

**Amended Pesticide Evaluation Report and Safer Use Action Plan  
(PERSUAP)  
Linking Agricultural Markets to Producers (LAMP): Pesticide  
Procurement and Use in the Fruit Sub-sector**

Activity Location: Bosnia Herzegovina

Activity Title: Linking Agricultural Markets and Producers  
(LAMP)

Sub-sector: Fruits (apples, pears, plums, cherries,  
peaches, nectarines, apricots, grapes)

Life of Activity July 2003-May 2008

Funding  
(Fruit sub-sector) \$ 1,500,000 (est.)

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Date Prepared: November 02, 2005

**BACKGROUND:**

This PERSUAP evaluates LAMP’s proposed assistance in the use of pesticides in the fruit sub-sector; and addresses pesticide safer use and handling issues. If in the future, LAMP 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, LAMP 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).

LAMP previously prepared a PERSUAP covering the project’s assistance for the use of pesticides in the berry sector. That PERSUAP was approved by the USAID/E&E Bureau Environmental Officer (BEO) on 3 May 3005. At the time that PERSUAP was conducted, LAMP had yet to identify other target fruits, and therefore, was not yet prepared to move forward with a request to the USAID/E & E BEO for approval to recommend specific pesticides. Now that LAMP has decided to provide support for interventions to strengthen market links in the broader fruit sub-sector, LAMP is submitting this Amended PERSUAP to the BEO.

The fruit PERSUAP is being submitted at the same time as the vegetable PERSUAP. LAMP decided to prepare two separate PERSUAPs for these sectors rather than combine them into a single PERSUAP to ease dissemination of PERSUAP information. LAMP

has separate technical staff for each of these sectors, and prefers to provide the pesticide analyses to their technical staff and partners only for the commodities of interest to them.

It is important to note that LAMP is only playing a supporting role for farmer groups and food processors, primarily working to strengthen market linkages in the sector. LAMP's role in production is generally minimal. However, LAMP is aware of many problems associated with pesticide use. Problems include: over-use of pesticides in some instances, the use of inappropriate pesticides for the target crop or pest, ignorance of withholding periods, the lack of an integrated approach to pest control and so forth. For these reasons, LAMP will be providing support to producers to promote safer pesticide use and integrated pest management (IPM), whilst giving specific pest control advice on target crops: apples, pears, plums, cherries, peaches, nectarines, apricots and grapes. LAMP itself does not intend to fund, distribute or apply pesticides. This Amended PERSUAP covers LAMP's proposed support for promoting safer use of pesticides in the fruit sector.

The 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 57 pesticides (33 fungicides, 18 insecticides, 2 herbicides and 4 bio-pesticides) typically recommended and used on the target crops in Bosnia and Herzegovina (BiH). These pesticides were compiled from a list obtained by LAMP's technical experts at the Faculty of Agriculture at the University of Sarajevo, through surveys of growers and pesticide suppliers.

**LAMP's TARGET CROPS:**

LAMP's target crops include: apples, pears, plums, cherries, peaches, nectarines, apricots and grapes. Peaches, nectarines, apricots, grapes and cherries are grown in commercial quantities mostly in the southern part of BiH while apples, pears, and plums are primarily grown in northern BiH.

**SUMMARY OF FINDINGS:**

LAMP 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 is confident that this will minimize the potential hazards of eye and skin irritation.

All pesticides being requested are registered for use by the Ministry of Agriculture (BiH). 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 LAMP to assist in the use of 37 pesticides: 21 are fungicides, 10 are insecticides, 2 are herbicides and 4 are bio-pesticides (Table 1); and presents the rationale for making these recommendations.

Table 1 shows the pesticides for which LAMP 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 LAMP Requests Approval**

Active Ingredient/ Chemical)	Crop requested for*	Target pests	Potential problems if any	Comments
<b>FUNGICIDES</b>				
1. Azoxystrobin	G	Downy mildew, ( <i>Plasmopara viticola</i> ), grapevine powdery mildew ( <i>Uncinula necator</i> ), Rot brenner ( <i>Pseudopeziza tracheiphila</i> ), Gray mold ( <i>Botrytis cinerea</i> ), Dead-arm disease ( <i>Phomopsis viticola</i> )	<b>Potential water contaminant</b>	Aquatic concerns <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). Application will be limited to areas over 25 meters away from any water bodies.</i>
2. Captan	G Apl Pr Pl Pch C N Apr	<i>Poystigma rubrum, Stigmia carpophila, Guignardia bidwelli, Plasmopara viticola, Pseudopeziza tracheiphilla, Venturia inaequalis, Venturia pyrina</i>	<b>EPA I - Severe eye irritation and skin irritation</b>	Mitigation recommended: 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.
3. Copper + mineral oil	Apl G Pch C N Pr Pl Apr	Apple scab ( <i>Venturia inaequalis</i> ), Pyrina pear scab ( <i>Venturia</i> ), Peach leaf curl ( <i>Taphrina deformans</i> ), Bladder plums ( <i>Taphrina pruni</i> ), Shot-hole disease ( <i>Stigmia carpophila</i> )		
4. Copper hydroxide	Apl G Pch C N Pr Pl Apr	Apple scab ( <i>Venturia inaequalis</i> ), Pyrina pear scab ( <i>Venturia</i> ), Peach leaf curl ( <i>Taphrina deformans</i> ), Bladder plums ( <i>Taphrina pruni</i> ), Shot-hole disease ( <i>Stigmia carpophila</i> )	Some formulations are EPA I  <b>Potential water contaminant</b>	Aquatic concerns <i>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</i>

