chew tobacco while working with any pesticide
- Wash thoroughly with soap and water before eating, drinking, smoking, or chewing tobacco
- Do not touch lips to contaminated objects (such as nozzles)
- Do not wipe mouth with contaminated hands or clothing
- Do not expose food, beverages, drinking vessels, or cigarettes to pesticides
- Wear a face shield when handling concentrated pesticides

*To avoid respiratory (lungs) exposure*

- Read the label to find out if respiratory protection is required
- If respiratory protection is required, use only an approved respiratory device
- Stay upwind during application

*To avoid eye exposure*

- Read the label to find out if eye protection is required
- If eye protection is required use goggles to protect eyes or a face shield to protect eyes and face
- Keep pesticide container below eye level when pouring

In addition to these common-sense measures, there is a way to ensure protection against exposure to pesticides by the type of clothing required for different classifications of acute toxicity. Toxicity classes are provided for each Macedonian AI in Table 1. Good protection is achieved by following the protective clothing and equipment guide on the product label (usually via pictograms), the MSDS, and Attachment 9.

The EPA system for determining acute toxicity of pesticides (as well as the European WHO system) is included as Attachment 2 to this PERSUAP.

**AgBiz Subcontractor and Beneficiary Mitigation Recommendations**

Follow basic first aid for pesticide overexposure

- Get medical advice quickly if you or any of your fellow workers have unusual or unexplained symptoms during work or later the same day. Do not let yourself or anyone else get dangerously sick before calling a physician or going to a hospital. It is better to be too cautious than too late.

- First aid is the initial effort to help a victim while medical help is on the way. If you are alone with the victim, make sure the victim is breathing and is not being further exposed to the poison before you call for emergency help. Apply artificial respiration if the victim is not breathing.
- Read the first aid instructions on the pesticide label, if possible, and follow them. Do not become exposed to poisoning yourself while you are trying to help. Take the pesticide container (or the label) to the physician. Do not carry the pesticide container in the passenger space of a car or truck.
- Additional basic first aid procedures for pesticide poisoning are presented in Attachment 10 to this PERSUAP.
- Continue to provide training in proper use of protective equipment and safe use of pesticides

All project farmers who handle (especially mix), supervise, or spray pesticides will require safe use training if not already received.

- Assist with the production and/or distribution of FAO or GTZ safety posters (in Macedonian) on use of safety equipment

For many projects using pesticides, posters exist to remind users of safety concerns and equipment. Such posters, in Macedonian, should be adapted, printed and posted where pesticide workers can see and review them. This can be done as part of a training program, and is a GAP.

- Avoid damage to environment through training to avoid non-target ecosystems

IPM and safe use training should components or training modules on how to mitigate exposure of non-target organisms to pesticides.

**Pesticide procedures element f: Effectiveness of the requested pesticide for the proposed use.**

This section of the PERSUAP requires information similar to that provided in item b, but more specific to the actual conditions of application. This section also considers the potential for the development of pest resistance to the proposed insecticide.

**Analysis**

Macedonian agriculture has a reasonably long history of pesticide use and pesticides are widely available and affordable to most farmers. Additionally, there are lower quality products available at lower prices on the market, which may contain unwanted production by-products or low quality active ingredients which perform less effectively. Finally, individual farmer education appears to be somewhat limited and farmers rely heavily upon consultation from agronomists in pesticide stores. The combination of these factors, along with under- and over-dosing, can form a foundation for the development of pest resistance to pesticides.

Fortunately, there are pesticide management methods being utilized in Macedonia which balance and help eliminate pest resistance. Interviews with farm agronomists and a key university entomologist revealed that there is a good understanding of the concept of pest resistance to pesticides in Macedonia. Agronomists supervising larger farms were found to be employing 'pesticide rotation' techniques to reduce the risk of pest resistance. This entailed regularly changing not only the pesticide active ingredient, but also ensuring that the mode of action of the pesticide was regularly changed. Agronomists indicated that this is done as often as possible during each growing season.

All of the pesticides chosen by Subcontractor and beneficiary company agronomists were selected based upon effectiveness as one of the primary criteria, from local farmer experience. AgBiz project staff members noted that under- and over-dosing are the primary concerns with lack of effectiveness, as well as with development of resistance. Pesticide suggestions for various constraints have been and continue to be reviewed by AgBiz Subcontractor and beneficiary company agronomists.

**Issue**

Individual farmers' understanding of pesticides and pesticide resistance issues is rather low. Additionally, individual farmers' reliance on agronomist-pesticide shop owners could cause a conflict of interest (i.e. shop owners are simultaneously selling products and advising farmers which products to use). An interview with a leading university entomologist showed that the agricultural research community was well aware of a wide range of integrated pest management IPM techniques; however, many of these techniques were not being transferred into practice in the farming community.

The greatest concern therefore rests on the premise that individual farmers, who do not have direct, unbiased advice from a trained agronomist, may be improperly using pesticides or applying incorrect dosages. This factor could lead to pesticide resistance in pest populations.
Moreover, many of the companies involved with AgBiz projects purchase a percentage of their crops from smaller farms. It is most likely that these farms could be areas where pest resistance could develop due to lack of farmer knowledge of pesticide usage.

**AgBiz Beneficiary Mitigation Recommendations**

- Agronomists working for larger contracting farms should ensure the extension of their knowledge to small farms where they purchase a percentage of their crops (i.e. advise the farmers on a pesticide program including types of pesticides to use, the most reliable brand names, regular pesticide rotation and correct dosages).
- Individual farmers should be trained to monitor for the development of pest resistance, and farm agronomists should be on the lookout for it during their field visits to their farms.
- Agronomists should pay special attention to signs of developing resistance by noting reduction in efficacy of each pesticide product on their company's farm and contract farms.

**<u>Pesticide procedures element g</u>: Compatibility of the proposed pesticide use with target and non-target ecosystems.**

This section examines the potential effect of the pesticide on organisms other than the target pest (for example, the effect on honeybee colonies in the spray area, risks to endangered species). Non-target species of concern also include birds, fish, aquatic organisms, and beneficial insects. The potential for negative impact on non-target species should be assessed and appropriate steps should be identified to mitigate adverse impacts.

**Biodiversity, conservation and protected or endangered species**

Macedonia has four national parks protected by law which cover an area of 130 000 ha. It also has multiple other forms of protected areas (Figure 1) such as 'strict nature reserves' and 'natural monuments'.

Figure 1: Biodiversity and protected areas in Macedonia[12]

There are three tectonic lakes (Ohrid, Prespa and Dojran) which have also been protected by law due to their importance for science and natural beauty[13].

According to the 'Earthtrends Organisation'[14] there are: 78 species of mammal indigenous to Macedonia, of which 11 are threatened; 199 species of birds, of which 3 are threatened; 29 species of reptiles, of which 2 are threatened; 5 species of amphibians; and 17 species of fish, of which 4 are threatened. Endangered species in Macedonia include[15]; Meadou viper (Vipera ursinii), Booted Eagle (Hieraaetus pennatus), Spotted Eagle (Aquila clanga), Lesser Spotted Eagle (Aquila pomarina), Imperial Eagle (Aquila heliaca), Lanner Falcon (Falco biarmicus), Capercaillie (Tetrao urogallus), Stone-curlew (Burhinus oedicnemus), Collared Pratincole (Glareola pratincola), Rock Dove (Columba livia), Calandra Lark (Melanocorypha calandra), Cough (Pyrrhocorax pyrrhocorax), Olivaceous Warbler (Hippolais pallida), Redstart (Phoenicurus phoenicurus), Rock Sparrow (Petronia petronia), Snowfinch (Montifringilla nivalis).

**Issue: Pesticide non-target impacts**

[12] National Environmental Action Plan, Synthesis Report, FYR of Macedonia, 1997; Department of Public Information of the United Nations (UNDPI), Cartographic Section, New York. Available at: http://maps.grida.no/go/graphic/biodiversity_and_protected_areas_in_macedonia
[13] http://faq.macedonia.org/travel/national.parks.html
[14] http://earthtrends.wri.org
[15] USAID MACEDONIA (2001): Biodiversity Assessment for Macedonia. Task Order under the Biodiversity and Sustainable Forestry IQC (BIOFOR). Internet address: http://rmportal.net/library/VI/2/118_macedonia/view

The map in Figure 1 is marked with red stars showing the locations of projects/companies funded through the AgBiz program which require a PERSUAP. As can be seen from the figure, a number of the AgBiz project companies are located in reasonably close proximity to nature reserves and protected areas. Companies located in the region surrounding the town of Kavadarci in south-central Macedonia are located most closely to a nature reserve. In addition, much of the land in this area is used solely for wine and table grape productions, indicating that great quantities of similar pesticides are being used in this region. The mass effect of this type of monoculture could possibly pose a problem for water quality Lake Kavadarci which hosts a great number of bird and fish species.

Of the threats to biodiversity identified in a USAID Macedonia report titled 'Biodiversity Assessment for Macedonia'[13] several are particularly related to Macedonian agricultural practices. These include; drainage of wetland areas for intensive agriculture, the impact of overuse of agrochemicals has a particularly harsh effect on lake ecosystems (for example; in the Prespa region apples are treated around 16-17 times per year), the drainage of lakes for irrigation of crops (for example; in Dojran, algae declined from 257 taxa in 1988 to merely 109 taxa in 1998 - and they are now all extinct!), and the lack of biological corridors due to monoculture of grain fields.

The effect of each pesticide on non-target ecosystems can depend on many factors such as its rate of degradation or half-life, its mode of action, application method, concentration, environmental conditions and proximity to the non-target organisms.

Half-life is defined as the time (in days, weeks or years) required for half of the pesticide present after an application to break down into degradation products. The rate of pesticide breakdown depends on a variety of factors including temperature, soil pH, soil microbe content and whether or not the pesticide is exposed to light, water, and oxygen.

Many pesticide breakdown products are themselves toxic, and each may also have a significant half-life. Since pesticides break down in soil, light, and water, there are half-lives for exposure to each of these factors. In the soil, types and numbers of microbes present, water, oxygen, temperature, pH, and soil type (sand, clay, loam) all affect the rate of breakdown. Most pesticides also break down, or photo-degrade, with exposure to light. Lastly, pesticides can be broken down, or hydrolyzed, with exposure to water.

Macedonia has some particularly advanced attitudes toward non-target organisms, specifically those of economic importance such as bees. For example; Macedonian law regulates that before spraying any form of pesticides in orchards, bee keepers in the region must be notified two days before by form of radio broadcasting and personal contact. Interviews with agronomists from companies involved in the AgBiz projects revealed that they were fully aware of such regulations.

Table 1 addresses the potential impact of each pesticide active ingredient on aquatic organisms, fish, birds, bees, beneficial insects, and ground water contamination. Please refer to this table to see the impacts and suggestions for mitigating these impacts.

Since pesticide use in Macedonia is relatively general according to standards of developed nations, with good management on the AgBiz project sites there should be little impact to non-target organisms.

**AgBiz Beneficiary Mitigation Recommendations**

- Avoid using pesticides in or near national parks and where endangered species are known to exist.
- Pesticide users should pay particular care when using pesticides in water catchments leading to any of Macedonia's lakes.

- Investigate the use of botanical and biological controls, where practical.
- Ensure pesticide applicators continue to respect laws associated for notification of beekeepers.

**Pesticide procedures element h: Conditions under which the pesticide is to be used, including climate, geography, hydrology, and soils.**

In general, in addition to element g, above, this requirement attempts to protect endangered species, forests, and parks from the dangers of pesticide misuse—as well as protect soil and water resources from contamination.

**Analysis**

Macedonia is predominantly a mountainous country, cut by larger or smaller valleys, gorges, plateaus, and highlands. Altitude ranges from about 60 m at the lowest point to 2,764 m at the highest point. It has about 15 mountain ranges higher than 2,000 m, but only the Shar Mountain has more than 20 peaks higher than 2,500 m. From the geomorphologic point of view, Macedonia can be divided into two main regions: the western part with carbonaceous rocks and the eastern part with a great diversity of siliceous rocks. Rainfall in Macedonia is unevenly distributed, with the greatest concentration of precipitation occurring in the west. Figure 2 illustrates average precipitation patterns, where higher precipitation levels are shown in dark blue. Project sites are shown with red stars.

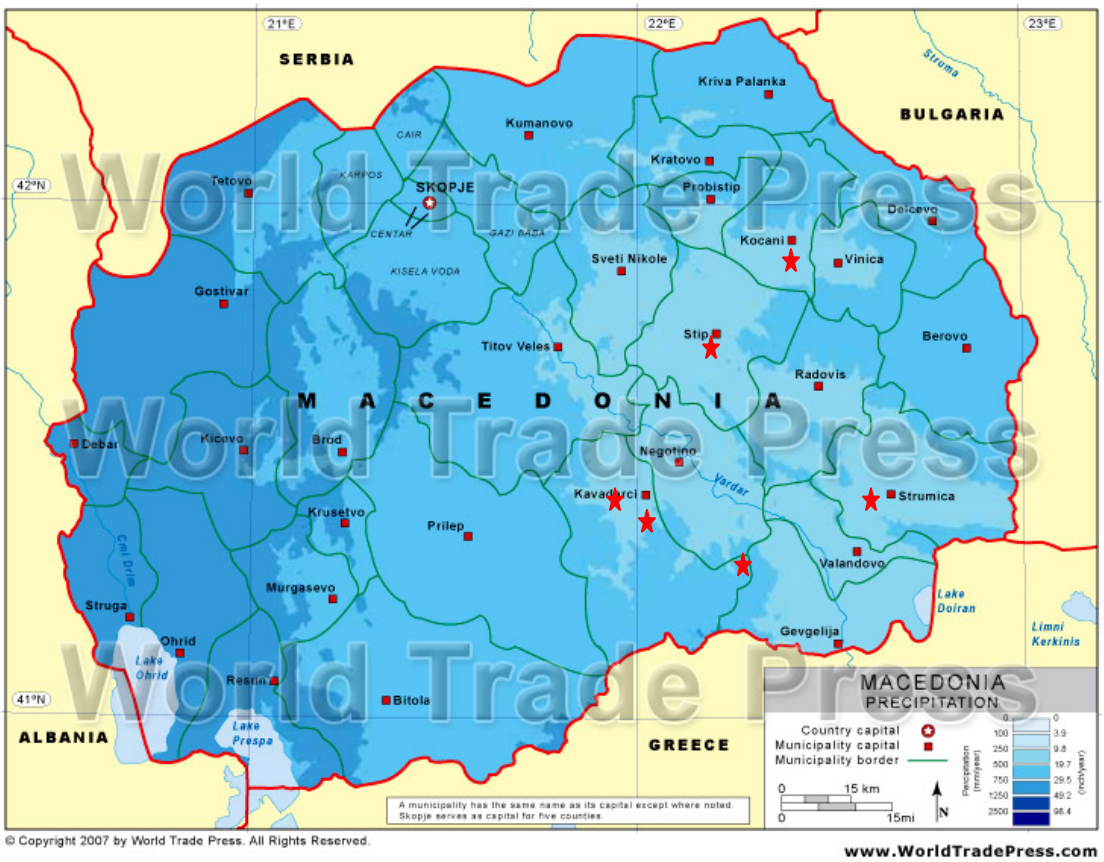


Figure 2: Average precipitation patterns for Macedonia16

According to: http://www.cs.earlham.edu/~dusko/InfoMak/land/climate.html "The Republic of Macedonia is characteristic of three different climates: Changed Mediteranean, Mountaneous, and Mildly Continental.

The changed mediteranean climate is represented in the Gevgelija-Valandovo ravine, the Dojran and the Strumica-Radovis ravines. It can also go as north as Skopje following the flow of the Vardar River. This climate is characterized with long and dry summers and mild and rainy winters. The spring and the fall are not very noticeable. The fall is longer and warmer and the spring is shorter and colder. The average temperature in the hottest month - July, is about 25 degrees Celsius. Demir Kapija is the hottest town in the country with a summer temperature that can get up to 40 degrees Celsius. The average temperature in the coldest month - January, is relatively high with about 3 degrees Celsius.

The mountainous climate, as its name suggests, is found in the high mountainous regions of the country. It is characterized with long and snowy winters and short and cold summers. The spring is colder than the fall. The temperature in the mountainous climate decreases with the increase of the elevation. That is why the lowest temperatures are found in the highest parts of the mountains. The Sar Planina, for example, has negative average temperatures in four months of the year, and it is also similar with the other high mountains. The coldest months are January and February, and the warmest July and August. However, even in the warm months there can be big weather changes and even snowfalls.

[16] http://www.bestcountryreports.com/Precipitation_Map_Macedonia.html

As for precipitation, the regions from the mountainous climate have the highest yearly precipitation in the country with as much rain and snowfall as 1,000 mm. The precipitation decreases as you go east and in the Eastern part of the country it is 600-700 mm. The average period that the snow stays on the mountains is from November to April, but in the higher mountains the snow can stay until the end of May.

The mildly continental climate is the most characteristic for the Republic of Macedonia, since it covers the biggest area of the country. It is characterized with relatively cold and humid winters and warm and dry summers. The spring is colder than the fall. There are differences in the average temperatures in the regions of the mildly continental climate. This is because of the differences in the regions' geographic latitude, elevation, etc. The average July temperature is highest in the Ovcepole, Kocani, and Skopje ravines. The average January temperature is lowest in the Malesevo ravine. The yearly precipitation also differs, ranging from 490 mm, in the Ovcepole ravine, to 760 mm, in the Prespa ravine. Apart from rain and snow, there is also hail-fall in these regions."

**Pesticide adsorption and leaching potentials**

Each pesticide has physical characteristics, such as solubility in water, ability to bind to soil particles and be held (adsorbed) by soil so they do not enter the soil water layers and the ground water table, and their natural breakdown rate in nature. This data can be found for the pesticides proposed for use on the AgBiz projects by checking each pesticide on the PAN website: http://www.pesticideinfo.org or the Footprint website: http://sitem.herts.ac.uk/aeru/footprint/en/
To find information for a particular pesticide one has to look up the active ingredient, not product names. In general, pesticides with water solubility greater than 3 mg/litre have the potential to contaminate groundwater; and pesticides with an adsorption coefficient of less than 1,900 have the potential to contaminate groundwater. And, pesticides with an aerobic soil half-life greater than 9 days have the potential to contaminate groundwater. Moreover, pesticides with a hydrolysis half-life greater than 14 days have potential to contaminate groundwater.

The majority of the AgBiz project companies are located in the south eastern half of Macedonia where there is good water holding capacity of soils (ground water capacity between 1 to10 l/sec). This means there will be lower rates of water runoff and therefore lower chance of pesticides being washed into waterways. In addition, the soils surrounding the AgBiz project company farms are typically alluvial sands, silts and clays (illustrated in Figure 3 and Figure 4 below). A broad generalization can be made that most pesticides will bind strongly to organic materials and fine particles in soils, thus meaning that they will can be transported into water if these materials are eroded and transported. In these regions rainfall is generally low.

Figure 3: Sandy and silty sediments in the Demir Kapija area. (1:200 000)

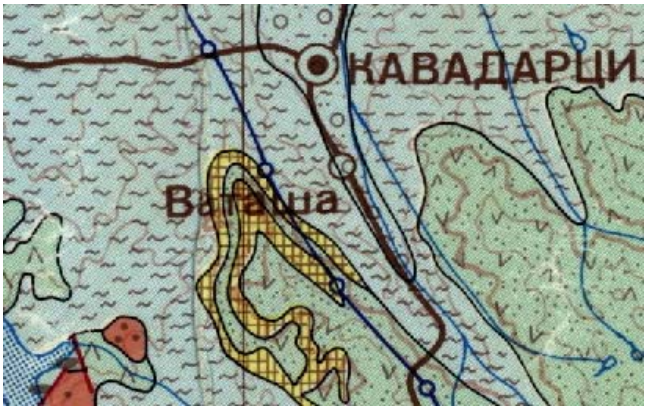


Figure 4: Sandy and silty sediments in the Kavardarci area. The green area is a basalt outcrop. (1:200 000)

**Issue: Soil and Water Contamination**

Macedonia has sufficient water resources for agricultural and other purposes, but the distribution of water resources is extremely uneven. There is a high concentration of water resources in western Macedonia, while in contrast there are some areas (such as the south-eastern catchment areas) where water resources are particularly limited.

According to http://waterwiki.net/index.php/FYR_Macedonia: "The quality of drinking water in rural settlements is a serious concern." Monitoring of groundwater sources used for drinking conducted by the Ministry of Health reveals that although no serious sanitary-hygiene problems exist, about 5 percent of the monitored wells have experienced microbiological contamination. Since they have failed to meet the quality limits, they cannot be used for drinking.

The main piece of legislation on water resources management is the 1998 Law on Water and its several by-laws. The Law on Water defines the management and control of water use, protection and prevention of water contamination, protection against floods, as well as financing of water management activities. The law introduces the following important instruments and institutions: the creation of a water fund to finance water resources development and works of public interest; establishment of public water management enterprises and water users' associations; introduction of wastewater standards and pollution charges according to the polluter-pay principle; and appointment of water management inspectors."

If well managed and applied according to instructions provided on the labeling with each pesticide, the chances of accidentally contaminating waterways and particularly groundwater with pesticides should remain low. However, since water and groundwater are of limited quantity in many parts of Macedonia, all attempts must be made to reduce contamination of this valuable resource.

With the exception of herbicides, most of the pesticides listed by AgBiz project companies are, in practice, not potential ground water contaminants. In addition, the semi-arid conditions under which the pesticides will be used indicate that they will be rapidly evaporated upon application. In some areas the water tables are potentially very shallow, and thus vulnerable to contamination with agrichemicals. Agronomists must take special care and inform applicators of potential environmental harm if working in areas near water.

**AgBiz Beneficiary Mitigation Recommendations**

- Utilize pesticides with low ground water contamination potential where water tables are high or easy to reach.
- As one of the criteria for selection of pesticides, determine the potential for risk of surface and ground water contamination at each site, see Table 1, and choose pesticides based upon little contamination potential.
- Reduce farming practices which promote erosion.
- Since transport of pesticides absorbed to soil particles is a likely transportation route to waterways, techniques should be employed to reduce farm erosion (such as employing ground covers between vine rows, planting rows perpendicular to the slope, using drip irrigation, etc.).
- Pay particular care when spraying near waterways.
- Since water is a particularly valuable in many of the project areas, applicators must pay special attention and care to preserving this resource.
- Investigate and promote the use of additional IPM measures including biological pesticides to replace synthetic pesticides and to reduce use of synthetic pesticides.
- Lists of botanical and biological pesticides are included as Attachment 5 at the end of this report. Investigate their usefulness and availability in Macedonia.

**Pesticide procedures element i: Availability of other pesticides or non-chemical control methods.** This section identifies other options for control of pests and their relative advantages and disadvantages.

**Analysis**

Macedonia has a long list of registered products, numbering more than 200 choices, thus alternatives for most uses are available. Non chemical methods (IPM tools and technologies) are listed under element c above.

**Natural and biological pesticides**

There exist pesticide active ingredients that are derived from natural or biological sources, and are hereby identified as being potentially useful on project sites:

- earth elements like cryolite and kaolin clay
- inorganic elements and compounds like forms of copper and sulfur, iron phosphate, calcium hydroxide, phosphorous acid, sodium bicarbonate and sodium tetrathiocarbonate
- compounds derived from plants like neem oil (azadirachtin), pyrethrin, citronella oil, rotenone and emamectin benzoate
- microbes like *Bacillus thuringiensis* and *Bacillus subtilis*
- microbial-derived products like Spinosad and Abamectin (Ivermectin)
- mineral and other oils
- fatty acids in insecticidal soaps

There are international and local companies that can provide support in biological controls, should the project's subcontractors and beneficiaries so choose. And, these companies specialize in many, if not most of the pests encountered in Macedonia.

**Biological control agents**

Biological controls are available commercially from two large international companies, Koppert of Holland and Biobest of Belgium. The Dutch company Koppert provides many biological controls against

spider mites, beetles, leaf miners, mealy bugs, thrips, aphids, whiteflies, and moth and butterfly larvae. Koppert also provides the Koppert Side Effects List, a list of the side effects of pesticides on biological organisms. Their website is: http://www.koppert.com.

Biobest of Belgium provides many of the same or similar biological controls as Koppert, and includes a control against leaf hoppers. Their website is: http://www.biobest.be.

**AgBiz Beneficiary Mitigation Recommendations**

- Try biological and natural pest controls, as practical.

All the resources are provided in this PERSUAP to do this. The websites given provide direct links to companies producing biological controls and Attachment 5 to this PERSUAP provides botanically extracted products. Compare these with synthetic pesticides for economic purposes and effectiveness.

**Pesticide procedures element j: Host country's ability to regulate or control the distribution, storage, use, and disposal of the requested pesticide.**

This section examines the host country's existing infrastructure and human resources for managing the use of the proposed pesticides. If the host country's ability to regulate pesticides is inadequate, the proposed action—use of pesticides—could result in greater harm to the environment.

**Analysis**
Macdonia has several new (2007) laws and institutional framework covering plant health, plant protection products and phystosanitary issues covering entry of products into the country, as follows[17]:

Law on Plant Health (OG 29/05) regulates the plant health, measures and obligations related to the occurrence of organisms harmful to plants, measures for eradication, biological measures for plant protection, exchange of information and information system, costs and reimbursements, competence of the authorities, competent services, authorities and bodies in the field of plant health, and other matters concerning plant health. This Law is based on the Council Directive 2000/29/EEC. Downstream to this law, the potato disease secondary legislation have been adopted: Order (OG 32/2007) on control of Potato Wart Disease, Order (OG 32/2007) on control of *Globodera spp*., Order (OG 32/2007) on control of *Clavibacter michiganensis subsp. Michiganensis*, and Order (OG 32/2007) on control of *Ralstonia solanacearum* (Smith) Yabuuchi et al.

Law on Plant Protection Products (OG 110/07) regulates approval, marketing, utilization and control of the plant protection products, placement on the market and control of active substances, maximum level of residues, equipment for products utilization, equipment and the measures for preventing harmful consequences from the use of the means for plants protection of the human and animal health, the environment and nature, exchange of information regarding the products, production of products, register of natural and legal entities involved in production and placement of products, authorizing condition of the bodies responsible for implementation, monitoring and control of this law. This Law is in compliance with the EU measures 91/414/EC.

[17] The former Yugoslav Republic of Macedonia operational programme under the EU Instrument for Pre-Accession for Rural Development (IPARD) National Plan for Agriculture and Rural Development 2007-2013 (final draft version), Skopje, 14 December 2007.

The Phytosanitary Directorate within the Ministry of Agriculture, Forestry and Water Economy is in charge of the implementation of phytosanitary policy. The human capacity in the Phytosanitary Directorate is performing the following activites border inspection; the internal control, regional reporters and competent institutions for monitoring of the health situation of the plants in the country. In accordance with the Law on Plant Health, the State Phytosanitary Laboratory is established to conduct diagnostics and determination of harmful organisms, analysis of physical and chemical characteristics of the plant protection products, analysis of active substances, as well as biological examinations in certain fields of the phytosanitary legislation. The laboratory is in the course of staffing. The Institute for Agriculture – Skopje, the Institute for Southern Crops – Strumica, the Tobacco Institute – Prilep, the Faculty of Agricultural Sciences and Food and SPL – the State Phytosanitary Laboratory within the Ministry of Agriculture, Forestry and Water Economy are engaged in some of the activities.

The inspection supervision and control of the production, circulation and use of plant protection products is carried out by 26 state agriculture inspectors from the State Agriculture Inspectorate within the Ministry of Agriculture, Forestry and Water Economy.

Disposal of Pesticides

Pesticide packaging and unused/out of date pesticides are regarded in Macedonia as hazardous waste. In accordance with the law, hazardous wastes should be disposed of in a manner which does not harm the environment. The Macedonian law of 2007 on plant protection products is a copy of the EU Directive 91. Within these documents it is stated that "Procedures for destruction or decontamination of the plant protection product and its packaging. Procedures for destruction and decontamination must be developed for both small quantities (user level) and large quantities (warehouse level). The procedures must be consistent with provisions in place relating to the disposal of waste and of toxic waste. The means of disposal proposed should be without unacceptable influence on the environment and be the most cost effective and practical means of disposal feasible."

There are no dedicated hazardous waste dumps in Macedonia, no licensing system for export of hazardous wastes to other countries for disposal, no incinerators capable of combusting such materials and no storage facilities (such as chemical storage bunkers). The Ministry of Agriculture is currently developing the secondary legislation to support this law, what they call 'rules'. At the same time they realize the conflicting nature of the laws and the reality of the current situation. They are now working hurriedly to find an acceptable solution for this dilemma and are working with the Customs Department - as they face the same problem with confiscated hazardous materials seized at border crossings. A representative at the Phytosanitary Department indicated that they expect to develop a 'chemical storage bunker' where hazardous materials can be stored. This is modeled after the system currently used in Bulgaria.

The current situation is that at best, pesticide packaging and unused pesticides are being taken to municipal waste dumps. In reality (and according to field experience) pesticide packaging is often burned. Field experience in Macedonia indicates that the occurrence of 'pesticide waste' or leftovers is rare since this is a valuable commodity. Farmers tend to use it rather than throw it away - even if the effect isn't ideal (out of date, banned, and so on).

The UNDP Environment Officer in Skopje put out a tender in March 2007 for the assessment of options for pesticide packaging disposal in southern Macedonia around Pelister Lake. The plan is to build a pilot 'hazardous waste dump' for pesticide packaging, develop a collection system for pesticide packaging and waste pesticides from farmers and educate farmers on proper disposal. The project is in process now and might be scaled up after completion by the end of this year to all of Macedonia if successful.

Though Macedonian capabilities are still imperfect, proximity to the EU markets, and the presence of other donors like the UNDP, will drive better practices in pesticide regulation and disposal. And, as the regulatory structure evolves and grows more like the EU, implementation and compliance will improve during the length of the AgBiz project. The project can take advantage of and contribute to this progress with the use of progressive pest control tactics and safe use of pesticides. Attachment 11 at the end of this document provides pesticide disposal options.

Attached (Attachment 3) is a 2005 copy of Macedonian pesticide regulations that has been updated and translated. Several encouraging developments were discovered in Macedonia:

1. Pesticide regulations and registered pesticides are harmonizing with EU/EC, thus higher risk products are systematically being weeded out of retail;
2. Fiscal stamps are being placed across the bottle cap on newer pesticide products being imported to Macedonia, thus reducing informal products from China and India;
3. Each pesticide seller in farm shops must be a university-trained agronomist, thus the person knows what they are treating and what to treat it with; and
4. Most pesticides being imported from developed country sources are arriving with MSDSs for each product, with EU-required product safety information.

**Issues**

The Government of Macedonia has been routinely updating its list of registered pesticide products permissible for import and use. And, recently, the list is being harmonized such that all pesticides permitted for use in Macedonia are included, as a subset, of the EU-permitted list. Although no banned chlorinated hydrocarbon pesticides were discovered in any of the farm shops visited, "leaky" Macedonia border crossings, especially through Bulgaria, are a likely source of unregistered, internationally-banned, substandard and pirated pesticides.

Conversations with AgBiz project subcontractors and beneficiaries indicate that illegal products do enter Macedonia, generally through Bulgaria. These may include non-registered products as well as internationally banned (or tightly controlled) products. Though not confirmed (yet), products containing chemicals on the international Persistent Organic Pollutants (POPs) banned list—like DDT, dieldrin, HCH, heptachlor and lindane—encountered widely in developing countries—are likely to be found in retail shops in smaller towns and border towns, as they move easily across land borders. And, chemicals contained on the usually tightly controlled Prior Informed Consent (PIC) list are also likely to be encountered in Macedonia. Products from either of theses lists should not be used on projects-supported crops.

Quality can be reduced by: not containing the active ingredient stated on the label; not containing the amount of active ingredient listed on the label; and, more dangerously, containing any number of chemical reaction byproducts produced along with the active ingredient. Byproducts are often much more acutely toxic than the active ingredient. Smaller companies without the means for removing these impurities include them with the active ingredient. And, most developing countries lack the analytical means for detecting not only active ingredients, but the presence and amounts of these often highly toxic byproducts.

**AgBiz Beneficiary Mitigation Recommendations**

- Continue to work with the Ministry (Department) of Agriculture (MAFWE) as they implement environmental compliance.

AgBiz Subcontractor and beneficiary staff can continue to work closely with the MAFWE to stay abreast of developments in the regulation and registration of pesticides.

**Pesticide procedures element k: Provision for training of users and applicators.**

USAID recognizes that safety training is an essential component in programs involving the use of pesticides. The need for thorough training is particularly acute in developing countries, where the level of education of applicators may typically be lower than in developed countries.

**Analysis**

Training in IPM and Safe Use are of paramount importance for Macedonians using pesticides. Most of the agronomists trained recently and under the Yugoslav systems understand GAPs, IPM and pesticide safety issues well. They should serve as excellent trainers for farmers who provide agricultural products. International expertise could be brought in with IPM tactics not yet known or used in Macedonia.

**Issue**

Additional and refresher training are superb means for affecting distributor, rural farm shop owner and farmer behavior, now, as they begin to expand their agricultural opportunities, and before risky behaviors become set.

