

**Pesticide Evaluation Report and Safer Use Action Plan (PERSUAP)
Global Development Alliance (GDA) for Rural Employment Generation
Activity (REGA)**

Activity Location:	Bosnia Herzegovina
Activity Title:	Global Development Alliance (GDA) for Rural Employment Generation Activity (REGA)
Sub-sector:	Fruits
Life of Activity	September 1, 2006-August 31, 2011 (LAMP activity ends May 2008)
Funding (Fruit sub-sector)	\$ 1,000,000 USAID funds
PERSUAP Prepared by:	Amela Peljto, Nedzad Karic, Benjamin Toric (PERSUAP team)
Date Prepared:	6 June 2006

BACKGROUND:

This PERSUAP evaluates GDA/REGA's proposed assistance for the use of pesticides for fruits (cherries, blackberries, raspberries and strawberries); and addresses pesticide safer use and handling issues. If in the future, REGA intends to assist the fruit sub-sector in the use of pesticides other than those requested and approved herein; or to assist in the use or procurement of pesticides for crops other than the target fruits, GDA/REGA will submit an amendment to this PERSUAP, with a request for the specific pesticides, in accordance with USAID's Pesticide Procedures (22 CFR 216.3).

This PERSUAP for the REGA GDA has been prepared in accordance with Section 4 (c) of the Initial Environmental Examination approved for the REGA project on 31st May 2006, which states that a LAMP PERSUAP may be modified for the specific REGA sites and activities. The Amended PERSUAP (fruits) for the LAMP Project was prepared by a PERSUAP team comprised of a LAMP Environmental Specialist and two Plant Protection Specialists from the Agriculture Faculty in Sarajevo and based on the original PERSUAP for berries for the LAMP Project prepared by Karen Menczer, Independent Consultant. The amended PERSUAP for fruits was also verified by Karen Menczer, Independent Consultant. To prepare the REGA PERSUAP, the Team is updating and revising the LAMP fruits Amended PERSUAP so that it will cover the specific REGA crops and approach.

The REGA PERSUAP Team is comprised of a LAMP Environmental Compliance Specialist, an entomologist and a plant health expert at the Faculty of Agriculture, University of Sarajevo. The team evaluated 32 pesticides (18 fungicides, 9 insecticides, 2 herbicides and 3 bio-pesticides) typically recommended and used on the target crops in Bosnia and Herzegovina (BiH). These pesticides were compiled by technical experts at the Faculty of Agriculture at the University of Sarajevo, through surveys of growers and pesticide suppliers.

The GDA/REGA will assist rural families to start soft fruit production on currently fallow land by 1) providing them with inputs (seedlings, trellises, irrigation systems, fertilizer, technical assistance); and 2) integrating them into a value-added processed soft fruit supply chain.

USAID will enter into a cooperative agreement with UPI Bank for the administration of the Funds. UPI Bank will enter into an agreement with Bosnaplod, whereby the release of USAID funds will be pre-conditioned on Bosnaplod's investment of an equal amount in inputs. USAID's contribution of \$1 million and its subsequent repayment will be accomplished through the Fund. UPI Bank will transfer USAID's contribution to Bosnaplod, and will ensure replenishment of the Fund as the fruit harvests are sold. UPI Bank will sign grant agreement with the Partner MKO and transfer repayments to Partner MKO.

Partner MKO will develop and implement an agriculture micro-lending and monitoring program for the sub-grants. Incidentally, Partner MKO has the most stringent environmental procedures of any microfinance institution with which USAID has worked in the past. Partner staff has undergone environmental training by USAID's Business Finance staff and the LAMP project.

USAID's LAMP activity will provide technical assistance to participants and will provide the Mission with an independent view of Alliance operations. LAMP, in collaboration with other REGA Partners, will provide support to producers to promote safer pesticide use and integrated pest management (IPM), whilst giving specific pest control advice on target crops: cherries, blackberries, raspberries and strawberries.

It is important that USAID identifies a suitable REGA partner, or an individual, who will be responsible for mitigation and monitoring of PERSUAP's recommendations for the life of the REGA project. During LAMP's existence, up until May 2008, LAMP will provide overall coordination within REGA to implement the PERSUAP's recommendations and build responsibility with the designated REGA partner (as identified by USAID) for mitigation, monitoring, and reporting. LAMP cannot provide assistance to this activity after May 2008.

REGA's TARGET CROPS:

REGA's target crops are: cherries, blackberries, raspberries and strawberries.

SUMMARY OF FINDINGS:

GDA/REGA is requesting approval to assist in the use of the pesticides shown in Table 1. Only USEPA registered pesticides that are classified as general use pesticides (GUP); and that are WHO and USEPA toxicity classes II and above are being requested. Exceptions are copper hydroxide, captan and dodine which are EPA Toxicity Class 1. For captan, although it is considered practically non-toxic”, it bears the signal word “Danger” or “Caution” when in concentrated form. The EPA Toxicity Class is based on the potential to cause eye and skin irritation. For copper hydroxide and dodine, the toxicity rating is based on their potential to cause eye irritation; these pesticides are relatively non-toxic. Mitigation is relatively simple to implement and monitor, and LAMP and other REGA partners are confident that the recommended mitigation will minimize the potential hazards of eye and skin irritation.

All pesticides being requested are registered for use by the Ministry of Agriculture (FBiH). The selection of pesticides, while the safest regarding human health and the environment, is expected to provide the necessary protection against crop pests and diseases, when used in conjunction with an IPM program, and taking into account the need to vary pesticide families to ensure against pest resistance. While this PERSUAP requests the least toxic pesticides, all pesticides are hazardous to the environment and to human health to some degree, and the PERSUAP recommends measures for mitigating adverse effects.

Based on the analyses contained herein, this PERSUAP requests approval for REGA to assist in the use of 24 pesticides: 13 are fungicides, 6 are insecticides, 2 are herbicides and 3 are bio-pesticides (Table 1); and presents the rationale for making these recommendations.

Table 1 shows the pesticides for which REGA is requesting approval from USAID; the pests/diseases for which the pesticide is being requested; and potential problems associated with the pesticide.

Table 1: Pesticides for which REGA Requests Approval

Active Ingredient/ Chemical)	Crop requested for*	Target pests	Potential problems if any	Comments
FUNGICIDES				
1. Azoxystrobin	S B R	<i>Sphaeroteca macularis</i> (powdery mildew), <i>Didymella applanata</i> (spur blight)	Potential water contaminant	For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water (e.g. shallow water tables). Application will be limited to areas over 25 meters away from any water bodies.

Active Ingredient/ Chemical)	Crop requested for*	Target pests	Potential problems if any	Comments
			Acute oral, dermal, inhalation-RNT-ST. Harmful if absorbed through the skin.	Use protective clothing as recommended by the label.
2. Captan EPA I	C	<i>Stigmina carpophila</i> ,	High acute toxicity: Skin, eye and respiratory tract irritant. Irreversible eye damage Carcinogen	Use eyewear protection, and wear protective clothes such as long-sleeved shirts, pants, and/or boots to protect skin. Will ensure warning labels are on pesticide containers. Long term exposure should be minimized
3. Copper + mineral oil	C	Shot-hole disease (<i>Stigmina carpophila</i>)	Potential water contaminant Rapid respiration, cyanosis, tachycardia, and low-grade fever. Copper can cause severe eye irritation and skin and respiratory tract irritation.	For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water (e.g. shallow water table). Application will be limited to areas over 25 meters away from any water bodies. Use eyewear protection, and wear protective clothes such as long-sleeved shirts, pants, and/or boots to protect skin. Will ensure warning labels are on pesticide containers.
4. Copper hydroxide Some formulations are EPA I	C B R	Shot-hole disease (<i>Stigmina carpophila</i>). <i>Didymella applanata</i> (spur blight on berries) <i>Mycosphaerella fragariae</i> (leaf spot on berries) <i>Leptosphaeria coniothyrium</i> (cane blight on berries)	Potential water contaminant Severe eye irritation. Skin and respiratory tract irritation.	For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water (e.g. shallow water table). Application will be limited to areas over 25 meters away from any water bodies. Use eyewear protection, and wear protective clothes such as long-sleeved shirts, pants, and/or boots to protect skin. Will ensure warning labels are on pesticide containers.
5. Copper oxide (Cuprous oxide)	C	Shot-hole disease (<i>Stigmina carpophila</i>)	Potential water contaminant	For terrestrial uses only; should not be applied directly to water or in a way

Active Ingredient/ Chemical)	Crop requested for*	Target pests	Potential problems if any	Comments
			Moderate acute toxicity. May irritate skin, eyes, and respiratory tract.	that will contaminate water (e.g. shallow water table). Application will be limited to areas over 25 meters away from any water bodies. Use eyewear protection, and wear protective clothes such as long-sleeved shirts, pants, and/or boots to protect skin. Will ensure warning labels are on pesticide containers.
6. Copper oxychloride 3Cu(OH)2xCuCl2	C	Shot-hole disease (<i>Stigmina carpophila</i>)	Potential water contaminant Chronic toxicity includes hepatic cirrhosis & brain damage.	Aquatic concerns For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water (e.g. shallow water table). Application will be limited to areas over 25 meters away from any water bodies. Avoid long-term exposure. Use protective clothing as recommended by the label.
7. Cyprodinil (+fludioxonil)	S B R	<i>Botrytis sp.</i>	Potential water contaminant Potential skin, eye and respiratory tract irritation. Harmful if absorbed through the skin.	For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water (e.g. shallow water tables). Application will be limited to areas over 25 meters away from any water bodies. Use eyewear protection, and wear protective clothes such as long-sleeved shirts, pants, and/or boots to protect skin. Will ensure warning labels are on pesticide containers
8. Dodine EPA I	C	<i>Blumeriella jappii</i>	Potential water contaminant	For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water (e.g. shallow water tables). Application will be limited to areas over 25 meters away from any water bodies.