Active Ingredient/ Chemical)	Crop requested for*	Target pests	Potential problems if any	Comments
			<b>EPA I - Severe eye irritation</b>	bodies.  Mitigation recommended: Use eyewear protection.
5. Copper oxide	Apl G Pch C N Pr Pl Apr	Apple scab ( <i>Venturia inaequalis</i> ), Pyrina pear scab ( <i>Venturia</i> ), Peach leaf curl ( <i>Taphrina deformans</i> ), Bladder plums ( <i>Taphrina pruni</i> ), Shot-hole disease ( <i>Stigmina carpophila</i> )		
6. Copper oxychloride	Apl G Pch C N Pr Pl Apr	Apple scab ( <i>Venturia inaequalis</i> ), Pyrina pear scab ( <i>Venturia</i> ), Peach leaf curl ( <i>Taphrina deformans</i> ), Bladder plums ( <i>Taphrina pruni</i> ), Shot-hole disease ( <i>Stigmina carpophila</i> )	<b>Potential water contaminant</b>	Aquatic concerns <i>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.</i>
7. Cymoxanil	G	<i>Plasmopara viticla</i> , <i>Uncinula necator</i> , <i>Phomopsis viticola</i>		
8. Cyprodinil (+fludioxonil)	G Apl #Apr #Pch #N #Registered in Slovenia for these crops)	<i>Botrytis sp.</i> , <i>Venturia spp.</i> , <i>Monilinia sp.</i>	<b>Potential water contaminant</b>	Aquatic concerns <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). Application will be limited to areas over 25 meters away from any water bodies.</i>
9. Difenoconazole	Apl Pr	<i>Podosphaera leucotricha</i> , <i>Venturia inaequalis</i> , <i>Venturia pyrina</i>		
10. Dodine	Apl Pr C	<i>Venturia inaequalis</i> , <i>Blumeriella jappii</i>	<b>Potential water contaminant</b>  <b>EPA I - Severe eye irritation</b>	Aquatic concerns <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). Application will be limited to areas over 25 meters away from any water bodies.</i>  Mitigation recommended: Use eyewear protection.

Active Ingredient/ Chemical)	Crop requested for*	Target pests	Potential problems if any	Comments
				Ensure labels are intact.
11. Fenarimol	Apl, G	<i>Podosphaera leucotricha</i> , <i>Venturia inaequalis</i> , <i>Uncinula necator</i>	<b>Potential water contaminant</b>	Aquatic concerns <i>For terrestrial uses only;</i> <i>should not be applied</i> <i>directly to water or in a way</i> <i>that will contaminate water</i> <i>(e.g. shallow water tables).</i> <i>Application will be limited</i> <i>to areas over 25 meters</i> <i>away from any water</i> <i>bodies.</i>
12. Fenhexamid	G C Pl	<i>Botrytis cinerea</i> , <i>Monilinia laxa</i> ,	<b>Potential water contaminant</b>	Aquatic concerns <i>For terrestrial uses only;</i> <i>should not be applied</i> <i>directly to water or in a way</i> <i>that will contaminate water</i> <i>(e.g. shallow water tables).</i> <i>Application will be limited</i> <i>to areas over 25 meters</i> <i>away from any water</i> <i>bodies.</i>
13. Folpet	Apl Pr G Pl	<i>Venturia inaequalis</i> , <i>Venturia pyrina</i> , <i>Phomopsis viticola</i> , <i>Plasmopara viticola</i> , <i>Polystigma rubrum</i> , <i>Treanzshelia pruni-spinosae</i>		
14. Iprodione	G Pl C	<i>Botrytis cinerea</i> , <i>Monilinia laxa</i>	<b>Potential water contaminant</b>	Aquatic concerns <i>For terrestrial uses only;</i> <i>should not be applied</i> <i>directly to water or in a way</i> <i>that will contaminate water</i> <i>(e.g. shallow water tables).</i> <i>Application will be limited</i> <i>to areas over 25 meters</i> <i>away from any water</i> <i>bodies.</i>
15. Kresoxim-methyl	G Apl Pch N Apr	<i>Venturia inaequalis</i> , <i>Podosphaera leucotricha</i> , <i>Uncinula necator</i>	<b>Potential water contaminant</b>	Aquatic concerns <i>For terrestrial uses only;</i> <i>should not be applied</i> <i>directly to water or in a way</i> <i>that will contaminate water</i> <i>(e.g. shallow water tables).</i> <i>Application will be limited</i> <i>to areas over 25 meters</i> <i>away from any water</i> <i>bodies.</i>
16. Mancozeb (dithiocarbamate)	G Apl Pr	<i>Plasmopara viticola</i> , <i>Podosphaera leucotricha</i> , <i>Uncinula necator</i> , <i>Phomopsis</i>	<b>Potential water contaminant</b>	Aquatic concerns <i>For terrestrial uses only;</i> <i>should not be applied</i>

Active Ingredient/ Chemical)	Crop requested for*	Target pests	Potential problems if any	Comments
	Pl C	<i>viticola, Stigmina carpophila,</i>		<i>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.</i>
17. Metalaxyl	G	<i>Plasmopara viticola</i>	<b>Some formulations are EPA II</b>  <b>Potential water contaminant</b>	Mitigation recommended: Will only be used by trained farmers (see training); safety clothing and equipment mandatory; used as part of IPM program.  Aquatic concerns <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). Application will be limited to areas over 25 meters away from any water bodies.</i>
18. Metiram (dithiocarbamate)	Apl G	<i>Venturia inaequalis, Plasmopara viticola, Uncinula necator, Phomopsis viticola,</i>	<b>Potential water contaminant</b>	Aquatic concerns <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). Application will be limited to areas over 25 meters away from any water bodies.</i>
19. Myclobutanil	Apl Pr G N Pch C Pl Apr	<i>Podospaera leucotricha, Uncinula necator, Venturia inaequalis, V. pyrina, Monilinia laxa, Sphaerotecha pannosa,</i>	<b>Some formulations are EPA II</b>	<b>Phase out EPA II formulations by 9/30/06</b>
20. Sulfur based compounds (Colloidal sulfur and Dusting sulfur)	G Apl Pch	<i>Podospaera leucotricha, Uncinula nector, Sphaerotheca pannosa</i>		
21. Trifloxystrobin	G Apl	<i>Plasmopara viticola, Uncinula necator, Guignardia bidwelli, Podospaera leucotricha, Venturia inaequalis,</i>		