**AgBiz Beneficiary Mitigation Recommendations**

- Continue to implement Pesticide Safe Use training for Subcontractor and beneficiary staff and farmers.

Training can occur via a train-the-trainer format, whereby supervisors are trained for 2-3 days, followed by training for actual applicator and laborer staff for the following 2-3 days.

**Pesticide procedures element l: Provision made for monitoring the use and effectiveness of each pesticide.** Evaluating the risks and benefits of pesticide use should be an ongoing, dynamic process.

**Analysis**

From economic, safety and environmental aspects, the proper management of pesticide use will be advantageous. Keeping records on quantities and types of pesticides used, making notes on effectiveness of individual pesticides and pest numbers will help develop a more sustainable pesticide use plan for the company. In addition, many of the AgBiz project companies are either already in the process of or looking toward GlobalGap certification and in doing so will need to greatly improve their inventory and other documentation standards.

**Issue**

Review of the information gathered on current pesticide management plans shows that agronomists are well trained and experienced, but documentation is often incomplete or not retained from year to year. Developing a more systemized approach to record keeping will allow seasonal and annual comparison of pesticide effectiveness, pest numbers, crop production, maintenance of safety equipment, and so on.

**AgBiz Subcontractor and Beneficiary Mitigation Recommendations**

Site managers/agronomists should develop a record-keeping system, which is also a requirement for GlobalGAP certification.

- Site managers/agronomists will be responsible for developing a record keeping system. It is highly recommended that records are kept in an electronic format for easy editing, updating and modification. An example of such a system is included in Attachment 12 and can be made available in digital format for agronomists to modify as needed. The following aspects could be included in the system:
- Macedonian and EU regulation compliance: A list of Macedonian and EU laws related to the use of agrochemicals for plant protection, short notes on the relevance of the law, dates the laws come into or exit force.
- A pesticide checklist: This list allows agronomists to ensure that the pesticides they are using are allowed in Macedonia, the EU and other countries to which they export. It should also provide notes on special safety requirements.
- GAPs/IPM measures tried/used: Agronomists should try to incorporate a minimum of at least one new IPM measure per annum and document its success or failure. Agronomists should use contacts in the industry, agricultural research organizations or from university to stay in touch with current IPM techniques.
- Personal protective equipment (PPE): Lists of the types of equipment made available to applicators, number of pieces, prices and contact details of suppliers, dates when equipment needs to be washed, maintained or replaced. PPE should be numbered or personally assigned to applicators to ensure that it is not taken home where (as a contaminated material) it could pose a risk to family members.
- Monitoring/recording pests: Agronomists should incorporate into their records regular field pest monitoring and identification. This could be done by the agronomists themselves, or if properly trained by farmers.
- Environmental conditions: Field conditions should be incorporated into the record keeping system (for example; precipitation, soil moisture, soil pH, temperatures).
- Information should be transmitted at least annually to AgBiz, and AgBiz should report on this progress in safety and GAP/IPM use in annual reports.

**Monitoring should commence by beneficiary subcontractor companies for:**

- Resistance: Although unlikely due to very limited pesticide use to date, pesticide resistance development among pests could eventually occur, and will be noted by farmers complaining that the spray no longer works as it once did.
- Human poisonings and any incidences of chronic health issues.
- Animal and livestock deaths.
- Any incidences of water pollution.
- Fish, bird, wildlife or honeybee kills.

**Safe Use Action Plan (SUAP)**
**for AgBiz Subconctractor Beneficiary Companies/Farmers to Implement**
**and AgBiz Project Staff to Oversee**

**Action Plan Title: Actions to increase awareness of and mitigate pesticide risks on Macedonia assistance projects sites**

Action Plan Objectives: Reduce risks from pesticides

*On the following Action Plan Matrix,* ***COP or delegate insert the start and end dates for each activity (see recommendations in Executive Summary for guidance on deadlines) or action or groups of sub-actions or activities to complete the action with the names of those responsible for each action, and a budget.*** *Once this action plan is completely filled, and actions are under way or done, it can be transmitted to AID to show Regulation 216 compliance progress reducing pesticide risks on your project.*

| Actions/Activities | Start | End | Who | Budget |
|---|---|---|---|---|
| Reiterating Pesticide Regulations and Restrictions | | | | |
| Ensure that Subcontractors do not propose the use of pesticide products containing active ingredients not EPA registered, RUP, too toxic, known carcinogen or known water pollutant, shaded red in Table 1 (PER Factors A, E, J) | | | | |
| Ensure that Subcontractors do not promote or use locally-available insecticides containing banned POPs or PIC chemicals like insecticide endosulfan/Thiodan (PER Factor J) | | | | |
| Ensure that Subcontractors do not promote or use fumigant aluminum phosphide to treat stored grain or produce (instead use trained and equipped fumigation services) (PER Factor D) | | | | |
| Promote the least toxic pesticides for each crop protection situation (PER Factor B) | | | | |
| Check for any movement by EU or MAFWE on new registrations of pesticides, including natural pesticides, and obtain this new pesticide registration information to benefit Subcontractors extension staff and reporting to USAID (PER Factors A, B, G, J, K, L) | | | | |
| Pesticide Risk Awareness and Mitigation | | | | |
| Provide annual training for Subcontractors and their served beneficiary farmers using the IPM and pesticide safety training topic list in Annex 8 (Factors A, B, C, D, E, F, G, K) | | | | |
| Ensure that Subcontractor encourage farmers and farmer associations or cooperatives to each have 1 | | | | |

| Actions/Activities | Start | End | Who | Budget |
|---|---|---|---|---|
| or 2 sets of PPE for the group to share; and encourage them to assign a responsible PPE caretaker for each group (PER Factors D, E, L) | | | | |
| Ensure that Subcontractors train farmers to use PPE and apply pesticides only when there is no wind or rain in the late afternoon or night when bees do not forage and it is cooler, or early morning if there is no dew present (PER Factors D, E, K, L) | | | | |
| Good Agriculture Practices and IPM | | | | |
| Have Subcontractors extension staff promote pest-specific crop-pest-IPM-pesticide information with farmers for field use, validation, modification or adaptation (PER Factor C, H, K, L) | | | | |
| Use IPM information to produce crop-specific production PMPs, and then field reference guides or posters for farmers to use to anticipate and manage pests, diseases and weeds (PER Factor C) | | | | |
| Have Subcontractor extension staff promote the use of artisanal natural chemicals listed in Annexes 1, 4 and 5, as available (PER Factors B, H, I) | | | | |
| Follow GlobalGAP standards and website http://www.epa.gov/oppfead1/labeling/lrm/chap-13.htm for empty container disposal and pesticide record-keeping (PER Factors D, J, K, L) | | | | |
| During Subcontractor training, promote use of electrostatic and sleeve-boom sprayers that can reduce spray drift (PER Factor D) | | | | |
| Natural Resources Protection | | | | |
| Use GAPs, erosion control and low aquatic toxicity pesticides near known protected areas and do not use pesticides within 30 meters of open water (PER Factor G, H) | | | | |
| Consider the use of botanical, microbial or biological controls near protected areas and species (PER Factor G) | | | | |
| Protect honeybees by spraying in late afternoon or night, and warn beekeepers of impending spray operations (PER Factor G) | | | | |
| On sandy soil with a high water table (less than 2 meters) do not use herbicides or other pesticides with water pollution potential (PER Factor G, H) | | | | |
| Near waterways, consider pesticides that both have low aquatic toxicity, no pollution potential and break down quickly; and do not apply when rain is | | | | |

| Actions/Activities | Start | End | Who | Budget |
|---|---|---|---|---|
| imminent (PER Factor G, H) | | | | |
| Project Management Responsibilities | | | | |
| Define and assure safe pesticide use practices following GlobalGAP standards, and audit AgBiz/Subcontractor-assisted farmer's use of each best practice (PER Factors K, L) | | | | |
| Keep copies of the current list of pesticide AIs analyzed by this PERSUAP at all AgBiz and Subcontractor centers (Table 1, PER Factors A, D, J) | | | | |
| Collect and keep copies of MSDSs for each commercial pesticide that farmers are likely to use at each Subcontractor center (PER Factors A, B, E, G) | | | | |
| Keep PERSUAP recommendation implementation records and report on them in Annual Reports, under a heading titled "Environmental Compliance and Best Practices" (PER Factor K, L) | | | | |
| Provide for SUAP implementation and use | | | | |

Action Plan Goals: Decrease the number of Subcontractors and beneficiary farmers unaware of pesticide safety, environmental and natural resource protection, and IPM concepts.

Action Plan Discussion Points:

**Action Plan Final Sign-off: COP _____, date: _____**

Introduction to Table 1 (below)

Table 1 below compiles all of the AIs in pesticides (natural and synthetic) registered for use in Republic of Macedonia. Project decision-makers—especially those who interface at the field level with Subcontractor and beneficiary farmers—are encouraged to look at the label of potential pesticide choices to determine the AIs contained in them and then use this Table as a quick reference guide to attributes and issues with each chemical.

The pesticide attributes include pesticide class (to manage resistance by rotating chemicals from different classes), EPA registration and Restricted Use Pesticide (RUP) status (to comply with Regulation 216) and acute toxicity (judged by this document to be safe, or not, for small-holder farmers—most Class I chemicals are not considered safe for smallholder farmers to use). Table 1 also presents chronic health issues, water pollution potential, and potential toxicities to important non-target organisms like fish, honeybee pollinators, birds and several aquatic organisms.

Further, Table 1 contains basic pieces of human safety and environmental data needed for the various analyses required throughout the PER; ergo it is referred to throughout this document. And it provides data used to produce the project-critical information contained in Annex 8. Thus, this PERSUAP provides useful tools for evaluating and choosing among IPM options, including natural and synthetic pesticides, while adhering to 22 CFR 216, as well as aiming at the market-driven best practices found in Standards and Certification (S&C) systems—the highest international standards available.

**Keys to matrix:**

**NL/blank** = Not Listed (information not available)

**Pend** (In column 5) = Pending EU imminent approval

**Red shading:** Subcontractors do not promote during AgBiz or GlobaGAP extension and training, or use with USAId resources, any products containing AIs shaded in red color.

**Yellow shading:** Caution; Promote during GlobalGAP training only product choices containing these AIs which are not designated as RUP (see http://www.pesticideinfo.org, alphabetical listings, for each AI with specific EPA-approved RUP and non-RUP products; choose only non-RUP products).

**Green shading:** Approved by EPA and this PERSUAP. Can be promoted for use during GlobalGAP training on AgBiz-supported (through subcontracts) farms and farmers.

**Beige shading:** Pending imminent approval by EU in 2011. Can be promoted or used with USAID resources only after EU and Macedonia approve products containing these same AIs.

**WHO Acute Toxicity Classes**: O = Obsolete; Ia = Extremely Hazardous; Ib = Highly Hazardous; II = Moderately Hazardous; III = Slightly Hazardous; U = Unlikely to present acute hazard in normal use

**EPA Acute Toxicity Classes**: I = Extremely Toxic; II = Highly Toxic; III = Moderately Toxic; IV = Slightly Toxic

**Chronic Human Toxicity**: KC = Known Carcinogen; PC = Possible Carcinogen; ED = Potential Endocrine Disruptor; RD = Potential Reproductive & Development Toxin; P = Risk of Parkinson's

**Ecotoxicity**: PNT = Practically Not Toxic; NAT = Not Acutely Toxic; ST = Slightly Toxic; MT = Moderately Toxic; HT = Highly Toxic; VHT = Very Highly Toxic

**References:** The following pesticide websites were used for locating and cross referencing specific toxicology information for each active ingredient in Table 1, below:
http://www.pesticideinfo.org (PAN most complete pesticides database, linked to EPA)
http://extoxnet.orst.edu/pips/ghindex.html (Extoxnet Oregon State database with ecotox)
http://cfpub.epa.gov/oppref/rereg/status.cfm?show=rereg (EPA Registration Eligibility Decisions)
http://www.epa.gov/pesticides/biopesticides/ai/all_ais.htm (EPA regulated biopesticides)
http://www.epa.gov/opppmsd1/RestProd/rupjun02.htm (EPA restricted use pesticides)
http://www.epa.gov/pesticides/health/tox_categories.htm (EPA Toxicity Classifications)
http://www.epa.gov/opppmsd1/PPISdata/index.html (EPA pesticide product information)
http://www.chemfinder.camsoft.com (chemical database & internet search, free & fee)
http://www.hclrss.demon.co.uk/index.html (compendium of pesticide common names)
http://www.agf.gov.bc.ca/pesticides/f_2.htm (all types of application equipment)
http://www.ohioline.osu.edu/hyg-fact/2000/2161.html (pesticide toxicity to honeybees)
http://www.greenbook.net/Search/AdvancedSearch (pesticide Material Safety Data Sheets)
http://wihort.uwex.edu/turf/Earthworms.htm (pesticide toxicity to earthworms)
http://www.ipm.ucdavis.edu/index.html (IPM and pesticide recommendations)
http://edis.ifas.ufl.edu/pdffiles/PI/PI07300.pdf (Restricted Use Pesticides)
http://sitem.herts.ac.uk/aeru/footprint/en/index.htm (all pesticide data)

## Table 1: 2011 October EU & 2010 Macedonia Accepted Pesticide AIs Health & Environment Risk Analysis

| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| **Fumigant/Soil Treatment** | | | | | | | | | | | | | | | | | |
| dazomet | unclassified | yes | no | yes | III | III | NL | **potential** | ST | PNT | ST | | MT | | HT | | HT |
| **Insecticides** | | | | | | | | | | | | | | | | | |
| abamectin(a) | microbial extract | yes | no | yes | NL | II, III | RD | NL | ST | HT | PNT | | | | HT | VHT | VHT |
| acequinocyl | unclassified | yes | no | yes | NL | III | NL | NL | MT | MT | MT | | MT | | HT | | |
| acetamiprid | neonicotinoid | yes | no | yes | NL | III | NL | NL | NAT | MT | HT | | | | NAT | | |
| *Adoxophyes orana* | microbial | **no** | no | pend | NL | NL | NL | NL | | | | | | | | | |
| alpha-cypermethrin | synthetic pyrethroid | **no** | no | yes | II | II, III | PC | NL | HT | HT | PNT | | | MT | VHT | VHT | VHT |
| aluminum phosphide | inorganic | yes | **all** | yes | NL | **I** | NL | NL | HT | HT | HT | | | | MT | | |
| azadirachtin/neem oil | botanical | yes | no | yes | NL | III | NL | NL | ST | NAT | NAT | MT | | | | MT | |
| *Bacillus thuringiensis*/BT | microbial | yes | no | yes | III | III | NL | NL | MT | PNT | NAT | NAT | | ST | ST | | |
| *Beauveria bassiana* | microbial | yes | no | yes | NL | III | NL | NL | NAT | NAT | NAT | | NAT | | NAT | | |
| beta cyfluthrin(e) | synthetic pyrethroid | yes | **some** | yes | II | II, III | ED | NL | VHT | HT | PNT | | | ST | | VHT | VHT |
| beta-cypermethrin | synthetic pyrethroid | yes | **some** | pend | | II, III | PC | NL | HT | HT | ST | | | | HT | | |

**Table 1: 2011 October EU & 2010 Macedonia Accepted Pesticide AIs Health & Environment Risk Analysis**

| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| **Insecticides** | | | | | | | | | | | | | | | | | |
| buprofezin | insect growth regulator | yes | no | yes | U | III | PC | NL | MT | ST | MT | NAT | MT | | | | |
| capric acid | unclassified | yes | no | yes | NL | I | NL | NL | | | | ST | | | | | |
| caprylic acid | unclassified | yes | no | yes | NL | I, III | NL | NL | | | | NAT | | | | | |
| carbon dioxide | inorganic | yes | no | yes | NL | II | NL | NL | | | | | | | | | |
| *Cydia pomonella* Granulovirus | microbial/viral | yes | no | yes | NL | II, III | NL | NL | | | | | | | | | |
| Chlorantraniliprole/rynaxypyr | anthranilic diamide | yes | no | pend | NL | IV | NL | NL | NAT | MT | MT | | MT | | HT | | |
| chlorpyrifos | organophosphate | yes | **some** | yes | II | II, III | ED | NL | HT | HT | HT | MT | PNT | MT | VHT | HT | MT |
| chlorpyrifos methyl | organophosphate | yes | no | yes | U | I, III | NL | NL | MT | HT | MT | MT | | | VHT | VHT | MT |
| chromafenozide | insect growth regulator | **no** | **no** | pend | NL | NL | NL | NL | MT | MT | ST | | MT | | | | |
| clothianidin | neonicotinoid | yes | no | yes | NL | III | NL | NL | ST | HT | ST | | | | ST | | |
| cyfluthrin | synthetic pyrethroid | yes | **some** | yes | II | II, III | ED | NL | VHT | HT | PNT | | | ST | | VHT | VHT |
| cypermethrin | synthetic pyrethroid | **no** | **some** | yes | NL | II, III | PC, ED, RD | NL | HT | HT | PNT | | | MT | VHT | VHT | VHT |
| cyromazine | triazine | yes | no | yes | U | III | NL | **known** | MT | ST | MT | | MT | | MT | NAT | |
| deltamethrin | synthetic pyrethroid | yes | **cotton** | yes | II | II, III | NL | NL | HT | MT | | VHT | | NAT | | VHT | VHT |
| diatomaceous earth | inorganic | yes | **no** | yes | NL | III | NL | NL | | | | | | | | | |
| diflubenzuron | insect growth regulator | yes | **some** | yes | U | III | NL | NL | ST | NAT | PNT | NAT | | NAT | NAT | ST | MT |

**Table 1: 2011 October EU & 2010 Macedonia Accepted Pesticide AIs Health & Environment Risk Analysis**

| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| **Insecticides** | | | | | | | | | | | | | | | | | |
| dimethoate | organophosphate | yes | no | yes | II | II | PC, ED, RD | **potential** | ST | VHT | VHT | HT | MT | VHT | HT | VHT | MT |
| emamectin benzoate | botanical | yes | **some** | pend | NL | I, III | NL | NL | HT | MT | | | | HT | HT | HT | |
| esfenvalerate | synthetic pyrethroid | yes | no | yes | II | II, III | ED | NL | VHT | HT | ST | VHT | | ST | HT | | |
| et(h)ofenprox | synthetic pyrethroid | yes | no | yes | U | III | PC, RD | NL | HT | HT | MT | | MT | | HT | | |
| ethoprop(hos) | organophosphate | yes | **some** | yes | **Ia** | **I** | **KC** | **potential** | MT | MT | HT | | MT | | MT | | |
| etoxazole | diphenyl oxazoline | yes | **one** | yes | NL | III | NL | NL | MT | MT | MT | | MT | | HT | MT | |
| fatty acids insecticidal soap | fatty acids | yes | no | yes | NL | II, III | NL | NL | MT | | | | | | | | |
| fenoxycarb | insect growth regulator | yes | no | yes | U | III | **KC**, RD | **potential** | VHT | PNT | PNT | | | | | VHT | MT |
| Fenugreek seed powder | natural--not regulated | | | yes | NL | NL | NL | NL | | | | | | | | | |
| fipronil | pyrazole | yes | **some** | yes | II | II, III | PC, ED | **potential** | HT | HT | HT | | | | | HT | HT |
| flonicamid | pyridine | yes | **some** | yes | NL | II, III | NL | NL | MT | MT | MT | | | | | | |
| flubendiamide | benzene dicarboxamide | yes | no | pend | NL | III | NL | NL | HT | NAT | MT | | MT | | HT | | |
| formetanate | formamadine | yes | no | yes | **Ib** | **I** | NL | **potential** | MT | HT | HT | | ST | | HT | | MT |
| gamma-cyhalothrin | pyrethroid | yes | **some** | pend | III | III, IV | ED | NL | HT | HT | ST | | | | HT | | |
| *Helicoverpa armigera* NPV | microbial | **no** | no | pend | NL | NL | NL | NL | | | | | | | | | |
| hexythiazox | insect growth regulator | yes | no | yes | U | III | PC | NL | HT | NAT | MT | | MT | | MT | | |

## Table 1: 2011 October EU & 2010 Macedonia Accepted Pesticide AIs Health & Environment Risk Analysis

| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| **Insecticides** | | | | | | | | | | | | | | | | | |
| hydrolysed proteins | natural--not regulated | | | yes | NL | NL | NL | NL | | | | | | | | | |
| imidacloprid | neonicotinoid | yes | no | yes | II | II, III | NL | **potential** | NAT | | MT | | | | | VHT | |
| indoxacarb | oxadiazine | yes | no | yes | **O** | III | NL | NL | MT | HT | HT | | NAT | | MT | | |
| lambda cyhalothrin | synthetic pyrethroid | yes | **some** | yes | II | II, III | ED | NL | VHT | HT | PNT | | VHT | VHT | VHT | VHT | |
| lauric acid | organic | **no** | no | yes | NL | NAT | NL | NL | ST | | | ST | | | | | |
| lime sulphur/calcium polysulphid | inorganic | yes | no | yes | NL | I | NL | NL | MT | | | | MT | | MT | | |
| lufenuron | benzoyl urea | yes | no | yes | NL | III | NL | NL | MT | ST | MT | | MT | | HT | ST | |
| magnesium phosphide | inorganic | yes | **all** | yes | NL | **I** | NL | NL | MT | | HT | | MT | | | | |
| malathion | organophosphate | yes | no | yes | III | II, III | PC, ED | **potential** | MT | HT | MT | HT | ST | VHT | MT | VHT | HT |
| Metaflumizone | semicarbazone | yes | no | pend | NL | III | NL | NL | MT | NAT | NAT | | | | MT | | |
| *Metarhizium anisopliae* | microbial | yes | no | yes | NL | III | NL | NL | | NAT | NAT | | NAT | | | | |
| methiocarb/mercaptodimethur | carbamate | yes | **most** | yes | **Ib** | **I**, III | NL | **potential** | HT | HT | MT | MT | MT | MT | MT | HT | HT |
| methomyl | carbamate | yes | **few** | yes | **Ib** | **I**, III | ED | **potential** | MT | HT | HT | ST | HT | ST | HT | VHT | HT |
| methoxyfenozide | diacylhydrazine | yes | no | yes | U | III | NL | **potential** | MT | MT | ST | | ST | | | HT | MT |
| methyl decanoate | inorganic | **no** | no | yes | NL | NL | NL | NL | | | | | | | | | |
| methyl octaonate | inorganic | **no** | no | yes | NL | NL | NL | NL | | | | | | | | | |

## Table 1: 2011 October EU & 2010 Macedonia Accepted Pesticide AIs Health & Environment Risk Analysis

| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| **Insecticides** | | | | | | | | | | | | | | | | | |
| milbemectin | microbial | yes | **one** | yes | NL | II, III | NL | **potential** | HT | HT | MT | | MT | | HT | | |
| novaluron | insect growth regulator | yes | no | pend | NL | II, III | NL | NL | MT | MT | MT | | MT | | HT | | |
| oleic acid | fatty acids | **no** | no | yes | NL | III | NL | NL | | | | | | | | | |
| orange oil | natural--not regulated | | | pend | NL | NL | NL | NL | | | | | | | | | |
| oxamyl | carbamate | yes | **most** | yes | **Ib** | **I** | NL | NL | ST | HT | VHT | | HT | | ST | | MT |
| parafin oil | petroleum | yes | no | yes | NL | III | NL | NL | NAT | | | | | | | | |
| pelargonic acid | organic | **no** | no | yes | NL | NL | NL | NL | MT | MT | | | | | MT | | |
| phosmet | organophosphate | yes | no | yes | II | **I**, II, III | PC | **potential** | MT | VHT | MT | | NAT | ST | HT | MT | HT |
| phosphane/phosphine | inorganic | yes | **all** | pend | **NL** | **I** | NL | NL | HT | | | | | | MT | | |
| pirimicarb | carbamate | yes | no | yes | II | II | NL | NL | NAT | PNT | | ST | | | | MT | |
| pyrimiphos methyl | organophosphate | yes | no | yes | II, III | **I**, II, III | NL | NL | MT | HT | MT | | MT | | | VHT | VHT |
| pymetrozine | triazine | yes | no | yes | III | III | PC | **potential** | MT | ST | MT | | MT | | MT | | |
| pyrethrins (Marigold extract) | botanical | yes | no | yes | II | III | PC | NL | HT | HT | ST | | MT | | HT | | |
| pyridaben | unclassified | yes | no | yes | II | II, III | NL | NL | VHT | HT | ST | | MT | | HT | | VHT |
| pyridalyl | unclassified | yes | no | pend | NL | III | NL | NL | MT | MT | MT | | | | | | |
| pyriproxyfen | insect growth regulator | yes | no | yes | U | II, III | NL | NL | MT | MT | MT | | MT | | MT | | VHT |

## Table 1: 2011 October EU & 2010 Macedonia Accepted Pesticide AIs Health & Environment Risk Analysis

| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| **Insecticides** | | | | | | | | | | | | | | | | | |
| spinetoram | unclassified | yes | no | pend | NL | NL | NL | NL | MT | | NAT | | MT | | MT | | |
| spinosad | microbial | yes | no | yes | U | III | NL | NL | MT | HT | PNT | | ST | | | HT | MT |
| spirodiclofen | keto-enol | yes | no | yes | NL | III | PC | NL | MT | HT | NAT | | NAT | MT | MT | MT | |
| spiromesifen | keto-enol | yes | no | pend | NL | III | NL | NL | HT | ST | MT | | MT | | | | |
| spirotetramat | keto-enol | yes | no | pend | NL | II, III | NL | NL | | MT | MT | | MT | | MT | | |
| *Spodoptera exigua* NPV | microbial/viral | **no** | no | yes | NL | NL | NL | NL | | | | | | | | | |
| *Spodoptera littoralis* NPHV | microbial/viral | **no** | no | pend | NL | NL | NL | NL | | | | | | | | | |
| sulfuryl fluoride | inorganic fumigant | yes | **most** | yes | NL | **I** | NL | NL | MT | | | | | | MT | | |
| *Tagetes* (Marigold) oil | botanical | **no** | no | pend | NL | NL | NL | NL | | | | | | | | | |
| tau fluvalinate | synthetic pyrethroid | yes | no | yes | U | III | ED, RD | NL | HT | MT | ST | | MT | | HT | | |
| *Melaleuca alternifolia* oil | botanical | **no** | no | yes | NL | NL | NL | NL | | | | | | | | | |
| teflubenzuron | insect growth regulator | **no** | no | yes | U | IV | NL | NL | ST | MT | ST | ST | HT | HT | HT | HT | HT |
| tefluthrin | synthetic pyrethroid | yes | **corn seed** | yes | Ib | III | ED | NL | VHT | HT | PNT | | | HT | HT | HT | HT |
| thiacloprid | neonicotinoid | yes | no | yes | II | II | PC | NL | | MT | ST | | MT | | | VHT | ST |
| thiamethoxam | neonicotinoid | yes | no | yes | NL | III | PC | NL | PNT | HT | PNT | | PNT | PNT | PNT | PNT | |
| thyme oil | natural--not regulated | | | pend | NL | NL | NL | NL | | | | | | | | | |

## Table 1: 2011 October EU & 2010 Macedonia Accepted Pesticide AIs Health & Environment Risk Analysis

| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| **Insecticides** | | | | | | | | | | | | | | | | | |
| thymol | botanical | yes | no | pend | NL | III | NL | NL | MT | | | | MT | ST | ST | | MT |
| triflumuron | insect growth regulator | **no** | no | yes | U | IV | NL | NL | VHT | ST | MT | | | | MT | MT | MT |
| urea | inorganic carbamide | **no** | no | yes | | III | NL | NL | NAT | | | | | | NAT | | |
| *Lecanicillium muscarium* | microbial | **no** | no | yes | NL | NL | NL | NL | MT | NAT | | | | | | | |
| zeta cypermethrin | pyrethroid | yes | **some** | yes | **Ib** | II, III | PC, ED | NL | VHT | VHT | NAT | | NAT | VHT | VHT | VHT | |
| **Miticides/Acaricides** | | | | | | | | | | | | | | | | | |
| abamectin/avermectin | microbial | yes | no | yes | NL | II, III | RD | NL | ST | HT | PNT | | | | HT | VHT | VHT |
| acetamiprid | chloro-nicotinyl | yes | no | yes | NL | III | NL | NL | NAT | MT | | | | | NAT | | |
| acequinocyl | unclassified | yes | no | pend | NL | III | NL | NL | MT | MT | MT | | MT | | HT | | |
| bifenazate | hydrazine carboxylate | yes | no | yes | NL | III | NL | NL | HT | MT | MT | | MT | | MT | | |
| capric acid | unclassified | yes | no | yes | NL | I | NL | NL | | | | ST | | | | | |
| caprylic acid | unclassified | yes | no | yes | NL | I, III | NL | NL | | | | NAT | | | | | |
| chlorpyrifos | organophosphate | yes | **some** | yes | II | II, III | ED | NL | HT | HT | HT | MT | PNT | MT | VHT | HT | MT |
| chlorpyrifos methyl | organophosphate | yes | no | yes | U | I, III | NL | NL | MT | HT | MT | MT | | | VHT | VHT | MT |

## Table 1: 2011 October EU & 2010 Macedonia Accepted Pesticide AIs Health & Environment Risk Analysis

| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity: fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Miticides/Acaricides** | | | | | | | | | | | | | | | | | |
| clofentezine | tetrazine | yes | no | yes | U | III | PC, RD | NL | ST | PNT | ST | | | | | | ST |
| cyfluthrin | synthetic pyrethroid | yes | **some** | yes | II | II, III | ED | NL | VHT | HT | PNT | | | ST | | VHT | VHT |
| cyflumetofen | bridged diphenyl | **no** | no | pend | NL | NL | NL | NL | MT | | MT | MT | | | HT | HT | |
| cypermethrin | pyrethroid | yes | **most** | yes | NL | II, III | PC, ED, RD | NL | HT | HT | PNT | | | MT | VHT | VHT | VHT |
| fatty acids insecticidal soap | fatty acids | yes | no | yes | NL | II, III | NL | NL | MT | | | | | | | | |
| fenazaquin | inorganic | yes | no | yes | NL | **I** | NL | NL | HT | | | | | | | | |
| fenbutatin oxide | organotin | yes | **some** | yes | U | III | ED, RD | NL | VHT | NAT | MT | | MT | | HT | | VHT |
| fenpyroximate | pyrazole | yes | no | yes | NL | II | NL | NL | HT | MT | MT | | MT | | HT | | |
| formetanate | formamadine | yes | no | yes | **Ib** | **I** | NL | **potential** | MT | HT | HT | | ST | | HT | | MT |
| hexythiazox | insect growth regulator | yes | no | yes | U | III | PC | NL | HT | NAT | MT | | MT | | MT | | |
| lauric acid | organic | **no** | no | yes | NL | NAT | NL | NL | ST | | | ST | | | | | |
| lime sulphur/calcium polysulphid | inorganic | yes | no | yes | NL | I | NL | NL | MT | | | | MT | | MT | | |
| malathion | organophosphate | yes | no | yes | III | II, III | PC, ED | **potential** | MT | HT | MT | HT | ST | VHT | MT | VHT | HT |
| methyl decanoate | inorganic | **no** | no | yes | NL | NL | NL | NL | | | | | | | | | |
| methyl octaonate | inorganic | **no** | no | yes | NL | NL | NL | NL | | | | | | | | | |
| oleic acid | fatty acids | **no** | no | yes | NL | III | NL | NL | | | | | | | | | |

**Table 1: 2011 October EU & 2010 Macedonia Accepted Pesticide AIs Health & Environment Risk Analysis**

| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| **Miticides/Acaricides** | | | | | | | | | | | | | | | | | |
| pelargonic acid | organic | **no** | no | yes | NL | NL | NL | NL | MT | MT | | | | | MT | | |
| pyridaben | unclassified | yes | no | yes | II | II, III | NL | NL | VHT | HT | ST | | MT | | HT | | VHT |
| spirodiclofen | keto-enol | yes | no | yes | NL | III | PC | NL | MT | HT | NAT | | NAT | MT | MT | MT | |
| spiromesifen | keto-enol | yes | no | pend | NL | III | NL | NL | HT | ST | MT | | MT | | | | |
| sulfur/sulphur | Inorganic | yes | no | yes | U | III | NL | NL | NAT | NAT | NAT | NAT | | | | | NAT |
| *Tagetes* (Marigold) oil | botanical | **no** | no | pend | NL | NL | NL | NL | | | | | | | | | |
| tebufenpyrad | pyrazole | yes | no | yes | III | II | NL | NL | HT | MT | MT | | MT | | HT | | |
| **Molluscicides** | | | | | | | | | | | | | | | | | |
| iron (ferric) phosphate | inorganic | yes | no | yes | NL | III | NL | NL | | | | | | | | | |
| metaldehyde | aldehyde | yes | no | yes | II | II, III | PC | potential | NAT | PNT | MT | PNT | PNT | PNT | PNT | PNT | PNT |
| methiocarb/mercaptodimethur | carbamate | yes | **some** | yes | **Ib** | **I**, III | NL | potential | HT | HT | MT | MT | MT | MT | MT | HT | HT |
| **Nematicides** | | | | | | | | | | | | | | | | | |