Active Ingredient/ Chemical)	Crop requested for*	Target pests	Potential problems if any	Comments
			High acute toxicity as it may cause severe eye irritation. ST via inhalation or ingestion. ST to skin.	Use eyewear protection, and wear protective clothes such as long-sleeved shirts, pants, and/or boots to protect skin. Will ensure warning labels are on pesticide containers.
9. Fenhexamid	C B R S	<i>Botrytis cinerea, Monilinia laxa,</i>	Potential water contaminant	For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water (e.g. shallow water tables). Application will be limited to areas over 25 meters away from any water bodies. Use protective clothing as recommended by the label.
10. Iprodione	C S	<i>Botrytis cinerea, Monilinia laxa</i>	Potential water contaminant Chronic health issues: Known carcinogen and known endocrine disruptor.	Aquatic concerns For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water (e.g. shallow water tables). Application will be limited to areas over 25 meters away from any water bodies. Avoid long-term exposure. Use protective clothing as recommended by the label.
11. Mancozeb (dithiocarbamate)	C S	<i>Stigmia carpophila, Didymella applanata</i> (spur blight)	Potential water contaminant Potential skin, eye and respiratory tract irritation. Chronic issues: Probable carcinogen, suspected	For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water (e.g. shallow water tables). Application will be limited to areas over 25 meters away from any water bodies. Use eyewear protection, and wear protective clothes such as long-sleeved shirts, pants, and/or boots to protect skin. Will ensure warning labels are on pesticide containers. Avoid long-term exposure.

Active Ingredient/ Chemical)	Crop requested for*	Target pests	Potential problems if any	Comments
			endocrine disruptor, known development or reproductive toxin.	
12. Metalaxyl	B R S	<i>Phytophthora cactorum</i> <i>P.fragariae</i> (root rot)	Some formulations are EPA II Potential water contaminant Causes eye irritation; harmful if inhaled or absorbed through skin.	Mitigation recommended: Will only be used by trained farmers (see training); safety clothing and equipment mandatory; used as part of IPM program. Aquatic concerns For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water (e.g. shallow water tables). Application will be limited to areas over 25 meters away from any water bodies. Use eyewear protection, and wear protective clothes such as long-sleeved shirts, pants, and/or boots to protect skin. Will ensure warning labels are on pesticide containers
13. Myclobutanil	C	<i>Monilinia laxa</i>	Some formulations are EPA II Slight acute toxicity. Likely developmental or reproductive toxin.	Phase out EPA II formulations by 9/30/07 Use protective clothing as recommended by the label. Avoid long-term exposure.
INSECTICIDES				
1. Acetamiprid	C B R	Green peach aphid (<i>Myzus persicae</i>), Mediterranean fruit fly (<i>Ceratitis capitata</i>), European cherry fruit fly (<i>Rhagoletis cerasi</i>)	Low dermal and inhalation toxicity. May irritate eyes and the skin and may absorb through the skin.	Use eyewear protection, and wear protective clothes such as long-sleeved shirts, pants, and/or boots to protect skin. Will ensure warning labels are on pesticide containers
2. Mineral oil - Red	C B R	Over-wintered pests. Part of an IPM program.	Slight acute toxicity.	Use protective clothing as recommended by the label.
3. Mineral oil - White	C B R	Aphids (<i>Aphidae sp.</i> , <i>Coccinae sp.</i>), Fruit tree red spider mite (<i>Panonychus</i>	Slight acute toxicity.	Use protective clothing as recommended by the label.

Active Ingredient/ Chemical)	Crop requested for*	Target pests	Potential problems if any	Comments
		<i>ulmi</i>), European pear suckers (<i>Psylla sp.</i>). Good for sedentary over-wintering insects. Part of an IPM program.		
4. Pirimicarb	S	Aphids	EPA II Moderate acute toxicity. Potential problem is cholinesterase inhibitor.	Phase out by 9/30/07 Use protective clothing as recommended by the label. Will ensure warning labels are on pesticide containers. Avoid long-term exposure
5. Tebufenozide	C	Codling moth (<i>Cydia pomonella</i>), Fruit tree tortrix moth (<i>Archips podana</i>),	Potential water contaminant Slight acute toxicity.	For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water (e.g. shallow water tables). Application will be limited to areas over 25 meters away from any water bodies. Use protective clothing as recommended by the label.
6. Thiacloprid	C	Aphids (<i>Myzus cerasi</i>)	EPA II Moderate acute toxicity. Probable human carcinogen.	Phase out by 9/30/07 Use protective clothing as recommended by the label. Will ensure warning labels are on pesticide containers. Avoid long-term exposure
HERBICIDES				
1. Glufosinate-ammonium	C	Annual weeds in fruit orchards more than 2 years old		Use protective clothing as recommended by the label.
2. Glyphosate	C	Perennial weeds in fruit orchards more than 2 years old	Acute toxicity: cough, redness of eyes, and upon ingestion, diarrhea, shortness of breath, vomiting, and weakness.	Avoid Class I products. Use eyewear protection, and wear protective clothes such as long-sleeved shirts, pants, and/or boots to protect skin. Will ensure warning labels are on pesticide containers
BIOLOGICAL/BOTANICAL PESTICIDES AND REPELLENTS				
1. Abamectin (Avermectin)	S	Fruit tree red spider mite (<i>Panonychus ulmi</i>), Two spotted spider mite (<i>Tetranychus urticae</i>)	Some formulations are EPA II Potential water	Phase out EPA II formulations by 9/30/07 For terrestrial uses only;

Active Ingredient/ Chemical)	Crop requested for*	Target pests	Potential problems if any	Comments
			contaminant High acute toxicity. Slight to moderate eye irritation and skin irritation. Central nervous system depression. Developmental or reproductive toxin.	should not be applied directly to water or in a way that will contaminate water (e.g. shallow water tables). Application will be limited to areas over 25 meters away from any water bodies. Use eyewear protection, and wear protective clothes such as long-sleeved shirts, pants, and/or boots to protect skin. Will ensure warning labels are on pesticide containers. Avoid long-term exposure.
2. Azadirachtin (Neem oil extract)	C B R	Aphids, Fruit tree red spider mite (<i>Panonychus ulmi</i>), Two spotted spider mite (<i>Tetranychus urticae</i>) Leafminers (<i>Leucoptera malifoliella</i> , <i>Lithocolletis blancardella</i> , <i>Lithocolestis corylifoliella</i>)		
3. <i>Bacillus thuringiensis</i> berliner	C	Moths		

*B-Blackberry, C-Cherry, R-Raspberry, S-Strawberry.

Table 1a shows the number of pesticides being requested for each target crop.

Table 1(a) Pesticides/Crop

Crop	Fungicide	Insecticide	Herbicide	Bio-control
Cherry	10	5	2	2
Blackberry	5	3	0	1
Raspberry	5	3	0	1
Strawberry	5	1	0	1

Table 2 lists all pesticides that were compiled by technical experts at the Faculty of Agriculture at the University of Sarajevo, through surveys of growers and pesticide suppliers. Depending on the pest problem, these are the pesticides that are most often recommended to growers in BiH for use on fruits. The PERSUAP Team was able to eliminate 8 of the pesticides because of their restricted use status (RUPs); because they are not registered by US EPA or by BiH; or because they are more toxic than available alternatives. In addition, this PERSUAP recommends that certain EPA and WHO

Toxicity Class II pesticide formulations should be phased out, and removed completely by September 30, 2007 unless it can be shown there are no practical alternatives.

Table 1 shows the pesticides being requested as an outcome of the PERSUAP Team's screening and assessment process. This PERSUAP includes recommendations which will mitigate significant adverse impacts of pesticide use on the environment, including the human environment. The following is a summary of the recommendations, which are described in greater detail in Section III.

1. Remove and phase-out more hazardous pesticides from trainings which LAMP and other REGA partners may organize beyond September 30, 2007, unless no suitable alternatives exist. REGA partners shall only recommend or assist with the use of pesticides approved herein, and with formulations that are USEPA registered as GUPs; that are registered for use on fruits; that are registered for use in BiH; and that are above USEPA *and* WHO Toxicity Class I, with the exceptions noted in the PERSUAP.
2. REGA partners shall only work with farmer groups who agree to use approved pesticides as part of an IPM program.
3. REGA partners shall ensure that IPM practices described in the PERSUAP (some examples in Section c) and others developed in collaboration with LAMP technical experts are disseminated.
4. REGA Partners, through extension agencies and trainers, shall promote the use of protective clothing and equipment by farmers and shall monitor use.
5. REGA Partners shall encourage farmers to read and follow labels.
6. LAMP shall work with REGA partners to strengthen their capacity so REGA can eventually take over IPM-safer use training and mitigation and monitoring activities in accordance with the REGA PERSUAP.
7. REGA Partners shall disseminate information from the PERSUAP broadly.
8. REGA Partners shall implement a Mitigation and Monitoring Plan.
9. PERSUAP mitigation and monitoring requirements may require GDA/REGA to provide funding to implement the above measures; GDA/REGA project budget will be adjusted accordingly.

Clearance:

_____ Date: _____
Jane Nandy
Mission Director, USAID/BiH

Optional Clearances:

_____ Date: _____
Samir Dizdar
MEO, Bosnia and Herzegovina

_____ Date: _____
Amira Ramhorst
LAMP CTO

_____ Date: _____
Dzenana Fazlic
REGA CTO

Concurrence:

_____ Date: _____
Mohammad Latif
Bureau Environmental Officer

Approved: ____ Disapproved: ____

PESTICIDE EVALUATION REPORT AND SAFER USE ACTION PLAN: REGA ASSISTANCE FOR THE USE OR PROCUREMENT OF PESTICIDES IN THE FRUIT SUB-SECTOR

I. BACKGROUND TO THE PERSUAP

A. USAID Pesticide Procedures, Amendments, and Updates

The following sections respond to the twelve factors in USAID's Pesticide Procedures (22 CFR 216.3). Prior to approving the use or procurement of pesticides, each pesticide must be evaluated with respect to the economic, social, and environmental risks and benefits of the planned use.