Active Ingredient/ Chemical)	Crop requested for*	Target pests	Potential problems if any	Comments
<b>INSECTICIDES</b>				
1. Acetamiprid	Apl Pr Pl C Pch Apr N	Sawflies ( <i>Hoplocampa sp.</i> ), Green peach aphid ( <i>Myzus persicae</i> ), Leafminers ( <i>Leucoptera malifoliella</i> , <i>Lithocolletis sp.</i> ), Mediterranean fruit fly ( <i>Ceratitis capitata</i> ), European cherry fruit fly ( <i>Rhagoletis cerasi</i> )		
2. Diflubenzuron	Apl Pr	Codling moth ( <i>Cydia pomonella</i> ), Pear moth ( <i>Cydia pyrivora</i> ), Leafminers ( <i>Leucoptera malifoliella</i> , <i>Lithocolletis sp.</i> )		
3. Fenoxycarb	Apl Pr G Pl Pch N Apr	Codling moth ( <i>Cydia pomonella</i> ), Pear moth ( <i>Cydia pyrivora</i> ), Leafminers ( <i>Leucoptera malifoliella</i> , <i>Lithocolletis sp.</i> ) Grape moth ( <i>Lobesia botrana</i> ), Grape bud moth ( <i>Eupocelia ambiguella</i> ), Plum fruit moth ( <i>Grapholita funebrana</i> ), Oriental peach moth ( <i>Grapholita molesta</i> )	<b>Potential water contaminant</b>	Aquatic concerns <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). Application will be limited to areas over 25 meters away from any water bodies.</i>
4. Hexaflumuron	Apl Pr	Codling moth ( <i>Cydia pomonella</i> ) European pear suckers ( <i>Psylla sp.</i> )		
5. Lufenuron	Apl Pr G Pch N Pl	Codling moth ( <i>Cydia pomonella</i> ), Pear moth ( <i>Cydia pyrivora</i> ), Grape moth ( <i>Lobesia botrana</i> ), Grape bud moth ( <i>Eupocelia ambiguella</i> ), Leafminers ( <i>Leucoptera malifoliella</i> , <i>Lithocolletis sp.</i> ), European pear suckers ( <i>Psylla sp.</i> ), Plum fruit moth ( <i>Grapholita funebrana</i> ), Oriental peach moth ( <i>Grapholita molesta</i> )		
6. Mineral oil - Red	Apl Pr G Pl Apr Pch C N	Over-wintered pests		

Active Ingredient/ Chemical)	Crop requested for*	Target pests	Potential problems if any	Comments
7. Mineral oil - White	Apl Pr G Pl	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> )		
8. Pymetrozine	Pch	Green peach aphid ( <i>Myzus persicae</i> ),	<b>Potential water contaminant</b>	Aquatic concerns <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). Application will be limited to areas over 25 meters away from any water bodies.</i>
9. Tebufenozide	Apl Pr G Pl Apr C N Pch	Codling moth ( <i>Cydia pomonella</i> ), Pear moth ( <i>Cydia pyrivora</i> ), Grape moth ( <i>Lobesia botrana</i> ), Grape bud moth ( <i>Eupocelia ambiguella</i> ), Fruit tree tortrix moth ( <i>Archips podana</i> ), Apple brown tortrix ( <i>Pandemis heparena</i> ), Plum fruit moth ( <i>Grapholita funebrana</i> ), Oriental peach moth ( <i>Grapholita molesta</i> )	<b>Potential water contaminant</b>	Aquatic concerns <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). Application will be limited to areas over 25 meters away from any water bodies.</i>
10. Thiamethoxam	Apl Pr Pl Pch	Apple sawflies ( <i>Hoplocampa testudinea</i> ), Aphids ( <i>Disaphis plantaginea</i> , <i>D. devector</i> , <i>D. pyri</i> , <i>Aphis pomi</i> ), European pear suckers ( <i>Psylla sp.</i> ),	<b>Potential water contaminant</b>	Aquatic concerns <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). Application will be limited to areas over 25 meters away from any water bodies.</i>
<b>HERBICIDES</b>				
1. Glufosinate- ammonium	Apl Pr Pl Pch G C N Apr	Annual weeds in fruit orchards more than 2 years old		
2. Glyphosate	Apl Pr Pl Pch G	Perennial weeds in fruit orchards more than 2 years old		