## Table 1: 2011 October EU & 2010 Macedonia Accepted Pesticide AIs Health & Environment Risk Analysis

| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| **Nematicides** | | | | | | | | | | | | | | | | | |
| *Bacillus firmus* | microbial | yes | no | pend | NL | III | NL | NL | NAT | NAT | NAT | | NAT | NAT | NAT | NAT | NAT |
| dazomet | unclassified | yes | no | yes | III | III | NL | potential | ST | PNT | ST | | MT | | HT | | HT |
| dimethoate | organophosphate | yes | no | yes | II | II | PC, ED, RD | potential | ST | VHT | VHT | HT | MT | VHT | HT | VHT | MT |
| ethoprop(hos) | organophosphate | yes | **some** | yes | **Ia** | **I** | KC | potential | MT | MT | HT | | MT | | MT | | |
| fenamiphos/phenamiphos | organophosphate | yes | **most** | yes | **Ib** | **I** | NL | potential | HT | HT | HT | | MT | | VHT | | MT |
| fosthiazate | organophosphate | yes | **most** | yes | NL | **I**, II | NL | NL | ST | HT | HT | | MT | | | | HT |
| iprodione | dicarboximide | yes | no | yes | III | II, III | PC, ED | potential | MT | MT | MT | | MT | | HT | MT | MT |
| oxamyl | carbamate | yes | **most** | yes | **Ib** | **I** | NL | NL | ST | HT | VHT | | HT | | ST | | MT |
| *Paecilomyces fumosoroseus* | microbial | **no** | no | pend | NL | NL | NL | NL | | | | | | | | | |
| *Paecilomyces lilacinus* | microbial | yes | no | yes | NL | III | NL | NL | MT | | | | | | MT | | |
| **Rodenticides** | | | | | | | | | | | | | | | | | |
| aluminum phosphide | inorganic | yes | **all** | yes | none | **I** | NL | NL | HT | HT | HT | | | | MT | | |
| bromadiolone | coumarin | yes | no | yes | **Ia** | III | NL | NL | MT | | MT | | | | MT | | |
| calcium phosphide | inorganic | **no** | no | yes | NL | NL | NL | NL | HT | | HT | | MT | | HT | HT | |

## Table 1: 2011 October EU & 2010 Macedonia Accepted Pesticide AIs Health & Environment Risk Analysis

| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| **Rodenticides** | | | | | | | | | | | | | | | | | |
| carbon dioxide | inorganic | yes | no | yes | NL | II | NL | NL | | | | | | | | | |
| difenacoum | coumarin | yes | no | yes | **Ia** | III | NL | NL | HT | | HT | | | | MT | | |
| magnesium phosphide | inorganic | yes | **all** | yes | none | **I** | NL | NL | MT | | HT | | MT | | | | |
| warfarin/coumaphene | coumarin | yes | no | yes | **Ib** | II, III | RD | NL | NAT | | MT | | | | NAT | | NAT |
| zinc phosphide | inorganic | yes | **some** | yes | **Ib** | **I**, II, III | RD | NL | HT | VHT | HT | | | | MT | | |
| **Fungicides** | | | | | | | | | | | | | | | | | |
| 2-phenylphenol | phenol | **no** | no | yes | III | I | **KC** | NL | MT | | | | MT | | MT | MT | |
| 8-hydroxyquinoline | quinoline | **no** | no | yes | NL | III | NL | NL | MT | MT | MT | | MT | | MT | | ST |
| ametoctradin | triazolopyrimidine | **no** | no | pend | NL | NL | NL | NL | HT | MT | MT | | ST | | MT | | |
| amisulbrom | sulfonamide | **no** | no | pend | NL | NL | NL | NL | | | | | | | | | |
| *Ampelomyces quisqualis* | microbial | **no** | no | yes | NL | III | NL | NL | | | | | | | | | |
| ascorbic acid | natural--not regulated | | | pend | NL | NL | NL | NL | | | | | | | | | |
| *Aureobasidium pullulans* | microbial | **no** | no | pend | NL | NL | NL | NL | | | | | | | | | |
| azoxystrobin | strobin | yes | no | yes | U | III | NL | **potential** | MT | MT | MT | | MT | | MT | | VHT |

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| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| **Fungicides** | | | | | | | | | | | | | | | | | |
| *Bacillus amyloliquefaciens* | microbial | **no** | no | pend | U | IV | NL | NL | | | | | | | | | |
| *Bacillus pumilus* | microbial | yes | no | pend | NL | III | NL | NL | | | | | | | | | |
| *Bacillus subtilis* | bacterial | yes | no | yes | U | III, IV | NL | NL | NAT | ST | NAT | | NAT | | NAT | | |
| benalaxyl | xylylalanine | **no** | no | yes | U | NL | NL | NL | MT | MT | ST | | MT | | MT | | |
| benalaxyl-M | phenylamide | **no** | no | pend | U | NL | NL | NL | MT | ST | ST | | MT | | MT | | |
| benthiavalicarb | carbamate | **no** | no | yes | NL | NL | NL | NL | | | | | | | | | |
| benzoic acid | aromatic carboxylic acid | yes | no | yes | NL | I | NL | NL | NAT | | | NAT | | | | | NAT |
| bixafen | pyrazole | **no** | no | pend | NL | NL | NL | NL | | | | | | | | | |
| Bordeaux mixture components | inorganic | yes | no | yes | III | NL | NL | NL | HT | MT | MT | | MT | | MT | | |
| boscalid/nicobifen | carboximide (anilide) | yes | no | yes | NL | II, III | PC | NL | MT | MT | MT | | MT | | MT | | |
| bromuconazole | azole | yes | no | yes | II | II, III | NL | NL | MT | MT | ST | | ST | MT | MT | MT | |
| bupirimate | pyrimidinol | **no** | no | yes | U | III | NL | NL | MT | MT | ST | | MT | | MT | | |
| *Candida oleophila* | microbial | yes | no | pend | NL | III | NL | NL | | | | | | | | | |
| captan | thiopthalamide | yes | no | yes | NL | **I**, II, III | **KC** | NL | HT | NAT | PNT | MT | | MT | NAT | MT | MT |
| carbendazim | benzimidazole | yes | no | yes | U | III | PC, ED | NL | MT | NAT | ST | ST | | | ST | | HT |
| carboxin | oxathiim | yes | no | yes | U | III | RD | NL | MT | MT | NAT | | MT | | NAT | | |

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| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| **Fungicides** | | | | | | | | | | | | | | | | | |
| chlorothalonil | chloronitrile | yes | no | yes | NL | **I**, II, III | PC | **potential** | VHT | | | HT | | ST | VHT | MT | MT |
| *Coniothyrium minitans* | microbial | yes | no | yes | NL | III | NL | NL | MT | | | | | | | | |
| copper/cupric hydroxide | inorganic | yes | no | yes | II | I, II, III | NL | NL | HT | MT | MT | | MT | HT | NAT | HT | HT |
| copper (cupric) oxide (CuO) | inorganic | yes | **few** | yes | NL | I, II, III | NL | NL | NAT | | | | | | ST | | ST |
| copper (cuprous) oxide (Cu2O) | inorganic | yes | no | yes | II | I, II, III | NL | NL | HT | | | | | HT | HT | | VHT |
| copper oxychloride (Cu2Cl(OH)3) | inorganic | yes | no | yes | NL | I, II, III | NL | NL | MT | MT | MT | | MT | | | | VHT |
| cyazofamid | cyanoimidazole | yes | no | yes | NL | III | NL | NL | MT | MT | MT | | MT | | MT | MT | |
| cyflufenamid | amide | **no** | no | yes | NL | NL | NL | NL | MT | MT | MT | | MT | | MT | MT | |
| cymoxanil | unclassified | yes | no | yes | III | III | NL | NL | MT | MT | ST | | MT | | MT | MT | ST |
| cyproconazole | azole | yes | no | yes | III | III | PC | NL | MT | MT | MT | | MT | | | | MT |
| cyprodinil | unclassified | yes | no | yes | III | NL | NL | **potential** | MT | ST | MT | | MT | | MT | MT | |
| dazomet | unclassified | yes | no | yes | III | III | NL | **potential** | ST | PNT | ST | | MT | | HT | | HT |
| didecyldimethyl ammonium chloride | quaternary ammonium | yes | no | yes | NL | I | NL | NL | HT | | | | MT | MT | HT | MT | HT |
| diethofencarb | carbamate | **no** | no | yes | U | NL | NL | NL | MT | NAT | NAT | | MT | | MT | | |
| difenoconazole | azole | yes | no | yes | III | III | PC | NL | MT | MT | ST | | MT | | MT | | HT |

**Table 1: 2011 October EU & 2010 Macedonia Accepted Pesticide AIs Health & Environment Risk Analysis**

| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| dimethomorph | morpholine | yes | no | yes | U | III | NL | NL | MT | MT | MT | | MT | | | | ST |
| dimoxystrobin | strobilurin | no | no | yes | NL | NL | NL | NL | HT | MT | MT | | MT | | HT | MT | |
| **Fungicides** | | | | | | | | | | | | | | | | | |
| disodium phosphonate | inorganic | no | no | pend | NL | I, II, III | NL | NL | | | | | | | | | NAT |
| dithianone | pyrimidine | **no** | no | yes | III | NL | NL | NL | HT | MT | MT | MT | MT | ST | MT | MT | |
| dodemorph | morpholine | **no** | no | yes | U | NL | NL | NL | MT | | | | | | MT | | |
| dodine | guanidine | yes | no | yes | III | **I** | NL | **potential** | HT | NAT | ST | | | MT | | | MT |
| epoxiconazole | triazole | **no** | no | yes | NL | NL | PC | NL | MT | MT | MT | | MT | | | | |
| etridiazole/terrazole | azole | yes | no | yes | III | III | **KC**, ED | NL | MT | | MT | ST | | | | | MT |
| eugenol | botanical | yes | no | pend | NL | III | NL | NL | MT | | | | | | MT | | |
| famoxadone/famoxate | oxazole | yes | no | yes | U | III | NL | NL | HT | MT | ST | | | | HT | | |
| fenamidone | unclassified | yes | no | yes | NL | II, III | NL | NL | MT | MT | MT | | MT | | MT | | |
| fenbuconazole | triazole | yes | no | yes | U | III | PC, ED | NL | MT | MT | ST | | MT | | MT | | HT |
| fenhexamid/fenhexsamid | hydroxyanilide | yes | no | yes | U | III | NL | **potential** | MT | MT | MT | | MT | | MT | | MT |
| fenpropidin | unclassified | **no** | no | yes | II | NL | NL | NL | MT | MT | MT | | MT | | MT | MT | |
| fenpropimorph | morpholine | **no** | no | yes | III | **I** | NL | NL | MT | MT | MT | | MT | | MT | | |
| fenpyrazamine | pyrazole | **no** | no | pend | NL | NL | NL | NL | MT | MT | MT | | MT | | MT | MT | |

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| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| fluazinam | phenylpyridinamine | yes | no | yes | NL | II | PC | NL | VHT | MT | MT | | MT | | MT | | |
| fludioxonil | phenylpyrrole | yes | no | yes | U | III | NL | **potential** | MT | MT | MT | | MT | | MT | | |
| **Fungicides** | | | | | | | | | | | | | | | | | |
| fluopicolide | benzamide | yes | no | yes | NL | III | NL | NL | MT | MT | NAT | | MT | | MT | | |
| fluopyram | benzamide | **no** | no | pend | NL | NL | NL | NL | MT | MT | MT | | MT | | MT | | |
| fluoxastrobin | strobilurin | yes | no | yes | NL | II, III | NL | NL | MT | | MT | | MT | | HT | MT | |
| fluquinconazole | triazole | **no** | no | yes | NL | NL | NL | NL | MT | MT | MT | | MT | | MT | | |
| flusilazole | azole | **no** | no | yes | III | III | NL | NL | MT | MT | MT | | MT | | MT | | |
| flutolanil | oxathiin (anilide) | yes | no | yes | U | III | NL | **potential** | ST | ST | MT | ST | | ST | MT | ST | ST |
| flutriafol | triazole | **no** | no | yes | III | NL | ED | **potential** | MT | MT | LT | | MT | | MT | | |
| fluxapyroxad | pyrazole | **no** | no | pend | NL | NL | NL | NL | MT | MT | MT | | MT | | MT | MT | |
| folpet | thiophthalimide | yes | no | yes | U | II, III | **KC** | NL | HT | PNT | ST | HT | MT | ST | HT | | MT |
| fosetyl aluminum | unclassified | yes | no | yes | NL | III | NL | **potential** | NAT | ST | ST | | MT | | NAT | | MT |
| fuberidazole | benzimidazole | **no** | no | yes | II | NL | NL | NL | MT | | MT | | MT | | MT | | |
| geraniol | botanical | yes | no | pend | NL | II, III | NL | NL | MT | | | | MT | | | | |
| *Gliocladium catenulatum* | microbial | yes | no | yes | NL | III | NL | NL | | | | | | | | | |
| hymexazol | unclassified | yes | no | yes | U | II | NL | **potential** | NAT | | | NAT | | | ST | | ST |

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| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| imazalil/enilconazole | imidazole | yes | no | yes | II | **I**, II, III | PC, RD | NL | MT | NT | PNT | | | | | | |
| iprodione | dicarboximide | yes | no | yes | U | III | PC, ED | **potential** | MT | NAT | ST | | | | HT | | |
| **Fungicides** | | | | | | | | | | | | | | | | | |
| iprovalicarb | unclassified | **no** | no | yes | U | NL | PC | NL | MT | ST | MT | | MT | | | | |
| isopyrazam | pyrazole | **no** | no | pend | NL | NL | NL | NL | HT | | MT | | MT | | MT | MT | |
| kresoxim-methyl | strobin | yes | no | yes | U | III | PC | **potential** | ST | ST | ST | | MT | | MT | | VHT |
| liquid lime sulfur | inorganic | yes | no | yes | U | III | NL | NL | NAT | NAT | NAT | NAT | | | | | NAT |
| mancozeb | dithiocarbamate | yes | no | yes | U | III | PC, ED, RD | NL | MT | MT | ST | HT | | | | | NAT |
| mandipropamid | mandelamide | yes | no | pend | NL | III | NL | NL | MT | MT | ST | | MT | | MT | | |
| maneb | carbamate | yes | no | yes | U | III | **KC**, ED, RD, P | NL | MT | NAT | PNT | ST | | | ST | | HT |
| mepanipyrim | anilinopyrimidine | **no** | no | yes | U | NL | **KC** | NL | MT | MT | | | MT | | MT | MT | |
| meptyldinocap | dinitrophenol | **no** | no | pend | NL | NL | NL | NL | HT | MT | NAT | HT | MT | HT | HT | | |
| metalaxyl | benzanoid | yes | no | yes | III | II, III | NL | **potential** | ST | PNT | PNT | | | | | | ST |
| metalaxyl-M/mefenoxam | phenylamide | yes | no | yes | II | II, III | NL | NL | MT | NAT | MT | | MT | | MT | | |
| metconazole | triazole | yes | no | yes | NL | II, III | NL | NL | MT | MT | MT | | MT | | MT | | |
| metiram | dithiocarbamate | yes | no | yes | U | III | PC, RD | NL | ST | PNT | ST | | MT | | MT | | MT |
| metrafenone | benzophenone | **no** | no | yes | NL | NL | none | NL | MT | MT | NAT | | MT | | MT | MT | |

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| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| myclobutanil | azole | yes | no | yes | III | III | RD | NL | MT | ST | MT | | MT | | MT | | HT |
| *Paecilomyces fumosoroseus* | microbial | yes | no | yes | NL | III | NL | NL | | | | | | | | | |
| **Fungicides** | | | | | | | | | | | | | | | | | |
| penconazole | azole | **no** | no | yes | U | | NL | NL | MT | MT | MT | | MT | | MT | | |
| pencycuron | urea | **no** | no | yes | U | IV | NL | NL | HT | MT | MT | | MT | | MT | | |
| pendimethalin | dinitroanaline | yes | no | yes | III | III | PC, ED | NL | MT | NAT | ST | | | | MT | MT | |
| penflufen | pyrazole | **no** | no | pend | NL | NL | NL | NL | MT | | MT | | MT | | MT | | |
| penthiopyrad | carboximide | **no** | no | pend | NL | NL | NL | NL | MT | | | | | | MT | | |
| *Phlebiopsis gigantea* | microbial | **no** | no | yes | NL | NL | NL | NL | | MT | | | | | | | |
| picoxystrobin | strobilurin | **no** | no | yes | NL | NL | NL | NL | HT | | | | HT | | HT | MT | |
| potassium iodide | inorganic | **no** | no | pend | NL | I, III | NL | NL | NAT | HT | MT | | MT | NAT | MT | | |
| potassium phosphite | inorganic | **no** | no | pend | NL | NL | NL | NL | ST | ST | ST | | | | | | |
| potassium thiocyanate | inorganic | **no** | no | pend | NL | NL | NL | NL | | MT | MT | | HT | | MT | | |
| prochloraz | azole | **no** | no | yes | III | NL | PC | NL | MT | NAT | MT | | MT | | MT | | |
| propamocarb | carbamate | **no** | no | yes | U | III | NL | NL | ST | | | | | NAT | | | NAT |
| propiconazole | azole | yes | no | yes | II | II, III | PC, RD | **potential** | MT | | | | | MT | ST | MT | MT |
| propineb | dithiocarbamate Zn | **no** | no | yes | U | NL | RD | NL | MT | PNT | PNT | | | MT | MT | MT | MT |

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| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| proquinazid | unclassified | **no** | no | yes | III | NL | NL | NL | MT | | | | | MT | MT | | MT |
| prothioconazole | triazolinthione | yes | no | yes | NL | III | NL | NL | MT | MT | MT | | MT | | MT | | |
| **Fungicides** | | | | | | | | | | | | | | | | | |
| *Pseudozyma flocculosa* | microbial | yes | no | pend | NL | III | NL | NL | | | | | | | | | |
| pyraclostrobin | strobin | yes | no | yes | NL | II, III | NL | NL | ST | MT | MT | | MT | | HT | | |
| pyrimethanil | anilinopyrimidine | yes | no | yes | U | III | PC, ED | NL | MT | | PNT | MT | | MT | MT | MT | |
| pyriofenone | unclassified | **no** | no | pend | NL | NL | NL | NL | | | | | | | | | |
| *Pythium oligandrum* M1 | microbial | **no** | no | yes | NL | NL | NL | NL | | | | | | | | | |
| quinoxyfen | quinoline | yes | no | yes | U | III | NL | NL | MT | MT | NAT | | MT | | HT | | |
| sedaxane | pyrazole anilide | **no** | no | pend | NL | NL | NL | NL | | MT | MT | | MT | | | | |
| silthiofam | thiophene | **no** | no | yes | NL | NL | NL | NL | MT | | | | MT | | MT | | |
| spiroxamine | unclassified | yes | no | yes | II | III | NL | NL | MT | MT | MT | | MT | | MT | | |
| *Streptomyces griseoviridis* K61 | microbial | yes | no | yes | NL | II | NL | NL | | | | | | | | | |
| *Streptomyces lydicus* | microbial | yes | no | pend | NL | III | NL | NL | MT | | | | | | | | |
| sulfur/sulphur/hydrogen sulfide | inorganic | yes | no | yes | U | III | NL | NL | NAT | NAT | NAT | NAT | | | | | NAT |
| tebuconazole/terbutrazole | azole | yes | no | yes | III | II, III | PC | **potential** | MT | MT | MT | | MT | | MT | MT | HT |
| tebufenozide | diacylhydrazine | yes | no | yes | U | III | NL | **potential** | MT | ST | ST | | MT | | | HT | MT |

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| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| tetraconazole | triazole | yes | no | yes | II | III | PC | **potential** | MT | MT | MT | | MT | | MT | MT | |
| thiabendazole | azole | yes | no | yes | U | III | PC, RD | NL | ST | NAT | | MT | ST | | | | ST |
| **Fungicides** | | | | | | | | | | | | | | | | | |
| thiophanate-methyl | benzamidazole | yes | no | yes | U | III | PC, RD | **potential** | MT | PNT | | NAT | | | ST | | |
| thiram/TMTD | (diothio) carbamate | yes | no | yes | III | III | ED, RD | NL | HT | NAT | PNT | VHT | HT | | NAT | HT | HT |
| thymol | botanical | yes | no | pend | NL | III | NL | NL | MT | | | | MT | ST | ST | | MT |
| tolclofos-methyl | chlorophenyl | **no** | no | yes | U | III | NL | NL | MT | MT | NAT | | MT | | MT | | |
| triadimenol | triazole | yes | no | yes | III | II, III | PC | NL | MT | ST | MT | | MT | | | | |
| triazoxide | benzotriazine | **no** | no | yes | NL | NL | NL | NL | HT | | HT | | MT | | MT | MT | |
| tribasic copper sulfate | inorganic | **no** | no | yes | II | I | NL | NL | MT | MT | HT | | MT | | MT | MT | HT |
| *Trichoderma asperellum* | microbial | yes | no | yes | NL | III | NL | NL | | | | | | | | | |
| *Trichoderma atroviride* | microbial | **no** | no | yes | NL | NL | NL | NL | | | | | | | | | |
| *Trichoderma gamsii* | microbial | yes | no | yes | NL | II, III | NL | NL | | | | | | | | | |
| *Trichoderma harzianum* | microbial | yes | no | yes | NL | III | NL | NL | | | | | | | | | |
| *Trichoderma polysporum* | microbial | yes | no | yes | NL | III | NL | NL | | | | | | | | | |
| *Trichoderma viride/lignorum* | microbial | **no** | no | yes | NL | III | NL | NL | | | | | | | | | |
| trifloxystrobin | strobin | yes | no | yes | NL | III | NL | NL | ST | ST | MT | | MT | | | | |

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| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| triflumizole | imidazole | yes | no | yes | III | III | NL | **potential** | HT | MT | ST | | | | MT | | |
| triticonazole | azole | yes | no | yes | U | III | NL | NL | MT | MT | MT | | MT | | MT | | |
| **Fungicides** | | | | | | | | | | | | | | | | | |
| valifenalate/valiphenal | acylamino acid | **no** | no | pend | NL | NL | NL | NL | | | | | | | | | |
| *Verticillium albo-atrum/dahliae* | microbial | **no** | no | yes | NL | NL | NL | NL | | | | | | | | | |
| ziram | dithiocarbamate | yes | no | yes | III | III | PC, ED, RD, P | NL | HT | NAT | MT | HT | | MT | | | HT |
| zoxamide | benzamide | yes | no | yes | NL | III | NL | **potential** | MT | MT | MT | | HT | | MT | | |
| Zucchini Yellow Mosaic Virus | microbial | yes | no | pend | NL | III | NL | NL | | | | | | | | | |
| **Algicide** | | | | | | | | | | | | | | | | | |
| quinoclamine | unclassified | **no** | no | yes | II | NL | NL | NL | HT | HT | MT | HT | MT | MT | MT | MT | |
| **Bactericides** | | | | | | | | | | | | | | | | | |
| aluminium sulphate | inorganic | **no** | no | yes | NL | IV | NL | NL | MT | | MT | | | NAT | NAT | | ST |
| *Aureobasidium pullulans* | microbial | **no** | no | pend | NL | NL | NL | NL | | | | | | | | | |
| *Bacillus subtilis* str. QST 713 | microbial | yes | no | yes | U | IV | NL | NL | | | | | | | | | |

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| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| benzoic acid | aromatic carboxylic acid | yes | no | yes | NL | III | NL | NL | NAT | | | NAT | | | | | NAT |
| capric acid | unclassified | yes | no | yes | NL | I | NL | NL | | | | ST | | | | | |
| **Bactericides** | | | | | | | | | | | | | | | | | |
| caprylic acid | unclassified | yes | no | yes | NL | I, III | NL | NL | | | | NAT | | | | | |
| sodium hypochlorite | inorganic | yes | no | yes | NL | I | NL | NL | HT | | | | MT | MT | MT | HT | MT |
| *Streptomyces lydicus* | microbial | yes | no | pend | NL | III | NL | NL | MT | | | | | | | | |
| **Herbicides** | | | | | | | | | | | | | | | | | |
| 2 4 D B | chlorophenoxy acid | yes | no | yes | III | III | PC, ED, RD | NL | MT | MT | MT | | MT | | MT | | |
| acetic acid | unclassified | yes | no | yes | NL | I, II, III | NL | NL | NAT | | | NAT | ST | | NAT | NAT | |
| aclonifen | diphenyl ether | **no** | no | yes | U | NL | NL | NL | MT | MT | MT | | MT | | MT | | |
| amidosulfuron | sulfonylurea | **no** | no | yes | NL | NL | NL | NL | NAT | MT | MT | | MT | | MT | | |
| aminopyralid | pyridine | yes | no | pend | NL | III | NL | **potential** | MT | MT | MT | | MT | | MT | | |
| aminotriazole/amitrol(e) | triazole | yes | **some** | yes | U | III | **KC**, ED | **potential** | NAT | MT | NAT | | MT | | ST | | ST |
| azimsulfuron | sulfonyl urea | **no** | no | yes | U | NL | NL | NL | | | MT | | MT | | | | |
| beflubutamid | amide | **no** | no | yes | NL | NL | NL | NL | MT | | MT | | MT | | MT | | |

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| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| benfluralin | dinitoraniline | yes | no | yes | U | II, III | PC | NL | HT | MT | MT | ST | MT | ST | MT | | MT |
| **Herbicides** | | | | | | | | | | | | | | | | | |
| bensulfuron | sulfonyl urea | yes | no | yes | U | II, III | NL | NL | NAT | MT | ST | | MT | | ST | | NAT |
| bentazon(e) | benzothiazinone | yes | no | yes | III | III | NL | NL | NAT | MT | MT | | MT | ST | MT | | |
| bifenox | diphehyl ether | **no** | no | yes | U | III | NL | NL | MT | NAT | MT | | MT | | | | VHT |
| bispyribac | unclassified | yes | no | yes | U | III | NL | NL | MT | ST | NAT | | MT | | MT | | |
| bromoxynil | hydroxybenzonitrile | yes | no | yes | II | II | PC, RD | NL | ST | MT | MT | | MT | MT | | | VHT |
| capric acid | unclassified | yes | no | yes | NL | I | NL | NL | | | | ST | | | | | |
| caprylic acid | unclassified | yes | no | yes | NL | I, III | NL | NL | | | | NAT | | | | | |
| carbetamide | amide | **no** | no | yes | U | NL | NL | NL | NAT | | MT | | MT | | MT | | |
| carfentrazone (ethyl) | triaolinone | yes | no | yes | III | III | NL | NL | MT | NAT | NAT | | MT | | MT | | MT |
| chloridazon/pyrazone | pyridazinone | yes | no | yes | U | III | NL | **potential** | ST | | | | | | | | |
| chlorotoluron | urea | **no** | no | yes | U | NL | NL | NL | ST | NAT | MT | | MT | | MT | | |
| chlorpropham | carbamate PGR | yes | no | yes | U | I, III | NL | NL | MT | MT | MT | MT | MT | | MT | | |
| chlorsulfuron | sulfonyl urea | yes | no | yes | U | III | RD | **potential** | ST | MT | ST | | MT | | ST | | HT |
| cinidon ethyl | dicarboximide | **no** | no | yes | NL | NL | NL | NL | | | MT | | MT | | MT | | |

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| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| citronella oil | botanical | yes | no | yes | NL | II | NL | NL | MT | | | | | | MT | | |
| clethodim | cyclohexenone | yes | no | yes | NL | II, III | NL | **potential** | MT | MT | MT | | MT | | MT | | |
| **Herbicides** | | | | | | | | | | | | | | | | | |
| clodinafop/propargyl | a propionic acid | yes | no | yes | III | II, III | PC, RD | NL | HT | MT | MT | | | | | | |
| clomazone | isoxazolidinone | yes | no | yes | II | III | NL | NL | MT | MT | NAT | | MT | | MT | | HT |
| clopyralid | pyridinecarbxilic acid | yes | no | yes | NL | I, II, III | NL | **potential** | PNT | | PNT | PNT | | | | NAT | |
| cycloxydim | cyclohexanone | **no** | no | yes | U | NL | NL | NL | NAT | MT | MT | | MT | | MT | | |
| cyhalofop-butyl | phenoxypropionate | yes | no | yes | U | II | NL | NL | MT | MT | NAT | | MT | | MT | | |
| dazomet | unclassified | yes | no | yes | III | III | NL | **potential** | ST | PNT | ST | | MT | | HT | | HT |
| desmedipham | bis-carbamate | yes | no | yes | U | I, II, III | NL | NL | MT | MT | MT | | MT | | MT | | |
| dicamba | a benzoic acid | yes | no | yes | III | II, III | RD | **potential** | ST | | | NAT | | | NAT | | ST |
| dichlorprop-P | aryloxyalkanoic acid | yes | no | yes | NL | II, III | PC, RD | NL | NAT | ST | MT | NAT | MT | | MT | | |
| diclofop | phenoxypropionate | yes | **few** | yes | III | I, II | PC, RD | NL | HT | NAT | ST | | | | | | |
| diflufenican | anilide | **no** | no | yes | U | NL | NL | NL | MT | MT | ST | | ST | | MT | | |
| dimethachlor | chloroacetamide | **no** | no | yes | III | NL | NL | NL | MT | | MT | | MT | | MT | MT | |
| dimethenamid-P | chloroacetamide | yes | no | yes | NL | II, III | NL | NL | MT | NAT | MT | | MT | | MT | | MT |
| diquat dibromide | bipyridylium | yes | no | yes | II | II | NL | **potential** | MT | MT | HT | NAT | MT | MT | ST | | ST |

**Table 1: 2011 October EU & 2010 Macedonia Accepted Pesticide AIs Health & Environment Risk Analysis**

| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| diuron | urea | yes | no | yes | U | III | **KC** | **known** | ST | | | ST | | ST | ST | MT | ST |
| ethametsulfuron | sulfonyl urea | **no** | no | pend | NL | NL | NL | NL | | | | | | | | | |
| **Herbicides** | | | | | | | | | | | | | | | | | |
| ethephon | organophosphate PGR | yes | no | yes | U | I, III | NL | NL | NAT | | ST | | MT | | NAT | NAT | NAT |
| ethofumesate | benzofuran | yes | no | yes | U | III | NL | **potential** | ST | MT | MT | | MT | | MT | | MT |
| ethoxysulfuron | sulfonylurea | **no** | no | yes | NL | NL | NL | NL | MT | ST | MT | | MT | | | | |
| fenoxaprop-p-ethyl | propionic acid | yes | no | yes | NL | II, III | NL | NL | MT | ST | PNT | | ST | | MT | | MT |
| flazasulfuron | sulfonyl urea | yes | no | yes | NL | III | NL | NL | MT | MT | MT | | MT | | MT | MT | |
| florasulam | triazolopyrimidine | **no** | no | yes | U | NL | NL | **known** | MT | MT | MT | | NAT | | NAT | | |
| fluazifop-p-butyl | propionic acid | yes | no | yes | III | II, III | NL | NL | MT | ST | PNT | | | | | ST | |
| flufenacet/fluthiamide | oxyacetamide | yes | **few** | yes | III | III | NL | NL | MT | NAT | MT | | MT | | MT | | MT |
| flumioxazine | dicarboximide | yes | no | yes | NL | III | NL | NL | MT | MT | NAT | | MT | | MT | | |
| fluometuron | urea | yes | no | yes | U | II, III | PC | **potential** | ST | | | | | ST | | | MT |
| flupyrsulfuron-methyl | sulfonyl urea | **no** | no | yes | **U** | NL | NL | NL | | MT | | | MT | | | | |
| flurochloridone | unclassified | **no** | no | yes | U | NL | RD | **potential** | MT | MT | NAT | | MT | | MT | | |
| fluroxypyr | unclassified | yes | no | yes | U | III | NL | NL | MT | MT | MT | | MT | | MT | | HT |
| flurtamone | pyridazinone | no | no | yes | NL | NL | NL | NL | MT | MT | | | | | MT | | |

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| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| foramsulfuron | sulfonylurea | yes | no | yes | NL | III | NL | **potential** | MT | ST | MT | | MT | | MT | | |
| glufosinate | unclassified | yes | no | yes | NL | II, III | NL | NL | NAT | NAT | MT | | MT | | NAT | | ST |
| **Herbicides** | | | | | | | | | | | | | | | | | |
| glyphosate | phosphonoglycine | yes | no | yes | U | II, III | NL | **potential** | ST | ST | NAT | | PNT | | MT | | ST |
| halosulfuron methyl | pyrazole | yes | no | pend | U | III | NL | **potential** | ST | MT | ST | | ST | | ST | | NAT |
| haloxyfop R methyl | a propionic acid | **no** | no | yes | NL | NL | **KC** | NL | HT | MT | MT | | | | MT | | |
| haloxyfop (P) methyl | a propionic acid | **no** | no | yes | NL | NL | **KC** | NL | HT | MT | MT | | | | MT | | |
| imazamox | imidazolinone | yes | no | yes | NL | III | NL | NL | NAT | | | | | | | | |
| imazaquin | imidazolinone | yes | no | yes | U | II, III | NL | NL | NAT | MT | NAT | | MT | | MT | | |
| imazosulfuron | sulfonyl urea | yes | no | yes | NL | III | NL | NL | MT | MT | | | | | | | |
| iodosulfuron | sulfonylurea | yes | no | yes | NL | III | NL | NL | NAT | PNT | PNT | | ST | | | | |
| ioxynil | hydroxybenzonitrile | **no** | no | yes | II | II | ED | NL | MT | MT | HT | | MT | MT | MT | | |
| iron sulphate | inorganic | **no** | no | yes | NL | NL | NL | NL | MT | | MT | | | | MT | | |
| isoproturon | urea | **no** | no | yes | III | NL | NL | NL | MT | ST | MT | | MT | HT | | | |
| isoxaben | benzamide | yes | no | yes | U | III | PC | **potential** | MT | MT | MT | | MT | | MT | | MT |
| isoxaflutole | isoxazole | yes | **most** | yes | NL | III | **KC** | NL | ST | MT | ST | | MT | | MT | | MT |
| lauric acid | inorganic | **no** | no | yes | NL | NL | NL | NL | ST | | | ST | | | | | |