The information in (a) through (l) should be reviewed and modified, as necessary, but at the least, on an annual basis. USEPA regularly revises pesticide data; and therefore, Section III recommends that LAMP will assist REGA Partners to annually update the information on USEPA registration status, and USEPA and WHO Toxicity Classes and report, in Project Quarterly Reports, to USAID on any changes. In addition, if REGA intends to support additional crops that require REGA to assist in the use or procurement of pesticides, the PERSUAP must be amended. This PERSUAP recommends that specific EPA Toxicity Class II and WHO Toxicity Class II pesticides be phased out (see Table 7) by September 30, 2007, unless there are no practical alternatives. LAMP will assist REGA Partners to report on the status of phase-out, and the PERSUAP should be amended to show any new pesticides necessary to replace those targeted for removal from the REGA project. Justifications shall be submitted to USAID/BiH and the USAID/E&E BEO if REGA is unable to identify a suitable alternative for EPA/WHO Toxicity Class II pesticides. This justification will be presented in the form of an Amended PERSUAP.

LAMP will oversee a rigorous training and monitoring program for REGA Partners, which will mitigate the risk to human health and the environment that could result from REGA activities in the fruit sub-sector. In designing/implementing/overseeing training, IPM will be a guiding principle for LAMP technical staff. Among other safer practices, discussed in the PERSUAP, REGA Partners will recommend only "judicious use" of pesticides to help avoid, reduce, and mitigate the risks to human health and the environment.

The degree and consistency with which farmers actually use the safer methods of pesticide application, recommended herein, determines the risk to human health and the environment. The PERSUAP mitigation and monitoring recommendations will be integrated into overall REGA Partners' project monitoring, and monitoring will be conducted on a regular and frequent basis. LAMP staff will assist in this task; and as described in the PERSUAP, LAMP will strengthen capacity of REGA Partners (or an individual) to take on this role once LAMP has ended.

LAMP has already had success in promoting IPM and safer use practices in the fruit and vegetable sector through training in Integrated Pest Management (IPM). LAMP became aware of great disparity between farmers' knowledge of pest control issues. A great number of farmers for example could not differentiate between fungicides and insecticides; were using inappropriate pesticides for the target pests; were unaware of newer pesticides which are more effective and less toxic; and almost never used protective clothing. On the other hand, some farmers in Gradacac region, had much higher knowledge of pest management. Through LAMP training in IPM, LAMP has increased awareness of the importance of safety clothing as well as introduced more effective and less toxic pesticides to farmers (pesticides that have been approved in the PERSUAP for fruits and vegetables). Subsequent visits to berry farms, for example, showed that pest control was more effective, and berries were healthier, as IPM practices are increasingly being used. Protective clothing is being somewhat slowly taken up by farmers so LAMP, in the REGA GDA, will continue supporting the BiH PPS (the lead IPM-safer use trainers for REGA) in their pursuit to raise awareness of IPM and the need for safety clothing. LAMP will apply their experience and lessons learned to their work with REGA partners.

It is important that USAID identifies a suitable REGA partner, or an individual, who will be responsible for mitigation and monitoring of PERSUAP's recommendations for the life of the REGA project. During LAMP's existence, up until May 2008, LAMP will provide overall coordination within REGA to implement the PERSUAP's recommendations and build responsibility with the designated REGA partner (as identified by USAID) for mitigation, monitoring, and reporting. LAMP cannot provide assistance to this activity after May 2008.

B. REGA's target crops – soft fruits and cherries:

Climatic, geographic and social conditions in BiH do not generally suit large-scale mechanized production of crops. Moreover, land holdings are generally small and fragmented. Individuals with access to land often lack technical knowledge of modern methods or recent developments in agriculture, including access to materials, transplants, crop protection, fertilizers, etc. As a result, agriculture since the war has tended to be subsistence rather than market-oriented. Viable agricultural development in BiH therefore depends on the identification of higher-value, labor-intensive crops such as soft fruits (blackberries, raspberries and strawberries) or stone fruits such as cherries for which the country has a competitive advantage due to geographic, climatic and labor force conditions. Since the end of the 1992-1995 war soft fruit production has been largely subsistence and very few pre-war market linkages with commercial processors have been restored.

Although soft fruit can be profitable for the small land holder, there are obstacles to start-up. It takes three years for berries to yield and several years for cherries. Raw berries are highly perishable, requiring quick freezing facilities, the harvest season is fairly short, and mass distribution or direct sale by individual small producers is not practical.

Hence the commercial processing market is a far more competitive market for BiH producers. However, the viability of the soft fruit processing market in BiH depends largely on the establishment of stable relationships between producers and commercially viable processors with freezing facilities close to growing areas. REGA target producers were chosen with these limitations in mind.

II. PESTICIDE EVALUATION REPORT

The information presented in the Pesticide Evaluation Report corresponds to the factors in 22 CFR 216.3(b)(i) (a) through (l).

(a) The USEPA registration status of the requested pesticides

Table 2 shows USEPA registration status for pesticides (with commercial product name in BiH listed, when available) that the technical experts at the Faculty of Agriculture at the University of Sarajevo determined, through grower and pesticide supplier surveys, are typically recommended and used for soft fruits and cherries. The table also shows EPA and WHO Toxicity Classes, and whether EPA has approved the pesticide’s use on the target fruits. Shaded pesticides did not pass the initial screening, and are not being requested for use in the LAMP fruit sub-sector.

USAID’s Pesticide Procedures, 22 CFR 216.3, state that when a project includes assistance for the procurement or use, or both, of any pesticide registered for the same or similar uses in the United States but the proposed use is restricted by the USEPA based on user hazard, the Pesticide Procedures in (a) through (l) must be completed, and in addition, an evaluation shall be undertaken regarding user hazards associated with the proposed USEPA restricted uses to ensure recipient government is aware and able to mitigate the risks. If restricted based on other than use hazard, an EA shall be conducted.

Table 2: EPA Registration Status and EPA/WHO Toxicity Classes of Pesticides Typically Used on fruits in BiH (c=cherries; r=raspberries; b=blackberries; s=strawberries)

Ref #	1/Active Ingredient/ Chemical)	2/Crop requested for	3/EPA Registration Status;	4/ EPA approved crops	5/Toxicity Class (EPA (2), WHO (3))	6/Commercial Product Name (BiH)
FUNGICIDES						
1	Azoxystrobin	G	GUP	Yes	EPA IV WHO U	Quadris KS
2	Bitertanol	C	NR		EPA None WHO U	Baycor WP25, Baycor DC 300
3	Captan	C	GUP	Yes	EPA I and II: mitigation	Merpan, Stopper, Captan, Topas,

Ref #	1/Active Ingredient/ Chemical)	2/Crop requested for	3/EPA Registration Status;	4/ EPA approved crops	5/Toxicity Class (EPA (2), WHO (3))	6/Commercial Product Name (BiH)
					proposed WHO U	
4	Copper + mineral oil	C	GUP	Yes	EPA III WHO not listed	Crveno ulje (Red mineral oil).
5	Copper + organic fungicide (dichlofluanid)	C	NR			Bakarni Atracol WP-63, Bakreni Dithane WP, Bakreni Euparen WP,
6	Copper hydroxide	C B R	GUP	Yes	EPA I-III (potential eye irritation): mitigation proposed WHO III	Champion WP 50, Kocide DF
7	Copper oxide	C	GUP	Yes	EPA III WHO II	Nordox 75 WG
8	Copper oxychloride	C	GUP	Yes	EPA II-III WHO III	Bakreno Vapno WP, Kupopin WP, Cuprocaffaro 50WP
9	Cyprodinil (+fludioxonil)	S B R	GUP	Yes	EPA III-IV WHO not listed	Chorus 75 WG, Switch 62,5WG
10	Dodine	C	GUP	Yes	EPA I: mitigation proposed WHO III	Bevedonin
11	Fenhexamid	C S B R	GUP	Yes	EPA III WHO U	Teldor
12	Iprodione	C S	GUP	Yes	EPA II and III WHO U	Kidan, Lupo
13	Mancozeb (dithiocarbamate)	C S	GUP	Yes	EPA IV WHO U	Dithane-M45, Mankozeb, Acrobat MZ, Curzate M, Bakarni Dithane
14	Metalaxyl	B R S	GUP	Yes	EPA II and III WHO III	Ridomil, Ridomil Gold Plus, Ridomil Gold Combi, Metalaxyl MZ,
15	Myclobutanil	C	GUP	Yes	EPA II WHO III	Systane, Sabithane
16	Prochloraz	C	NR	No	EPA None WHO III	Octave 50 WP
17	Tolyfluanid	C	NR	No	EPA None WHO U	Euparen Multi WP
18	Vinclozolin	C	GUP		EPA III WHO U Not recommended in IPM	Ronilan, Konker, Silbos
INSECTICIDES						
1	Acetamiprid	C B R	GUP	Yes	EPA III WHO not listed	Mospilan SP 20, Volley Sp 20, Acelan SP 20

Ref #	1/Active Ingredient/ Chemical)	2/Crop requested for	3/EPA Registration Status;	4/ EPA approved crops	5/Toxicity Class (EPA (2), WHO (3))	6/Commercial Product Name (BiH)
2	Alphacypermethrin	S C B R	NR	No	WHO II	Fastac SC 10, Direkt Sc 10, Alfa Sc 10
3	Dimethoate	C	GUP	Yes	EPA II WHO II	Rogor Ec 40, Chromgor Ec 40, Perfection Ec 40, Zagor EC 40, Sistem Ec 40
4	Cyhalothrin, lambda	C	RUP		EPA II WHO II	Karate EC 2,5, King Ec 2,5
5	Mineral oil - Red	C B R	GUP	Yes	EPA III WHO not listed	Crveno ulje Ec 55
6	Mineral oil - White	C B R	GUP	Yes	EPA III WHO not listed	Bijelo ulje Ec 80 (White mineral oil)
7	Pirimicarb <i>Request to retain</i>	S	GUP	Yes	EPA II WHO II	Pirimor WG 50
8	Tebufenozide	C	GUP	Yes	EPA III WHO U	Mimic SC
9	Thiacloprid <i>Request to retain</i>	C	GUP	Yes	EPA II WHO II	Calypso SC 480
HERBICIDES						
1	Glufosinate-ammonium	C	GUP	Yes	EPA II and III None WHO Not listed (glufosinate only WHO III)	Basta SL 15
2	Glyphosate	C	GUP	Yes	EPA III WHO U	Hércules SC 480, Herbocid SL 480, Zorkatop SI 480
BIOLOGICAL/BOTANICAL Pesticides and Repellents (all vital for IPM Programs)						
1	Abamectin (Avermectin)	S	GUP	Yes	EPA II and III WHO not listed	Vertimec Ec 18
2	Azadirachtin (Neem oil extract)	C B R	GUP	Yes	EPA-No consensus WHO-Not listed	NeemAzal TS
3	<i>Bacillus thuringiensis</i>	C	GUP	Yes	EPA III WHO U	Delfin

References for columns:

1/, 2/ and 6/ from LAMP technical experts and Ciglar (1998), and Friedrich and Rode (1996).