Active Ingredient/ Chemical)	Crop requested for*	Target pests	Potential problems if any	Comments
	C N Apr			
<b>BIOLOGICAL/BOTANICAL PESTICIDES AND REPELLENTS</b>				
1. Abamectin (Avermectin)	Apl Pr G Pl	Fruit tree red spider mite ( <i>Panonychus ulmi</i> ), Two spotted spider mite ( <i>Tetranychus urticae</i> ) European pear suckers ( <i>Psylla sp.</i> )	<b>Some formulations are EPA II</b>  <b>Potential water contaminant</b>	<b>Phase out EPA II formulations by 9/30/06</b>  Highly toxic to aquatic ecosystem. <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). Application will be limited to areas over 25 meters away from any water bodies.</i>
2. Azadirachtin (Neem oil extract)	Apl Pch C G	Apple small ermine moth ( <i>Yponomeuta malinellus</i> , <i>Yponomeuta sp.</i> ), 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>	G	Grape moth ( <i>Lobesia botrana</i> ), Grape bud moth ( <i>Eupocelia ambiguella</i> )		
4. Spinosad	Apl G	Summer fruit tortrix moth ( <i>Capua reticulana</i> ), Leafminers ( <i>Leucoptera malifoliella</i> , <i>Lithocolletis blancardella</i> , <i>Lithocolestis corylifoliella</i> ), Grape moth ( <i>Lobesia botrana</i> ), Grape bud moth ( <i>Eupocelia ambiguella</i> ),		

\*Apl-Apple, Apr-Apricot, C-Cherry, G-Grape, N-Nectarine, Pch-Peach, Pl-Plum, Pr-Pear

# The pesticide is registered in Slovenia and is likely to be soon registered in BiH for the same crops.

LAMP will wait for registration in BiH before promoting the use of the pesticide for the aforementioned crops.

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

**Table 1(a) Pesticides/Crop**

Crop	Fungicide	Insecticide	Herbicide	Bio-control
Apple	16	9	2	3

Apricot	7	4	2	0
Cherry	10	3	2	1
Grape	19	5	2	4
Nectarine	7	5	2	0
Peach	8	7	2	1
Plum	10	7	2	1
Pear	10	9	2	1

Table 2 lists all pesticides that LAMP’s technical experts found may be recommend to growers in BiH for use on fruits, depending on the pest problem. Working with other LAMP technical experts, the PERSUAP Team was able to eliminate 13 of the pesticides because of their restricted use status (RUPs) or because they are not registered by US EPA or by BiH; and 7 pesticides were eliminated because they are more toxic than available alternatives or because they are not recommended in IPM. 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, 2006 unless it can be shown there are no practical alternatives. Table 1 shows the outcome of the PERSUAP’s team’s screening and assessment process undertaken for this PERSUAP.

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. Phase-out more hazardous pesticides (most EPA and WHO Toxicity Class II formulations) from trainings which LAMP may organize beyond September 30, 2006, unless no suitable alternatives exist. If no suitable alternative exists for the more hazardous pesticides (EPA/WHO Toxicity Class II), LAMP will submit a justification for retaining each specific pesticide beyond September 30, 2006. This justification shall be submitted prior to the phase-out date. Annually, LAMP shall review US EPA registration status, and EPA and WHO Toxicity Classes of approved pesticides.
2. LAMP shall only work with farmer groups who agree to use approved pesticides as part of an IPM program.
3. LAMP 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 implemented.
4. LAMP, through extension agencies and trainers, shall promote the use of protective clothing and equipment by farmers and shall monitor use.
5. LAMP shall encourage farmers to read and follow labels.
6. LAMP shall train LAMP staff, farmer groups, extension agents, and pesticide suppliers in pesticide safer use and handling, and environmental protection.

- 7. LAMP shall disseminate information from the PERSUAP broadly.
- 8. LAMP shall implement a Mitigation and Monitoring Plan.
- 9. PERSUAP mitigation and monitoring requirements may require LAMP to provide funding to implement the above measures.

Approvals:

\_\_\_\_\_ Date: \_\_\_\_\_  
Mohammad Latif  
Bureau Environmental Officer (Acting)

\_\_\_\_\_ Date: \_\_\_\_\_  
Howard Sumka  
Mission Director, USAID/BiH

\_\_\_\_\_ Date: \_\_\_\_\_  
Merritt Broady  
USAID/MEO

\_\_\_\_\_ Date: \_\_\_\_\_  
Samir Dizdar  
Assistant MEO

\_\_\_\_\_ Date: \_\_\_\_\_  
Dina Karic  
LAMP CTO

**AMENDED PESTICIDE EVALUATION REPORT AND SAFER USE ACTION PLAN: LAMP 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 shall 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 LAMP intends to support additional crops that require LAMP 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 by September 30, 2006, unless there are no practical alternatives. LAMP should 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 LAMP project. Justifications shall be submitted to USAID/BiH and the USAID/E&E BEO if LAMP 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 undertake a rigorous training and monitoring program, which will mitigate the risk to human health and the environment that could result from LAMP activities in the fruit sub-sector. The use of IPM will be a guiding principle for LAMP technical staff. Among other safer practices, discussed in the PERSUAP, LAMP 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 LAMP project monitoring, and monitoring will be conducted on a regular and frequent basis.

LAMP has already had success in promoting IPM and safer use practices in the berry sector through berry production training in the field. 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 berry growers in Gradacac region, had much higher knowledge of pest management. Through LAMP training in berry production, 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 berries). Subsequent visits to those farms 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 intends to increase the number of training events on IPM and safe pesticide through the use of specialist trainers and applying adult learning techniques to change attitudes and behavior.

#### B. LAMP's Fruit Sub-Sector:

Agricultural production, especially early fruits, holds an important place in BiH's economy. Although there is great market potential, unfortunately, this production is still largely performed on small parcels of land and is not really market oriented. A large portion of it is still used for the producers' home needs. The region has a long tradition of agricultural production, but it lacks new technologies.

The level of production development in this region is also affected because many vineyards and fruit orchards, as well as their irrigation systems, have not yet recovered from war devastation.

Cherry, sour cherry, apricot, and peach are unique to or characteristic of the area of southern BiH, including southern Republic of Srpska (RS). They are typically sold fresh throughout BiH. With respect to the current market situation, domestic fruit production is approximately equal to imports. However, the region is capable of much higher levels of production.