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| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| lenacil | uracil | **no** | no | yes | U | IV | NL | NL | MT | MT | MT | | MT | | MT | | |
| linuron | urea | yes | no | yes | U | III | PC, ED, RD | **potential** | MT | NAT | MT | | MT | ST | MT | ST | MT |
| **Herbicides** | | | | | | | | | | | | | | | | | |
| MCPA | chlorophenoxy acid | yes | no | yes | II | II, IIII | PC | NL | ST | PNT | NAT | ST | | ST | NAT | NAT | ST |
| MCPB | aryloxyalkonic acid | yes | no | yes | III | III | PC | NL | ST | MT | MT | | MT | | MT | | ST |
| mecoprop/MCPP | phenoxy acid | yes | no | yes | III | III | PC | **potential** | ST | | | | | MT | | | |
| mecoprop-p/MCPP | chlorophenoxy acid | yes | no | yes | III | II, III | PC | **potential** | MT | MT | MT | | MT | | | | |
| mesosulfuron | sulfonylurea | yes | no | yes | NL | II, III | NL | NL | MT | MT | MT | | MT | | MT | | |
| mesotrione | unclassified | yes | no | yes | NL | II, IIII | NL | NL | NAT | MT | MT | | MT | | NAT | | |
| metamitron | triazinone | yes | no | yes | III | III | **KC**, RD | **potential** | NAT | MT | MT | | MT | | MT | | |
| metazachlor | chloroacetanilide | **no** | no | yes | U | NL | NL | NL | MT | MT | MT | | | | MT | | |
| methyl decanoate | organic | **no** | no | yes | NL | NL | NL | NL | | | | | | | | | |
| methyl octaonate | organic | **no** | no | yes | NL | NL | NL | NL | | | | | | | | | |
| metobromuron | urea | **no** | no | pend | U | III | NL | NL | ST | | MT | | MT | | | | |
| metosulam | triazolopyrimidine | **no** | no | yes | U | NL | NL | NL | MT | MT | MT | | MT | | MT | | |
| metribuzin | triazinone | yes | no | yes | II | II, III | ED | **potential** | MT | NAT | MT | | MT | | ST | | ST |
| metsulfuron-methyl | sulfonyl urea | yes | no | yes | U | III | NL | **potential** | NAT | MT | NAT | | MT | | NAT | | |

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| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| molinate | thiocarbamate | yes | no | yes | II | IV | PC, ED | **potential** | MT | MT | MT | | MT | | MT | | |
| napropamide | alkanamide | yes | no | yes | U | I, III | PC | **potential** | ST | MT | | | MT | | ST | | MT |
| **Herbicides** | | | | | | | | | | | | | | | | | |
| nicosulfuron | sulfonylurea | yes | no | yes | U | II, III | NL | **potential** | MT | MT | MT | | MT | | MT | | |
| oleic acid | organic | **no** | no | yes | NL | III | NL | NL | NAT | | | | | | | | |
| orthosulfamuron | sulfonyl urea | yes | no | pend | NL | III | NL | **potential** | | | MT | | MT | | | | |
| oryzalin | dinitoaniline | yes | no | yes | U | III | PC, RD | **potential** | MT | MT | MT | | MT | | HT | | HT |
| oxadiargyl/oxadiargil | unclassified | **no** | no | yes | NL | NL | NL | NL | MT | NAT | MT | | MT | | NAT | | |
| oxadiazon | oxidiazole | yes | no | yes | U | II, III | **KC**, RD | NL | MT | MT | ST | MT | MT | | ST | | HT |
| oxasulfuron | sulfonyl urea | **no** | no | yes | NL | NL | NL | NL | | | | | MT | | MT | | |
| pelargonic acid | organic | **no** | no | yes | NL | NL | NL | NL | MT | MT | | | | | MT | | |
| pendimethalin | dinitroanaline | yes | no | yes | III | III | PC, ED | NL | MT | NAT | ST | | | | MT | MT | |
| penoxsulam | triazolopyrimidine | yes | no | yes | U | III | PC | **known** | MT | MT | MT | | NAT | | NAT | | |
| pethoxamid | chloroacetamide | **no** | no | yes | NL | NL | NL | NL | MT | | MT | | MT | | MT | | |
| phenmedipham | bis-carbamate | yes | no | yes | U | III | NL | **potential** | ST | ST | MT | | MT | ST | MT | | |
| picloram | pyridinecarboxylic acid | yes | **few** | yes | U | II | ED | **known** | ST | MT | MT | NAT | ST | | NAT | ST | ST |
| picolinafen | pyridine | **no** | no | yes | NL | NL | NL | NL | MT | | | | MT | | MT | MT | |

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| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| pinoxaden | unclassified | yes | no | pend | III | I, II, III | NL | NL | MT | MT | NAT | | MT | | | | |
| profoxydim | cyclohexanone | **no** | no | yes | NL | NL | NL | NL | MT | NAT | MT | | | MT | | | |
| **Herbicides** | | | | | | | | | | | | | | | | | |
| propaquizafop | a propionic acid | **no** | no | yes | U | NL | NL | NL | MT | MT | MT | | MT | | MT | | |
| propoxycarbazone sodium | triazalone | yes | no | yes | NL | III | NL | **potential** | MT | NAT | MT | | MT | | NAT | | |
| propyzamide | benzamide | yes | no | yes | U | IV | PC, RD | **potential** | NAT | NAT | MT | | MT | | MT | | MT |
| prosulfocarb | thiocarbamate | **no** | no | yes | II | NL | NL | NL | MT | MT | | | MT | | MT | | |
| prosulfuron | sulfonylurea | yes | no | yes | NL | III | NL | NL | NAT | MT | MT | | MT | | NAT | | |
| pyraflufen ethyl | phenylpyrazole | yes | no | yes | NL | III | PC | NL | MT | MT | MT | | MT | | MT | | |
| pyridate | phenylpyridazine | **no** | no | yes | III | II, III | NL | **potential** | MT | MT | MT | | MT | | MT | | MT |
| pyroxsulam | triazolopyrimidine | yes | **few** | pend | NL | II, III | NL | NL | MT | MT | MT | | NAT | | MT | | |
| quinmerac | quinoline | **no** | no | yes | U | NL | NL | NL | MT | MT | MT | | MT | | MT | | |
| quinoclamine | unclassified | **no** | no | yes | III | NL | NL | NL | HT | HT | MT | HT | MT | MT | MT | MT | |
| quizalofop/quizalfop-p-ethyl | a propionic acid | yes | no | yes | NL | I, III | NL | NL | MT | MT | MT | | MT | | MT | | |
| quizalofop-p-tefuryl | aryloxyphenoxypropionate | yes | no | yes | II | III | PC | **potential** | MT | MT | NAT | | MT | | MT | | |
| rimsulfuron/renriduron | sulfonylurea | yes | no | yes | U | III | NL | **potential** | NAT | MT | NAT | | MT | | | | NAT |
| s-metolachlor | chloroacetanilide | yes | no | yes | NL | III | PC, ED | **known** | MT | ST | MT | | MT | | MT | | |

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| Active Ingredients | Class | EPA Registered | Restricted Use Pesticide | EU Registered | WHO Acute Toxicity Class | EPA Acute Toxicity Classes | Chronic Toxicity | Groundwater contaminant | Ecotoxicity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | fish | bees | birds | amphibians | worms | Mollusks | Crustaceans | Aquatic Insects | Plankton |
| sulcotrione | unclassified | **no** | no | yes | NL | NL | NL | NL | | | | | | | | | |
| sulfosulfuron | sulfonylurea | yes | no | yes | NL | III | PC | NL | ST | MT | NAT | | MT | NAT | | | NAT |
| **Herbicides** | | | | | | | | | | | | | | | | | |
| tembotrione | triketone | yes | no | pend | III | III | NL | NL | MT | MT | MT | | MT | | MT | | |
| tepraloxydim | cyclohexadioneoxime | **no** | no | yes | NL | NL | PC | **potential** | MT | MT | MT | | MT | | MT | | |
| terbuthylazine | triazine | yes | no | yes | U | III | NL | NL | MT | MT | MT | | MT | | MT | | HT |
| thiencarbazone | triazolone | **no** | no | pend | NL | III | NL | NL | | | MT | | | | MT | | |
| thifensulfuron-methyl | sulfonylurea | yes | no | yes | U | III | NL | **potential** | MT | MT | NAT | | NAT | | NAT | | |
| topramezone | benzoylpyrazole | yes | no | pend | NL | III | NL | NL | MT | MT | MT | | MT | | MT | | |
| tralkoxydim | cyclohexadione | yes | no | yes | III | III | PC | **potential** | MT | | NAT | | | | | | |
| tri-allate | thicarbamate | yes | no | yes | III | III | PC | **potential** | MT | MT | MT | | MT | | HT | HT | VHT |
| triasulfuron | sulfonylurea | yes | no | yes | U | III | PC, RD | **potential** | MT | MT | NAT | | MT | | MT | | |
| tribenuron/metometuron | sulfonylurea | yes | no | yes | NL | III | PC | NL | ST | MT | ST | | MT | | | | |
| triclopyr | chloropyridinyl | yes | no | yes | III | I, II, III | NL | NL | MT | | | NAT | | | | ST | |
| trifulsulfuron | sulfonyl urea | yes | no | yes | U | III | PC | **potential** | NAT | MT | NAT | | MT | | NAT | | |
| tritosulfuron | sulfonyl urea | **no** | no | yes | NL | NL | NL | NL | | | | | | | | | |

**Attachment 1:**

**SCOPE OF WORK**
Update of the
Pesticide Evaluation Report and Safe Use Action Plan (PERSUAP)
For Tetratech ARD/USAID's AgBiz Program

Alan Schroeder, PhD, MBA

**BACKGROUND**

USAID supports economic growth in Macedonia through programs that strengthen and improve competitiveness of Macedonian agribusinesses, improve the business environment, and encourage local economic development. Tetra Tech ARD has been successfully implementing USAID's AgBiz Program in Macedonia for more than four years.

All USAID activities are subject to evaluation via, at minimum, an Initial Environmental Examination (IEE) and at maximum an Environmental Assessment (EA). And because of high risk concerns presented by pesticides, the USAID environmental regulations require that at least the 12 factors outlined in the Pesticide Procedures described in 22 CFR 216.3 (b)(1)(i) (a through l) be addressed in the IEE for any program that includes assistance for the procurement or use of pesticides. For several years, the Agency has asked that these factors be examined using a systems approach in a particular type of document, termed a "Pesticide Evaluation Report and Safer Use Action Plan" (PERSUAP), which is submitted as an attachment or amendment to the umbrella IEE. The PERSUAP focuses on the particular circumstances of the program in question, the risk management choices available, and how a risk management action plan would be implemented in the field.

In line with these requirements, in June 2008, before signing contracts with grantees for implementation of 20 business expansion projects, AgBiz Program in Macedonia developed the SoW and engaged PhD Alan Schroeder, an Environmental Assessment Professional and David Benjamin Graham, Agro-Environmental Consultant to develop an AgBiz Program PERSUAP and a model "comprehensive pesticide use plan" for an individual grantee that can be adopted to the pesticide-related circumstances of each grantee requiring one.

This 2008 AgBiz PERSUAP has evaluated 173 pesticide active ingredients (AIs) found in the Macedonia 2005 registered pesticides list. Each AI was evaluated for the following factors: active ingredient class, EPA registration status including Restricted Use Products status with criteria for restrictions, acute human toxicity by EPA and WHO systems, chronic human health issues, groundwater contamination potential, and ecotoxicity to fish, honeybees, birds, amphibians, earthworms, mollusks, crustaceans, aquatic insects and plankton. Notably, all of the pesticides registered for use in Macedonia for 2008 were a subset of the pesticides permitted for use by the European Union (EU)/European Commission (EC), thus, by default all of them have been valuated by the EU systems for evaluation of risks.

The 2008 PERSUAP was approved by Mission Director, COTR (previously CTO) as well as Mission Environmental Officer (MEO) and Bureau Environmental Officer (BEO).

In May 2011, USAID/Macedonia asked Tetra Tech ARD to respond to a Statement of Work (SOW) for a two year extension of AgBiz. The objective of AgBiz Extension will be to build off of the existing capacity and expertise of Macedonian professionals, lead firms, and farms to

create a new understanding in the market for embedded services and fee-based service delivery. The provision of the services will be delivered sustainably by local partners well beyond the anticipated graduation of the USAID Macedonia program. AgBiz Extension will focus on two value chains-fresh fruits and vegetables (FF&V) and processed vegetables (PV); emphasis will be on the lower levels of the value chains, with a view to increasing product quality and quantity to meet demand, and to raising the critical mass of stakeholders in the targeted value chains and increasing the use of service providers and the development of sustainable packages of services.

In order to comply with the requirements of 22 Code of Federal Regulations (CFR) 216 as prescribed in the project's environmental documentation, Initial Environmental Examination AMD No. 2 dated 05/10/2011 and USAID Recommended Environmental Threshold Decision, ARD Macedonia AgBiz Program would need to **update the PERSUAP to ensure Program compliance with USAID environmental rules and regulations.**

In addition to updating the PERSAUP, we propose capitalizing on the consultant's expertise by asking him to review and draft an amendment (No3) to the original Initial Environmental Examination and recommend Environmental Threshold Decision based on the changes in the approach to implementation of the AgBiz Extension wherein the provision of the services is now delivered by local partners called Lead Facilitators that will implement packages of activities for multiple participants.

The Consultant will also be asked to review several activity descriptions which define the work that our implementing partners will be conducting in the coming year, to make determinations as to whether or not any environmental impacts might be expected and to make recommendations for any mitigation measures that must be undertaken in order to ensure compliance with USAID environmental rules and regulations.

**PURPOSE OF SOW**

This Scope of Work (SoW) describes services requested of Alan Schroeder- Environmental Assessment Professional (EAP) who will perform the necessary follow on services to USAID's AgBiz Program in Macedonia.

**TASK**

1. Analyze current Macedonian lists of pesticides and pesticide active ingredients established according to EU and EPA registration and risk (human health and environment) information systems to identify new additions, changes and information made available since the original 2008 PERSUAP was conducted. The EAP will be provided with an updated and current list of the pesticides registered in Macedonia. This update will cover the evaluation of the pesticide active ingredients registered and available in Macedonia and provide a matrix of these pesticide active ingredients by pesticide types; class; Environmental Protection Agency and World Health Organization acute human toxicities; chronic human health toxicity issues; groundwater contamination potential and toxicities to fish, honeybees, birds, amphibians, earthworms, mollusks, crustaceans, aquatic insects, and plankton.

2. Update the original PERSUAP to ensure that implementation of recommendations made therein ensure the Program's full adherence to USAID's Environmental Compliance Regulations and Procedures.

3. Review Lead Facilitator Activity Descriptions and make environmental impact determinations and recommendations on any mitigation measures that must be undertaken to ensure compliance with USAID environmental rules and regulations.

4. Based on the change in the approach to implementation of AgBiz, draft an amendment (No3) to the original Initial Environmental Examination and recommend changes in the Environmental Threshold Decision.

**DELIVERABLES**

1) Matrix summarizing the results of Task 1 above.
2) Leopold matrix detailing potential impacts at planning and design, construction, and operation stages of the activity
3) Updated PERSUAP

**PERIOD OF PERFORMANCE**

The level of effort for this assignment is up to 14 days. No travel is required as the EAP will work from the US in collaboration with AgBiz staff and implementing partners. Period of performance is from December 21, 2011 to January 10, 2012. Work will start upon the availability of the preferred consultant and will be completed by January 10, 2012.

**REPORTING AND COORDINATION**

The PERSUAP update will respond to comments from MEO, CTO, REO (if present), BEO, and comments from Agbiz program staff and Tetra Tech ARD Home Office support staff.

The Contractor shall work under the overall guidance of the AgBiz Chief of Party and provide technical reporting to both the AgBiz COP and ARD's Senior Technical Advisor/Manager.

**Attachment 2: Toxicity of pesticides: EPA and WHO classifications**

**General Toxicity**

Pesticides, by necessity, are poisons, but the toxicity and hazards of different compounds vary greatly. Toxicity refers to the inherent intoxicating ability of a compound whereas hazard refers to the risk or danger of poisoning when the pesticide is used or applied. Pesticide hazard depends not only on toxicity but also on the chance of exposure to toxic amounts of the pesticide. Pesticides can enter the body through oral ingestion, through the skin or through inhalation. Once inside the body, they may produce poisoning symptoms, which are either acute (from a single exposure) or chronic (from repeated exposures or absorption of smaller amounts of toxicant).

**EPA and WHO Toxicity Classifications**

Basically, there are two systems of pesticide toxicity classification. These are the USEPA and the WHO systems of classification. It is important to note that *the WHO classification is based on the active ingredient only, whereas USEPA uses product formulations to determine the toxicity class of pesticides.* So, WHO classification shows relative toxicities of all pesticide active (or technical) ingredients, whereas EPA classification shows actual toxicity of the formulated products, which can be more or less toxic than the active ingredient alone and are more representative of actual dangers encountered in the field. The tables below show classification of pesticides according to the two systems.

a) USEPA classification (based on formulated product = active ingredient *plus inert and other ingredients*)

| Class | Descriptive term | Mammalian $LD_{50}$ | | Mammalian Inhalation $LC_{50}$ | Irritation | | Aquatic invert/fish ($LC_{50}$ or $EC_{50}$)[2] | Honey bee acute oral ($LD_{50}$) |
|---|---|---|---|---|---|---|---|---|
| | | Oral | Dermal | | Eye[1] | Skin | | |
| I | Extremely toxic | ≤50 | ≤200 | ≤0.2 | Corrosive | Corrosive | < 0.1 | |
| II | Highly toxic | 50-500 | 200-2000 | 0.2-2.0 | Severe | Severe | 0.11-1.0 | < 2 µg/bee |
| III | Moderately toxic | 500-5000 | 2000-20000 | 2.0-20 | No corneal opacity | Moderate | 1.1-10.0 | 2.1-11 µg/bee |
| IV | Slightly toxic | ≥5000 | ≥20000 | ≥20 | None | Moderate or slight | 10.1-100 | |
| | Relatively non-toxic | | | | | | 101-1000 | |
| | Practically non-toxic | | | | | | 1001-10,000 | > 11 µg/bee |
| | Non-toxic | | | | | | > 10,000 | |

[1] Corneal opacity not reversible within 7 days for Class I pesticides; corneal opacity reversible within 7 days but irritation persists during that period for Class II pesticides; no corneal opacity and irritation is reversible within 7 days for Class III pesticides; and Class IV pesticides cause no irritation

[2] Expressed in ppm or mg/l of water

b) WHO classification (based only on active or 'technical' ingredient)

| Class | Descriptive term | Oral $LD_{50}$ for the rat (mg/kg body wt) | | Dermal $LD_{50}$ for the rat (mg/kg body wt) | |
|---|---|---|---|---|---|
| | | Solids | Liquids | Solids | Liquids |
| Ia | Extremely hazardous | ≤5 | ≤20 | ≤10 | ≤40 |
| Ib | Highly hazardous | 5-50 | 20-200 | 10-100 | 40-400 |
| II | Moderately hazardous | 50-500 | 20-2000 | 100-1000 | 400-4000 |
| III | Slightly hazardous | ≥501 | ≥2001 | ≥1001 | ≥4001 |
| U | Unlikely to present acute hazard in normal use | ≥2000 | ≥3000 | - | - |

**Attachment 3: Macedonia Pesticide Regulations**

## 1) LAWS RELATING TO CHEMICAL PRODUCTS IN MK

**Ministry of Environment and Physical Planning**
**Law on the Environment**
**June 2005**
**http://www.moepp.gov.mk/WBStorage/Files/Law%20on%20Environment.pdf**

**Article 27**
Labeling the products and packaging for their environmental impact
(1) Products, semi finished products, raw materials and chemicals, as well as their packaging, shall be released for trade only if they bear a label on which the possibility of pollution or possible harmful impact of products, semi finished products, raw materials and chemicals, as well as their packaging, on human life and health and on the environment is stated, as required by the law.
(2) Manufacturers and importers of chemical substances or products shall, prior to the sale or import, provide information on their properties and effects, according to which they may be classified, packed and labeled as prescribed by the law.
(4) The Minister managing the body of the state administration responsible for the affairs of the economy, in consent with the Minister managing the body of the state administration responsible for the affairs of environment shall prescribe the manner of product and product packaging, semi finished products, raw materials and chemicals labeling, the type of label and the content thereof in terms of packaging impact on the environment and the manner of handling the packaging and certain used products, semi finished products and raw materials.

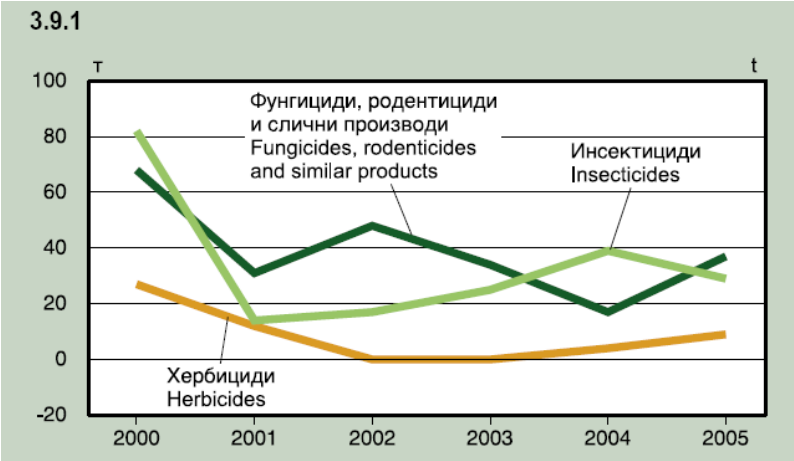
**Article 194**
Responsible bodies
(4) Inspection supervision over the enforcement of this Law regarding the trade in products, semi-products, raw material, chemical substances and packaging, as well as the labeling of products and packaging containing information on the environment impacts, shall be performed by the State Market Inspectorate, through the State Market Inspectors, State Sanitary and Health Inspectorate through State Sanitary and Health Inspectors, Phytosanitary Administration through Phytosanitary Inspectors

## 2. STATISTICS RELATED TO PRODUCTION OF AGCHEMICALS IN MK

**ENVIRONMENTAL STATISTICS**
**Publisher:**
**Republic of Macedonia, State Statistical Office**
**website: http://www.stat.gov.mk**
**Bi-annual publication**

### 3.9.1 Production of pesticides
The data on produced quantities of pesticides (insecticides, herbicides and fungicides) represent an annual production from the Annual report for industry in the class 24.20 - Production of pesticides and other agrochemical products from the National Classification of Activities (NCA). The produced quantities are processed according to the National Nomenclature of Industrial Products. Also, the production of pesticides is included in the sample products for calculating the total volume index. The production of pesticides (insecticides, herbicides and fungicides) has

decreased during the period from 2000 to 2005. *(See chart 3.9.1)* In 2005, 75 tones of pesticides, out of which 49,3% fungicides, 38,7% insecticides and 12,0% herbicides were produced. *(See chart 3.9.1.1)*



## 3. INFORMATION ON PESTICIDE REGISTRATION IN MK

**National implementation plan on reduction and elimination of persistent organic pollutants in the Republic of Macedonia**
**Ministry of Environment and Physical Planning**
**2004**
http://www.pops.org.mk/doc/en/POPs-en.pdf

**2.3.12 Details of any relevant system for the assessment and listing of new chemicals**
It should be stressed that there is no term "chemicals", or "new chemicals" into Macedonian legislation. In the Republic of Macedonia, registration of poisons is determined, where in accordance with the Law on trade of poisons, Ministry of Health publish the List on poisons which can be put on market. Also, the term "poison" is not in accordance with EU terminology. In the Republic of Macedonia only officially registered chemicals and/or plant, protection substances are allowed to be imported and used. The substances that are already classified in the

official list of poisons/plant protection substances are allowed to be placed on the market. They are listed in the "Official Gazette of the Republic of Macedonia."

According to current procedure, the poison/plant protection substance registration is divided into several stages. The responsible body in the first phase of the registration is the Ministry of Health (Law on Poison Trade, "Official Gazette of the Republic of Macedonia," 13/91). The Law regulates the classification of the substances based on their toxicity. Some plant protection substances are in certain toxicity groups. Therefore, this Law regulates the registration of these plant protection substances. The Law contains provisions regulating the toxicity classification and labeling. In order to determine the toxicity group, the producer submits an application for toxicological assessment of the active ingredients of the chemical/plant protection substance. The authorized institutions for toxicological assessment are the Institute for Pre-Clinical and Clinical Pharmacology and Toxicology and the Institute for Toxicological Chemistry. Based on the performed toxicological analysis the producer submits the application for classification of the chemical/plant protection substance in a toxicity group. The Commission for Poisons (professionals in the field of pharmacy, medicine, chemistry, agriculture, biotechnology, veterinary are members of the Commission), established by the Ministry of Health, is responsible for confirmation and or classification of the chemical/plant protection substances in the right toxicity group. According to the opinion received from the Commission for Poisons, the Ministry of Health issues a decision and publishes it in the Official Gazette. The second phase, which is the registration and issuing of a permit for trade and application, is implemented by the responsible ministries. If it is a plant protection chemical, the Ministry of Agriculture, Forestry and Water Economy acts. If it is an industrial chemical then the list of allowed chemicals is authoritative, which is issued by the Customs Administration. For plant protection chemicals the authorized national laboratories (Institute for Agriculture, Faculty of Agriculture and Food, Institute for Southern Crops) perform the analysis. They check the physical, chemical and biological characteristics of the plant protection substance according to the methodologies accepted by international organizations (WHO, FAO, OECD, EPA, EEA, CIPAC, AOAC). After receiving the official result of the analysis, the producer submits
an application to the Ministry of Agriculture, Forestry and Water Economy. According to the Law and Regulation on the criteria for granting licenses for trading of plant protection substances, the applicant cannot be issued a permit if the maximum allowed concentration and food tolerance are not determined (separately for every application and every method of application). The Commission for Plant Protection Substances, established by the Ministry of Agriculture, Forestry and Water Economy (representatives of the Ministry of Agriculture, Forestry and Water Economy, Institutes for Agriculture, Faculty of Agriculture and Food, Faculty of Forestry are members of the Commission for Plant Protection Substances), reviews the submitted documentation and requests the Plant Protection Administration under the Ministry of Agriculture, Forestry and Water Economy to issue a permit for the applicant. This permit allows the applicant to place the plant protection chemical on the market. The list of the plant protection substances is published in the Official Gazette of the Republic of Macedonia once a year. The permit, depending on the toxicity and effectiveness of the active ingredients, is issued for five to ten years. After it expires the same procedure should be applied. The registration of the plant protection substances is regulated by the Regulation on the criteria for granting licenses for trading in plant protection substances ("Official Gazette of the RM," 65/2001 and 99/2003), the regulation on the conditions to be met by legal entities concerning the equipment, instruments and structures used for testing plant protection substances ("Official Gazette of the RM," 54/2001) and the regulation on the conditions to be met by legal entities concerning the equipment, instruments and structures used for the production, wholesale and retail of plant protection chemicals and the content and the way of reporting on these activities ("Official Gazette of the RM" No. 54/2001). For industrial chemicals, unless it is classified as toxic, it is the responsibility

of the applicant to check if the chemical he aims to market in the country is included in the list of allowed substances. This list is published in the Official Gazette, and amended on an as needed basis.

There are no chemicals under the Stockholm Convention or EU Directive 79/117/EEC included in the list of plant protection substances. The existing Law on Poison Production, Law on Poison Trade and Law on Plant Protection and the regulations under the mentioned laws are harmonized with the Stockholm Convention on POPs and the EU-regulations, especially in the part for prohibition of the production, trade, application, and labeling of the pesticides and industrial chemicals. In the frameworks of the CARDS Project (NIPS-2004) preparation of a new Law on Plant Protection Substances (harmonized with the EU Directive 91/414/EC) is foreseen. This Law will unite the procedures for plant protection substance classification, packing, labeling. One national body will coordinate the procedure and will be responsible for information exchange (in accordance to the Stockholm Convention Article 9).

## 4. LIST OF PESTICIDES REGISTERED FOR USE IN MACEDONIA

**Diffusion pollution of chemicals in the former Yugoslav Republic of Macedonia**

CLICK ON THIS LINK…
http://www.vardarvalley.org/docs/diffusionpollution.pdf
2006

In this report there area collection of list relating to chemical use in Macedonia (some of which are more relevant to our PERSUAP):

LIST 1. LIST OF REGISTERED POISONS IN REPUBLIC OF MACEDONIA CLASSIFICATION 1-4
LIST 2. DISTRIBUTION OF MORE IMPORTANT AGRO CULTURES IN REPUBLIC OF MACEDONIA
LIST 3. CHEMICALS USED FOR PROTECTION OF THE PLANTS IN REPUBLIC OF MACEDONIA
LIST 4. LIST OF DISINFECTANTS AND DESINSECTANTS USED IN MACEDONIA FOR PUBLIC SANITATION
LIST 5. THE LIST OF POP'S IN EVIDENCE IN REPUBLIC OF MACEDONIA
LIST 6. THE STATUS OF THE INTENTIONALLY PRODUCED POPS IN THE REPUBLIC OF MACEDONIA
LIST 7. REGIONS TREATED WITH DDT IN REPUBLIC OF MACEDONIA IN 1973
LIST 8. CLEANING AGENTS AND DISINFECTANTS USED IN INDUSTRY AND HOSPITALS

Notes/ comparison of the EU directive and the MK law on plant protection products
David Graham
Thursday, 26 June 2008

| Page | Note about EU Directive | Present in MK law? |
|---|---|---|
| 6 | Uses the term 'plant protection products' instead of 'pesticide', but also means *growth regulators* and *preservatives*. | yes |
| 7 | Uses the term 'integrated control' instead of IPM | yes |
| Annex I | Provides a list (Annex I) of pesticides registered for use which includes the | Yes, but list is updated |

| | | |
|---|---|---|
| | common name, IPUAC name, purity, date of entry and expiry to the list and specific provisions (which relate to Annex II). | annually and maintained by the Ministry of Agriculture. |
| Annex II | For inclusion into the list of registered use pesticides, an application must be made by the producer which includes a **very detailed** dossier on its characteristics (details in Annex II), such as chemical and physical characteristics, environmental behaviour and toxicity. | Any pesticide registered for use in Macedonia must be on the EU list – thus by default the required information is the same |
| 9 | Permissions for registration and inclusion of pesticides on the list are given for a period of 10 years. Following this reapplication must be made, proving that none of the conditions for its approval have changed. | yes |
| 17 | Clearly outlines the packaging and labeling requirements for all registered products | yes |

Note: EU list is larger than MK list.