3/ and 4/ from www.pesticideinfo.org, www.epa.gov/

5/ from www.who.int.pcs, www.pesticideinfo.org, www.extonet.orst.edu

Notes:

(1) NR: not registered

(2) EPA Toxicity classification: 1, Highly toxic; 2, Moderately toxic; 3, Slightly toxic; 4 Not acutely toxic

(3) WHO classification: 1a, extremely hazardous; 1b, highly hazardous; II, moderately hazardous; III, slightly hazardous; U, unlikely to present acute hazard in normal use. The LD 50 used for acute toxicity is either oral (O) or dermal (D).

[In some cases, references for registration status and toxicity conflict; the PERSUAP Team considered the most up-to-date information, and in consultation with technical experts, selected the most efficacious and least toxic, according to the information available]

(b) The basis for selection of the requested pesticides

General: The PERSUAP Team screened the list of pesticides typically recommended and used in BiH for use on fruits. The Team made selections based on the pesticide’s USEPA registration status—they are GUPs; they are listed by USEPA as being registered for use on the specific crop and pest/disease or for a similar use; they are registered in BiH by the Ministry of Agriculture, the pesticide regulatory entity; they have relatively lower human toxicity or health risks; and relatively lower environmental risks (the last two criteria are based on the EPA and WHO Toxicity Classes and on the information in Table 5); they are recommended for use in IPM programs; and they treat the target pests or diseases in the project locations. All recommendations contained herein have been formulated in consultation with project technical staff (LAMP technical experts and external experts who will be involved in the GDA). Pesticides that passed the screening process are presented in Table 3 showing the basis for selection. The selection takes into account the need to use a variety of pesticide families so that pathogens and pests do not develop resistance.

The PERSUAP Team identified a minimum number of pesticides, selecting from the least toxic *and* most effective alternatives. The pesticides selected will allow farmers to achieve adequate control, within an overall IPM program (Sections (c) and (i)), while conforming to the high quality requirements of the buyers.

Pesticides chosen are applied during different periods of the year, some before the start of plant growth, others during plant growth, and still others after harvest.

Table 3: Basis for selection of the requested pesticides

Pesticide (1)	Crop	Pest/disease (2)	Basis for selection (3)
FUNGICIDES			
1. Azoxystrobin	S B R	<i>Sphaeroteca macularis</i> (powdery mildew), <i>Didymella applanata</i> (spur blight)	Controls the most important illnesses. Systemic control.
2. Captan (EPA I)	C	<i>Stigmina carpophila</i>	Contact fungicide with preventative and curative action. Compatible and mixed with many fungicides and insecticides. Degrades in soil in 1 day.
3. Copper + mineral oil	C	Shot-hole disease (<i>Stigmina carpophila</i>)	Copper-based pesticides work preventatively against many types of fruit pathogens. Also used to treat wounds. Use on stone fruits only during

Pesticide (1)	Crop	Pest/disease (2)	Basis for selection (3)
			vegetative rest (winter spraying) at higher concentrations.
4. Copper hydroxide (EPA I)	C B R	Shot-hole disease (<i>Stigmata carpophila</i>). <i>Didymella applanata</i> (spur blight on berries) <i>Mycosphaerella fragariae</i> (leaf spot on berries) <i>Leptosphaeria coniothyrium</i> (cane blight on berries)	Same as above
5. Copper oxide	C	Shot-hole disease (<i>Stigmata carpophila</i>)	Same as above
6. Copper oxychloride	C	Shot-hole disease (<i>Stigmata carpophila</i>)	Same as above
7. Cyprodinil (+fludioxonil)	S B R	<i>Botrytis sp.</i>	Has a preventative and curative effect and there is no cross-resistance with triazoles.
8. Dodine (EPA I)	C	<i>Blumeriella jappii</i>	Foliar fungicide with protective and partly curative action. Smaller concentrations are used for preventative action and larger for curative action.
9. Fenhexamid	C S B R	<i>Botrytis cinerea</i> , <i>Monilinia laxa</i> ,	Botriticide which does not have cross resistance with other botriticides.
10. Iprodione	C S	<i>Botrytis cinerea</i> , <i>Monilinia laxa</i>	Highly effective.
11. Mancozeb (dithiocarbamate)	C S	<i>Stigmata carpophila</i> , <i>Didymella applanata</i> (spur blight)	Fungicide with protective action. Works on a large number of pathogenic fungi and is frequently mixed with systemic fungicides through which a more effective protection of cultivars is obtained.
12. Metalaxyl	B R S	<i>Phytophthora cactorum</i> <i>P.fragariae</i> (root rot)	Systemic fungicide with protective and curative action. Absorbed through the leaves, stem and roots. Inhibits protein synthesis. Controls a large number of pathogenic fungi. Compatible with many pesticides. Can be phototoxic if applied in cold and humid weather.
13. Myclobutanil	C	<i>Monilinia laxa</i>	Systemic fungicide with protective and curative action. Inhibits the biosynthesis of ergosterol. Mixed with other pesticides such as captan, mancozeb etc.
INSECTICIDES			
1. Acetamiprid	C	Green peach aphid (<i>Myzus persicae</i>),	Recommended in IPM.

Pesticide (1)	Crop	Pest/disease (2)	Basis for selection (3)
	B R	Mediterranean fruit fly (<i>Ceratitis capitata</i>), European cherry fruit fly (<i>Rhagoletis cerasi</i>)	Systemic. Very effective on resistant populations of pests.
2. Mineral oil - Red	C B R	Over-wintered pests	Recommended in IPM. Inexpensive. Very effective if applied correctly.
3. Mineral oil - White	C B R	Aphids (<i>Aphidae sp.</i> , <i>Coccinae sp.</i>), Fruit tree red spider mite (<i>Panonychus ulmi</i>), European pear suckers (<i>Psylla sp.</i>)	Recommended in IPM. Inexpensive. Very effective if applied correctly.
4. Pirimicarb	S	Aphids	The most effective and most useful aphicide on the market, particularly for the control of aphids on strawberries. Can be used in early season IPM as it is soft on beneficial groups that control aphids.
5. Tebufenozide	C	Codling moth (<i>Cydia pomonella</i>), Fruit tree tortrix moth (<i>Archips podana</i>)	Growth regulator. Recommended in IPM. Very effective if applied at an optimal period. No resistance.
6. Thiacloprid	C	Aphids (<i>Myzus cerasi</i>)	Recommended in IPM. A systemic and very effective for resistant pests.
HERBICIDES			
1. Glufosinate-ammonium	C	Annual weeds in fruit orchards more than 2 years old	Very effective and fast acting.
2. Glyphosate	C	Perennial weeds in fruit orchards more than 2 years old	Very effective.
BIOLOGICAL/BOTANICAL PESTICIDES/REPELLENTS			
1. Abamectin (Avermectin)	S	Fruit tree red spider mite (<i>Panonychus ulmi</i>), Two spotted spider mite (<i>Tetranychus urticae</i>)	Very effective at controlling resistant strains.
2. Azadirachtin (Neem oil extract)	C B R	Aphids, Fruit tree red spider mite (<i>Panonychus ulmi</i>), Two spotted spider mite (<i>Tetranychus urticae</i>) Leafminers (<i>Leucoptera malifoliella</i> , <i>Lithocolletis blancardella</i> , <i>Lithocolestis corylifoliella</i>)	Plant-based insecticide. Effective control of a wide range of pests.
3. <i>Bacillus thuringiensis</i>	C	Moths	Bioinsecticide. Ecologically acceptable

References for Table 3:

(1) Only pesticides from Table 2 that are GUP and EPA and WHO Toxicity Classes II and above are included in this list (with the exceptions noted)

(2) and (3) PERSUAP Team

(c) The extent to which the proposed pesticide use is part of an IPM program

[See Section (i) for specific crop, pest, and pest management option including IPM for specific pests/diseases.]

An integrated disease-management program for controlling fruit diseases and pests combines the use of all available control methods into one program. For example, the use of fungicides for control of several important diseases can be a major part of the overall disease-management program, but the use of various cultural practices is perhaps even more important in obtaining effective disease control. In integrated disease management, pesticides are the control measure of last resort.

IPM principles started to be introduced into BiH, in a systematic way, only about four years ago. IPM is still not widely used. However, traditional approaches to farming include IPM principles, and because of limited funds—not always by choice—farmers do use IPM.

LAMP experts will work with other REGA partners to train farmers in safer use of pesticides and IPM, and will assist individual farmers to implement IPM. The intention is that LAMP will strengthen other REGA partners' capacity in IPM-safer use so that once the LAMP project has ended, they (or a specific individual—depending on LAMP and BiH PPS's recommendation once the GDA is underway) can take over the training role, as described in Section (I) and in Section III, the Safer Use Action Plan.

Monitoring will take place to ensure that farmers are practicing IPM and that the IPM approach is effective. REGA will use the LAMP model to institute a monitoring program, with the intention of training other REGA partners (or an individual, to be identified) to take over this role once LAMP has ended. In the case of berries, LAMP has been revisiting berry growers and has noticed that farmers' pest control practices are gradually improving: there is greater, although still inadequate, pest monitoring; some farmers are now using meteorological monitoring to determine optimal time for spraying; farmers are employing preventative measures a lot more: using healthier seedlings and not planting on waterlogged sites thus avoiding attacks by *Phytophthora* fungus.