There is the overwhelming prevalence of illegally imported products: estimates from well-positioned market informants indicate that 50–70% of fresh fruits enter the country illegally. Also farmers have a strong preference for selling a majority of their production to friends and neighbors, as well as to buyers at local, open green markets, despite the prevalence of low prices. These transactions are completely unrecorded.

There is evidence that production is increasing although it is far below pre-war levels. This occurs through the establishment of new orchards and the renovation of old orchards. The export of fruits is insignificant.

#### **Apples**

After plum production, the most important fruit produced in BiH is apples. Many varieties of wild, uncultivated apples exist throughout the mountains of BiH, providing a valuable resource for rootstock material and scion tissue for plant breeding programs. Many of the varieties are more than 200 years old and should be preserved. In 1999, the Agricultural Institute in Sarajevo planted 50 domestic varieties of apples in an orchard. Natural conditions in BiH are very favorable for apple production, with adequate rainfall

in critical periods of the annual cycle, plentiful sunlight in summer, and enough cold weather to meet dormancy requirements.

The first fresh apples (not from storage) can be found in the green markets at the end of July. These apples originate from central Herzegovina and command the best prices. At the beginning of the harvest, prices are about 2.00 KM/kg, but later decline to 1.00 KM/kg. The largest apple markets are the urban centers, with Sarajevo being the most important. Yields vary from 20 to 40 t/ha, depending on the variety and production system. Apples are packed in wooden crates, in weights of 10–15 kg.

### **Pears**

Production of pears is very widespread throughout BiH since they are quite profitable, despite requiring more investment in plant protection and manpower for pruning. The product is packed in wooden crates, typically 10–15 kg depending on the size of the product and the distance to market. Pears can be found on the green markets at the beginning of June and remain available until the end of August. The biggest markets for these products are the Dalmatian Coast, Sarajevo, and bigger urban centers. Most of the orchards were destroyed during the war, but many have been revitalized with investments from the producers themselves and through the support of humanitarian organizations. There is no organized marketing of pears, and most are sold on the wholesale green markets. The price of these product ranges from 1.30 to 3.50 KM/kg depending on the time of ripening and market demand.

### **Plums**

Plums are one of the most important fruits grown in BiH. The most important period for fresh plum production and export was 1955–1985. During this time, exports to markets in western and eastern Europe were from 6,000–10,000 t of fresh plums and up to 12,000 t of dried plums. This period is characterized by the nearly total domination by just one cultivar, Pozegaca, with very few other varieties. By the mid-1980s, production declined because of the spread of Plum Pox 7 virus. Although treatments were simple and effective, the disease weakened trees, leaving them susceptible to pests; together these factors drastically reduced output quantity and quality, lowering prices on the domestic market. Even with the introduction of two improved varieties, Stanley and Cacak, 1985 production levels have not been revived. The main characteristics of plum production today are:

- Many thousands of small groves.
- Low-intensity cultivation practices.
- Domination of old, out-of-date varieties.
- Scarce use of irrigation.
- Rare application of crop treatments for viruses and pests.
- Inadequate level of producer training.

Plum ripening starts at the beginning of July and continues to the end of October. A typical yield is 15 t/ha. The use of improved agricultural practices could easily raise yields to 20 t/ha.

There is no special packaging for plums. They are sometimes packed in wooden crates that can hold 8-12 kg. Most plums are sold at local, retail green markets. At the start of the season, plum prices (cash retail) are KM 2.50, which later falls to 1.00 KM/kg. Few organized marketing efforts are made. The two main forms of plum processing are drying and the production of plum brandy (sljivovica), a traditional rural household activity that probably consumes more than half of the crop annually.

### **Cherries**

Cherries and sour cherries normally begin to ripen and be ready for harvesting from mid-April until the end of June. These fruits do not have any specific packaging, but are often packed in wooden crates or cardboard cartons of 12–15 kg. These fruits stay fresh for only a very short time; most are sold on green markets without any market organization. Quality and size of cherries and sour cherries depend on the time of ripening as well as the area from where the fruits come. In the early season the price is 4 KM/kg; later the price decreases to 1.50 KM/kg. Cherries are grown in many parts of BiH on account of their specific climate needs. Most production is centered in the Neretva valley and the Dubrave plateau.

Cherries can be produced very cheaply. They do not require significant annual investments, and cultural practices are similar to other fruits. During the war most of the orchards were destroyed, but they have begun to be revitalized. In the coming years, production is expected to reach its pre-war levels.

### **Peaches, nectarines and apricots**

Production of peaches, nectarines and apricots is grown throughout Herzegovina since they are quite profitable, despite requiring more investment in plant protection and manpower for pruning. The product is packed in wooden crates, typically 10–15 kg depending on the size of the product and the distance to market. The fruits can be found on the green markets at the beginning of June and remain available until the end of August. The biggest markets for these products are the Dalmatian Coast, Sarajevo, and bigger urban centers. Again, most of the orchards were destroyed during the war, but many have been revitalized with investments from the producers themselves and through the support of humanitarian organizations. There is no organized marketing of these products, and most are sold on the wholesale green markets. The price of these products ranges from 1.30 to 3.50 KM/kg depending on the time of ripening and market demand.

### **Grapes**

Grape growing and wine production in BiH is centered in the Mostar region, especially the municipalities of Citluk, Capljina, Stolac, and Mostar. These areas enjoy a warm Mediterranean climate with well-drained karst soils. The industry is dominated by many very small vineyards, ranging in size from 0.3–0.4 ha; very few vineyards exceed 10 ha in a single block. White varieties account for roughly 70% of production, red varieties for about 30%. The two dominant varieties are Zilavka and Blatina: white and red, respectively. The BiH wine industry is stagnant, sharing common problems with many other BiH agricultural sectors.