**Attachment 4: RUP Criteria**

| Pesticide Active Ingredient (AI) name | Specific formulations | Specific uses | Criteria for RUP |
|---|---|---|---|
| Acetochlor | Emulsifiable concentrate | Field corn, popcorn, forage/feeder corn | Ground and surface water concerns |
| Acrolein | As sole active ingredient | All uses | Human inhalation hazard, adverse effects on avian and aquatic organisms |
| Alachlor | All formulations | All uses | Oncogenic potential |
| Aldicarb | As sole active ingredient and in combination with other actives; all granular formulations | All uses | Accident history |
| Aluminum phosphide | As sole active ingredient | All uses | Human inhalation hazard |
| Amitraz | All formulations | Pears | Possible oncogenicity |
| Amitrole | All formulations | All uses except homeowner | Oncogenic potential |
| Arsenic acide | All formulations except brush-on | All dessicant uses; all wood preservative uses | Oncogenicity, mutagenicity and repro/fetotoxicity |
| Arsenic pentoxide | All formulations | Wood preservative uses | Potential oncogenicity, mutagenicity, |

| | | | |
|---|---|---|---|
| | | | repro/fetotoxicity |
| Atrazine | All manufacturing and end use | Agricultural and industrial uses | Ground water contamination potential; worker exposure concerns |
| Avermectin (Abamectin) | Emulsifiable concentrate | Cotton and citrus | Toxic to fish, mammals and aquatic organisms |
| Avitrol | All formulations | All uses | Hazard to fish and non-target birds |
| Azinphos-methyl | All liquids with greater than 13.5% concentration; others on a case-by-case basis | All uses | Human inhalation hazard, acute toxicity, hazard to avian, aquatic and mammalian species |
| Bendiocarb | Granular and wettable powder | Turf | Toxicity to aquatic and avian species |
| Bifenthrin | Emulsifiable concentrate | Cotton | Toxic to fish and aquatic organisms |
| Bis(tributyltin)oxide | Solution - ready to use | Antifouling paint | Toxic to aquatic organisms including shellfish |
| Carbofuran | All formulations except pellets and tablets | All uses | Acute inhalation toxicity; avian toxicity (granular) |
| Chlorophacinone | Tracking powder, dust and ready to use 0.2% | Inside buildings | Human hazard, potential for food |

| | | | |
|---|---|---|---|
| | (EPA Reg. Nos. 7173-113 and 7173-172 | | contamination, possible inhalation hazard |
| Chloropicrin | All formulations greater than 2% and all formulations (rodent control) | All uses (greater than 2% including rodent control) | Acute inhalation toxicity, hazard to non-target organisms |
| Chlorpyrifos | Emulsifiable concentrate | Agricultural uses | Avian and aquatic toxicity |
| Chromic acid | All formulations except brush-on | All wood preservative | Oncogenicity, mutagenicity, teratogenicity and fetotoxic effects |
| Clofentezine | All formulations | All uses | Additional data required to remove the restriction |
| Coal tar | Solution - ready to use | Wood preservative | Oncogenicity and mutagenicity |
| Coal tar creosote | All formulations | Wood preservative | Possible oncogenic and mutagenic effects |
| Coumaphos | Flowable concentrate | Indoor food and indoor nonfood | Acute oral toxicity hazards |
| Cube resins other than rotenone | Emulsifiable concentrate | Small fruits, currants, certain berries | Chronic eye and inhalation effects |
| Cyfluthrin | 25% Emulsifiable concentrate | Agricultural | Acute toxicity to applicators, fish and |

| | | | |
|---|---|---|---|
| | | | other aquatic organisms |
| Cyhalothrin | Emulsifiable concentrate | Cotton | Environmental data requirements |
| Cypermethrin | All formulations | All agricultural crops | Oncogenicity, hazard to non-target organisms |
| Deltamethrin | Emulsifiable concentrate | Cotton | High toxicity to aquatic organisms |
| Diazinon | Granular, emulsifiable concentrate and wettable powders | Small fruits and certain berries | Avian and aquatic toxicity |
| Dichlobenil | 2,6-dichlorobenzonitrile | Terrestrial | Conditional |
| Dichloropropene | All formulations (94% liquid concentrate is the only formulation) | All uses | Probable human carcinogen, oncogenic, acutely toxic by oral and inhalation routes |
| Diclofop methyl | All formulations | All uses | Oncogenicity |
| Dicrotophos | All liquid formulations 8% and greater | All uses | Acute dermal toxicity, residue effects on avian species |
| Diflubenzuron | Wettable powders | All uses | Hazard to wildlife |

| | | | |
|---|---|---|---|
| Disulfoton | All ECs 65% and greater, all ECs and concentrate solutions 21% and greater with fensulfothion 43% and greater, all ECs 32% and greater in combination with 32% fensulfothion and greater | All uses, commercial seed treatment (non-aqueous solution 95% and greater). | Acute dermal toxicity, inhalation hazard |
| Emamectin benzoate | 4-epimethlyamino-4-deoxykavermectin BLA and B1b benzoates | Insecticide, miticide | Toxicity to fish |
| Esfenvalerate | 66% emulsible concentrate | Insecticide | Toxicity to fish and aquatic organisms |
| Ethoprop | Emulsifiable concentrates 40% and greater (aquatic uses); all uses (granular and fertilizer formulations | Aquatic uses (ECs 40% or greater); all uses (granular and fertilizer formulations) | Acute dermal toxicity |
| Fenamiphos | Emulsifiable concentrates 35% and greater | All uses | Acute dermal toxicity, avian acute oral toxicity, acute inhalation toxicity |
| Fenbutatin-oxide | Wettable powder | Grapes | Very high toxicity to aquatic organisms |
| Fenpropathrin | 2.4 emulsifiable concentrate spray | Agricultural uses | Environmental concerns: toxic to fish and aquatic organisms |
| Fenthion | Emulsifiable concentrate | Mosquitocide | Very high acute toxicity to birds, fish and aquatic |

| | | | |
|---|---|---|---|
| | | | invertebrates |
| Fipronil | All formulations | Insecticide/miticide | Conditional amended |
| Hydrogen cyanamide | 50% active ingredient | Desert grown grapes Potato | Corrosive effects to skin and eyes |
| Lambda-cyhalothrin | All formulations | All uses | Toxicity to fish and aquatic invertebrates |
| Magnesium phosphide | All formulations | All uses | Inhalation hazard |
| Methamidophos | Liquid formulations 40% and greater, dust formulations 2.5% and greater | All uses | Acute dermal toxicity, residue effects on avian species |
| Methidathion | All formulations | All uses except nursery stock, safflower and sunflower | Residue effects on avian species |
| Methiocarb | All formulations | Outdoor commercial and agricultural uses | Possible hazard to avian, fish and other aquatic organisms |
| Methomyl | As sole active ingredient in 1 to 2.5% baits (except 1% fly bait), all concentrate solution formulations and 90% wettable powder formulations (not in water soluble bags) | Nondomestic outdoor and all other registered uses (agricultural crops, ornamentals and turf) | Residue effects on mammalian species, other hazards - accident history |
| Methyl bromide | All formulations | All uses | Acute toxicity and accident history |

| | | | |
|---|---|---|---|
| Methyl isothiocyanate | Solution - ready to use | Fungicide for wood, wood preservative | Exceeds classification criteria of 40 CFR 152.170 |
| Methyl parathion | All formulations | All uses | Residue effects on mammalian and avian species, hazard to bees, acute dermal toxicity |
| Niclosamide | All wettable powders 70% and greater | All uses | Acute inhalation toxicity, effects on aquatic organisms |
| Nicotine | Liquid and dry formulations 14% and greater (greenhouse); all formulations (cranberries) | Greenhouse applications, all applications to cranberries | Acute inhalation toxicity, effects on aquatic organisms |
| Nitrogen, liquid | Solution - ready to use | Termiticide | Highly corrosive upon contact with skin or eyes |
| Oxamyl | Liquid formulations, granular on a case-by-case basis | All uses | Acute oral toxicity, acute inhalation toxicity, avian oral toxicity |
| Oxydemeton methyl | All products | All uses | Reproductive effects |
| Paraquat | All formulations and concentrations except certain mixtures - see label | All uses | Human toxicological data, other hazards - use and accident history |

| | | | |
|---|---|---|---|
| Pentachlorophenol | All formulations | Wood preservative uses | Possible oncogenic, teratogenic and fetoxic effects |
| Pentachlorophenol, Sodium S | All formulations | Wood preservative uses | Possible oncogenic, mutagenic and/or fetotoxic effects |
| Permethrin | All formulations | Agricultural crop uses | Highly toxic to aquatic organisms, oncogenicity |
| Phorate | Liquid formulations 65% and greater (all uses); all granular formulations (rice) | All uses (65% and greater); granular formulations (rice) | Acute oral and dermal toxicity for granulars, residue effects on avian and mammalian species (foliar application of liquid formulation only), effects on aquatic organisms |
| Piperonyl butoxide | Emulsifiable concentrate | Small fruits, certain berries, currants | Not specified |
| Profenofos | Emulsifiable concentrate 59.4%, EPA Reg. Nos. 100-599 and 100-669 | Cotton | Corrosive to eyes |
| Pronamide | All 50% wettable powders | All uses | Oncogenicity |
| Propanoic acid | Emulsifiable concentrate | Wheat, rice, edible chrysanthemum, cotton, clover, alfalfa, wheat-grass, sideoats | Not specified |

| | | | |
|---|---|---|---|
| | | grama, little bluestem | |
| Pyrethrins | Emulsifiable concentrate | No uses listed | Chronic eye effects |
| Resmethrin | All formulations | Mosquito abatement and pest control treatments at nonagricultural sites | Acute fish toxicity |
| Rotenone | 2.5/5.0 EC, 5.0% +20.0% wettable powder | Fish toxicant | Chronic eye and inhalation effects |
| Simazine | Emulsifiable concentrate | Grapes and certain berries | Not specified |
| Sodium cyanide | All capsules and ball formulations | All uses | Human inhalation hazard, hazard to non-target species |
| Sodium dichromate | All wood preservative formulations except brush-on | Wood preservative uses | Oncogenicity, mutagenicity, teratogenicity and fetotoxocity |
| Sodium fluoroacetate | All solutions and dry baits | All uses | Acute oral toxicity, hazard to non-target organisms, use and accident history |
| Sodium hydroxide | Ready to use solution | Control tree roots in sewage systems | Acute toxicity; eye, inhalation and dermal hazard |
| Sodium methyldithiocarbamate | 32.7% anhydrous | Soil fumigant to control soilborne pests | Dermal toxicity and teratogenicity. Acute |

| | | | |
|---|---|---|---|
| | | of ornamental, food and fiber crops and for root control in sewage systems | toxicity of metam sodium and its intended use in controlling sewer root growth |
| Strychnine | Dry baits, pellets and powder formulations - see specific labels | Formulations greater than 0.5%: all uses. All formulations: all uses calling for burrow builders. Formulations less than 0.5%: all uses except below-ground hand application. | Acute oral toxicity hazard to non-target avian species; use and accident history |
| Sulfotepp | Sprays and smoke generators | All uses | Inhalation hazard to humans |
| Sulfuric acid | Solution - ready to use | Potato vine desiccant | Extremely corrosive - acute toxicity to humans |
| Sulfuryl fluoride | All formulations | All uses | Acute inhalation hazard and possible acute toxicity hazard in humans |
| Tefluthrin | Granular formulations | Corn grown for seed | Environmental concerns Toxicity to fish and aquatic organisms |
| Terbufos | Granular formulations 15% and greater | All uses | Residue effects on avian species; acute oral and dermal toxicity and risks to aquatic organisms and other wildlife from runoff |

| | | | |
|---|---|---|---|
| TFM | Impregnated material | Aquatic pest control | Complexity in use-requires specialized training, equipment and clothing |
| Tralomethrin | All formulations | All agricultural crop uses | Toxicity to aquatic organisms |
| Tributyltin fluoride | Solution - ready to use | Antifouling paint | Toxicity to aquatic organisms including shellfish |
| Tributyltin methacrylate | Solution - ready to use | Antifouling paint | Toxicity to aquatic organisms |
| Triisopropranolamine | Emulsifiable concentrate | All uses | Hazard to non-target organisms, specifically plants both crop and noncrop |
| Triphenyltin hydroxide | All formulations | All uses | Possible mutagenic effects |
| Zinc phosphide | All dry formulations 60% and greater; all bait formulations; all dry formulations 10% and greater | All uses - non-domestic outdoor uses (other than 1-2% formulation in/around buildings); domestic uses | Hazard to non-target organisms, acute oral toxicity, acute inhalation toxicity |

**Attachment 5: Botanical Pesticides, Repellents, and Baits Regulated by EPA, as EPA-listed**

| Name | Other Names | Use | Toxicity | EPA Tracking Number |
|---|---|---|---|---|
| Allium sativum | Garlic | Repels insects | Low | 128827 |
| Allyl isothiocyanate | Oil of Mustard | Kills & repels insects | Questionable | 004901 |
| Anise Oil | | Repels vertebrates | Low | 004301 |
| 4-allyl anisole | Estragole | Kills beetles | Low | 062150 |
| Azadirachtin | *Azadirachta indica* Neem tree extract | Kills & repels insects | Low, IV | 121701 |
| Bergamot | | Repels vertebrates | | 129029 |
| Canola Oil | *Brassica Napus* | Kills many insects | Low | 011332 |
| Capsaicin | *B. Campestris* *Capsicum frutescans* | Repels vertebrates | Low, III | 070701 |
| Castor Oil | | Repels vertebrates | Low | 031608 |
| Cedarwood Oil | | Repels moth larvae | Low | 040505 |
| Cinnamaldehyde | *Ceylon and Chinese* cinnamon oils | Kills insects, fungi & repels vertebrates* | Low | 040506 |
| Citronella Oil | | Repels insects & vertebrates | Low | 021901 |
| Cloves, Crushed | | | Low | 128895 |
| Dihydroazadirachtin | Neem tree extract *Azadirachta indica* | Kills & repels insects | III-IV | 121702 |
| Eucalyptus Oil | | Repels insects, mites fleas & mosquitoes | Low | 040503 |
| Eugenol | Oil of cloves | Kills insects** | Low | 102701 |
| Geraniol | Oil of rose isomeric w/ linalool | Repels vertebrates** | Low | 597501 |
| Geranium Oil | | | Low | 597500 |
| Indole | from all plants | Trap bait: corn root-worm beetles | Low | 25000- |
| Jasmine Oil | | | Low | 040501 |
| Jojoba Oil | | Kills & repels whitefly kils powdery mildew | Low | 067200 |
| Lavandin Oil | | Repels clothes moth | Low | 040500 |
| Lemongrass | | Repels vertebrates | Low | 040502 |

| | | | | |
|---|---|---|---|---|
| Linalool | Oil of Ceylon isomeric w/ geraniol | Repels insects, ticks, mites & spiders | Low | 128838 |
| Maple lactone | | Roach trap bait | Low | 004049 |
| Methyl salicylate | Oil of wintergreen | Repels moths, beetle & vertebrates | May be Toxic in large quantity | 76601- |
| Mint | Herb | Kills aphids | Low | 128892 |
| Mint Oil | | Kills aphids | Low | 128800 |
| Mustard Oil | | Repels insects, spiders & vertebrates | Low | 004901 |
| Neem Oil | | Kills whitefly, aphids | Low | 025006 |
| 1-Octen-3-ol | From clover, alfalfa | Trap bait: mosquitoes | Low | 69037- |
| Orange | | Repels vertebrates | Low | 040517 |
| p-Methane-3,8 diol | *Eucalyptus sp.* | Repels biting flies, mosquitoes | Low | |
| 2-Phenylethyl-propionate | From peanuts | Kills insects, ticks, mites & spiders | Low | 102601 |
| Pyrethrum | *Chrysanthemum sp.* | Stored products use | III | |
| Red pepper | Chilli | Repels insects | Low | 070703 |
| Rosemary | Herb | | Low | 128893 |
| Rotenone | *Derris sp., Tephrosia* | Controls ticks | III | |
| Ryania | *Ryania speciosa* | Kills thrips, coddling moth, corn borers | | |
| Sabadilla | *Schoenocaulon sp.* | | III | |
| Sesame Oil | *Sesamum indicum* | Pyrethroid synergist | Low | |
| Soybean Oil | Soja | Kills insects, mites | Low | 031605 |
| Thyme | Herb | Controls aphids | Low | 128894 |
| 1,2,4 Trimethoxy-benzene | From squash | Trap bait: corn rootworm, cucumber beetles | Low | 40515- |
| Verbenone | From pine trees | Repels bark beetles | Low | 128986 |

1. This table does not necessarily describe all plant oil active ingredients.
2. More detailed information available for most of the oils: http://www.epa.gov/pesticides/reregistration/status.htm
3. Natural Source: Only one or a few sources are listed. Most of these chemicals are found in many different plants.
* attracts corn rootworm beetles, ** attracts Japanese beetles

## Attachment 6: A General IPM Planning and Design Protocol

The design of an IPM program can be developed with all of the fundamental parts of any good management plan. The vital parts of a plan include a definition of the targeted primary (small or large-holder farmers) and secondary (marketers, processors, transporters, and consumers) beneficiaries, implementation partners (farmers, laborers, extension personnel, national, regional and international organizations), listed production constraints (problem identification) and IPM strategies for dealing with them.

### Elements of IPM Program

Since IPM is not generally an active part of crop production in Guinea, a basic understanding of the steps or elements needed in an IPM program is addressed below.

**Step 1: Evaluate and use non-pesticide management options first**.
Use both preventive and responsive/curative options that are available to manage pest problems. Farmers may prevent pests (and avoid requiring pesticides) by the way they select plants, prepare the site, plant and tend growing plants. Along with prevention, farmers may respond to or cure the problem via physical, mechanical or biochemical methods.

**General Preventive Interventions:**

***Plant selection***
- choose pest-resistant strains
- choose proper locally-adapted plant varieties
- diversify plant varieties or inter-crop plants
- provide or leave habitat for natural enemies

***Site preparation and planting***
- choose pest-free or pest-avoidance planting dates (e.g., early planting in rainy season avoids stem borers in cereals)
- enhance/provide shade for shade-grown crops
- assign crop-free (fallow) periods and/or rotate crops
- install buffer zones of non-crop plants and/or physical barriers
- improve soil health
- use and appropriate planting density
- rotate crops
- low-till, no-till

***Plant tending/cultivation practices***
- fertilize and irrigate appropriately
- remove weeds while small and before sowing crop

**Responsive/Curative Interventions:**

***Physical/mechanical control***
- remove or destroy diseased plant or plant parts & pests
- weed
- install traps

***Biochemical control***
- pheromones (very effective, but not currently easily accessible or economical, however, they are becoming more so)
- homemade botanical pesticides

- repellents

***Biological control***

- release or augment predators
- release or augment parasites/parasitoids
- release or augment microbial pesticides

**Step 2: Assess IPM Needs and Establish Priorities.** In planning IPM project consider crop protection needs, farmers' perceptions of pest problems, pesticide use history and trends, availability of IPM technology, farming practices, access to sources of IPM expertise, support for IPM research and technical assistance, and training needs for farmers and project field extension workers.

Next, identify strategies and mechanisms for fostering the transfer of IPM technology under various institutional arrangements, mechanisms, and funding levels. Define what is available for immediate transfer and what may require rapid and inexpensive adaptation and validation research. During the planning stages of an IPM program, the inputs from experienced IPM specialists will be extremely useful. If possible, set up an initial planning workshop to help define and orient implementation activities, and begin to assign individual responsibilities.

**Step 3: Learn and value farmers' indigenous IPM tactics, and link with and utilize all local resources/partners.** Most farmers are already using their own forms of IPM, many of which are novel, self-created, adapted for local conditions, and many of which work well. These include: mechanical and physical exclusion; crop rotation, trap crops, cover crops, and green manures; local knowledge of strategic planting or harvesting times; water, soil and fertilizer resource management; intensive intercropping with pest-repellent plants; leaving refuge habitat for natural enemies; soil augmentation and care leading to healthy nutrient cycling; transplanting; and weeding.

Accurate assessments of these farmer technologies, as well as of actual losses due to different constraints in farmers' fields are a must, before designing a crop production and pest management program. Crop loss figures provided by small and large farmers alike, and thus projected and reported by international organizations, are often inaccurate, and thus overestimated.

**Step 4: Identify key pests for each target crop.** Although hundreds of species of organisms can be found in a crop at any one time, only a few of them may cause substantial crop losses, and be considered pests. Become familiar with the key pests of target crops, whether they are primary or secondary pests, how to positively identify them. Monitor their population size, the kind of damage that they cause, and their life cycle. These usually amount to a relatively small number of species on any one crop and can include any combination of insects, pathogens, weeds, diseases, and vertebrates. A few other species, known as secondary or occasional pests, attain damaging status from time to time; especially if over-spraying occurs and kills natural predators that naturally regulate their populations.

The vast majority of insect species found in any one crop are actually predators and parasites of the plant-feeding species. Many small-holder farmers are not aware of these distinctions and must be taught to correctly identify the more common beneficial species, as well as pests, found in their crops. Incorrect identification of beneficial insects, predators or neutral insect species, may lead to unnecessary pesticide applications. This diagnostic phase requires sampling and careful observation. Usually, most key pests are fairly well known by local farmers and government extension personnel. However, a few species may be poorly known or understood because they occur at night, are hidden, or small. These include soil-inhabiting species such as

nematodes and insect larvae (wireworms, white grubs, cutworms), mites, and pathogens (viruses, bacteria, mycoplasma, fungi). In addition, farmers usually do not understand the role of some insects as vectors of plant diseases.

**Step 5: Do effective activities and training to promote IPM**. A number of activities are very effective in promoting IPM in developing countries:

*Learning-by-doing/discovery training programs*
The adoption of new techniques by small- and large-holder farmers occurs most readily when program participants acquire knowledge and skills through personal experience, observation, analysis, experimentation, decision-making and practice. First, frequent (usually weekly) sessions are conducted for 10–20 farmers during the cropping season in farmers' fields by trained instructors or extension agents. Because these IPM training sessions take place in the farmers' own environment, (1) they take advantage of the farmers' own knowledge; and (2) the farmers understand how IPM applies to their own farms.

Of these IPM training sessions, four or five analyze the agroecosystem. They identify and describe conditions such as soil type, fertility, and needs, weather, crop stage, each pest, their natural enemies, and relative numbers of both. Illustrations and drawings are provided, as necessary. Extensionists apply a Socratic method, guiding farmers with questions to discover important insights and supplying information only when absolutely necessary.

Farmers may also experiment with insect zoos where they can observe natural predators of their pests in action and the impact of pesticide on both. Knowledge and skills necessary for applying IPM are best learned and understood through practice and observation, understanding pest biology, parasitism, predation and alternate hosts; identifying plant disease symptoms; sampling population size; and preparing seed beds.

*Recovering collective memory*
Pest problems often emerge because traditional agricultural methods were changed in one way or another, or lost. These changes can sometimes be reversed. This approach uses group discussions to try to identify what changes might have prompted the current pest problem.

*Smallholder support and discussion groups*
Weekly meetings of smallholders, held during the cropping season, to discuss pest and related problems can be useful for sharing the success of various control methods. However, maintaining attendance is difficult except when there is a clear financial incentive (e.g., credit).

*Demonstration project*
Subsidized experiments and field trials at selected farms can be very effective at promoting IPM within the local community. These pilots demonstrate IPM in action and allow comparison with traditional synthetic pesticide-supported cultivation.

*Educational material-Guinea*
In many countries, basic written and photographic guides to pest identification and crop-specific management techniques are unavailable or out of date. Such material is essential. Videos featuring graphic pictures of the effects of acute and chronic pesticide exposure, and interviews with poisoning victims can be particularly effective. A study in Nicaragua found videos to be the most important factor in motivating farmers to adopt IPM.

*Youth education*

Promoting and improving the quality of programs on IPM and the risks of synthetic pesticides has been effective at technical schools for rural youth. In addition to becoming future farmers, these students can bring informed views back to their communities.

*Organic food market incentive*
Promoting organic certification for access to the lucrative and rapidly growing organic food market can be a strong incentive to adopt IPM.

**Step 6: Partner successfully with other IPM implementers.** Many IPM project consist of partnerships between two or more organization, e.g., donors, governments, PVOs and NGOs. If these partnerships are not forged with care, the entire project may be handicapped. The following design steps are considered essential.

*Articulate the partnership's vision of IPM*
Organizations may forge partnerships based on a common commitment to "IPM"—only to discover too late that that their visions of IPM differ considerably. It is important that partners articulate a common, detailed *vision* of IPM, centered on the crops and conditions the project will encounter.

*Confirm partner institutions' commitment*
Often, organizations make commitments they do not intend to (or are unable to) fulfill completely. The extent of commitment to IPM integration into project, design, and thus implementation depends strongly upon the following key variables:

- **IPM program integration into larger project**. The IPM program is likely to be part of a larger "sustainable agriculture" project. The IPM program must fit into a partner's overall program. The extent of this integration should be clearly expressed in the proposed annual work plan.
- **Cost sharing**. The extent of funds (or in-kind resources) is a good measure of a genuine partner commitment.
- **Participation of key IPM personnel.** Large partner organizations should have staff with expertise in IPM who are assigned specifically to IPM work. In strong partnerships, these staff members are actively involved in the partnership.

**Step 7: Monitor the fields regularly.** The growth of pest populations usually is related closely to the stage of crop growth and weather conditions, but it is difficult to predict the severity of pest problems in advance. The crops must be inspected regularly to determine the levels of pests and natural enemies and crop damage. Current and forecast weather should be monitored. Farmers, survey personnel, and agricultural extension staff can assist with field inspections. They can train other farmers to be able to separate pests from non-pests and natural enemies, and to determine when crop protection measures, are necessary.

**Step 8: Select an appropriate blend of IPM tools.** A good IPM program draws from and integrates a variety of pest management techniques. IPM does not require predetermined numbers or combinations of techniques, nor is the inclusion or exclusion of any one technique required for IPM implementation. Flexibility to fit local needs is a key variable. Pesticides should be used only if no practical, effective, and economic non-chemical control methods are available. Once the pesticide has been carefully chosen for the pest, crop, and environment, it should be applied only to keep the pest population low. When dealing with crops that are already being treated with pesticides, IPM should aim first at reducing the number of pesticide applications through the introduction of appropriate *action thresholds*, while promoting

appropriate pesticide management and use practices and shifting to less toxic and more selective products and non-chemical control methods. In most cases, NGOs/PVOs will probably need to deal with low to moderate levels of pesticide use. Either way, an IPM program should emphasize preventive measures and protect a crop, while interfering as little as possible with the production process.

**Step 9: Develop education, training, and demonstration programs for extension workers.** Implementation of IPM depends heavily on education, training, and demonstration to help farmers and extension workers develop and evaluate the IPM methods. Hands-on training conducted in farmers' fields (as opposed to a classroom) is a must. Special training for extension workers and educational programs for government officials and the public are also important.

**Step 10: Monitor and Evaluate.** First, develop data collection tools, and then collect baseline data at the beginning of the project to identify and determine the levels of all variables that will need to be tracked. These may include numbers and types of pests, predators, and soil microorganisms; relative numbers of all non-target animals (birds, lizards, etc.) that may be negatively impacted if pesticides are used; soil and water samples to determine levels of pesticide residue; soil samples to learn dominant soil types and to predict soil nutrition, requirements, and fertilizer/pesticide activities; pesticides, application and safety equipment available; and, amounts and type of training received by target audiences.

Develop methods for measuring the effectiveness of each IPM tactic used, and of their sum in reducing pest damage and crop losses. Also, develop methods for monitoring environmental health (maintaining and encouraging high levels of predators and soil microorganisms) and human health if pesticides are used. Kits are available for determining the level of cholinesterase-inhibiting pesticides to which farmers and applicators have been exposed. Make checklists for farmers to use when applying pesticides that indicate the type of application and safety equipment used, and the rates at which pesticides were applied.

**Attachment 7 Questionnaires and Responses to Questionnaires**

**AGBIZ – PESTICIDE SURVEY**
**АГБИЗ- ПРАШАЛНИК ЗА ПЕСТИЦИДИ**

According to U.S. Agency for International Development (USAID) environmental regulations, an environmental review must be conducted prior to using USAID funds to procure or use pesticides.
Во согласност со регулативите на УСАИД за животна средина, треба да се направи проценка на употребата на пестициди за да се овозможи користење на фондовите за добивање и употреба на пестициди.

The following questionnaire is being used to gather information which will be used as the basis for the USAID-required use of pesticides in Macedonia.
За таа цел, овој прашалник се користи да обезбеди информации кои ќе бидат употребени како основа за проценката на УСАИД за употреба на пестицидите во Македонија.

Please fill in the below questionnaire. Give as much information as possible; it is better to provide too much information than too little.
Ве молам пополнете го прашалникот и при тоа потрудете се да дадете што е можно повеќе информации.

**PESTICIDE QUESTIONNAIRE**
**ПРАШАЛНИК ЗА ПЕСТИЦИДИ**

**A. Pesticides Used/Procured/Recommended and Efficacy**

| Pesticides you use/recommend—include all pesticides, use additional paper if necessary (please be as specific as possible, and if you know the chemical formulation as well as the brand name, please supply both).<br>Наведете ги пестицидите кои ги предлагате (комерцијално име и хемиска формулација) | What pest(s) is the pesticide controlling? (Common and scientific name, if you know them).<br><br>Кои штетници го контролираат пестицидот? (локалното или латинското име ако го знаете) | Why do you recommend this pesticide? (some possible reasons: it is available and inexpensive; it is the most efficacious; it is part of an IPM program, etc).<br>How effective is this pesticide in controlling the specific pest(s)? Describe.<br>Зошто ги предлагате овие пестициди? (можни причини се дека се ефтини, ефикасни, дел од | Are there other pesticides or non-chemical means that would be effective? What are they?<br><br>Дали постојат други пестициди или други начини без употреба на хемиски средства да се контролираат овие штетници? Наведете кои се тие начини? |
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| | | програмата за интегрална заштита на растенијата, и.т.н.) Колку е ефикасен овој пестицид во контрола на штетниците? Опишите. | |
| **FUNGICIDES** | | | |
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| **INSECTICIDES** | | | |
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| **HERBICIDES** | | | |
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**B. Integrated Pest Management (IPM) / Интегрална заштита на растенија/ Добра земјоделска пракса**

What other techniques except for pesticides do you use to control pests? Кои други техники кои не вклучуваат пестициди ги користите против штетниците?

**Alternative pest control methods available:**

| **Crop Плод** | **Main Pest/Disease Problems/главни штетници/ проблеми** | **Integrated Pest Management Интегрална заштита на растенијата** |
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**C. Pesticide Application, Protective Equipment, and Monitoring /monitoring Апликација на пестициди, сигурносна опрема/ облека и надзор/мониторинг**

How are the pesticides applied? If different application methods are used for the different pesticides, please describe for each pesticide (backpack sprayer, through irrigation system, etc
Како се применуваат пестицидите? Ако користите различни методи на апликација за различни пестициди, ве молам наведете за секој пестицид посебно (рачно шприцање, преку иригациони системи и.т.н.)

Do you require that safety equipment/clothing is used? Yes/No
Дали се залагате за користење на сигурносна опрема/облека?

What type of safety equipment and clothing is used (specify for each pesticide)? Is it available from chemical supply stores?
Кој вид на сигурносна опрема/облека се користи (наведете за секој пестицид посебно). Дали таква опрема е достапна на продажба во земјоделските аптеки?

Do you require that only trained applicators use pesticides or do individual farmers use pesticides?
Дали се залагате да само обучените апликатори користат пестициди или и индивидуалните земјоделци тоа го прават?

Who ensures that the equipment/clothing is available for the farmers/applicators?
Кој се грижи за сигурносната опрема/облека да биде достапна за апликаторите/земјоделците?

Is there a monitoring program to ensure the safety equipment and clothing is in good condition and is being used? Please describe.
Дали постои надзор за да се осигура дека сигурносната опрема/облека е во добра состојба и дека се корист?

Do you have a monitoring program to ensure pesticides are being used correctly? Please describe.
Дали постои надзорен систем за да се осигура дека пестицидите се користат правилно?

**D. Training / Obuke**

Who provides training in safe pesticide use? Please describe.
Кој обезбедува тренинг за правилна употреба на пестицидите?

**AGBIZ – AGROS PESTICIDE SURVEY**
**АГБИЗ- ПРАШАЛНИК ЗА ПЕСТИЦИДИ**

According to U.S. Agency for International Development (USAID) environmental regulations, an environmental review must be conducted prior to using USAID funds to procure or use pesticides.
Во согласност со регулативите на УСАИД за животна средина, треба да се направи проценка на употребата на пестициди за да се овозможи користење на фондовите за добивање и употреба на пестициди.

The following questionnaire is being used to gather information which will be used as the basis for the USAID-required use of pesticides in Macedonia.
За таа цел, овој прашалник се користи да обезбеди информации кои ќе бидат употребени како основа за проценката на УСАИД за употреба на пестицидите во Македонија.

Please fill in the below questionnaire. Give as much information as possible; it is better to provide too much information than too little.
Ве молам пополнете го прашалникот и при тоа потрудете се да дадете што е можно повеќе информации.

**PESTICIDE QUESTIONNAIRE**
**ПРАШАЛНИК ЗА ПЕСТИЦИДИ**

**A. Pesticides Used/Procured/Recommended and Efficacy**

| Наведете ги пестицидите кои ги предлагате (комерцијално име и хемиска формулација) | | Кои штетници го контролираат пестицидот? (локалното или латинското име ако го знаете) | Зошто ги предлагате овие пестициди? (можни причини се дека се ефтини, ефикасни, дел од програмата за интегрална заштита на растенијата, и.т.н.) Колку е ефикасен овој пестицид во контрола на штетниците? Опишите. | Дали постојат други пестициди или други начини без употреба на хемиски средства да се контролираат овие штетници? Наведете кои се тие начини? |
|---|---|---|---|---|
| **FUNGICIDES** | | | | |
| FUNGURAN – OH | Copper Hidroxide | Colletotrichium loeosporides, Cercospora capsici, Xanthomonas campestris, | Евтини и ефикасни 70% Cheap and 70% effective | Постојат многу пестициди, но овие највеќе одговараат од аспект цена/квалитет/ |
| KOCPIN WP | Copper Hidroxide | | Евтини и ефикасни 70% | |

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| | | Erwinia carotovora, Verticilium albo-atrum | Cheap and 70% effective | почек/искуство. Други методи за контрола на габи не ни се познати A lot of pesticides exist, but these are the most appropriate according to price/quality/ loans/ experience. Other methods for the control of fungi are unknown |
| PREMIER 20% WP | Imidakloprid | Rhizoctonia solani, botrytis cinera, Phytophthora capsici, Fusarium oxysporum, Levaillila taurica, | Многу ефикасен 100%, на одложено плаќање Very effective (100%). Deferred payment. | |
| PREVIKUR 607 - SL | Propamocarb | | Многу ефикасен 100% Very effective (100%). | |
| Armetil VP 15/35 | Metal Aksil 15% Coper Oxiclhoride 35% | | Многу ефикасен 100%, на одложено плаќање Very effective (100%). Deferred payment. | |
| Top M 70% VP | Thiophamamte methyl 70% | | Евтини и ефикасни 80%, на одложено плаќање Very effective (80%). Deferred payment. | |
| | | | | |
| **INSECTICIDES** | | | | Постојат многу пестициди, но овие највеќе одговараат од аспект цена/квалитет/ почек/искуство. Во Македонија сеуште нема искуство со биолошка борба со штетници, иако знаеме за нејзино постоење |
| BULLDOCK | Beta-cyfluthrin 25 gr/l | Mamestra spp., Aphis fabae Trips spp., Meligethes aeneus, Pieris spp., Brevicoryne brassicae, Leptinotarsa decemlineata | Многу ефикасен 100% Very effective (100%). | |
| GALATION G - 5 | Fenitrothion 4,7% ± 0,5% Malathion 0,3% | Gryllotalpa gryllotalpa, Elateridae | Евтини и ефикасни 70%, на одложено плаќање Cheap and effective (70%). Deferred | |

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|---|---|---|---|---|
| | | | payment. | A lot of pesticides exist, but these are the most appropriate according to price/quality/ loans/ experience. In Macedonia people don't have experience using biological control of pests, although we know of its existence. |
| | | | | |
| **HERBICIDES** | | | | |
| TREFLAN –EC | Trifluralex | Широколисни плевели | Евтини и ефикасни 70% Cheap and effective (70%). | Сме користеле повеќе препарати иста активна материја In the past we used more preparations consisting of the same active material |

**B. Integrated Pest Management (IPM) / Интегрална заштита на растенија/ Добра земјоделска пракса**

What other techniques except for pesticides do you use to control pests? Кои други техники кои не вклучуваат пестициди ги користите против штетниците?