In the REGA project, it is expected that through interventions by LAMP and other REGA partners, farmers will be much more careful with pesticide use on market crops. Training in safe pesticide use and IPM is expected to have a positive impact beyond project target crops.

In general, IPM practices to be introduced by trainers will include the following recommendations:

- When selecting a site for planting choose well drained sites as poorly drained sites are conducive to the development of root rot. Planting on raised beds can also be helpful;
- Select disease resistant varieties and high quality (certified virus-free), healthy stock;
- Trickle irrigation (as opposed to overhead sprinkler irrigation) greatly reduces the wetting of foliage and fruit and the risk of splash dispersal of several important fungal pathogens;

- Keep plantings free from weeds and plant debris;
- Manually control pests and diseases when infestations are low;
- Remove infected plant material from the field;
- Use bait traps/plants for insect pests;
- Apply insecticides as a measured response to monitored pest populations, rather than on a fixed schedule;
- Properly select application methods, using farmer operated hand-pumped backpack sprayers at early stages of plant growth;
- Alternate protectant and systemic fungicides from different chemical families to reduce the use of more toxic pesticides and to avoid developing resistant pathogen strains.

Section (l) contains information on monitoring pesticide use and implementation of IPM measures.

(d) The proposed method or methods of application, including availability of appropriate application and safety equipment

Table 4 shows protective clothing that is recommended for a few of the REGA-requested pesticides. Rather than list all protective clothing for each pesticide, which varies by formulation, LAMP and other REGA partners will be training and encouraging farmer groups to apply pesticides using appropriate safety clothing and equipment, as described on pesticide labels, and will encourage chemical dealers to ensure that safety clothing and equipment are available. This model has been successfully implemented by LAMP.

Except for the summer months, the area is relatively cool, and there should be less objection to using protective clothing and equipment than in hotter regions.

For pesticides discussed above that may result in eye and skin irritation—captan, copper hydroxide, and other copper-based compounds—REGA technical experts will promote the use of protective eyewear and appropriate protective clothing.

Farmers apply pesticides in their own fields, and do not use trained applicators. Type of sprayers depends on the size of the area under planting. Back sprayers (10-20l) are mostly used in closed areas and tractors with 330l sprayers are most frequently used in the open space. Protective clothing which may be used includes long-sleeved shirts and trousers, gloves, boots, and face protection gear.

Safe and appropriate application methods are a requirement of many EU buyers under EUREPGAP and are verified by field audits. LAMP has already started raising

awareness of EUREPGAP in BiH, initially through training provided by experts supported by Israel's MASHAV program. Furthermore, LAMP has been building capacity of BiH Plant Protection Society members through an IPM/EUREPGAP study tour in Israel conducted in May 2006. Those who have received training in EUREPGAP criteria will in turn be available for training REGA partners. Implementation of EUREPGAP protocols is a highly effective means to ensure safe use of pesticides.

LAMP will assist REGA partners to implement a monitoring program. Bosnaplod staff and other REGA partners, farmer groups or local agronomists as appropriate, will monitor to ensure that the clothing and equipment are being used, used correctly, and are maintained. Some improvements in this respect have been noticed in the berry sector, however, LAMP intends to provide further training in safer use practices and improve application methods so that they are safer for farmers and less potentially harmful to the environment. This training will be provided by representatives of the BiH Plant Protection Society (see Section k).

Table 4: Example of Protective Clothing Required for Some REGA-Requested Pesticides

Pesticide	Protective Clothing (1)
FUNGICIDES	
Azoxystrobin	Long-sleeved shirt, long pants, chemical resistant gloves, shoes and socks
Copper hydroxide	Dust mask and eye protection
Mancozeb	Safety glasses, chemical resistant gloves and apron or other impervious clothing

(1) This is a sample of the protective clothing and equipment required; protective equipment varies by formulation, and a proper label should specify the requirements for that particular product.

(e) Any acute and long-term toxicological hazards, either human or environmental associated with the proposed use and measures available to minimize such hazards

Table 5 shows the hazards associated with the pesticides being requested by REGA.

Many if not most of the fungicides are potential ground water contaminants, therefore they shall not be used in areas with very sandy soil or where the ground water table is less than 2 meters from the surface. In these areas, less toxic fungicides shall be used.

Table 5: User and Environmental Hazards Associated with REGA-Requested Pesticides

	Pesticide	Acute/Chronic Toxicity (human hazards)	Eco-toxicity	Groundwater (GW) Contamination Potential
FUNGICIDES				
1	Azoxystrobin	Acute oral, dermal, inhalation-RNT-ST. Harmful if absorbed through the skin. Not a likely carcinogen.	MT to VHT to fish.	Potential water contaminant; <i>For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water (e.g. Shallow water tables).</i>

	Pesticide	Acute/Chronic Toxicity (human hazards)	Eco-toxicity	Groundwater (GW) Contamination Potential
2	Captan	High acute toxicity: Skin, eye and respiratory tract irritant. Irreversible eye damage Unknown endocrine disruptor; cholinesterase inhibitor-no; Carcinogen therefore long term exposure should be minimized	HT to VHT to fish; MT to insects, amphibians, mollusks and zooplankton.	Insufficient data
3	Copper + mineral oil	Rapid respiration, cyanosis, tachycardia, and low-grade fever usually indicate frank hydrocarbon pneumonitis. Copper can cause severe eye irritation and skin and respiratory tract irritation.	Copper is VHT to amphibians, echinoderms and phytoplankton; HT to annelids, crustaceans, zooplankton; and MT to fish, aquatic insects, nematodes, and mollusks.	<i>For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water (e.g. Shallow water tables).</i>
4	Copper hydroxide	Severe eye irritation. Skin and respiratory tract irritation. Carcinogenicity unknown.	VHT to amphibians, echinoderms and phytoplankton; HT to annelids, crustaceans, zooplankton; and MT to fish, aquatic insects, nematodes, and mollusks.	<i>For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water (e.g. Shallow water tables).</i>
5	Copper oxide (Cuprous oxide)	Moderate acute toxicity. Can cause cough, sore throat, metal fume fever, dry skin, eye redness and pain, abdominal pain, diarrhoea, nausea, vomiting.	VHT to amphibians, echinoderms and phytoplankton; HT to annelids, crustaceans, zooplankton; and HT to fish, aquatic insects, nematodes, and mollusks.	<i>For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water (e.g. Shallow water tables).</i>
6	Copper oxychloride	Acute effects: RNT Chronic toxicity includes hepatic cirrhosis & brain damage	VHT to amphibians, echinoderms and phytoplankton. HT to earthworms; MT to fish, aquatic inverts, nematodes and mollusks; RNT to birds, beneficial arthropods	<i>For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water (e.g. Shallow water tables).</i>
7	Cyprodinil (+fludioxonil)	Potential skin, eye and respiratory tract irritation. Harmful if absorbed through the skin. Carcinogenicity unclassifiable.	MT to fish, phytoplankton and aquatic invertebrates.	Potential water contaminant; <i>For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water (e.g. Shallow water tables).</i>
8	Dodine	High acute toxicity as it	MT to mollusks and	Potential water

	Pesticide	Acute/Chronic Toxicity (human hazards)	Eco-toxicity	Groundwater (GW) Contamination Potential
		may cause severe eye irritation. ST via inhalation or ingestion. ST to skin. Does not appear to be mutagenic.	zooplankton. RNT to fish. ST to birds. NT to bees.	contaminant; <i>For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water (e.g. Shallow water tables).</i>
9	Fenhexamid	Acute oral, dermal, inhalation-RNT. Not a likely carcinogen.	MT to zooplankton. ST to MT to fish.	Potential water contaminant; <i>For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water (e.g. Shallow water tables).</i>
10	Iprodione	Low acute toxicity. Chronic health issues: Known carcinogen and known endocrine disruptor.	PNT to slightly toxic to birds; practically non-toxic to small mammals; MT to bees; moderately toxic to freshwater fish; HT to crustaceans.	Potential water contaminant; <i>For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water (e.g. Shallow water tables).</i>
11	Mancozeb (dithiocarbamate)	Causes cough, sore throat, redness and pain of skin and eyes; diarrhea, nausea and vomiting. Chronic issues: Probable carcinogen, therefore long-term exposure should be minimized; suspected endocrine disruptor (on 4 of 4 lists), known development or reproductive toxin.	HT to fish, amphibians, aquatic inverts, MT to bees, aquatic plants; RNT to birds.	Does not accumulate in soil; moderate potential to contaminate GW
12	Metalaxyl	Causes eye irritation; harmful if inhaled or absorbed through skin. Carcinogenicity unknown. No other effects on humans.	ST to fish and zooplankton. PNT to birds, bees.	Potential water contaminant; <i>For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water.</i>
13	Myclobutanil	Slight acute toxicity. Not likely carcinogen. Likely developmental or reproductive toxin.	MT to fish. HT to zooplankton.	Insufficient data.
INSECTICIDES				
1	Acetamiprid	Low dermal and inhalation toxicity. May irritate eyes and the	ST to MT to bees. NT to MT to birds. NT to fish.	Not known.