For the purposes of this PERSUAP, it is important to note that LAMP is only playing a supporting role for farmer groups and food processors, primarily working to strengthen market linkages in the sector. LAMP's role in production is minimal as the sector has support from agronomists who give advice on site selection, production techniques and pest management. LAMP is focusing on non-production issues such as marketing, branding and packaging.

However, LAMP recognizes that there are some environmental and potentially human health issues associated with pesticide use by some fruit growers particularly in Herzegovina. There is substantial anecdotal evidence that pesticides are used inappropriately:

- Farmers using excessive amounts of pesticides,
- Farmers not abiding by withholding periods, as described in the label, resulting in contaminated products being sold, particularly on the green market,
- Farmers using inappropriate pesticide for the target pest or agricultural crop,
- Farmers using unregistered pesticides,
- Farmers using highly toxic pesticides when other alternatives exist.

To address the above issues, LAMP is intending to undertake training activities and roundtables on Integrated Pest Management and safe pesticide use.

## **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 LAMP technical expert and extension services have stated are typically recommended and used for fruits. 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.
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**Table 2: EPA Registration Status and EPA/WHO Toxicity Classes of Pesticides Typically Used on fruits in BiH**

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)
<b>FUNGICIDES</b>						
1	Azoxystrobin	G	GUP	Yes	EPA IV WHO U	Quadris KS
2	Benalaxyl	G	NR		EPA None WHO U	Galben-M, Galben-C, Baldo-M, Baldo-C
3	Bitertanol	Apl Apr C N Pch Pr Pl	NR	Yes	EPA None WHO U	Baycor WP25, Baycor DC 300
4	Captan	G Apl Pr Pl Pch C N	GUP	Yes	EPA I: mitigation proposed WHO U	Merpan, Stopper, Captan, Topas,
5	Copper + mineral oil	Apl G Pch C N Pr Pl	GUP	Yes	EPA III WHO not listed	Crveno ulje (Red mineral oil).
6	Copper + organic fungicide (dichlofluanid)	Apl G Pch C N Pr Pl	NR			Bakarni Atracol WP-63, Bakreni Dithane WP, Bakreni Euparen WP,
7	Copper hydroxide	Apl G Pch C N Pr Pl	GUP	Yes	EPA I-III (potential eye irritation): mitigation proposed WHO III	Champion WP 50, Kocide DF
8	Copper oxide	Apl G Pch C N	GUP	Yes	EPA III WHO II	Nordox 75 WG, Nordox Super 7575

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)
		Pr Pl				
9	Copper oxychloride	Apl G Pch C N Pr Pl	GUP	Yes	EPA II-III WHO III	Bakreno Vapno WP, Kupopin WP, Cuprocaffaro 50WP
10	Cymoxanil	G	GUP	Yes	EPA III WHO III	Antracol Combi WP76, Avisio DF, Curzate BWG, Bayleton AC WP 37,5
11	Cyprodinil (+fludioxonil)	G Apl *Apr *Pch *N *Registered in Slovenia for these crops)	GUP	Yes	EPA III-IV WHO not listed	Chorus 75 WG, Switch 62,5WG
12	Difenoconazole	Apl Pr	GUP	Yes	EPA III WHO III	Score 250EC
13	Diniconazole	Apl G	NR		EPA None WHO III	Sumi 8
14	Dinocap	Apl Pch G	NR		EPA None WHO III	Karathane, Sabithane
15	Dithianon	Apl Pr G Pch	NR		EPA None WHO III	Delan SC and WG
16	Dodine	Apl Pr C	GUP	Yes	EPA I: mitigation proposed WHO III	Bevedonin
17	Fenarimol	Apl, G	GUP	Yes	EPA III WHO U	Rubigan
18	Fenhexamid	G C Pl	GUP	Yes	EPA III WHO U	Teldor
19	Folpet	Apl Pr G Pl	GUP	Yes	EPA No Consensus Value WHO U	Folpan WD, Folpan WP50, Futura 50 WP, Galben F, Melody Comby 43.5 WP, Shavit F, Folpan WD, F
20	Fosetyl-Al	G	GUP	Yes	EPA I WHO not listed	Mikal Flash, Winner, Attila
21	Iprodione	G Pl C	GUP	Yes	EPA III WHO U	Kidan, Lupo
22	Kresoxim-methyl	G	GUP	Yes	EPA III	Stroby WG