**Alternative pest control methods available:**

| **Crop Плод** | **Main Pest/Disease Problems/главни штетници/ проблеми** | **Integrated Pest Management Интегрална заштита на растенијата** |
|---|---|---|
| **Пиперка pest** | Плевели - weeds | Фрезирање, Наривање, Копање, прецизно наводнување, корнење на заразени растенија Harrowing, ?, hoeing, precision irrigation, weeding of infected plants |
| | Инсекти - insects | Редовно следење на состојба и интервенции по потреба Regular observation of the situation and intervention when needed |

| Crop<br>Плод | Main Pest/Disease Problems/главни штетници/ проблеми | Integrated Pest Management<br>Интегрална заштита на растенијата |
|---|---|---|
| | Вируси - viruses | Корнење на заразени растенија<br>weeding of infected plants |
| | Габи - fungi | Наводнување само со чиста вода која не содржи спори, минимална апликација на превентива и најчесто избегнување на тераписки третмани<br>Irrigation only with clean water which doesn't contain spores, minimal application preventative substances and avoidance of unnecessary treatments. |

**C. Pesticide Application, Protective Equipment, and Monitoring /monitoring Апликација на пестициди, сигурносна опрема/ облека и надзор/мониторинг**

Прашањата се одговорени со претпоставка дека разговараме за 30 ха кои се предмет на проектот, не за целото здружение.
These questions have been answered with the assumption that we are discussing the 30 ha. which are a part of the project, not for the entire cooperation.

How are the pesticides applied? If different application methods are used for the different pesticides, please describe for each pesticide (backpack sprayer, through irrigation system, etc
Како се применуваат пестицидите? Ако користите различни методи на апликација за различни пестициди, ве молам наведете за секој пестицид посебно (рачно шприцање, преку иригациони системи и.т.н.)
Сите пестициди со исклучок на Галатионот (кој се расфрла) се нанесуваат со тракторски прскалки (300-600 л/ 8-12 метра)
All pesticides are applied with the exception of Galation (which is spread) are applied using tractor sprayers (boom sprayers) a rate of 300-600 l/8-12 meters).

Do you require that safety equipment/clothing is used? Yes/No
Дали се залагате за користење на сигурносна опрема/облека?
Да, пиперот се прска исклучиво со тракторски прскалки со кабини. Кога се користи трактор без кабина трактористот носи заштитна опрема.
Yes, the peppers are sprayed only with tractor sprayers with cabins. When a tractor without a cabin is used, the applicator wears protective equipment.

What type of safety equipment and clothing is used (specify for each pesticide)? Is it available from chemical supply stores?

Кој вид на сигурносна опрема/облека се користи (наведете за секој пестицид посебно). Дали таква опрема е достапна на продажба во земјоделските аптеки?

Комбелизон, филтер маска, очила, нараквици, чизми

Overalls, filter mask, goggles, gloves and boots.

Do you require that only trained applicators use pesticides or do individual farmers use pesticides?

Дали се залагате да само обучените апликатори користат пестициди или и индивидуалните земјоделци тоа го прават?

Само обучените апликатори користат пестициди

Only trained applicators use pesticides.

Who ensures that the equipment/clothing is available for the farmers/applicators?

Кој се грижи за сигурносната опрема/облека да биде достапна за апликаторите/земјоделците?

Самите апликатори се професионални земјоделци кои работат услужно и ја имаат целата неопходна заштитна опрема

The applicators are professionally trained in agriculturists who provide services and they have all the necessary protective equipment.

Is there a monitoring program to ensure the safety equipment and clothing is in good condition and is being used? Please describe.

Дали постои надзор за да се осигура дека сигурносната опрема/облека е во добра состојба и дека се корист?

Да, секое прскање се следи од менаџментот на проектот, со оглед дека има вкупно 4 прскања во годината

Yes, every spraying is supervised by the project management, taking into consideration that there are 4 sprayings per year.

Do you have a monitoring program to ensure pesticides are being used correctly? Please describe.

Дали постои надзорен систем за да се осигура дека пестицидите се користат правилно?

Да, секое прскање се следи од менаџментот на проектот, и се проверува дозата, мешањето на средствата и прскањето

Yes, every spraying is supervised by the project management, and also the dose, mixing of chemicals and actual spraying are supervised.

**D. Training / Obuke**

Who provides training in safe pesticide use? Please describe.
Кој обезбедува тренинг за правилна употреба на пестицидите?

Самите апликатори се професионални земјоделци кои работат услужно.
Проектиот тим се Агроном и експерт за примена на Добра земјоделска пракса и ГлобалГАП, по потреба даваат совети на давателите на услуги.

The applicators themselves are professional agriculturalists which provide services to the farmers. The project team includes an agronomist and an expert for good agricultural practice and GlobalGAP. When needed the team provides counselling to the service providers (i.e. the trained applicators previously mentioned).

**AGBIZ – BOVIN PESTICIDE SURVEY**
**АГБИЗ- ПРАШАЛНИК ЗА ПЕСТИЦИДИ**

According to U.S. Agency for International Development (USAID) environmental regulations, an environmental review must be conducted prior to using USAID funds to procure or use pesticides.
Во согласност со регулативите на УСАИД за животна средина, треба да се направи проценка на употребата на пестициди за да се овозможи користење на фондовите за добивање и употреба на пестициди.

The following questionnaire is being used to gather information which will be used as the basis for the USAID-required use of pesticides in Macedonia.
За таа цел, овој прашалник се користи да обезбеди информации кои ќе бидат употребени како основа за проценката на УСАИД за употреба на пестицидите во Македонија.

Please fill in the below questionnaire. Give as much information as possible; it is better to provide too much information than too little.
Ве молам пополнете го прашалникот и при тоа потрудете се да дадете што е можно повеќе информации.

**PESTICIDE QUESTIONNAIRE**
**ПРАШАЛНИК ЗА ПЕСТИЦИДИ**

**A. Pesticides Used/Procured/Recommended and Efficacy**

| Pesticides you use/recommend—include all pesticides, use additional paper if necessary (please be as specific as possible, and if you know the chemical formulation as well as the brand name, please supply both).<br>Наведете ги пестицидите кои ги предлагате (комерцијално име и хемиска формулација) | What pest(s) is the pesticide controlling? (Common and scientific name, if you know them).<br><br>Кои штетници го контролираат пестицидот? (локалното или латинското име ако го знаете) | Why do you recommend this pesticide? (some possible reasons: it is available and inexpensive; it is the most efficacious; it is part of an IPM program, etc).<br>How effective is this pesticide in controlling the specific pest(s)? Describe.<br>Зошто ги предлагате овие пестициди? (можни причини се дека се ефтини, ефикасни, дел од програмата за интегрална заштита на растенијата, и.т.н.) Колку е ефикасен овој пестицид во контрола на штетниците? Опишите. | Are there other pesticides or non-chemical means that would be effective? What are they?<br><br>Дали постојат други пестициди или други начини без употреба на хемиски средства да се контролираат овие штетници? Наведете кои се тие начини? |
|---|---|---|---|
| **FUNGICIDES** | | | |
| Ditan-mankozeb<br>Mancozeb | Plasmopara viticola<br>(downy mildew) | Kontakten<br>Contact | Da<br>yes |
| Antracol- propineb<br>'Antrokol' is propineb + | Plamenica<br>Erwinia amylovora | Kontakten<br>contact | Da<br>yes |

| | | | |
|---|---|---|---|
| Triadimefon | | | |
| Verita-fozetil al+fenamidon<br>Fosetil aluminium | Plamenica<br>Erwinia amylovora | kurativna zastita<br>careful protection | Da<br>yes |
| Mikal-fozetil al+folpet<br>Fosetil aluminium | Plamenica<br>Erwinia amylovora | kurativna zastita<br>careful protection | Da<br>yes |
| Akrobat-dimetomorf<br>Acrobat is mancozeb<br>+ dimethomorph | Plamenica<br>Erwinia amylovora | *Kontaktno so kurativno*<br>Contact and careful protection | |
| Colis-krezoksimetil<br>Tanymecus dilaticolis - ? | Folicur<br>(Tebuconazole) | Pepelnica(uncinulanecator)<br>Powdery mildew<br>**(Uncinula necator)** | Da<br>yes |
| Teldor-fenkxiksamid | Botritis | Suvognienje<br>Dry rot | |
| **INSECTICIDES** | | | |
| Nurel<br>Nurelle - cypermethrin + chlorpyrifos | Hlor pirifos+ciprometran<br>Chlorpyrifos + cypromethrin | Grozdov molec (clusia ambicuela,deluvaat na larvata<br>Lobesia (affects the larvae) | Da<br>yes |
| Decis<br>Deltamethrin | Deltametrin<br>(deltamethrin) | Grozdov molec(clusia ambicuela,deluvaat na larvata<br>Lobesia (affects the larvae) | Da<br>yes |
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| **HERBICIDES** | | | |
| Dominator<br>glyphosate | Glifosat<br>(glyphosate) | Totalen herbicid<br>Za sirokolisni I telesni pleveli<br>Total herbicide with a broad spectrum and effective action against weeds | Da<br>yes |
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**B. Integrated Pest Management (IPM) / Интегрална заштита на растенија/ Добра земјоделска пракса**

What other techniques except for pesticides do you use to control pests? Кои други техники кои не вклучуваат пестициди ги користите против штетниците?

**Alternative pest control methods available:**

| Crop<br>Плод | Main Pest/Disease Problems/главни штетници/ проблеми | Integrated Pest Management<br>Интегрална заштита на растенијата |
|---|---|---|
| | | Rezidba-otstranuvanje na zarazeni lozi I dezinfekcija na alatot za rezidba<br>Pruning – removal and thinning of the grape vines and disinfection of tools for pruning. |
| **Grozje – 1. Grapes** | Grozdov molec<br>Lobesia | Lovenje na molecot so lovni mamci-feromoni I mamci so ocet<br>Trapping grape moths with pheromonal attractants and vinegar attractants. |
| | Clusija ambicuela I polikrosis botrana | |
| **2.** | Pepelnica<br>Powdery mildew | Indicator-trendafil |
| | | Feliziranje so sto se zgolemuva provetrenosta na lozata<br>Harrowing to increase the aeration of the vines. |
| **3.** | Plamenica<br>Erwinia amylovora | -osloboduvanje na lozata od site jalovi letorasti – cistenje na nasadot od treva koja ja zadrzuva vlagata blizu do lozjata<br>Removal of all unfertile branches<br>Clearing the vineyard of grass which holds humidity in the proximity of the grape vines |
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**C. Pesticide Application, Protective Equipment, and Monitoring /monitoring Апликација на пестициди, сигурносна опрема/ облека и надзор/мониторинг**

How are the pesticides applied? If different application methods are used for the different pesticides, please describe for each pesticide (backpack sprayer, through irrigation system, etc

Како се применуваат пестицидите? Ако користите различни методи на апликација за различни пестициди, ве молам наведете за секој пестицид посебно (рачно шприцање, преку иригациони системи и.т.н.)

Aplikacijata na pesticidite se vrsi so traktorski vlecni-atomizeri so zapremnina od 1000L.

The application of pesticides is done with a tractor drawn mister with a capacity of 1000L

Tretiranje so herbicidi se vrsi so vgradeni breneri na pistoli koi gi opsluzuvaat dvajca rabotnici dvizejci se po atomizerot.

Treatment with herbicides is carried out with inbuilt sprayers attached to a pistol which are used by two workers. The sprayer is connected to the tank of the mister.

Do you require that safety equipment/clothing is used? Yes/No
Дали се залагате за користење на сигурносна опрема/облека?
Da
Yes

What type of safety equipment and clothing is used (specify for each pesticide)? Is it available from chemical supply stores?
Кој вид на сигурносна опрема/облека се користи (наведете за секој пестицид посебно). Дали таква опрема е достапна на продажба во земјоделските аптеки?
Maska-medicinska za usta i nos,
gumeni rakavici
Kabanica-rabotnicko odelo
Cizmi
Mask (medical for mouth and nose)
Rubber gloves
Overalls (probably cotton)
Boots

Do you require that only trained applicators use pesticides or do individual farmers use pesticides?
Дали се залагате да само обучените апликатори користат пестициди или и индивидуалните земјоделци тоа го прават?
Samo za obuceni aplikatori.
Only trained operators

Who ensures that the equipment/clothing is available for the farmers/applicators?
Кој се грижи за сигурносната опрема/облека да биде достапна за апликаторите/земјоделците?
”Bovin” se grizi za ispravnosta na opremata
”Bovin” ensures maintence of the equipment.

Is there a monitoring program to ensure the safety equipment and clothing is in good condition and is being used? Please describe.
Дали постои надзор за да се осигура дека сигурносната опрема/облека е во добра состојба и дека се корист?
Da- nadzorot go vrsi strucno lice Agronom
Yes – supervision is carried out by a professional agronomist.

Do you have a monitoring program to ensure pesticides are being used correctly? Please describe.
Дали постои надзорен систем за да се осигура дека пестицидите се користат правилно?
Da-agronom vo sorabotka so ministerstvoto za zemjodelie
Yes – an agronomist which is registered with the Ministry of Agriculture

**D. Training / Obuke**

Who provides training in safe pesticide use? Please describe.
Кој обезбедува тренинг за правилна употреба на пестицидите?
Nadleznata terenska sluzba na cello so agronomot na Bovin.
The responsible field workers in combination with the agronomist from Bovin

**AGBIZ – PESTICIDE SURVEY**
**АГБИЗ- ПРАШАЛНИК ЗА ПЕСТИЦИДИ**

According to U.S. Agency for International Development (USAID) environmental regulations, an environmental review must be conducted prior to using USAID funds to procure or use pesticides.
Во согласност со регулативите на УСАИД за животна средина, треба да се направи проценка на употребата на пестициди за да се овозможи користење на фондовите за добивање и употреба на пестициди.

The following questionnaire is being used to gather information which will be used as the basis for the USAID-required use of pesticides in Macedonia.
За таа цел, овој прашалник се користи да обезбеди информации кои ќе бидат употребени како основа за проценката на УСАИД за употреба на пестицидите во Македонија.

Please fill in the below questionnaire. Give as much information as possible; it is better to provide too much information than too little.
Ве молам пополнете го прашалникот и при тоа потрудете се да дадете што е можно повеќе информации.

**PESTICIDE QUESTIONNAIRE**
**ПРАШАЛНИК ЗА ПЕСТИЦИДИ**

**A. Pesticides Used/Procured/Recommended and Efficacy**

| Pesticides you use/recommend—include all pesticides, use additional paper if necessary (please be as specific as possible, and if you know the chemical formulation as well as the brand name, please supply both).<br>Наведете ги пестицидите кои ги предлагате (комерцијално име и хемиска формулација) | What pest(s) is the pesticide controlling? (Common and scientific name, if you know them).<br><br>Кои штетници го контролираат пестицидот? (локалното или латинското име ако го знаете) | Why do you recommend this pesticide? (some possible reasons: it is available and inexpensive; it is the most efficacious; it is part of an IPM program, etc).<br>How effective is this pesticide in controlling the specific pest(s)? Describe.<br>Зошто ги предлагате овие пестициди? (можни причини се дека се ефтини, ефикасни, дел од програмата за интегрална заштита на растенијата, и.т.н.)<br>Колку е ефикасен овој пестицид во контрола на штетниците? | Are there other pesticides or non-chemical means that would be effective? What are they?<br><br>Дали постојат други пестициди или други начини без употреба на хемиски средства да се контролираат овие штетници? Наведете кои се тие начини? |
|---|---|---|---|

| | | | |
|---|---|---|---|
| | | Опишите. | |
| **FUNGICIDES** | | | |
| Dithane DG (mancozeb) | Plasmopara viticola (downy mildew) | Permitted and effective | |
| Karatane (dinokap) | Uncinula necator (a fungus that causes powdery mildew on grape) | Permitted and effective | |
| Galbec F (Benalaksy – M, Folpet) | Plasmopara viticola | Permitted and effective | |
| Electis (zoxamide + mancozeb) | Plasmopara viticola | Permitted and effective | |
| Crystal (quinoxyfen) | Uncinula necator | Permitted and effective | |
| Systhane 12 E (myclobutanol) | Uncinula necator | Permitted and effective | |
| Champion (Copper 50%) | Plasmopara viticola | Permitted and effective | |
| **INSECTICIDES** | | | |
| Reldan (Chlorpyrifos methyl) | Lobesia botrana | Permitted and effective | |
| Vantex (Gama cyhalotrin) | Lobesia botrana | Permitted and effective | |
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| **HERBICIDES** | | | |
| Glyphosate | Weeds after tilling/harrowing | Permitted and effective | |
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**B. Integrated Pest Management (IPM) / Интегрална заштита на растенија/ Добра земјоделска пракса**

What other techniques except for pesticides do you use to control pests? Кои други техники кои не вклучуваат пестициди ги користите против штетниците?

**Alternative pest control methods available:**

| **Crop Плод** | **Main Pest/Disease Problems/главни штетници/ проблеми** | **Integrated Pest Management Интегрална заштита на растенијата** |
|---|---|---|
| **Wine** | Plasmopara viticola | Agrotechnical measurements (moisture, temp., etc. ), |

| Crop<br>Плод | Main Pest/Disease Problems/главни штетници/ проблеми | Integrated Pest Management<br>Интегрална заштита на растенијата |
|---|---|---|
| **grapes** | | selective pruning, regular field inspections, pesticides, careful monitoring of irrigation. |
| | Uncinula necator | |
| | Botrytis cinerea (bunch rot) | |
| | Phomopsis viticola (Alan, this is half of the 'dead arm' disease) | |
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**C. Pesticide Application, Protective Equipment, and Monitoring /monitoring Апликација на пестициди, сигурносна опрема/ облека и надзор/мониторинг**

How are the pesticides applied? If different application methods are used for the different pesticides, please describe for each pesticide (backpack sprayer, through irrigation system, etc
Како се применуваат пестицидите? Ако користите различни методи на апликација за различни пестициди, ве молам наведете за секој пестицид посебно (рачно шприцање, преку иригациони системи и.т.н.)

The main method of application is by means of a mister (turbo atomizer). Backpack sprayers are used for 'spot' application of herbicides.

Do you require that safety equipment/clothing is used? Yes/No
Дали се залагате за користење на сигурносна опрема/облека?
Yes.

What type of safety equipment and clothing is used (specify for each pesticide)? Is it available from chemical supply stores?
Кој вид на сигурносна опрема/облека се користи (наведете за секој пестицид посебно). Дали таква опрема е достапна на продажба во земјоделските аптеки?
Boots, gloves, goggles, paper mask for nose and mouth

Do you require that only trained applicators use pesticides or do individual farmers use pesticides?
Дали се залагате да само обучените апликатори користат пестициди или и индивидуалните земјоделци тоа го прават?

All users

(sorry Alan, this was Jovan's response… I am lost as to what he means here. He may have misinterpreted the question as …are applicators trained for the use of pesticides… recall that all the pesticide applicators had recieved some training, but their 'skill level' was varied from expert to absolute novice)

Who ensures that the equipment/clothing is available for the farmers/applicators?
Кој се грижи за сигурносната опрема/облека да биде достапна за апликаторите/земјоделците?

Plantation managers

Is there a monitoring program to ensure the safety equipment and clothing is in good condition and is being used? Please describe.
Дали постои надзор за да се осигура дека сигурносната опрема/облека е во добра состојба и дека се корист?

Yes

Do you have a monitoring program to ensure pesticides are being used correctly? Please describe.
Дали постои надзорен систем за да се осигура дека пестицидите се користат правилно?

It exists.
(sorry again... that is all he said, but we know more from the field visit)

**D. Training / Obuke**

Who provides training in safe pesticide use? Please describe.
Кој обезбедува тренинг за правилна употреба на пестицидите?

A trained expert

(Alan, I assume that Jovan is talking about himself – he is a trained expert for pesticides and agronomy).

**Pesticides Used by Each Company**

**COMPANY 1: "AGROS"**

1. Fungicides

| Product | Producer | | Importer |
|---|---|---|---|
| FUNGURAN - OH | "SPIESS-URANIA CHEMICALS" GmbH - HAMBURG - GERMANY | Copper Hidroxide | DT "HEMOFARM KOMERC I DR." - SKOPJE |
| KOCPIN WP | DPVNT " AGROPIN" DOO SKOPJE | Copper Hidroxide | DPVNT " AGROPIN" DOO SKOPJE |
| PREMIER 20% WP | "KAFR EL. Z.I. PESTICIDES - | Imidakloprid | TDPTDU"AGROJUNIKOM" DOOEL- SKOPJE |

| | | | |
|---|---|---|---|
| | CHEMIKAL" CO – EGYPT | | |
| PREVIKUR 607 - SL | "BAYER" - Crop Science AG-GERMANY | Propamocarb | DPVNT " AGROPIN" DOO SKOPJE |
| Armetil VP 15/35 | "KAFR EL. Z.I. PESTICIDES - CHEMIKAL" CO – EGYPT | Metal Aksil 15% Coper Oxiclhoride 35% | TDPTDU"AGROJUNIKOM" DOOEL- SKOPJE |
| Top M 70% VP | "KAFR EL. Z.I. PESTICIDES - CHEMIKAL" CO - EGYPT | Thiophamamte methyl 70% | TDPTDU"AGROJUNIKOM" DOOEL- SKOPJE |

2. Insecticides

| Producer | Trade name | Active compound | Dosage | Range |
|---|---|---|---|---|
| "BAYER" AG Germany "AGROPIN" Skopje | BULLDOCK | Beta-cyfluthrin 25 gr/l | 0,3-0,5% | Mamestra spp., Aphis fabae Trips spp., Meligethes aeneus, Pieris spp., Brevicoryne brassicae, Leptinotarsa decemlineata |
| "GALENIKA" Belgrade - SCG "AGROHEMIJA KOMERC" Skopje | GALATION G - 5 | Fenitrothion 4,7% + 0,5% Malathion 0,3% | 20-25kg/ha | Gryllotalpa gryllotalpa, Elateridae |

3. Herbicides

| Name | Producer | Importer | Active compound |
|---|---|---|---|
| TREFLAN -EC | DOW"AgroSciences"V.M.B.H VIENA-AUSTRIA | DPPU "RADOMAK" DOO SKOPJE | Trifluralex |

**COMPANY 2: "POPOVA KULA VINEYARDS"**

1. DITHANE DG
2. KARTHANE
3. GALBEN F
4. SABITHANE
5. VANTEX
6. ELECTIS
7. CRYSTAL
8. SUMILEX
9. CHAMPION
10. RELDAN
11. SYSTHANE 12E

**COMPANY 3: "BOVIN VINEYARDS"**

| Name | Active Material | Diseases |
|---|---|---|

| | | |
|---|---|---|
| Polikam DF | Metiram | Plazmospora Viticola |
| Kumulus | 80% Sulfur | Uncinula Nekator |
| Forum Star | Dimetomorf I Folpet | Plazmospora Viticola |
| Vivando | Metrafenon | Uncinula Necator |
| Acrobat | Dimetomorf I Mancozeb | Plazmospora Viticola |
| Colis | Boskalid+Kresoxim Methil | Uncinula Necator |
| Funguran-Cu | Metiram | Plazmospora Viticola |
| Propiconazol | Propiconazol | Uncinula Necator |
| Cantus | Boscalid | Botritis Cinerea |

Note that all of the products have certificate of origin.

Correct spellings:

Dimethomorph
Boscalid
Kresoxym methyl

Dear Mr. Branko Baltovski
Phyto-pharmacist
Agrohemija
agrohem@mol.com.mk
7/14/2008

Following our telephone conversation on Monday ~13:00, I am sending you some questions in regard to Agrohemija's involvement and extensive knowledge of the agrochemical industry in Macedonia.

According to U.S. Agency for International Development (USAID) environmental regulations, an environmental review must be conducted prior to using USAID funds to procure or use pesticides.
Во согласност со регулативите на УСАИД за животна средина, треба да се направи проценка на употребата на пестициди за да се овозможи користење на фондовите за добивање и употреба на пестициди.

If it is easier for you please feel free to contact me over the phone to discuss your answers to these questions.

1) Does the new law (Zakon za proizbodi za zashtita na rastenijata) which was introduced in September 2007 eliminate any of Agrohemija's current products? Which?
They don't know exactly what the Annex of the EU law will include; and their might be local variations in the annex according to what member countries decide. This means that so far Agrohemija has not eliminated any of its products and will wait to see exactly what the law will include for Macedonia.

2) Is Agrohemija a member of CropLife International or would this be in your company's interests?
Not a member, not interested in becoming one.

3) Has your company ever provided training for the end users of your products (farmers, agronomists) in regard to safe use and handling of pesticides?
Yes training is supplied for agronomists / retailers annually (for those stores for where they sell their products). Training for new products includes safety, development of pest programs, application and use.

4) Does your company ever have problems with the quality of imported materials (completed products or ingredients)?
No problems so far. Testing done on request by the Ministry of Agriculture, Phyto-sanitary Dept. – although this has never happened.

5) Does your company provide testing / quality control of its products for impurities or unwanted materials such as isomers?
They did their own testing in the beginning to ensure quality, but it was found quality was OK and in accordance with the suppliers' documentation. They receive quality certificates from authorized laboratories in the producer's country – i.e. products come with a quality certificate from the country of origin.

6) Does Agrohemija have a 'return system' for pesticide packaging or unused/out of date pesticides? How does it operate?
Agrohemija has had no incident of having to return or destroy unwanted product since they try (from a business sense perspective) not to produce/order extra amounts. With regard to packaging there is no return/collection system.

7) In your opinion, what could / should be done to improve the use of pesticides in Macedonia?

The government should be involved more in extension services to train individual farmers.

8) How has the use of agrichemicals changed compared to the times of Yugoslavia?
He has seen changes in industry, not distribution. These days there are much less toxic active ingredients, smaller amounts used and the effectiveness and accuracy of pesticides is far greater. In the times of Yugoslavia farming systems were better organized due to the scale. There were whole teams working on phyto–sanitary and fertilizer regimes, whereas now the farm management often relies on one agronomist.

Thank you for you time,

David B. Graham
Consultant for the AgBiz Program regarding pesticide use

**Agros Questions**

**Ilcho Velkov, Director Agros 2004 (started by FAO/GTZ), Kolcheni**

**Questions for managers**

1. Is there a person(s) (agronomist) in the company responsible for managing the pesticide program for your farms/ farmers?

Coop agronomist and shop owner very experienced. No fire extinguisher—maybe size small—in car. 400 Euros per month. Kolcheni. He is good in practice, though he learned theory in university. Since 1984, work grapes, hot houses tomato, rice, mushrooms, start here 2004. FAO donation seed, chemicals—free donation. Start 40 farmers, increase fast-free handouts. 220 farmers second year—choose serious farmers with bigger farms, 4th year 120 farmers. Went outside contract to help people outside region to buy their peppers and find markets. Now stricter, need contract to sell through them. After farmers sign, can estimate how much prod will be, then contact buyers. Each farmer has code, get weight by farm, know how much to pay. Bar coded receipt. Know the company it will go to. The price of seeds and fertilizer are taken out of produce sales returns at the end of the season. Buyers cannot rip off farmers.

2. What are the future plans for the company?

Problem with labor. 30-40 k for conveyor belt to take picked peppers to tractor trailer. Work force getting older. Young leaving. 50-60 kg per bag now before conveyor. Big plastic 300kg bins are used with field conveyor belts.

Now have large tractor-pulled boom sprayer, need 2 more. Farmers use own tractors, want more boom sprayers, tractors. Many farmers use backpack, but inefficient and slow. Most farms 2 ha, and rent additional land. Some commercial farms 40ha. Flood irrigation for rice, spray for other crops. Great soil holds moisture. Function guide farmers. Farmers use methods outside of reccs. Encourage to use hot houses. Take to Serbia Greece, Bulgaria to see newest techs. White fly problem here in tunnels. Evolve quickly live 24 hrs long, fast evolve quickly. Different pesticides changed.

**Questions for agronomists**

1. What are your main crops? Agros, Historical for region = rice. Long light green pepper, red pepper, industrial tomato, eggplant, carrot, red beet, and leeks.
2. What else do you grow?
3. What are the main pests that you have for each crop? He has pesticide company color flyers for all main pests and what to use.
4. What pesticides do you use for each of those pests? Above. *Phytophthora capsicum* if high moisture.
5. What methods other than pesticides do you use for those pests? Biological, rare, mosaic virus use milk. Tunnel to extend season.
6. Have you ever seen the affectability of agro-chemicals decrease over time? He switches up every year or two.
7. Do farmers ever complain about the quality of the agrochemicals (i.e. they don't work)?
8. What are the main factors controlling the selection of a pesticide (cost, efficacious, availability, safety, environmental concern?)

9. Do you have any *local* methods for controlling pests that have been effective? Milk for virus, others, but not believe in.
10. Have you or others in this area ever been involved in IPM or GAP programs? Not big pest problems, no need. (Интегрална заштита на растенија/ Добра земјоделска пракса)
11. Have you ever heard of anyone being poisoned or becoming sick from using pesticides? Environmental impacts (fish/bee/bird kills)
12. What do you do with pesticide containers? Bury or burn. Plan with FAO for better mgmt, collect, and return to company.
13. How is the use of agrochemicals different today compared to the times of Yugoslavia?
14. Soil test done? pH 7, low potassium some soils, some low N, alluvial, was a swamp—neutralize soil high pH, reduced non-oxidized soils, sulphuric acid forms when O2 hits. Put lime.