	Pesticide	Acute/Chronic Toxicity (human hazards)	Eco-toxicity	Groundwater (GW) Contamination Potential
		skin and may absorb through the skin. Unlikely human carcinogen.		
2	Mineral oil - Red	Slight acute toxicity.	NT to fish.	Insufficient data.
3	Mineral oil - White	Slight acute toxicity.	NT to fish.	Insufficient data.
4	Pirimicarb	Moderate acute toxicity. Symptoms of poisoning include: Malaise, muscle weakness, dizziness, and sweating, headache, salivation, nausea, vomiting, abdominal pain, and diarrhea. Potential problem is cholinesterase inhibitor.	NT to ST to fish. ST to other aquatic organisms. MT to insects.	Insufficient data.
5	Tebufenozide	Slight acute toxicity. Not likely carcinogen. Not a cholinesterase disruptor.	MT to fish and zooplankton. HT to aquatic and other insects.	Potential water contaminant; <i>For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water.</i>
6	Thiacloprid	Moderate acute toxicity. Probable human carcinogen according to US EPA, therefore should be used with care if used over an extended period of time. Not a cholinesterase disruptor.	RNT to fish and aquatic organisms. No concern for birds on an acute oral basis. Chronic risks to birds and very small mammals. RNT to bees.	Insufficient data. Because of limited mobility unlikely to run-off from the site. However, it has high water solubility so can contaminate surface waters following rain.
HERBICIDES				
1	Glufosinate-ammonium	Not listed acute toxicity. Not likely carcinogen. Not a cholinesterase disruptor.	NT-ST to fish.	Insufficient data
2	Glyphosate	Glyphosate exposure may lead to: cough, redness of eyes, and upon ingestion, diarrhea, shortness of breath, vomiting, and weakness. Minimal chronic effects noted.	MT to amphibians, aquatic inverts, beneficial arthropods, earthworms; ST to fish; RNT to birds, bees <i>Depending on location, biodiversity concern due to drift</i>	Hazard from drift to adjacent sites Highly soluble but does not leach appreciably
BIOLOGICAL/BOTANICAL PESTICIDES				
1	Abamectin (Avermectin)	High acute toxicity. Slight to moderate eye irritation and skin	ST-HT to fish. VHT to insects and zooplankton. HT to crustaceans. Non-toxic to	Immobile and unlikely to leach in soils and therefore unlikely to

	Pesticide	Acute/Chronic Toxicity (human hazards)	Eco-toxicity	Groundwater (GW) Contamination Potential
		irritation. Central nervous system depression: inco-ordination, tremors, lethargy, excitation, pupil dilation, coma. Vomiting, convulsions and/or tremors, and coma. Developmental or reproductive toxin. Unlikely carcinogen.	birds. HT to bees.	contaminate water.
2	Azadirachtin (Neem oil extract)	Acute oral: RNT; No chronic toxicity noted	HT to fish; MT to amphibians. MT to aquatic invertebrates; RNT to bees, beneficial arthropods	Insufficient data on groundwater contamination potential, but unlikely
3	<i>Bacillus thuringiensis</i>	Non toxic. Unlikely carcinogen.	Not toxic to birds and fish. Shrimp and mussels may be affected adversely. Not toxic to most beneficial insects.	Unlikely to cause problems because of rapid biological breakdown.

Information in this table is primarily from www.pesticideinfo.org, www.epa.gov/pesticides,

www.extoxnet.orst.edu

VHT=very highly toxic

HT=highly toxic

MT=moderately toxic

T=toxic

ST=slightly toxic

RNT=relatively non-toxic

PNT=practically non-toxic

(f) The effectiveness of the requested pesticides for proposed uses

To determine the most effective pesticides for the proposed uses, the PERSUAP Team discussed with other technical experts, and consulted web sites and IPM literature such as Ciglar (1998) and Friedrich and Rode (1996). The requested pesticides will likely be the most effective in controlling the specific pests. They will be used in conjunction with IPM measures, which will prove more effective than the pesticide alone, and be less hazardous to human health and the environment.

LAMP has experience using most of these pesticides as part of its program, and growers have had success combining these pesticides with an IPM program, as recommended by LAMP. LAMP technical experts, in collaboration with other REGA partners, will advise REGA growers on most efficacious pesticides for target crops and pests.

(g) Compatibility of the proposed pesticides with target and non-target ecosystems

Table 5, “User and Environmental Hazards,” discusses the main risks the requested pesticides pose to non-target organisms and the environment. While the PERSUAP requests approval for the least toxic pesticides typically used for fruits in BiH, many of the requested pesticides pose some risk to non-target ecosystems. The PERSUAP proposes training and monitoring to minimize environmental threats.

Some of the requested pesticides pose a threat to ground or surface water, and also to aquatic organisms. Training will also take these threats into account, and trainers will ensure that farmers understand the importance of protecting the aquatic environment, and that they have the tools necessary to implement precautionary measures. LAMP and other REGA Partners will ensure that the effect of pesticides on water is addressed where it is applicable, particularly with respect to pesticides which pose a greater threat to aquatic systems.

In all cases, proper application, storage, and disposal to minimize threats to non-target ecosystems and species will be an integral part of training. As described in this PERSUAP, pesticide use, storage and disposal will be monitored to prevent misuse or drift and run-off from application site, and to protect non-target species and surface and groundwater.

Where honey bees and other pollinators are present, precautions must be taken to prevent poisoning. If the fruit crop is the only attractive plant within flight range, bee colonies from several miles away may be affected. Abamectin, for example, is highly toxic to honey bees. Precautions include not applying these pesticides during the blooming period; using the lowest effective rate; using the pesticide least hazardous to bees; using the pesticide with the shortest residual effect; using sprays or granules instead of dusts; applying pesticides in late afternoon or at night when bees are not working blooms; avoiding drift of pesticides onto plants that are attractive to bees; and notifying beekeepers several days before applying pesticides.

These precautions will be incorporated into IPM and safer use training, where honey bees and other pollinators are present. Already LAMP has been raising this issue with berry growers and noticed that most farming communities are quite organized in this respect. Before spraying, berry growers put signs up and notify neighboring apiculturalists when spraying will take place. This model will be used with REGA fruit growers.

(h) The conditions under which the pesticides are to be used, including climate, flora, fauna, geography, hydrology, and soils

The REGA project will concentrate on the Brcko District and the surrounding area within northeastern Bosnia. The Brcko District strategically located at the crossroads of three states: Bosnia Herzegovina, Serbia and Croatia. Sava flows through Brcko, making the area highly accessible to trade. Northeastern Bosnia is very suitable to growing soft fruits such as such strawberries, raspberries and blackberries as well as stone fruits including cherries. Climate is mild continental with warm/hot summers and cold winters. Average temperatures range from 22 °C in July to 0 °C in January. The average annual

precipitation is 800 mm. Hydromorphic soils with very good conditions for agricultural production dominate this region in flat and moderately undulating terrain in the valleys of the Sava River and its tributaries.

(i) The availability and effectiveness of other pesticides or non-chemical control methods

The use of pesticides can be reduced through the application of IPM principles specified in Table 6. Various measures also exist that may reduce the reliance on specific pesticides generally used in BiH, for example:

Fungicides

- The reliance on many fungicides can be reduced through agrotechnical/cultural methods which contribute to better ventilation and reduce dampness and humidity. Critical is also the removal of infected plant parts and diseased fruits. Selection of more resistant cultivars will also reduce pathogen attacks and therefore the need for fungicides.

Insecticides

- Toxic but widely used insecticides in BiH include diazinon, dimethoate, fenthion and cyhalothrin, lambda (not included in the REGA PERSUAP request). There are less toxic insecticides which can be used instead. Furthermore, “confusion technique” with pheromones can be used including insect traps with food or pheromones, as well as the use of natural enemies (parasites and predators). The use of these techniques can also reduce the need for many of the less toxic pesticides.

Herbicides

The use of herbicides can be reduced or avoided by using mechanical and manual removal methods.

Table 6: Pest control methods available:

Crop	Main Pest/Disease Problems	Integrated Pest Management
Cherries	<i>Stigmia carpophila</i> - (shot- hole disease)	Preventative: balanced N-fertilizer application and spring cutting to increase ventilation of tree tops and to reduce surplus growth. Removal of diseased branches. Use copper-based fungicides after leaf fall or during vegetative period.
	<i>Monilinia laxa</i> , <i>M. fructigena</i> (brown rot) –	Balanced feed, ventilated tree tops, removal of diseased fruits. Pesticide application at the start of flowering when less than 10% of flowers have opened.
	<i>Blumeriella jappii</i> ()	Autumn and winter spraying will reduce the appearance of this pathogen. Treatment during vegetative period will start after first symptoms are noticed.
	Aphids	Winter monitoring and winter spraying of fruit orchards with red oil, monitoring during the vegetative period using yellow sticky traps and intervention with white oil or other insecticide as needed.

Crop	Main Pest/Disease Problems	Integrated Pest Management
	European cherry fruit fly (<i>Rhagoletis cerasi</i>),	Monitoring using yellow sticky traps and the application of acetamiprid as needed.
Soft fruits (Raspberries, blackberries, strawberries)	<i>Bothrytis cinerea</i> (botrytic blight)	Pruning out all infected old fruited canes and any diseased new canes and removing them from the planting breaks the disease cycle. All infected pruning waste should be removed from the field and destroyed. However, the use of fungicides is still considered necessary and very effective. Least toxic fungicides for adequate control are being requested.
	<i>Didymella applanata</i> (spur blight)	It is essential to have raspberries/blackberries in a sunny location and keep canes thinned out to control this disease. Spraying the plants will reduce the spread of this disease, but the thinning of the canes and admission of sunlight is the first control measure. Burn diseased canes.
	<i>Leptosphaeria coniothyrium</i> (cane blight)	Pruning out all infected old fruited canes and any diseased new canes and removing them from the planting breaks the disease cycle. All infected pruning waste should be removed from the field and destroyed.
	<i>Mycosphaerella fragaria</i> (leaf spot)	Pruning out all infected old fruited canes and any diseased new canes and removing them from the planting breaks the disease cycle. All infected pruning waste should be removed from the field and destroyed.
	<i>Phragmidium rubi-idaei</i> (raspberry rust)	Pruning out all infected old fruited canes and any diseased new canes and removing them from the planting breaks the disease cycle. All infected pruning waste should be removed from the field and destroyed. The use of fungicides alone may not provide effective control.
	<i>Phytophthora fragariae va. rubi</i> (Root rot)	Choose sites which are well drained. Good soil drainage is the primary means of controlling this disease as the disease is most commonly associated with heavy soils or portions of the planting that are the slowest to drain. Choose more resistant plant varieties and healthy seedlings.
	<i>Sphaerotheca macularis</i> (Powdery mildew)	Remove and destroy all infected plant parts. Selectively prune overcrowded plant material to help increase air circulation. This helps reduce relative humidity and infection. If cultural controls fail to prevent disease buildup or if the disease pressure is too great, an application of a fungicide may be necessary.
	<i>Sphaerulina rubi</i> (raspberry leaf spot)	Practicing good sanitation, especially the removal and destruction of old fruited canes, and managing to increase air movement and sunlight penetration work to suppress leaf spot.
	<i>Anthonomus rubi</i> (strawberry blossom weevil)	Difficult to control without the use of pesticides.
	<i>Agilus rubicola</i> (raspberry buprestid/bronze cane borer)	Removing and destroying infected plants is an organic option. Least toxic pesticides for adequate control in conventional agriculture are being requested.
<i>Aphis idaei</i> (aphids)	High aphid populations are often an indication of excessive nitrogen fertilization particularly when soluble nitrate fertilizer is used. Avoiding excessive application of fertilizers and relying on natural enemies may reduce the problem but full control of the aphids is difficult to achieve	