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)
		Apl Pch N			WHO not listed	
23	Mancozeb (dithiocarbamate)	G Apl Pr Pl C	GUP	Yes	EPA IV WHO U	Dithane-M45, Mankozeb, Acrobat MZ, Curzate M, Bakarni Dithane
24	Metalaxyl	G	GUP	Yes	EPA II and III WHO III	Ridomil, Ridomil Gold Plus, Ridomil Gold Combi, Metalaxyl MZ,
25	Metiram (dithiocarbamate)	Apl G	GUP	Yes	EPA IV WHO U	Polyram, Cabrio Top
26	Myclobutanil	Apl Pr G N Pch C Pl	GUP	Yes	EPA II WHO III	Systane, Sabithane
27	Penconazole	Apl, G	NR		EPA None WHO U	Topas 100 EC, Topas-C 50 WP,
28	Prochloraz	Pl C	NR		EPA None WHO III	Octave 50 WP
29	Propineb (dithiocarbamate)	G Apl Pr	NR	Yes	EPA None WHO U	Antracol, Bayleton AC WP, Melody Duo
30	Sulfur based compounds (Colloidal sulfur and Dusting sulfur)	G Apl Pch	GUP	Yes	EPA III WHO U	Kossan, Kumulus DF, Chromosul, Thiovit Jet, Sumpor Močivi, Sulfolac,
31	Tolyfluanid	G Apl Pr Pl C	NR		EPA not listed WHO U	Euparen Multi WP
32	Trifloxystrobin	G Apl	GUP	Yes	EPA III WHO not listed	Éclair 49 WG, Zato 50 WG
33	Vinclozolin	G Pl C			EPA III WHO U Not recommended in IPM	Ronilan, Konker, Silbos
<b>INSECTICIDES</b>						
1	Acetamiprid	Apl Pr Pl C Pch	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)
		Apr N				
2	Diazinon	Apl G Pr Pl Pch	GUP	Yes	EPA II-III WHO II	Basudin EW 60, Beker EW 60, Diazol EW 50
3	Diflubenzuron	Apl Pr	GUP	Yes	EPA III WHO U	Dimilin SC 48
4	Dimethoate	C Apl Pch N Apr G Pr Pl	GUP	Yes	EPA II WHO II	Rogor Ec 40, Chromgor Ec 40, Perfection Ec 40, Zagor EC 40, Sistemin Ec 40
5	Fenoxycarb	Apl Pr G Pl Pch N Apr	GUP	Yes	EPA III WHO U	Insegar Wp25
6	Fenthion	Apl G Pr Apr Pch N Pl	GUP	Yes	EPA II WHO II	Lebaycid EC 50
7	Flufenoxuron	Apl Pr G	NR		EPA None WHO U	Cascade EC 50
8	Hexaflumuron	Apl Pr	GUP	Yes	EPA III WHO U	Sonet 100 EC
9	Lambdacihalotrin	Apl Pr G Pch Apr N Pl C	RUP		EPA II WHO II	Karate EC 2,5, King Ec 2,5
10	Lufenuron	Apl Pr G Pch N Pl	GUP	Yes	EPA III WHO not listed	Match EC 50
11	Mineral oil - Red	Apl	GUP	Yes	EPA III	Crveno ulje Ec 55

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)
		Pr G Pl Apr Pch C N			WHO not listed	
12	Mineral oil - White	Apl Pr G P	GUP	Yes	EPA III WHO not listed	Bijelo ulje Ec 80 (White mineral oil)
13	Pirimicarb	Apl Pr Pl G C Apr N Pch	GUP	Yes	EPA II WHO II	Pirimor WG 50
14	Pymetrozine	Pch	GUP	Yes	EPA III WHO Not listed	Chess WP 25
15	Tebufenozide	Apl Pr G Pl Apr C N Pch	GUP	Yes	EPA III WHO U	Mimic SC
16	Teflubenzuron	Apl Pr G	NR		EPA None WHO U	Nomolt Sc 15
17	Thiacloprid	Apl Pl Pch Apr N C	GUP		EPA II WHO II	Calypso SC 480
18	Thiamethoxam	Apl Pr Pl Pch	GUP	Yes	EPA III WHO not listed	Actara 25 WG, Acra 25 WG, Tara 25 WG
<b>HERBICIDES</b>						
1	Glufosinate-ammonium	Apl Pr Pl Pch G C N	GUP	Yes	EPA None WHO Not listed (glufosinate only WHO III)	Basta SL 15

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)
		Apr				
2	Glyphosate	Apl Pr Pl Pch G C N Apr	GUP	Yes	EPA III WHO U	Hércules SC 480, Herbocid SL 480, Zorkatop SI 480
<b>BIOLOGICAL/BOTANICAL Pesticides and Repellents (all vital for IPM Programs)</b>						
1	Abamectin (Avermectin)	Apl Pr G Pl	GUP	Yes	EPA II and III WHO not listed	Vertimec Ec 18
2	Azadirachtin (Neem oil extract)	Apl Pch C G	GUP	Yes	EPA-No consensus WHO-Not listed	NeemAzal TS
3	<i>Bacillus thuringiensis</i>	G	GUP	Yes	EPA III WHO U	Delfin
4	Spinosad	Apl G	GUP	Yes	EPA III WHO U	Laser KS 24

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](http://www.pesticideinfo.org), [www.epa.gov/](http://www.epa.gov/)

5/ from [www.who.int.pcs](http://www.who.int.pcs), [www.pesticideinfo.org](http://www.pesticideinfo.org), [www.extonet.orst.edu](http://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 LAMP 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 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 most pests or diseases in the project locations. All recommendations contained herein have been formulated in consultation with project technical staff. Pesticides that passed the screening process are

presented in Table 3 showing the basis for selection. LAMP’s 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, comprised of LAMP technical experts, 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)
<b>FUNGICIDES</b>			
1. Azoxystrobin	G	Downy mildew, ( <i>Plasmopara viticola</i> ), grapevine powdery mildew ( <i>Uncinula necator</i> ), Rot brenner ( <i>Pseudopeziza tracheiphila</i> ), Gray mold ( <i>Botrytis cinerea</i> ), Dead-arm disease ( <i>Phomopsis viticola</i> )	Controls the most important grapevine illnesses. Systemic control.
2. Captan	G Apl Pr Pl Pch C N	<i>Poystigma rubrum</i> , <i>Stigmina carpophila</i> , <i>Guignardia bidwelli</i> , <i>Plasmopara viticola</i> , <i>Pseudopeziza tracheiphilla</i> , <i>Venturia inaequalis</i> , <i>Venturia pyrina</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	Apl G Pch C N Pr Pl	Apple scab ( <i>Venturia inaequalis</i> ), Pyrina pear scab ( <i>Venturia</i> ), Peach leaf curl ( <i>Taphrina deformans</i> ), Bladder plums ( <i>Taphrina pruni</i> ), Shot-hole disease ( <i>Stigmina carpophila</i> )	Copper-based pesticides work preventatively against many types of fruit pathogens. Also used to treat wounds. Must keep in mind that it can cause leaf blight on grapevines in cold weather. On apple fruits they need to be used only until the beginning of flowering and on stone fruits only during vegetative rest (winter spraying) at higher concentrations.
4. Copper hydroxide	Apl G Pch C N Pr Pl	Apple scab ( <i>Venturia inaequalis</i> ), Pyrina pear scab ( <i>Venturia</i> ), Peach leaf curl ( <i>Taphrina deformans</i> ), Bladder plums ( <i>Taphrina pruni</i> ), Shot-hole disease ( <i>Stigmina carpophila</i> )	Same as above
5. Copper oxide	Apl G Pch	Apple scab ( <i>Venturia inaequalis</i> ), Pyrina pear scab ( <i>Venturia</i> ), Peach leaf curl ( <i>Taphrina deformans</i> ), Bladder	Same as above