Which of the following GAP/IPM tools/techniques are used for each target crop:

Soil nutrient, texture and pH testing—yes by company that does irrigation
Pest resistant/tolerant seed/plant variety—yes
Seed treatment with pesticides—yes
Solar soil sterilization—no
Raised-bed planting technique—no
Plastic or other mulches—no
Follow seeding rate & thinning recommendations—yes
Soil moisture measurements—yes
Use of organic fertilizers (manure, compost)—yes, sheep manure is generally bought up by veggie farmers
Use of purchased mineral fertilizers—yes
Combinations of organic and mineral fertilizers—no
Crop rotation—yes
Use of green manure crops—na
Early/late plantings/harvestings to avoid pests—yes
Use of trap crops to trap and destroy pests—no
Pruning and sanitation of diseased plants/trees—should be, but not yet
Planting parasite-attracting plants on field margins—no
Farmer ability to correctly identify pests—no
Is there a parasitoid that attacks major pests?—no
Farmer ability to correctly identify predators & parasites—some, but mostly no
Weekly field scouting to assess pest levels/damage—yes, every day usually
Mechanical weed control by hoe or tiller—yes
Use of herbicides for weed control—yes
Mechanical pest control by hand picking—no
Spot treatment of pest hotspots with pesticides (instead of area spraying)—yes
Use of pheromone traps to monitor moth pest levels—no
Use of pheromone inundation to confuse moth mating—no
Crop residue destruction at end of season—no, leave on ground
Apply local artesenal plant extracts to kill pests—no
Do things to encourage predator/parasite build-up—no

**Macedonia Preparatory Information needed to do PERSUAP: Popov Kula**

**First questions to get answers to (as soon as possible)**

**100 tons grapes from here, 400 tons outside, mix of farm sizes, some bigger farms have agronomist, he goes to smaller farms, cides sourced from everywhere, would like to control more of plant protection component. Give cides take out amount worth at end season. need to control quality of grape/wine. export to Poland, UK, pinot, chardonnay, merlot, mostly cabernet sauvignon, vranitz—Balkan variety.**

- 1. We need a list of the major production constraints (Macedonia pests) for each target crop—grapes, downy mildew, insect *Lobesia botrana*.
- 2. We need a list of the pesticide active ingredients (by Product or Trade names) registered by the Macedonia Government for import and use, and if possible with specific information on formulation (like EC, WP, etc), concentration and registered uses for each product.
- 3. Pesticides available for each crop constraint (what can one find in farm input supply/pesticide stores where program partner farmers shop?). Only buy American and European products, worry about quality from China and other countries.
- 4. Pesticides proposed by partner farmers and beneficiaries for each crop constraint.
- 5. What are the primary bases for farmer selection of pesticides in Macedonia: price, efficacy, availability, safety, environmental concerns, or other?—efficacy, safe, rest equal.
- 6. Which of the following GAP/IPM tools/techniques are used for each target crop:

Soil nutrient, texture and pH testing—yes by company that does irrigation
Pest resistant/tolerant seed/plant variety—no
Seed treatment with pesticides—no seeds
Solar soil sterilization—no
Raised-bed planting technique—no
Plastic or other mulches—no
Follow seeding rate & thinning recommendations—na
Soil moisture measurements—yes
Use of organic fertilizers (manure, compost)—no, sheep manure bought up by veggie farmers
Use of purchased mineral fertilizers—yes
Combinations of organic and mineral fertilizers—no
Crop rotation—na
Use of green manure crops—na
Early/late plantings/harvestings to avoid pests—not possible, grapes picked according to sugar, use refractometer to determine. sept, oct pick season. higher ground picked lastfirst, ripen quicker. 200-800 meters above sea level
Use of trap crops to trap and destroy pests—no
Pruning and sanitation of diseased plants/trees—should be, but not yet.
Planting parasite-attracting plants on field margins—no
Farmer ability to correctly identify pests—not know early symptoms and know too late, esp sooty mildew (powdery mildew)

Rare pests *Anomal vitis* very rare beetle eats leaves, cigar-maker,
Is there a parasitoid that attacks major pests?—no, knows that can buy but not used
Farmer ability to correctly identify predators & parasites—na
Weekly field scouting to assess pest levels/damage—yes, every day usually.
Mechanical weed control by hoe or tiller—yes
Use of herbicides for weed control—yes
Mechanical pest control by hand picking
Spot treatment of pest hotspots with pesticides (instead of area spraying)—yes
Use of pheromone traps to monitor moth pest levels—yes
Use of pheromone inundation to confuse moth mating—yes, tested here with limited success.
Crop residue destruction at end of season—no, leave on ground, should do.
Apply local artesenal plant extracts to kill pests
Do things to encourage predator/parasite build-up

ensure soil well prepared, amount water exactly what need, no flooding, measure soil quality and minerals—company that does irrigation does soil analysis, make reccs on amount fert to use. prevent fungus by defoliate by hand to reduce pest issues, low acid levels in grape is a problem. remove around grape, grapes grow on older wood, take leaves off newer parts/stems, mostly on bottom, allow wind to get in. monitoring trap for grape moth = Lobesia botrana. have not had to spray this year. weed control by glyphosate, and by hand. spring by hand, then spray. plan for larger area of grapes will do harrowing (tilling) for weed control. village people.

spray by calendar or when needed? preventive spray used by calendar early season before flower for downy mildew. all other diseases sprayed when see signs of disease. depend on attack/infection. use spot treatment. no parasitoids here. another place one year successful pheromone, one year was patchy. mating disruption pheromone.

- 7. For pesticides that your project intends to use, how are they generally applied? By hand-pump backpack sprayer with wand, motorized backpack sprayer, hand-held micro-ULV sprayers, granular applicators, truck-mounted sprayers, boom sprayers, or air-blast sprayers? Use a tractor-pulled turbo atomizer—big fan—to spray all cides. backpack rare, most have small tractors and equip.

- 8. Do farmers who use pesticides generally use personal protection equipment (PPE) while applying the pesticides? What do they use? Goggles, chemical cartridge respirator and filtering cartridges or elements, gloves, spray suit or coveralls with long pants and long-sleeve shirt, hat, boots?—overalls, goggles, paper mask, gloves, hood,

- 9. Have there been any pesticide human poisonings in Macedonia in the past five years?—not that he knows, he knows Lannate is supposed to be banned.

- 10. Have there been any pesticide-caused environmental (like fish or honeybee kills) or groundwater contamination issues associated with pesticide application in Macedonia?—no—in law, have to announce on radio to protect honey industry. Beekeepers are well cared for.

- 11. Have any of the pesticides used on partner farmer/beneficiary farms shown signs of working less and less effectively over time? In other words, does it take increasingly larger doses of any of the pesticides to control the disease, insect or weed pests of your project's crops?—he manages resistance to cides, most of farmers come to him to get cide, will control all. Now, not all know.

- 12. We need to know if any Macedonian farmers use traditional (non-pesticide) control measures for diseases, insects, or weeds pests of crops. What do they use? Do these work well?—none, used to use Bordeaux mix, sulfur and nothing for insects.

- 13. We need copies (in English) of Macedonian regulations/policies/laws for safe use (import, storage, application, disposal) of pesticides. What are major constraints to enforcement of these laws?—follow EU rules.

- 14. Have any of the farmers or project staff members that currently have pesticide responsibilities had training in good agriculture practices (GAPs) and integrated pest management (IPM) to find lowest risk pest control alternatives or combinations?—HACCP, EuroGAP

- 15. Have project staff and farmers who are using pesticides on your project had any safe pesticide use training in the past?—yes, and will have more.

- 16. What happens with empty pesticide containers?—burn them. 2 years ago he went to USA for plant protect products training in Texas—big collection containers returned to distributor.

**Macedonia Second Preparatory Information needed to do PERSUAP Popov Kula**

**Next questions to get answers to (as soon as the first priority questions have been answered)**

The conditions under which the pesticides are to be used, including soil types and characteristics, hydrology (watersheds, groundwater and surface water resources), geography, climate, endangered flora and fauna (has an FAA 118/119 study been performed?)—lomes, alluvium, delluvial, black soil. river water should be tested, but not. MOH is supposed to do but not. dept hydro-bio inspection

What are the local recommended application rates for each proposed pesticide?—got it

In general, how do farmers or project staff store pesticides?—staff special bodega, big farmers have appropriate places, small farmers keep wherever.

Is there a provision or possibility for training of pesticide users and applicators who will work on the project?

Have any soil tests been performed to determine soil inputs needs? If so, what was found?—yes

Will any irrigation be used? Is there capability to test water for toxins (E. coli, arsenic, chlorinated hydrocarbon pesticide residues, etc)?

Is there capability to do soil moisture testing?

Will any of the production be exported? To where? Under any standards/certification schemes (BRC, ISO, Organic, GlobalGAP)?

Manufacturers: What are the names of the manufacturers for each pesticide used, for example BASF, Bayer, Dow AgroSciences, DuPont FMC, Monsanto, Syngenta, Sumitomo, or others, including national pesticide producers, formulators, or re-packagers in the region? done

Popov Kula interviews

Yovan Petrov, Skopje U, Agriculture Sciences, 28 years ago, field agron grpes, cereals, stone fruits, apples in coop. Then 10 years plant protection all products in Macedonia for coop in Povardariya. 95-07 company import cides—Radomak. instructor for plant protect. did lots training in plant protect. no PPE. boots, overalls, goggles, paper mask, hood, gloves.

Manage product distribution and agchem program. Use a turbo atomizer to spray all cides.

crystal = quinoxyfen

rotate product through season and mode of action

know IPM and implant informally, use as much as possible.

Yugoslavia had large coops with locked metal storage places organized by type. Had entire teams to manage plant protection. Was a good system, but now small farmers do not know what to do.

table grapes are the same, he thinks.

designed questionnaire to see what cides farmers are using—have copy in MK.

goes to farmers and inspects crops.

connected to another firm or coop in Kumanovo—grapes 260 ha, table grapes 10 ha, peaches, apricots, wheat, apple, sunflowers, foreign company will buy, PK will manage it.

before 1940s, what did farmers use here for pests? Bordeux mix and sulfur. insects nothing.

containers? burn

climatic factor on grapes? really cold -20C. buds freeze. 80s happen 3 times, catastrophic. sometimes light piles of hay around edges.

**Macedonia Preparatory Information needed to do PERSUAP: GD Tikves**

**First questions to get answers to (as soon as possible)**

**since 25 years ago**
**800 ha, 250 table grapes**
**altitude = 450-500 masl**

- What is the source of pesticides? Whatever large importer/distributor company has what they like at the price they like.
- Where sell product to? Romania, Serbia, Poland, Croatia, local Balkan region.
- Source from other farmers? No

- 1. We need a list of the major production constraints (Macedonia pests) for each target crop. Plasmopara viticola, wine downy mildew, is related to climate problems—long dry period controls it. No major pest, only early summer months when wet enough, grape moth. No white flies.

- pheromone traps to monitor. team of 20 agronomists. modify program constantly, to determine levels of moth. also monitor temp, humidity. 30 ha with no cide. plant to get rid of cides, British company donate traps, use for assessment, and also to trap out all the males. numbers have been so low that have not needed to treat 30 ha. Planning to expand the use of these traps for table grapes only, which are expensive to use. The traps are too expensive to use for wine grapes. It is cheaper to spray. They test the table grapes for pesticides. Largest company in Macedonia. Concerned about image as well as residues. Company that provides traps is British Exosect (www.exosect.com). It is a donation, funded first by MOEd, now by company.

- 2. We need a list of the pesticide active ingredients (by Product or Trade names) registered by the Macedonia Government for import and use, and if possible with specific information on formulation (like EC, WP, etc), concentration and registered uses for each product

- 3. Pesticides available for each crop constraint (what can one find in farm input supply/pesticide stores where program partner farmers shop?) Depends on growth phase. Before flower no treatment, Reldan in early stages, Lannate later, Maverick, Methomyl (Methonix). Early season mildew, use Crystal as preventative. For wine grapes, use copper, not for table grapes (makes look dirty and blue). Folpan, folpet. Mancozeb.

- 4. Pesticides proposed by partner farmers and beneficiaries for each crop constraint.

- 5. What are the primary bases for farmer selection of pesticides in Macedonia: price, efficacy, availability, safety, environmental concerns, or other? Use list of cides available to/through EU. Price is a major determinant. Rotate pesticides. Use sulfur dioxide gas in cold room.

- 6. Which of the following GAP/IPM tools/techniques are used for table grapes:

  Soil nutrient, texture and pH testing—yes, every year, send samples to Holland
  Soil moisture measurements—yes
  Pest resistant/tolerant variety/seed—yes
  Seed treatment with pesticides
  Solar soil sterilization—na

Raised-bed planting technique—na
Drip irrigation—yes
Fertigation—yes
Plastic or other mulches—no
Follow seeding rate & thinning recommendations—na
Use of organic fertilizers (manure, compost)—yes, sheep manure from own farm
Use of purchased mineral fertilizers—yes, Dutch Co that does 'free' soil samples
Combinations of organic and mineral fertilizers—yes, but usse care with sheep manure as it has too much of some microelements
Use of green manure crops—na
Crop rotation—after 25-30 years take out plants, rotate to/plant grains for 5 years
Early/late plantings/harvestings to avoid pests—na
Use of trap crops to trap and destroy pests—na
Do things to encourage predator/parasite build-up
Planting parasite-attracting plants on field margins
Pruning and sanitation of diseased plants—yes
Company agronomist ability to correctly identify pests—yes
Are there parasites/predators of major pests—no
Company agronomist ability to correctly identify predators & parasites—na
Weekly field scouting to assess pest levels/damage—continuous
Mechanical weed control by hoe or tiller—yes, between rows
Use of herbicides for weed control—yes, glyphosate
Mechanical pest control by hand picking—na
Preventive or calendar spraying—yes
Spot treatment of pest hotspots with pesticides (instead of area spraying)—yes after area treatment does not work
Use of pheromone traps to monitor moth pest levels—yes
Use of pheromone inundation to confuse moth mating—yes
Crop residue destruction at end of season—yes, remove leaves around grapes, chemical cannot reach grapes, reduce humidity around grapes, easier picking—Burn residues
Apply local artesenal plant extracts to kill pests—na

- 7. For pesticides that your project intends to use, how are they generally applied? By hand-pump backpack sprayer with wand, motorized backpack sprayer, hand-held micro-ULV sprayers, granular applicators, truck-mounted sprayers, boom sprayers, or air-blast sprayers?—use mist blowers, grandpa used backpack sprayers.

- 8. Do farmers who use pesticides generally use personal protection equipment (PPE) while applying the pesticides? What do they use? Goggles, chemical cartridge respirator and filtering cartridges or elements, gloves, spray suit or coveralls with long pants and long-sleeve shirt, hat, boots?—overalls, single carbon-filter mask, gloves, some people not like to use a lot of equipment due to heat/comfort. Some tractors have cover. Apply early morning, 4-9, below 28 degrees C.

- 9. Have there been any pesticide human poisonings in Macedonia in the past five years?—no, people have worked with chemicals for a long time and know risks.

- 10. Have there been any pesticide-caused environmental (like fish or honeybee kills)?—NL, warning system for beekeepers, and bees moved from here because gets too hot and dry here, move up to mountains. Bee guys also have grapes.

- Have there been any groundwater contamination issues associated with pesticide application in Macedonia?—NL

- 11. Have any of the pesticides used on partner farmer/beneficiary farms shown signs of working less and less effectively over time? In other words, does it take increasingly larger doses of any of the pesticides to control the disease, insect or weed pests of your project's crops?—no, rotate cides.

- 12. We need to know if any Macedonian farmers use traditional (non-pesticide) control measures for diseases, insects, or weeds pests of crops. In old or Yugoslav times, what do they use? Do these work well?—sulfur, copper, Sumpur, Kosan, Kumulus. Bordeaux mix.

- 13. We need copies (in English) of Macedonian regulations/policies/laws for safe use (import, storage, application, disposal) of pesticides. What are major constraints to enforcement of these laws?—got it.

- 14. Does the company do training for safety?—no, training on pests of plants for workers, need to do some for GlobalGAP certification. Also there is training for shops, and farmers. MAFWE/phytosanitary.

- Have any of the farmers or project staff members that currently have pesticide responsibilities had training in good agriculture practices (GAPs) and integrated pest management (IPM) to find lowest risk pest control alternatives or combinations?—Are EurepGAP certified through INCEBO (Germany). Cost for Cert? 300 Euros, with 100 Euros per year thereafter. 4-5000 Euros for training for company.

- 15. Have project staff and farmers who are using pesticides on your project had any safe pesticide use training in the past?—yes, also have managers to dictate safe use.

- 16. What does the company do with empty pesticide containers?—collect, put into containers, EurepGAP not permit burn, burry. Company contracted to collect these.

- What are the local recommended application rates/dose for each proposed pesticide?—use label. GlobalGAP requires record keeping.

- GlobalGAP, do one time per year.

- In general, how do farmers or project staff store pesticides?

**Macedonia agriculture, Goran Angelovski DVM—can send questions by email to him**

Was Exec Dir of BioSan, Federation of Organic Producers, can send questions.

Organic is common sense best practices plus record-keeping.

He also train people to audit HACCP.

Organic donation of Swiss Gov, institute for research in organic ag called FIBL-did trainings, set up federation, managed project, lots training to be ***advisors***

Manure here from cow, sheep.

Also work Swedish dairy co.

Advisors for veggies, fruits, vineyards, adjust to new EU laws on organic prod. Works here. Called Eco or Bio.

Lannate was used to treat dogs for parasites, many dogs died.

MSDSs are required by law.

Stamp on bottles show that they were not smuggled, clear by ministry to enter.

Smuggled pesticides come through Bulgaria, made in Burlgaria, many organic products are smuggled from Greece.

Macedonia Chamber of Commerce that lobbies for law, regulations, to favor business.

Ohis—pesticide produced for export (part state, part private) tender to make chemicals here, export to Israel, released chemicals at night—2 years ago. Complaints of no safety equipment.

Many old Yugoslav companies were very careful with worker health. Old restaurants have better-than German Yugo HACCP standards, like where windows and doors were.

IPM will check.

90% of producers are small farmers; need to talk with individual producers.

No one has trained individual farmers here.

Less than half a hectare for most farmers, since it has been divided and subdivided among kids.

Government has 10% of arable land, in big blocks. Agros is renting the land, or buying combinatz (Yugo socialized land in big pieces) land in one piece.

INCEBO, EuroMak implement all standards, MCG, Dutch company—no longer accredited. Now in talks with Control Union for Dutch company to get reaccreditation.

Balkan BioCert (did inspections, audits), Bulgarian company. Based in Plovdiv. Have done work in Organic in MK.

No Fair Trade yet, IMO had wkshop with AgBiz to look into this.

Wild-collected will be organic, through InterMak. Also cert organic under USDA NOP stds.

Alkaloid (MK) company—make pharmas, export to USA herbs/teas as organic. Giant leftover of Yugo.

Wild-collected fruits (frozen, dry for teas) & mushrooms (fresh, dry & frozon), herbs (dry).

All companies must implement HACCP by law or be closed, as of Jan 1. Old Yugo system was better than HACCP.

**Attachment 8: Mitigating potential pesticide dangers General measures to ensure safe use**

If there are no feasible alternatives to pesticides, take the following measures to mitigate and reduce their risks to human health and the environment. Note that risk is a function of both toxicity and exposure. Reducing risk means (1) selecting less toxic pesticides and (2) selecting pesticides that will lead to the least human exposure before, during and after use.

***Reduce exposure time or the degree of exposure***

**Before using**

*Transport:*

- separate pesticides from other materials being transported

*Packaging:*

- follow international and national norms and guidelines
- use packaging (small containers) adapted to local needs
- eliminate re-use of packaging materials

*Storing:*

- develop strict guidelines for village-level storage
- ensure permanent, well-marked labeling
- follow and respect national norms
- use appropriate language and approved pictograms

*Formulating:*

- use appropriate type and concentration

**During use**

*Training:*

- should be continuous
- should identify level and audiences (distributors, farmers, transporters, etc.)

*Use application equipment:*

- should be adapted to user needs and possibilities
- should assure maintenance and availability of parts and service

*Use protective equipment and clothing:*

- should be adapted to local climatic conditions
- should be adapted to user needs and resource possibilities
- should eliminate exposure rather than just reduce it, if at all possible

*Focus on "buffer zones" around the following:*

- housing
- environment: water, sensitive areas

**After using**

- know, enforce, respect exclusion or reentry periods after application
- assure proper cleaning and rinsing off of:
  - applicators' preparation and application equipment
  - applicators' clothing
  - storage containers
- develop a workable monitoring and evaluation system for:
  - adherence to national and international policies regarding pest management and pesticides
  - health effects on applicators, the local population, and domestic animals
  - efficacy on target pests
  - impacts on environment: above- and below-ground water, soils, air, drift, biodiversity
  - elimination of pesticide leftovers and containers

**Attachment 9: Protective Clothing and Equipment Guide**

**EPA Recommended Worker Protection Standards**

| HANDLER PPE FOR WORKER PROTECTION STANDARD PRODUCTS | | | | |
|---|---|---|---|---|
| **Route of Exposure** | **Toxicity Category by Route of Exposure of End-Use Product** | | | |
| | I<br>DANGER | II<br>WARNING | III<br>CAUTION | IV<br>CAUTION |
| Dermal Toxicity or Skin Irritation Potential[1] | Coveralls worn over long-sleeved shirt and long pants<br><br>Socks<br><br>Chemical-resistant footwear<br><br>Chemical-resistant Gloves[2] | Coveralls worn over short-sleeved shirt and short pants<br><br>Socks<br><br>Chemical-resistant footwear<br><br>Chemical-resistant Gloves[2] | Long-sleeved shirt and long pants<br><br>Socks<br><br>Shoes<br><br>Chemical-resistant Gloves[2] | Long-sleeved shirt and long pants<br><br>Socks<br><br>Shoes<br><br>No minimum[4] |
| Inhalation Toxicity | Respiratory protection device[3] | Respiratory protection device[3] | No minimum[4] | No minimum[4] |
| Eye Irritation Potential | Protective eyewear[5] | Protective eyewear[5] | No minimum[4] | No minimum[4] |

1 If dermal toxicity and skin irritation toxicity categories are different, PPE shall be determined by the more severe toxicity category of the two. If dermal toxicity or skin irritation is category I or II, refer to the pesticide label/MSDS to determine if additional PPE is required beyond that specified in Table.
2 Refer to the pesticide label/MSDS to determine the specific type of chemical-resistant glove.
3 Refer to the pesticide label/MSDS to determine the specific type of respiratory protection.
4 Although no minimum PPE is required for these toxicity categories and routes of exposure, some specific products may require PPE. Read pesticide label/MSDS.
5"Protective eyewear" is used instead of "goggles" and/or "face shield" and/or "shielded safety glasses" and similar terms to describe eye protection. Eye glasses and sunglasses are not sufficient eye protection.

Note that all types of PPE were sourced at a company in Skopje.

## Attachment 10: Basic first aid for pesticide overexposure

Get medical advice quickly if you or any of your fellow workers have unusual or unexplained symptoms during work or later the same day. Do not let yourself or anyone else get dangerously sick before calling a physician or going to a hospital. It is better to be too cautious than too late.

First aid is the initial effort to help a victim while medical help is on the way. If you are alone with the victim, make sure the victim is breathing and is not being further exposed to the poison before you call for emergency help. Apply artificial respiration if the victim is not breathing.

Read the first aid instructions on the pesticide label, if possible, and follow them. Do not become exposed to poisoning yourself while you are trying to help. Take the pesticide container (or the label) to the physician. Do not carry the pesticide container in the passenger space of a car or truck.

**Poison on skin**

- Act quickly
- Remove contaminated clothing and drench skin with water
- Cleanse skin and hair thoroughly with detergent and water
- Dry victim and wrap in blanket.

**Chemical burn on skin**

- Wash with large quantities of running water
- Remove contaminated clothing
- Cover burned area immediately with loose, clean, soft cloth
- Do not apply ointments, greases, powders, or other drugs in first aid treatment of burns

**Poison in eye**

- Wash eye quickly but gently
- Hold eyelid open and wash with gentle stream of clean running water
- Wash for 15 minutes or more
- Do not use chemicals or drugs in the wash water; they may increase the extent of injury

**Inhaled poison**

- Carry victim to fresh air immediately
- Open all doors and windows so no one else will be poisoned
- Loosen tight clothing
- Apply artificial respiration if breathing has stopped or if the victim's skin is blue. If patient is in an enclosed area, do not enter without proper protective clothing and equipment. If proper protection is not available, call for emergency equipment from your fire department

**Poison in mouth or swallowed**

- Rinse mouth with plenty of water
- Give victim large amounts (up to 1 quart) of milk or water to drink
- Induce vomiting only if instructions to do so are on the label

**Procedure for inducing vomiting**

- Position victim face down or kneeling forward, Do not allow victim to lie on his back, because the vomit could enter the lungs and do additional damage
- Put finger or the blunt end of a spoon at the back of victim's throat or give syrup of ipecac
- Collect some of the vomit for the physician if you do not know what the poison is
- Do not use salt solutions to induce vomiting

**When *not* to induce vomiting**

- If the victim is unconscious or is having convulsions
- If the victim has swallowed a corrosive poison. A corrosive poison is a strong acid or alkali. It will burn the throat and mouth as severely coming up as it did going down. It may get into the lungs and burn there also
- If the victim has swallowed an emulsifiable concentrate or oil solution. Emulsifiable concentrates and oil solutions may cause severe damage to the lungs if inhaled during vomiting

## Attachment 11: Pesticide Disposal Options (translate and distribute to users)

### Pesticide Disposal

If you end up with excess pesticide concentrate, dilute it as directed on the label; then apply it to an area listed on the label. You can dispose of excess pesticide mix by applying it to an area listed on the label. Do not apply more than is recommended. You can also store leftover pesticide until you are able to take it to a hazardous-waste collection site.

An empty pesticide container is not as empty as you might think; a significant amount of pesticide residue can remain inside of it. Triple-rinse an empty container of liquid pesticide before you toss it into the trash. Here's how: First, when you are down to the last amount of pesticide concentrate, drain the pesticide container into your spray tank for at least 30 seconds.

Fill the empty container one-fifth to one-fourth full of water and rinse thoroughly. Use this rinse water as dilution water for the pesticide concentrate in the sprayer. If the dilution rate allows you to pour all the rinse water into the sprayer, drain it into the sprayer for at least 30 seconds.

Follow the procedure in Steps 2 and 3 two more times. Then spray the pesticide mixture on areas listed on the label. Do not exceed the label's application rate.

### Container Disposal

**All empty pesticide containers must be destroyed, and never re-used.** It is extremely dangerous to use them for anything else. Consult the pesticide label, the manufacturer, or the manufacturer's representative for specific recommendations regarding container cleanup and disposal. The following are general guidelines. There are two basic methods for cleaning pesticide containers prior to disposal. Both require that the container be turned upside down and allowed to drain into the spray tank for at least 30 seconds, followed by adding water to the container and rotating it well to wet all surfaces, then draining it again into the spray tank as an additional dilutent.

- Triple Rinse Method: Add a measured amount of water or other specified dilutent so that the container is one-fifth to one-fourth full. Rinse container thoroughly, pour into a tank, and allow it to drain for 30 seconds. Repeat three times. The water rinsate can be used to mix with or dilute more of the same pesticides or it can be sprayed on the target crop.
- Pesticide Neutralization Method: Empty organophosphate and carbamate containers can be neutralized by adding alkaline substances. The following procedure is recommended for 200-liter barrels. Use proportionally less material for smaller containers.

1. Add 20 liters of water, 250 milliliters of detergent, and one kilogram of flake lye or sodium hydroxide.
2. Close the barrel and rotate to wet all surfaces.
3. Let stand for 15 minutes.
4. Drain completely and rinse twice with water. The rinsate should be drained into a shallow pit in the ground located far away from wells, surface water, or inhabited areas.

Containers cleaned by any of the above methods are still not safe to use for any other purpose. Glass containers should be broken and plastic or metal containers punctured or crushed. Containers can then be buried in an isolated area at least 50 cm below ground surface.

| Container Type | Disposal Statements |
|---|---|
| Metal Containers (non-aerosol) | Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of container in a sanitary landfill, or by other procedures approved by state and local authorities. |
| Paper and Plastic Bags | Completely empty bag into application equipment. Then dispose of empty bag in a sanitary landfill or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke. |
| Glass Containers | Triple rinse (or equivalent). Then dispose of in a sanitary landfill or by other approved state and local procedures. |
| Fiber Drums with Liners | Completely empty liner by shaking and tapping sides and bottom to loosen clinging particles. Empty residue into application equipment. Then dispose of liner in a sanitary landfill or by incineration if allowed by state and local authorities. If drum is contaminated and cannot be reused, dispose of it in the manner required for its liner. |
| Plastic Containers | Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke. |
| Compressed Gas Cylinders | Return empty cylinder for reuse (or similar wording). |
| Foil outer pouches of water soluble packets (WSP) | Dispose of the empty outer foil pouch in the trash, as long as WSP is unbroken. |

Attachment 12 Record keeping associated with pesticide use

| Protective item | Item number/applicator | Cost per item | Supplier contact details | Maintenance date and notes | Date needs to be replaced |
|---|---|---|---|---|---|

**Attachment 13: Pesticide AIs not EU approved**

Pesticides not permitted for use in EU countries or Macedonia

| from Oct 13, 2011 EU list, minus most attractants/pheromones and repellents | Pesticide Type |
|---|---|
| (5-chloro-4-nitro-1H-pyrazol-3-yl)-methanol (CHNP) | FU |
| 1,3-Dichloropropene | NE, HB |
| 1,3-Dichloropropene (cis) | NE, HB |
| 1,3-Diphenyl urea | PG |
| 1-Methoxy-4-propenylbenzene (Anethole) | |
| 1-Methyl-4-isopropylidenecyclohex-1-ene (Terpinolene) | |
| 2,3,6-TBA | HB |
| 2,4,5-T | HB |
| 2,6,6-Trimethylbicyclo(3.1.1)hept-2-en-4-ol | |
| 2,6,6-Trimethylbicyclo[3.1.1]hept-2-ene (alpha-Pinen) | |
| 2-(dithiocyanomethylthio)-benzothiazol | FU |
| 2-Aminobutane (aka sec-butylamine) | FU |
| 2-Benzyl-4-chlorophenol | FU |
| 2-Ethyl-1,6-dioxaspiro (4,4) nonan (chalcogran) | |
| 2-Hydroxyethyl butyl sulfide | |
| 2-Mercaptobenzothiazole | |
| 2-Methoxy-5-nitrofenol sodium salt (ISO: nitrophenolate mixture) | |
| 2-Methoxypropan-1-ol | |
| 2-Methoxypropan-2-ol | |
| 2-Methyl-3-buten-2-ol | |
| 2-Methyl-6-methylene-2,7-octadien-4-ol (ipsdienol) | |
| 2-Methyl-6-methylene-7-octen-4-ol (Ipsenol) | |
| 2-Naphthyloxyacetamide | PG, HB |
| 2-Naphthyloxyacetic acid (2-NOA) | PG |
| 2-Propanol | |
| 3(3-Benzyloxycarbonyl-methyl)-2-benzothiazolinone (Benzolinone) | |
| 3,7,11-Trimethyl-1,6,10-dodecatrien-3-ol (aka Nerolidol) | |
| 3,7,7-Trimethylbicyclo[4.1.0]hept-3-ene (3-Carene) | |
| 3,7-Dimethyl-2,6-octadienal | AT |
| 3-Methyl-3-buten-1-ol | |
| 3-phenyl-2-propenal (Cinnamaldehyde) | |
| 4,6,6-Trimethyl-bicyclo[3.1.1]hept-3-en-ol,((S)-cis-verbenol) | |
| 4-Chloro-3-methylphenol | FU |
| 4-CPA (4-chlorophenoxyaceticacid = PCPA) | PG |
| 4-t-Pentylphenol | BA |

| | |
|---|---|
| 5-chloro-3-methyl-4-nitro-1H-pyrazole (CMNP) | FU |
| 7,8-Epoxi-2-methyl-octadecane | AT |
| 7-Methyl-3-methylene-7-octene-1-yl-propionate | AT |
| Acephate | IN |
| Acetochlor | HB |
| Acifluorfen | HB |
| Acridinic bases | RE |
| Agrobacterium radiobacter K84 | |
| Agrotis segetum granulosis virus | IN |
| Alachlor | HB |
| Alanycarb | IN |
| Aldicarb | NE, IN, AC |
| Aldimorph | FU |
| Aldrin | |
| Alkyl mercury compounds | |
| Alkyldimethylbenzyl ammonium chloride | HB |
| Alkyldimethylethylbenzylammonium chloride | HB |
| Alkyloxyl and aryl mercury compounds | |
| Alkyltrimethyl ammonium chloride | BA, FU |
| Alkyltrimethylbenzyl ammonium chloride | HB |
| Allethrin | IN |
| Alloxydim | HB |
| Allyl alcohol | HB |
| Ametryn | HB |
| Amino acids: gamma aminobutyric acid | PG |
| Amino acids: L-glutamic acid | |
| Amino acids: L-tryptophan | |
| Amino acids: mix | |
| Amitraz | AC, IN |
| Ammonium bituminosulfonate | |
| Ammonium carbonate | FU |
| Ammonium hydroxyde | FU |
| Ammonium sulphamate | HB |
| Ammonium sulphate | HB |
| Ampropylfos | FU |
| Ancymidol | PG |
| Anilazine | FU |
| Anilofos | |
| Anthracene oil | IN, AC, HB, RO |
| Anthraquinone | RE |

| | |
|---|---|
| Aramite | IN |
| Aschersonia aleyrodis | IN |
| Asomate | IN |
| Asphalts | |
| Asulam | HB |
| Atrazine | HB |
| Aviglycine HCL | PG |
| Azaconazole | IN, FU |
| Azafenidin | HB |
| Azamethiphos | IN |
| Azinphos ethyl | IN, AC |
| Azinphos-methyl | IN, AC |
| Aziprotryne | HB |
| Azocyclotin | AC |
| Bacillus sphaericus | IN |
| Bacillus subtilis strain IBE 711 | |
| Baculovirus GV | |
| Barban | HB |
| Barium fluosilicate | IN |
| Barium nitrate | RE |
| Barium polysulphide | IN, FU |
| Beauveria brongniartii | |
| Benazolin | HB |
| Bendiocarb | IN |
| Benfuracarb | IN, NE |
| Benfuresate | HB |
| Benodanil | FU |
| Benomyl | FU |
| Bensulide | HB |
| Bensultap | IN |
| Bentaluron | FU |
| Benzalkonium chloride | HB |
| Benzobicyclon | HB |
| Benzoximate | AC |
| Benzoylprop | HB |
| Benzthiazuron | HB |
| Bifenthrin | IN, AC |
| Binapacryl | |
| Bioallethrin | IN |
| Biohumus | |