Crop	Main Pest/Disease Problems	Integrated Pest Management
		without the use pesticides.
	<i>Byturus tomentosus</i> (raspberry beetle)	Very difficult to control without the use of pesticides. Least toxic pesticides for adequate control in conventional agriculture are being requested.
	<i>Coroebus rubi</i>	Difficult to control without the use of pesticides.
General	Various insects and diseases	Rotation with crops that are non-berry pest hosts; and monitoring of pest populations and application of pesticides when pest populations reach action thresholds (to be disseminated to farmers or established, where they don't yet exist).
	Birds	Use netting if birds are a pest.
	Weeds	Plant fields with a minimum of soil disturbance, use mechanical and hand weeding.

Note: Information in this table provided by LAMP technical staff and Ciglar (1998), and Friedrich and Rode (1996) and <http://ohioline.osu.edu/b782/index.html> and <http://attra.ncat.org/>

(j) The requesting country's ability to regulate or control the distribution, storage, use, and disposal of the requested pesticide

BiH inherited in 1992 the phytosanitary legislation from the former Yugoslavia. Since then, the two responsible entity Ministries of Agriculture have worked largely independently on the improvement of the legislation. Because not all areas of the phytosanitary legislation have been modified and the laws and regulations are not harmonized between the entities, the legal framework is rather weak and not in line with EU standards.

In the absence of appropriate state level institutions the responsibility for the implementation of any phytosanitary measure is in the jurisdiction of the Federal Ministry of Agriculture (FBiH MoA), the Republika Srpska Ministry of Agriculture (RS MoA) and the Agricultural Department of the District Brcko (AgDep DB). Because of a lack of coordinating mechanisms, this creates practical problems in the implementation at the borders as well as inland.

Based on recommendations of the EU Road Map and the EU Feasibility Study the BiH Ministry of Foreign Trade and Economic Relations (MoFTER) initiated in early 2003 the establishment of a Phytosanitary Commission. The commission had a temporary character for six months only, and was designed to develop the legal framework for all plant health related matters. The commission was comprised of representatives of the entity Ministries of Agriculture, the District Brcko and scientific agricultural institutions (faculties and institutes). MoFTER only chaired the commission and served as a secretariat. Due to some financial constraints the work of the commission lasted twelve months. The Commission received some technical assistance from Slovenian experts to assure EU compliance. Because of the complicated administrative structure of BiH, the EU directives could not be just copied. Although the Slovenian administration is different than BiH's, the Slovenians had historically the same legal background and underwent the introduction of EU compliant laws and regulations recently. Therefore, their expertise was highly appreciated.

The commission finished drafts of several phytosanitary laws and regulations and handed them over to MoFTER. Amongst these laws is the Law on Plant Protection Products in BiH published on November 2, 2004 in the Official Gazette (OG 02/2005). This law is harmonized with EU standards, however the law only sets the framework for the development of secondary legislation.

Law on Plant Protection Products in BiH

The Law on Plant Protection Products basically sets the framework for the use and marketing of all plant protection products. It regulates the licensing of those products according to their active substances which need to be included in a positive list (approved substances). BiH acknowledges the EU list of active substances which is based on scientific evaluations. Once a substance is included in the positive list, the authorities may authorize the use of products containing them. This is a very pragmatic approach taking into consideration both the high EU safety standards and BiH's economic situation as well. The law stipulates conditions for individuals and legal entities trading with plant protection products, the register of traders and users as well as the technical requirements regarding the application. Furthermore, the role of the public service in the control and application, and the responsibilities of the different authorities on state and entity level are prescribed. Unfortunately this law is not yet implemented. The reason for this is the lack of secondary legislation as well as the absence of a government body to implement the law.

Future

In order to meet international standards and to fulfill international obligations, BiH needs to have a competent authority on state level as a focal point for all plant health related matters. BiH is a signatory of the International Plant Protection Convention (published in OG 8, 10/2003-International Agreements). Consequently, this means that BiH accepted the obligation to establish a national organization for plant health (i.e. BiH Administration for Plant Health). The BiH Administration for Plant Health has been established in the middle of 2005 but it currently has only one, albeit very competent, staff member. The Administration is expected to expand to needed capacity in the next few months.

The activities in the field of regulating the use and trade of plant protection products should be as follows:

- Preparation and adoption of by-laws/regulations
- Harmonisation, review, updating and expansion of the BiH list of plant protection products (active substances)

Implementation

The BiH Administration for Plant Health needs to establish mechanisms on how to cooperate with the competent entity bodies and the District Brcko. Given the complicated administrative system in BiH, success or failure in the implementation of the laws depends strongly on the establishment of functioning mechanisms. Implementation rules are currently being drafted and this is being supported by the EU. LAMP will also provide technical support to address organizational issues. This will help BiH to implement the law according to EU standards.

Currently BiH imports all of the pesticides as no pesticides are produced in the country. The procedure for importing pesticides is as follows:

1. Companies (as legal entities) must be registered with the relevant Ministry of Agriculture (RS, FBiH or the District of Brcko as relevant)
2. Must have appropriate storage for pesticides
3. Must have an adequately trained employee (i.e. an agronomist)
4. For every pesticide a company wishes to import, a copy of registration for use in the country of origin must be submitted, as supplied by the relevant authority of that country
5. For every pesticide a company wishes to import, an approval for its use needs to be obtained from the Ministry of Health. Then a request for registration for use in BiH must be submitted to the Ministry of Agriculture. Following this, permission for import needs to be obtained from the Ministry of Foreign Trade and Economic Relations.

The above-mentioned administrative procedures have been put in place in absence of an adequate laboratory in the FBiH for the testing of pesticides. In the RS, there is a laboratory for testing pesticides at the Agriculture Institute in Banja Luka. Therefore, in the RS, pesticides need to be tested at the laboratory before they can be registered for use by the Ministry of Agriculture. Then a license for permission for import can be obtained from the Ministry of Foreign Trade and Economic Relations.

(k) The provisions made for training users and applicators

In general, training will cover IPM/safer use of pesticides, including safety clothing and equipment, storage, application, and disposal of unused pesticides and used containers, pest resistance, and environmental considerations, including protection of aquatic resources, birds, and other wildlife, honeybees, and domestic animals. LAMP will make a special effort to target all family members who may work in the fields or come in contact with pesticides.

For pesticides highly toxic to aquatic organisms, and/or that could contaminate groundwater, trainers/technicians will give specific instructions about protecting aquatic habitats and groundwater. For pesticides highly toxic to birds, bees, and other wildlife, trainers/technicians will give specific instructions about protecting habitat, including preventing drift.

The summary of the GDA/REGA PERSUAP will be made available to REGA partners, and it will be used as a basis for training.

Approach to Training:

LAMP will work with REGA partners to strengthen their capacity so REGA can eventually take over IPM-safer use training and mitigation and monitoring activities. Specifically, LAMP will train (through the BiH Plant Protection Society-PPS) an individual to take on the responsibility of the PERSUAP after LAMP, possibly an agronomist at Bosnaplod (this will be determined once the project is in place and LAMP and BiH PPS have identified a promising individual). The aim is that once LAMP has ended, REGA has access to an individual (either on staff or a partner) who will continue to ensure that PERSUAP mitigation and monitoring is implemented. LAMP will be responsible for building capacity of that individual and will implement the PERSUAP's recommendations until May 2008.

LAMP will work (through the BiH Plant Protection Society) intensively with the partners during LAMP's lifetime to build capacity of local farmers and staff at Agropod. The BiH PPS will have the lead in training in the hope they build a good relationship and trust with local farmers and Bosnaplod staff and any local extension officers so they will continue using professional services of the BiH Plant Protection Society post-LAMP.

(I) The provisions made for monitoring the use and effectiveness of the pesticides

Currently farmers use field observation to monitor the need for pesticides and the effectiveness of pesticides. LAMP will work with REGA partners to strengthen farmer capacity to use field observation within an overall IPM program. LAMP and other REGA partners will encourage farmer groups, directly and/or through agronomists and local extension agencies, as relevant, to monitor pests, efficacy of pesticides and safe application of pesticides.

In the case of the berry sector, LAMP has taken every opportunity to promote IPM and safe application of pesticides. Pest monitoring is being undertaken to a greater extent than before but there are still improvements to be made. Some farmers are particularly advanced having obtained meteorological stations which can provide them with better information on optimal periods for spraying. Better control of pests is being achieved though the implementation of IPM measures but continued training in this respect is needed. Continued efforts in awareness raising of safe pesticide application practices are also necessary. LAMP will use lessons learned in working with berry growers to assist REGA partners to monitor the use and effectiveness of pesticides.

Besides monitoring at the farmer/field level, REGA will undertake further monitoring associated with pesticide use and the provisions of this PERSUAP, which may include the following:

- Registration status (change in status of requested pesticides)
- Phase out of select pesticides (Table 7) by 9/30/07

- Training implemented and safer use practices applied (farmers and agriculture service providers aware of and using the information)
- Chemicals being used by farmers; minimum reliance on chemicals
- Efficacy of IPM measures
- Pesticides being sold to farmers with intact labels
- Safety clothing and equipment available and maintained, spare parts available
- Proper storage of pesticides
- Proper disposal of unused pesticides and empty containers

Monitoring pesticide use and implementation of safer practices will be incorporated into REGA's overall monitoring plan, and reported in quarterly reports as determined by USAID.

III. RECOMMENDATIONS: SAFER USE ACTION PLAN

REGA shall report to USAID on mitigation measures required herein, including training courses, in project quarterly reports as determined by USAID. This monitoring activity is considered the REGA Mitigation and Monitoring Plan, and is a requirement of the REGA PERSUAP.

1. Remove and phase-out more hazardous pesticides (EPA Toxicity II: avermectin, myclobutanil, thiacloprid, and pirimicard) from trainings which REGA may organize beyond September 30, 2007, unless no suitable alternatives exist. REGA shall only recommend or assist with the use of pesticides approved herein, and with formulations that are USEPA registered as GUPs; that are registered for use on the target fruits; that are registered for use in BiH; and that are above USEPA *and* WHO Toxicity Class I (except for those noted herein).

By September 30, 2007, REGA shall replace pesticides in USEPA Toxicity Class II or WHO Toxicity Class II except for those with no practical alternative, and for those pesticides whose risk can easily be mitigated (copper-based pesticides and captan). Table 7 shows EPA/WHO Toxicity Class I or II pesticides that REGA is requesting, and that will be phased out by September 30, 2007. REGA requests not to phase out captan (eye and skin irritant), copper hydroxide (eye irritant) and other copper-based compounds, dodine, and metlaxyl (some formulations are EPA II), and mitigation for this is given below.

Request is made for retention of EPA II formulations until phase-out date of September 30, 2007: avermectin, myclobutanil, thiacloprid and pirimicard. REGA will submit a detailed justification for retaining these pesticides beyond September 30, 2007, if retention is necessary. This justification shall be submitted prior to the phase-out date, and shall be in the format of an Amended PERSUAP.

a) On an annual basis, GDA/REGA shall review US EPA registration status, and EPA and WHO Toxicity Classes of approved pesticides, and shall report, in the Quarterly Report, to USAID on any significant revisions.

Table 7 Phase out of select pesticides and justification for not phasing out

Pesticide/Issue	Justification	Mitigation
Abamectin (Avermectin): Some formulations are EPA II	Useful in rotation with lufenuron. Phase out EPA II formulations by 9/30/07.	Only to be applied by trained applicators (see training); protective clothing and equipment mandatory; part of IPM program. Phase out EPA II formulations by 9/30/07
Captan: EPA warns on potential for severe eye and skin irritation. (EPA I)	This can be mitigated, and REGA requests to retain this pesticide, and not phase it out.	Will ensure applicators use protective eye wear and clothing to protect against skin irritation. Safer use training will include this precaution.
Copper hydroxide: EPA warns on potential for severe eye irritation. (EPA I)	This can be mitigated, and REGA requests to retain this pesticide, and not phase it out.	Will ensure applicators use protective eye wear. Safer use training will include this precaution.
Dodine: EPA warns on potential for severe eye irritation. (EPA I)	This can be mitigated, and REGA requests to retain this pesticide, and not phase it out.	Will ensure applicators use protective eye wear. Safer use training will include this precaution.
Metalaxyl: Some formulations are EPAII	This pesticide was approved in the LAMP berry PERSUAP. LAMP requests to retain this pesticide, and not phase it out as no effective systemic alternative exists. It is relatively non-toxic to bees, fish, and birds, and has minimal acute or chronic effects on humans.	Will only be used by trained farmers (see training); safety clothing and equipment mandatory; used as part of IPM program.
Myclobutanil: Some formulations are EPA II	Effective in the control of powdery mildew though systemic action. Fits into IPM as fewer applications are required, low rate of active ingredient, and its safety to beneficial insects. Useful in rotation with triadimenol and triadimefon to prevent resistance.	Phase out EPA II formulations by 9/30/07
Other copper based compounds, including copper oxide, copper hydroxide, copper oxychloride and copper sulfate: Some formulations are EPA I and EPA II. EPA I formulations will not be used.	Copper based compounds are general preventative fungicides recommended in IPM programs, and widely used in BiH. REGA requests to retain and not phase out EPA II formulations.	Will only be used by trained farmers (see training); safety clothing and equipment mandatory; used as part of IPM program.
Thiacloprid	EPA II and WHO II. The only registered pesticide for the control a species of aphids (<i>Myzus cerasi</i>) in cherries. Although a WHO II, the pesticide is recommended in IPM. It is a systemic and very effective for resistant pests, and relatively non-toxic to bees and aquatic fauna.	Will only be used by trained farmers (see training); safety clothing and equipment mandatory; used as part of IPM program. Phase out by 9/30/07
Pirimicarb	EPA II and WHO II. The most	Will only be used by trained

Pesticide/Issue	Justification	Mitigation
	effective and most useful aphicide on the market. No other suitable alternative exists in the region for the control of aphids on strawberries. Can be used in early season IPM as it is soft on beneficial groups that control aphids.	farmers (see training); safety clothing and equipment mandatory; used as part of IPM program. Phase out by 9/30/07

2. REGA partners shall only work with farmer groups who agree to use approved pesticides as part of an IPM program.

3. REGA partners shall ensure that IPM practices described in the PERSUAP (some examples in Section c) and others developed in collaboration with LAMP technical experts are disseminated and will encourage implementation of these practices, for example:

- a) Rotation of chemical families of pesticides to minimize the chance of resistance
- b) Rather than using insecticides on a prophylactic basis or at the mere appearance of pests, chemical application should be undertaken upon reaching established action thresholds.
- c) Pesticides shall be the last resort control; the first level of control is cultural practices; chemicals shall be used minimally.
- d) Better on-farm water management practices to avoid contamination of ground and surface water with pesticide residues.
- e) Only clean, disease free seed should be used by growers.

4. REGA partners shall promote the use of protective clothing and equipment by farmers and shall monitor use:

- a) REGA partners shall encourage chemical suppliers to store appropriate protective clothing and equipment;
- b) REGA partners shall show examples of safety clothing to farmers during training and ask them to request these items when purchasing the relevant pesticides from chemical suppliers;
- c) REGA partners shall inform farmers how the safety clothing should be used; and
- d) REGA partners shall monitor, to ensure that the protective clothing and equipment is well-maintained and spare parts are available.

5. REGA partners shall encourage farmers to read and follow labels.

a) REGA partners shall work with farmers groups, farmer organizations, and pesticide suppliers to ensure pesticide packaging remains intact and that instructions are provided in appropriate languages, at appropriate levels.

b) REGA partners shall assist farmers to understand and abide by the information provided on the pesticide label.

6. LAMP shall work with REGA partners to strengthen their capacity so REGA can eventually take over IPM-safer use training and mitigation and monitoring activities. Specifically, LAMP will train (through the BiH Plant Protection Society-PPS) partners or an individual to take on the responsibility of the PERSUAP after LAMP, possibly an agronomist at Bosnaplod (this will be determined once the project is in place and USAID has identified a suitable individual/partner). LAMP will implement the PERSUAP's recommendations until May 2008, and will be responsible for building capacity of the individual/partner who will take on this role, post-LAMP. REGA will report on progress towards this transition in quarterly reports as determined by USAID.

a) LAMP, in collaboration with other REGA partners, shall train Bosnaplod staff, farmers, pesticide suppliers, and Partner MKO staff as necessary, in pesticide safer use and handling, and environmental protection: LAMP technical experts will be responsible for providing training, as appropriate (described in Section k), to target groups, in safer use of pesticides, including use of protective clothing and equipment, pesticide storage and disposal, restricted entry intervals, pre-harvest intervals, IPM, rotating chemical families to minimize pesticide resistance, and environmental protection, especially regarding protection of aquatic habitats and terrestrial wildlife, including birds (Section (k).

b) To some degree, many of the proposed pesticides could adversely affect bees and other beneficial insects, fish and other aquatic organisms, birds, and other wildlife (those in Table 7 are the most serious offenders). Training for Bosnaplod staff and farmer groups and service providers shall include information on proper use and disposal so as to minimize any danger to aquatic and terrestrial non-target species, surface and groundwater.

c) Encourage all family members, who may come in contact with pesticides, to participate in training.

7. REGA partners shall disseminate information from the PERSUAP broadly:

a) Information should be translated and disseminated to farmer groups, agricultural service providers, project staff, consultant trainers, and others involved in the fruit sub-sector. For farmers, an IPM or safe pesticide use pamphlet may be more appropriate for dissemination rather than the full report-REGA will use the LAMP model for information dissemination.

8. REGA partners shall implement a Mitigation and Monitoring Plan: GDA/REGA shall implement the mitigation and monitoring described herein, and report in Project

Quarterly Reports on the implementation of mitigation measures and successes and failures. Where monitoring indicates that mitigations/safer use practices are not being implemented, or where they are not adequately addressing impacts, REGA shall report to USAID and develop means to respond to the problem.

9. PERSUAP mitigation and monitoring requirements may require GDA/REGA to provide funding to implement the above measures; GDA/REGA project budget will be adjusted accordingly.

REFERENCES

Ciglar, I. (1998): Integralna zaštita voćnjaka i vinograda. "Zrinski", Čakovec, Hrvatska. (Integrated Pest Management of fruit orchards and vineyards)

EPA: www.epa.gov/pesticides

Extoxnet: www.ace.ace.orst.edu/info/extoxnet

Friedrich, G., Rode, H. (1996): Pflanzenschutz in Integrierten Obstbau. Verlag Eugen Ulmer, Stuttgart, Deutschland.

National Environmental Action Plan BiH 2003.

PAN: www.pesticideinfo.org

USAID Safer Use Practices/IPM: <http://www.encapafrika.org/SmallScaleGuidelines.htm>

WHO: www.who.int/pcs