| | |
|---|---|
| Bioresmethrin | IN |
| Biphenyl | |
| Bis(tributyltin) oxide | FU |
| Bitertanol | FU |
| Bitumen | Pruning |
| Blasticidin-S | FU |
| Bone Oil | RE |
| Boric acid | IN |
| Brandol (hydroxynonyl-2,6-dinitrobenzene) | FU |
| Brodifacoum | RO |
| Bromacil | HB |
| Bromethalin | RO |
| Bromocyclen | IN |
| Bromofenoxim | HB |
| Bromophos | IN |
| Bromophos-ethyl | IN |
| Bromopropylate | AC |
| Bronopol | FU, BA |
| Butachlor | HB |
| Butamifos | HB |
| Butocarboxim | IN |
| Butoxycarboxim | IN, AC |
| Butralin | HB, PG |
| Butylate | HB |
| Cadusafos (aka ebufos) | IN, NE |
| Cafenstrole | HB |
| Calciferol | RO |
| Calcium carbonate (aka chalk) | |
| Calcium chloride | FU, PG |
| Calcium hydroxide | |
| Calcium hydroxide (aka slake lime) | |
| Calcium oxide (quick lime) | |
| Calcium phosphate | RO |
| Camphechlor | |
| Captafol | |
| Carbaryl | IN, PG |
| Carbofuran | IN, NE, AC |
| Carbon disulphide | IN, NE |
| Carbon monoxide | RO |
| Carbophenothion | IN, AC |

| | |
|---|---|
| Carbosulfan | IN, NE |
| Cartap | IN |
| Casein | |
| Cetrimide | HB |
| Chinin hydrochlorid | |
| Chinomethionat (aka quinomethionate) | AC, FU |
| Chitosan | |
| Chlomethoxyfen | HB |
| Chloral-bis-acylal | PG |
| Chloral-semi-acetal | HB |
| Chloralose | RO |
| Chloramben | HB |
| Chlorates (incl. Mg, Na, K chlorates) | HB |
| Chlorbenside | |
| Chlorbromuron | HB |
| Chlorbufam | HB |
| Chlordane | |
| Chlordecone | |
| Chloretazate (ISO: karetazan) | PG |
| Chlorethoxyfos | IN |
| Chlorfenapyr | IN, AC |
| Chlorfenprop | HB |
| Chlorfenson (aka chlorfenizon) | IN, AC |
| Chlorfenvinphos | IN |
| Chlorfluazuron | IN |
| Chlorflurenol (chlorflurecol) | PG |
| Chlorhydrate of poly(iminino imido biguanidine) | FU, BA |
| Chlorine dioxide | FU |
| Chlormephos | IN |
| Chlorobenzilate | AC |
| Chloroneb | FU |
| Chlorophacinone | RO |
| Chlorophylline | FU, BA |
| Chloropicrin | NE |
| Chloropropylate | AC |
| Chloroxuron | HB |
| Chlorphonium chloride | PG |
| Chlorthal-dimethyl | HB |
| Chlorthiamid | HB |
| Chlorthiophos | IN |

| | |
|---|---|
| Chlozolinate | FU |
| Cholecalciferol | RO |
| Choline chloride | RO |
| Choline, K & Na salts of maleic hydrazide with > 1 mg/kg free hydrazine | |
| Cinosulfuron | HB |
| cis-Zeatin | PG |
| Citrus extract | |
| Citrus extract/grapefruit extract | |
| Citrus extract/grapefruit seed extract | |
| Clofencet | PG |
| Clomeprop | HB |
| Conifer needle powder | |
| Copper complex: 8-hydroxyquinolin with salicylic acid | |
| Corn steep liquor | |
| Coumachlor | RO |
| Coumafuryl | RO |
| Coumaphos | IN |
| Coumatetralyl | RO |
| Cresylic acid | ST, FU |
| Crimidine | RO |
| Cryolite | IN |
| Cufraneb | FU |
| Cumylphenol | |
| Cyanamide (H & Ca cyanamide) | PG, HB |
| Cyanazine | HB |
| Cyanides: calcium, hydrogen, sodium | IN, RO |
| Cycloate | HB |
| Cycluron | HB |
| Cyenopyrafen | IN |
| Cyhalothrin | IN |
| Cyhexatin | AC |
| Cyprofuram | FU |
| DADZ (zinc-dimethylditiocarbamate) | RE |
| Dalapon | HB |
| DDT | |
| delta-endotoxin of Bacillus thuringiensis | IN |
| Demeton-S-methyl | IN, AC |
| Demeton-S-methyl sulphone | IN |
| Desmetryn | HB |
| Di-1-p-menthene B470 | PG |

| | |
|---|---|
| Diafenthiuron | IN, AC |
| Dialifos | IN, AC |
| Diallate | HB |
| Diammonium phosphate | AC |
| Diazinon | IN, AC |
| Dichlobenil | HB |
| Dichlofenthion | IN |
| Dichlofluanid | FU |
| Dichlone | FU |
| Dichlorophen | HB, FU |
| Dichlorprop | HB |
| Dichlorvos | IN, AC |
| Diclobutrazol | FU |
| Dicloran | FU |
| Dicofol | AC |
| Dicofol (containing 1g/kg DDT and DDT related cmpds | |
| Dicrotophos | IN, AC |
| Dicyclopentadiene | PG |
| Dieldrin | |
| Dienochlor | AC |
| Diethatyl (-ethyl) | HB |
| Difenoxuron | HB |
| Difenzoquat | HB |
| Difethialone | RO |
| Dikegulac | PG |
| Dimefox | IN |
| Dimefuron | HB |
| Dimepiperate | HB |
| Dimethenamid | HB |
| Dimethipin | PG, HB |
| Dimethirimol | FU |
| Dimethyl disulfide (DMDS) | NE |
| Dimethylvinphos | |
| Dimexano | HB |
| Diniconazole-M | FU |
| Dinitramine | HB |
| Dinobuton | AC, FU |
| Dinocap | FU, AC |
| Dinoseb, its acetate and salts | |
| Dinotefuran | |

| | |
|---|---|
| Dinoterb | HB |
| Dioctyldimethyl ammonium chloride | FU, BA |
| Dioxacarb | IN |
| Dioxathion | IN |
| Diphacinone | RO |
| Diphenamid (aka difenamide) | HB |
| Diphenylamine | PG |
| Disodium octaborate tetrahydrate | HB |
| Disulfoton | IN |
| Ditalimfos | FU |
| Dithiopyr | HB |
| DNOC | IN, AC, FU, HB |
| Drazoxolon | FU |
| Edifenphos | |
| EDTA and its salts | HB |
| Endosulfan | IN, AC |
| Endothal | HB |
| Endrin | |
| EPN | IN, AC |
| EPTC (S-dipropylthiocarbamate) | HB |
| Esprocarb | HB |
| Etacelasil | PG |
| Ethaboxam | FU |
| Ethalfluralin | HB |
| Ethanedial (glyoxal) | |
| Ethanethiol | RO |
| Ethidimuron (aka sulfodiazol ) | HB |
| Ethiofencarb | IN |
| Ethion (aka diethion) | IN, AC |
| Ethiprole | |
| Ethirimol | FU |
| Ethoate-methyl | IN |
| Ethoxyquin | PG |
| Ethychlozate | |
| Ethyl 2,4-decadienoate | |
| Ethyl formate | IN |
| Ethylene oxide | |
| Ethylhexanoate | FU, BA |
| Etrimfos | IN, AC |
| Extract from Equisetum | |

| | |
|---|---|
| Extract from Menta piperita | |
| Extract from Plant Red oak, Prickly pear cactus, Fragrant sumac, Red mangrove | |
| Fatty acids / Isobutyric acid | |
| Fatty acids / Isovaleric acid | |
| Fatty acids / Valeric acid | |
| Fatty acids: potassium salt - caprylic acid | HB, IN |
| Fatty acids: potassium salt - tall oil fatty acid | HB, IN |
| Fatty alcohols / Aliphatic alcohols | PG |
| Fenaminosulf | FU |
| Fenarimol | FU |
| Fenazaflor | AC |
| Fenchlorphos | IN |
| Fenfuram | FU |
| Fenitrothion | IN, AC |
| Fenobucarb | |
| Fenoprop | PG, HB |
| Fenothiocarb | IN, AC |
| Fenoxaprop | HB |
| Fenpiclonil | FU |
| Fenpropathrin | IN, AC |
| Fenridazon | PG |
| Fenson (aka fenizon) | AC |
| Fenthion | IN |
| Fenthiosulf | IN |
| Fentin acetate | FU, HB |
| Fentin hydroxide | FU, HB |
| Fentrazamide | HB |
| Fenuron | HB |
| Fenvalerate | IN, AC |
| Ferbam | FU |
| Flamprop | HB |
| Flamprop-M | HB |
| Flocoumafen | RO |
| Fluacrypyrim | |
| Fluazifop | HB |
| Fluazolate (formerly isopropozole) | HB |
| Flubenzimine | AC |
| Flucarbazone-sodium | HB |
| Flucycloxuron | AC |
| Flucythrinate | IN |

| | |
|---|---|
| Flufenoxuron | IN |
| Flufenzin (ISO: diflovidazin) | |
| Flumequine | BA |
| Flumetralin | PG |
| Flumetsulam | |
| Flumiclorac-pentyl | HB |
| Fluoroacetamide | RO |
| Fluorodifen | HB |
| Fluoroglycofen | HB |
| Flupoxam | HB |
| Flurenol (flurecol) | HB |
| Fluridone | HB |
| Flurprimidol | PG |
| Flusulfamide | FU |
| Folic acid | PG |
| Fomesafen | HB |
| Fonofos | IN |
| Formaldehyde | FU, ST |
| Formic acid | IN |
| Formothion | IN, AC |
| Fosamine | HB |
| Fosthietan | NE |
| Furalaxyl | FU |
| Furathiocarb | IN |
| Furconazole | FU |
| Furfural | |
| Furmecyclox | FU |
| Garlic pulp | |
| Gelatine | IN |
| Gentian violet | BA |
| Glutaraldehyde (aka glutardialdehyde) | FU, BA |
| Guazatine | FU, RE |
| Halfenprox (aka brofenprox) | AC |
| Haloxyfop | HB |
| HBTA (high boiling tar acid) | |
| HCH | |
| Heptachlor | |
| Heptenophos | IN |
| Hexachlorobenzene | |
| Hexachlorophene | FU |

| | |
|---|---|
| Hexaconazole | FU |
| Hexaflumuron | IN |
| Hexamethylene tetramine (urotropin) | |
| Hexazinone | HB |
| Hydramethylnon | IN |
| Hydrogen peroxide | |
| Hydroxy-MCPA | PG |
| Hydroxyphenyl-salicylamide | FU |
| Idanofan | HB |
| Imazamethabenz | HB |
| Imazapic | HB |
| Imazapyr | HB |
| Imazethabenz | HB |
| Imazethapyr | HB, PG |
| Imibenconazole | FU |
| Imicyafos | NE |
| Iminoctadine | FU |
| Indanofan | HB |
| Indolylacetic acid (aka auxins) | PG |
| Iodofenphos | IN |
| Iprobenfos | FU |
| Iron pyrophosphate | |
| Isazofos | IN |
| Isocarbamid | HB |
| Isocarbophos (ISO: isopropyl O-(methoxyaminothiophosphoryl)salicylate) | |
| Isofenphos | IN |
| Isofenphos-methyl | |
| Isolane | IN |
| Isoprocarb | |
| Isopropalin | HB |
| Isoprothiolane | FU |
| Isotianil | FU |
| Isouron | HB |
| Isoval | RO |
| Isoxathion | IN |
| Jasmonic acid | |
| Karbutilate | HB |
| Kasugamycin | FU, BA |
| Kelevan | IN |
| Kinoprene | IN |

| | |
|---|---|
| Lactic acid | PG |
| Lactofen | |
| Lanolin | |
| Lauryldimethylbenzylammonium bromide | FU, BA |
| Lauryldimethylbenzylammonium chloride | HB |
| Lecithin | FU |
| Lepimectin | IN |
| Lime phosphate | PG |
| Lindane | IN, RO |
| Maleic hydrazide and its salts, other than its choline, K and Na salts | |
| Mamestra brassica nuclear polyhedrosis virus | IN |
| Mancopper | FU |
| Marigold extract | |
| Mecarbam | IN, AC |
| Mefenacet | HB |
| Mefluidide | PG |
| Mephosfolan | IN |
| Mepronil | FU |
| Mercuric oxide | |
| Mercurous chloride (calomel) | |
| Merphos (aka tributylphosphorotrithioite) | PG |
| Metam (incl. -potassium and -sodium) | FU, IN, HB, NE |
| Metamifop | HB |
| Methabenzthiazuron | HB |
| Methacrifos | IN |
| Methamidophos | IN, AC |
| Methazole | HB |
| Methfuroxam | FU |
| Methidathion | IN, AC |
| Methoprene | IN |
| Methoprotryne | HB |
| Methoxychlor | IN |
| Methyl bromide | FU, IN, NE, HB |
| Methyl isothiocyanate | FU, NE, HB, IN |
| Methyl p-hydroxybenzoate | |
| Methyl-trans-6-nonenoate | AT |
| Methylenebisthiocyanate | FU |
| Methylnaphthylacetamide | PG |
| Methylnaphthylacetic acid | PG |
| Metolachlor | HB |

| | |
|---|---|
| Metolcarb | IN |
| Metoxuron | HB |
| Metsulfovax | FU |
| Mevinphos | IN, AC |
| Milk albumin | |
| Mimosa tenuiflora extract | |
| Mirex | |
| Monalide | HB |
| Monocarbamide-dihydrogensulphate | PG, HB |
| Monocrotophos | AC, IN |
| Monolinuron | HB |
| Monuron | HB |
| MSMA (methyl arsonic acid) | HB |
| Mustard powder | |
| N-phenylphthalamic acid | |
| Nabam | FU, HB |
| Naled | IN, AC |
| Naphtalene | RE |
| Naphtylacetic acid hydrazide | PG |
| Naptalam | HB |
| Neburon | HB |
| Neodiprion sertifer nuclear polyhedrosis virus | |
| Nicotine | IN |
| Nitenpyram | |
| Nitralin | HB |
| Nitrofen | |
| Nitrogen | IN |
| Nitrothal | FU |
| Nonylphenol ether polyoxyethyleneglycol | PG |
| Nonylphenol ethoxylate | FU |
| Norflurazon | HB |
| Noruron | HB |
| Nuarimol | FU |
| Octhilinone | FU |
| Octyldecyldimethyl ammonium chloride | FU, BA |
| Ofurace | FU |
| Olein | |
| Omethoate | IN, AC |
| Onion extract | |
| Orbencarb | HB |

| | |
|---|---|
| Other inorganic mercury compounds | |
| Oxadixyl | FU |
| Oxine-copper | FU |
| Oxycarboxin | FU |
| Oxydemeton-methyl | IN, AC |
| Oxytetracycline | BA |
| p-Chloronitrobenzene | IN |
| p-Cresyl acetate | RE |
| p-Dichlorobenzene | RO |
| p-Hydroxybenzoic acid | |
| Papaine | RO |
| Paraffin oil/(CAS 64741-88-4) | |
| Paraffin oil/(CAS 64741-89-5) | |
| Paraffin oil/(CAS 64741-97-5) | |
| Paraffin oil/(CAS 64742-54-7) | IN |
| Paraffin oil/(CAS 64742-55-8) | |
| Paraffin oil/(CAS 64742-65-0) | |
| Paraffin oil/(CAS 8012-95-1) | |
| Paraformaldehyde | IN |
| Paraquat | HB |
| Parathion | IN, AC |
| Parathion-methyl | IN, RE |
| Pebulate | HB |
| Pentachlorophenol | HB |
| Pentanochlor | HB |
| Pentoxazone | HB |
| Peracetic acid | |
| Perchlordecone (mirex) | |
| Perfluidone | HB |
| Permethrin | IN |
| Petroleum oils | FU, HB, IN, AC |
| Petroleum oils/(CAS 64742-55-8/64742-57-7) | |
| Petroleum oils/(CAS 74869-22-0)) | |
| Petroleum oils/(CAS 92062-35-6) | IN |
| Phenols | HB, ST |
| Phenothrin | IN |
| Phenthoate | IN |
| Pherodim | AT |
| Phorate | IN |
| Phosalone | IN, AC |

| | |
|---|---|
| Phosametine (LS830556) | HB |
| Phosphamidon | IN, AC |
| Phosphoric acid | |
| Phoxim | IN |
| Piperalin | FU |
| Piributicarb | HB |
| Pirimiphos-ethyl | IN |
| Plant oils / Blackcurrant bud oil | |
| Plant oils / Coconut oil | |
| Plant oils / Daphne oil | RE |
| Plant oils / Eucalyptus oil | |
| Plant oils / Gaiac Wood oil | |
| Plant oils / Garlic oil | |
| Plant oils / Lemongrass oil | |
| Plant oils / Maize oil | |
| Plant oils / Marjoram oil | |
| Plant oils / Olive oil | |
| Plant oils / Peanut oil | |
| Plant oils / Pinus oil | |
| Plant oils / Soya oil | |
| Plant oils / Soybean oil, epoxylated | IN |
| Plant oils / Sunflower oil | |
| Plant oils / Ylang-Ylang oil | |
| Polymer of styrene and acrylamide | |
| Polyoxin | FU |
| Polyvinyl acetate | |
| Potassium permanganate | FU, BA, MO |
| Potassium silicate | |
| Potassium sorbate | FU |
| Potassium tri-iodide | FU |
| Pretilachlor | HB |
| Primisulfuron | HB |
| Procymidone | FU |
| Profenofos | IN |
| Prohydrojasmon | PG |
| Promecarb | IN |
| Prometryn | HB |
| Pronumone | AT |
| Propachlor | HB |
| Propanil | HB |

| | |
|---|---|
| Propaphos | |
| Propargite | AC |
| Propazine | HB |
| Propetamphos | IN |
| Propham | HB, PG |
| Propionic acid | FU, BA |
| Propisochlor (ISO: 2-chloro-6´-ethyl-N-isopropoxymethylaceto-o-toluidide) | |
| Propolis | |
| Propoxur | IN |
| Propyl-3-t-butylphenoxyacetate | PG |
| Propyrisulfuron | HB |
| Prothiocarb | FU |
| Prothiofos | IN |
| Prothoate | IN, AC |
| Pyraclofos | AC |
| Pyranocoumarin | RO |
| Pyrasulfotole | HB |
| Pyrazophos | FU |
| Pyrazoxyfen | HB |
| Pyridafol | HB |
| Pyridaphenthion | IN, AC |
| Pyrifenox | FU |
| Pyrifluquinazon | IN |
| Pyriftalid | HB |
| Pyrimidifen | |
| Pyrimisulfan | HB |
| Pyroquilon | FU |
| Quassia | IN, RE |
| Quaternary ammonium compounds | |
| Quinalphos | IN |
| Quinclorac | HB |
| Quintozene | FU |
| Quintozene containing > 1 g/kg HCB or > 10 g/kg pentachlorobenzene | |
| Quizalofop | HB |
| Repellent (by taste) of vegetal and animal origin/extract of food grade/phosphoric acid and fish flour | |
| Repellents: Essential oils | |
| Repellents: Fatty acids, fish oil | |
| Repellents: Tall oil crude | |
| Resins | |

| | |
|---|---|
| Resmethrin | IN |
| Rock powder | |
| Rotenone | IN |
| Saflufenacil | HB |
| Scilliroside | RO |
| Sebacic acid | RE |
| Secbumeton | HB |
| Seconal (aka 5-allyl-5-(1´-methylbutyl) barbituric acid) | OT |
| Serricornin | AT |
| Sethoxydim | HB |
| Siduron | HB |
| Silafluofen | |
| Silver nitrate | PG, FU |
| Simazine | HB |
| Simeconazole | FU |
| Sodium arsenite | FU, IN |
| Sodium carbonate | |
| Sodium chloride | HB |
| Sodium diacetoneketogulonate | PG |
| Sodium dichlorophenate | FU, BA |
| Sodium dimethylarsinate | RO |
| Sodium dimethyldithiocarbamate | FU |
| Sodium dioctyl sulfosuccinate | AC |
| Sodium fluosilicate | IN |
| Sodium hydrogen carbonate | FU |
| Sodium hydroxide | HB |
| Sodium lauryl sulfate | FU, BA |
| Sodium metabisulphite | FU |
| Sodium monochloroacetate | HB |
| Sodium o-benzyl-p-chlorphenoxide | FU |
| Sodium p-t-amylphenate | FU, BA |
| Sodium p-t-amylphenoxide | FU |
| Sodium pentaborate | PG |
| Sodium propionate | FU |
| Sodium tetraborate | IN, HB, MO |
| Sodium tetrathiocarbamate | NE |
| Sodium tetrathiocarbonate | NE, FU |
| Sodium thiocyanate | HB |
| Sodium-p-toluene-sulfonchloramid | BA |
| Soybean extract | |

| | |
|---|---|
| Streptomycin | BA |
| Strychnine | RO |
| Sulfentrazone | HB |
| Sulfotep | IN, AC |
| Sulphuric acid | HB |
| Sulprofos | IN |
| Sumithrin | IN |
| Tar acids | IN |
| Tar oils | IN, HB |
| TCA | HB |
| TCMTB | FU |
| Tebutam (aka butam) | HB |
| Tebuthiuron | HB |
| Tecnazene | FU, PG |
| Temephos | IN |
| Terbacil | HB |
| Terbufos | IN |
| Terbumeton | HB |
| Terbutryn | HB |
| Tetrachlorvinphos | IN |
| Tetradifon | AC, IN |
| Tetraethyl pyrophosphate (TEPP) | IN |
| Tetramethrin | IN |
| Tetrasul | AC |
| Thallium sulphate | RO |
| Thiazafluron | HB |
| Thiazopyr | HB |
| Thidiazuron | PG |
| Thiobencarb | HB |
| Thiocyclam | IN |
| Thiodicarb | IN |
| Thiofanox | IN |
| Thiometon | IN, AC |
| Thionazin | NE |
| Thiophanate (ethyl) | FU |
| Thiosultap sodium | |
| Thiourea | RO |
| Tiocarbazil | HB |
| Tolfenpyrad | |
| Tolylfluanid | FU, AC |

| | |
|---|---|
| Tolylphtalam (ISO: N-m-tolylphthalamic acid) | PG |
| Tomato mosaic virus | VI |
| Tralomethrin | IN |
| trans-6-Nonen-1-ol | AT |
| Triadimefon | FU |
| Triapenthenol | PG |
| Triazamate | IN |
| Triazbutyl | FU |
| Triazophos | IN, AC |
| Tribufos (s,s,s-tributyl-phosphorotrithioate) | PG |
| Tricalcium phosphate | RO |
| Trichlorfon | IN |
| Trichloronat | IN |
| Tricyclazole | FU |
| Tridemorph | FU |
| Tridiphane | HB |
| Trietazine | HB |
| Trifenmorph | MO |
| Trifluralin | HB |
| Triforine | FU, AC |
| Trimedlure | AT |
| Trioxymethylen | FU |
| Uniconazole | PG |
| Validamycin | FU |
| Vamidothion | IN, AC |
| Vernolate | HB |
| Vinclozolin | FU |
| Wheat gluten | |
| XMC | |
| Zineb | FU |
| Zucchini yellow mosaic virus (ZYMV mild strain) | FU |

| Category |
|---|
| AC - Acaricide |
| AT - Attractant |
| BA - Bactericide |
| EL - Elicitor |
| FU - Fungicide |
| HB - Herbicide |
| IN - Insecticide |

| |
|---|
| MO - Molluscicide |
| NE - Nematicide |
| OT - Other treatment |
| PA - Plant activator |
| PG - Plant growth regulator |
| Pruning |
| RE - Repellant |
| RO - Rodenticide |
| ST - Soil treatment |
| Safener |
| Synergist |
| VI - Virus inoculation |
| DE - Desiccant |

**Popova Kula Winery Model Comprehensive Pesticide Use Plan**
**for Popova Kula Winery to Implement**
**(and AgBiz Project Staff to Oversee)**

The following is a model plan of recommendations for Popova Kula Winery and farmers to mitigate risks and implement agriculture best management practices (most of which are also GlobalGAP certification requirements) where pesticide use is involved. It will provide a model for other AgBiz Subcontractor and beneficiary companies to use to produce their own Comprehensive Pesticide Use Plan. And, it begins with findings and recommendations found in the EDD/PPA for Popova Kula Winery.

**Following the EDD/PPA for Popova Kula Winery, the following apply**

Application of pesticides on the vineyards currently is managed by the winery itself; however, pending a decision for increase of the vineyard estate, it is planned to outsource the entire vineyard management activity to a specialized agriculture extension company, which will be in charge for quality and origin of used pesticides, quantity and timing of pesticide application.

EDD Liability and Environmental Concerns: The principal EDD concern is that Popova Kula purchases pesticides for farmers. Popova Kula must provide annual pesticide training. This training must cover proper handling and use of pesticides, pesticide mixing and application rates, disposal of unused pesticide and package disposal. In addition, a Pesticide Evaluation Report and Safe Use Action Plan (PERSUAP) is being conducted by AgBiz and the results will be used by Popova Kula to develop a comprehensive pesticide use plan.

There are no other significant liabilities or environmental concerns from the EDD. There is little waste, and a small amount of equipment cleanup wastewater is discharged intermittently throughout the year to either a new wastewater treatment system or to the municipal sewer system. Even if they treat the wastewater themselves and use the effluent for irrigation, because of the amount and characteristics of the wastewater, this effluent should not cause any significant liability concerns for soils or groundwater contamination.

Mitigation and Monitoring Recommendations: There are no significant liabilities or environmental concerns from the EDD and PPA. Mitigations include the following:

- Pesticides. Popova Kula purchases pesticides for farmers. Popova Kula must provide annual pesticide training. This training must cover proper handling and use of pesticides, pesticide mixing and application rates, disposal of unused pesticide and package disposal. In addition, a Pesticide Evaluation Report and Safe Use Action Plan (PERSUAP) is being conducted by AgBiz and the results will be used by Popova Kula to develop a comprehensive pesticide use plan.

Note that many of these recommendations, with the possible exception of specific particularly toxic pesticides—*most of which have less toxic alternatives available*—are already being implemented by Popova Kula as they prepare for GlobalGAP certification. Although farmers who supply Popova Kula will grapes currently use whatever pesticides they wish, Popova Kula is planning to advise farmers on the best inputs package, which will include pesticides. As this commences, it is recommended that Popova Kula also provide training for farmers in best practices, which are located below.

Special attention needs to be focused on problematic pesticide active ingredients—many of which, especially Class I acute toxins, are being phased out of use by EU regulations, identified immediately below. Many of the products registered for use in 2005/06 are still present in farm stores, regardless of 2007/08 registration status, as they clear the retail system, and are thus analyzed by this PERSUAP for risk and inordinate risk.

**MITIGATION and REPORTING MEASURES**

| Actions/Activities | Start | End | Who | Budget |
|---|---|---|---|---|
| Reiterating Pesticide Regulations and Restrictions | | | | |
| Ensure that Subcontractors do not propose the use of pesticide products containing active ingredients not EPA registered, RUP, too toxic, known carcinogen or known water pollutant, shaded red in Table 1 (PER Factors A, E, J) | | | | |
| Ensure that Subcontractors do not promote or use locally-available insecticides containing banned POPs or PIC chemicals like insecticide endosulfan/Thiodan (PER Factor J) | | | | |
| Ensure that Subcontractors do not promote or use fumigant aluminum phosphide to treat stored grain or produce (instead use trained and equipped fumigation services) (PER Factor D) | | | | |
| Promote the least toxic pesticides for each crop protection situation (PER Factor B) | | | | |
| Check for any movement by EU or MAFWE on new registrations of pesticides, including natural pesticides, and obtain this new pesticide registration information to benefit Subcontractors extension staff and reporting to USAID (PER Factors A, B, G, J, K, L) | | | | |
| Pesticide Risk Awareness and Mitigation | | | | |
| Provide annual training for Subcontractors and their served beneficiary farmers using the IPM and pesticide safety training topic list in Annex 8 (Factors A, B, C, D, E, F, G, K) | | | | |
| Ensure that Subcontractor encourage farmers and farmer associations or cooperatives to each have 1 or 2 sets of PPE for the group to share; and encourage them to assign a responsible PPE caretaker for each group (PER Factors D, E, L) | | | | |
| Ensure that Subcontractors train farmers to use PPE and apply pesticides only when there is no wind or rain in the late afternoon or night when bees do not forage and it is cooler, or early morning if there is no dew present (PER Factors D, E, K, L) | | | | |
| Good Agriculture Practices and IPM | | | | |

| Actions/Activities | Start | End | Who | Budget |
|---|---|---|---|---|
| Have Subcontractors extension staff promote pest-specific crop-pest-IPM-pesticide information with farmers for field use, validation, modification or adaptation (PER Factor C, H, K, L) | | | | |
| Use IPM information to produce crop-specific production PMPs, and then field reference guides or posters for farmers to use to anticipate and manage pests, diseases and weeds (PER Factor C) | | | | |
| Have Subcontractor extension staff promote the use of artisanal natural chemicals listed in Annexes 1, 4 and 5, as available (PER Factors B, H, I) | | | | |
| Follow GlobalGAP standards and website http://www.epa.gov/oppfead1/labeling/lrm/chap-13.htm for empty container disposal and pesticide record-keeping (PER Factors D, J, K, L) | | | | |
| During Subcontractor training, promote use of electrostatic and sleeve-boom sprayers that can reduce spray drift (PER Factor D) | | | | |
| Natural Resources Protection | | | | |
| Use GAPs, erosion control and low aquatic toxicity pesticides near known protected areas and do not use pesticides within 30 meters of open water (PER Factor G, H) | | | | |
| Consider the use of botanical, microbial or biological controls near protected areas and species (PER Factor G) | | | | |
| Protect honeybees by spraying in late afternoon or night, and warn beekeepers of impending spray operations (PER Factor G) | | | | |
| On sandy soil with a high water table (less than 2 meters) do not use herbicides or other pesticides with water pollution potential (PER Factor G, H) | | | | |
| Near waterways, consider pesticides that both have low aquatic toxicity, no pollution potential and break down quickly; and do not apply when rain is imminent (PER Factor G, H) | | | | |
| Project Management Responsibilities | | | | |
| Define and assure safe pesticide use practices following GlobalGAP standards, and audit AgBiz/Subcontractor-assisted farmer's use of each best practice (PER Factors K, L) | | | | |
| Keep copies of the current list of pesticide AIs | | | | |

| Actions/Activities | Start | End | Who | Budget |
|---|---|---|---|---|
| analyzed by this PERSUAP at all AgBiz and Subcontractor centers (Table 1, PER Factors A, D, J) | | | | |
| Collect and keep copies of MSDSs for each commercial pesticide that farmers are likely to use at each Subcontractor center (PER Factors A, B, E, G) | | | | |
| Keep PERSUAP recommendation implementation records and report on them in Annual Reports, under a heading titled "Environmental Compliance and Best Practices" (PER Factor K, L) | | | | |
| Provide for SUAP implementation and use | | | | |

**Specialized training plan which will accomplish many of the above recommendations**

Popova Kula Winery
Value Chain - Wine Grapes

Phase 1: Training Needs Assessment (completed)

The needs assessment was conducted using:
Consultation with the lead agronomist,
Field inspection of the wine processing facility and surrounding vineyards,
Discussion with company staff,
Field assessment of buying centers for agricultural chemicals (pesticide pharmacies).

Phase 2: Interactive farmer training (to be done ASAP)

Component 1: Timing, ½ day (3-4 hours)

Component 2: Materials and infrastructure
Venue: Popova Kula Winery,
Instructor: Company Agronomist Demir Kapija
Printed materials: Printed take home materials for participants
Presentation materials: laptop computer, digital presentation, projector, examples of protective equipment, examples of pesticide application equipment
Condiments: Food and drinks for the participants

Component 3: Themes and content examined through interactive seminar

Introduction and knowledge base: groups of pesticides according to use; classification of pesticides based on safety and environment; most relevant local pest species; explanation of all components of pesticide labels; GlobalGAP standards related to pesticides.

Safety and handling issues: dose is related to toxicity; international examples of poisonings; acute vs. chronic poisoning; personal, family and environmental consequences of poor pesticide use; proper use and maintenance of application

equipment; monitoring for resistance; use and maintenance of safety equipment; proper mixing of chemicals; disposal of packaging and unused chemicals.

Phase 3: International Integrated Pest Management Tools & Techniques (within 6 months)

Through consultation and assistance from AgBiz, the lead agronomist from Popova Kula Wineries will learn innovative IPM tools and techniques being used in top vineyards in USA and Europe. AgBiz may bring an international consultant to present examples of these IPM methods for the Popova Kula agronomist to test in field trials in the coming field season. The agronomist would be responsible for implementing testing these methods. The agronomist will be responsible for extending knowledge of effective IPM methods to farms where Popova Kula sources grapes.

The terms and conditions of the original IEE and subsequent Amendments shall remain in effect.

**USAID Approval of Recommended Environmental Threshold Decision:**

Approval: Robert Wuertz

Robert Wuertz, Mission Director — 1/31/2012 Date

Clearance: Y Thomason

Yasmeen Thomason, Mission Environmental Officer — 1/30/2012 Date

Clearance: M Cuculoska

Meri Cuculoska, Originator/Preparer & COTR — 01/30/2012 Date

**Concurrence:** mail

William Gibson, E&E Bureau Environmental Officer — 01/31/2012 Date

**Distribution:**
IEE & Project File
Mission Environmental Officer (to distribute to COTR/AOTR)