Pesticide (1)	Crop	Pest/disease (2)	Basis for selection (3)
	C N Pr Pl	plums ( <i>Taphrina pruni</i> ), Shot-hole disease ( <i>Stigmina carpophila</i> )	
6. Copper oxychloride	Apl G Pch C N Pr Pl	Apple scab ( <i>Venturia inaequalis</i> ), Pyrina pear scab ( <i>Venturia</i> ), Peach leaf curl ( <i>Taphrina deformans</i> ), Bladder plums ( <i>Taphrina pruni</i> ), Shot-hole disease ( <i>Stigmina carpophila</i> )	Same as above
7. Cymoxanil	G	<i>Plasmopara viticla</i> , <i>Uncinula necator</i> , <i>Phomopsis viticola</i>	Has a contact and systemic effect.
8. Cyprodinil (+fludioxonil)	G Apl *Apr *Pch *N *Registered in Slovenia for these crops)	<i>Botrytis sp.</i> , <i>Venturia spp.</i> , <i>Monilinia sp.</i>	Has a preventative and curative effect and there is no cross-resistance with triazoles.
9. Difenoconazole	Apl Pr	<i>Podosphaera leucotricha</i> , <i>Venturia inaequalis</i> , <i>Venturia pyrina</i>	Systemic fungicide with preventative and curative effect. It can be mixed with compounds based on fludioxonil. Complementary with different adjuvants which increase its activity. During the year it can be applied 3 times on the same surface.
10. Dodine	Apl Pr C	<i>Venturia inaequalis</i> , <i>Blumeriella japii</i>	Foliar fungicide with protective and partly curative action. Smaller concentrations are used for preventative action and larger for curative action.
11. Fenarimol	Apl, G	<i>Podosphaera leucotricha</i> , <i>Venturia inaequalis</i> , <i>Uncinula necator</i>	Systemic fungicide with protective, eradicated and curative action. Inhibits biosynthesis of ergosterol, substance which takes part in building of cell membranes and in that way it stops the development of fungi. It is mixed with chemicals based on dodine and sulphur. It is not recommended for application in the phase of green fruits. Treatment should not exceed 2-3 applications during vegetation.
12. Fenhexamid	G C Pl	<i>Botrytis cinerea</i> , <i>Monilinia laxa</i> ,	Botriticide which does not have cross resistance with other botriticides.

Pesticide (1)	Crop	Pest/disease (2)	Basis for selection (3)
13. Folpet	Apl Pr G Pl	<i>Venturia inaequalis</i> , <i>Venturia pyrina</i> , <i>Phomopsis viticola</i> , <i>Plasmopara viticola</i> , <i>Polystigma rubrum</i> , <i>Treanzshelia pruni-spinosae</i>	Contact (not systemic) fungicide with protective action. Inhibits enzyme activity involved in breathing (SH-enzymes). Effective against a large number of pathogenic fungi. Compatible with many pesticides but not highly alkaline preparations. Mixed with preparations based on copper oxychloride, cymoxanil, mankozeb, metalaxyl, etc.
14. Iprodione	G Pl C	<i>Botrytis cinerea</i> , <i>Monilinia laxa</i>	Highly effective. Controls <i>Botrytis</i> sp. in grapevines and moniliza on plums and cherries.
15. Kresoxim-methyl	G Apl Pch N	<i>Venturia inaequalis</i> , <i>Podosphaera leucotricha</i> , <i>Uncinula necator</i>	Systemic fungicide with strong protective, eradicated, curative and other residual actions. Inhibits mitochondrial breathing. Controls a large number of pathogenic organisms which parasitizes different cultivars.
16. Mancozeb (dithiocarbamate)	G Apl Pr Pl C	<i>Plasmopara viticola</i> , <i>Podosphaera leucotricha</i> , <i>Uncinula necator</i> , <i>Phomopsis viticola</i> , <i>Stigmina carpophila</i> ,	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.
17. Metalaxyl	G	<i>Plasmopara viticola</i>	Systemic fungicide with protective and curative action. Absorbed through the leaves, stem and roots. Inhibits protein synthesis. Controls a large number of pathogenic fungi particularly <i>Peronosporales</i> . Compatible with many pesticides. Can be phototoxic if applied in cold and humid weather.
18. Metiram (dithiocarbamate)	Apl G	<i>Venturia inaequalis</i> , <i>Plasmopara viticola</i> , <i>Uncinula necator</i> , <i>Phomopsis viticola</i> ,	Non-systemic foliar fungicide with protective action. Compatible with many pesticides but not very alkaline substances.
19. Myclobutanil	Apl Pr G N	<i>Podosphaera leucotricha</i> , <i>Uncinula necator</i> , <i>Venturia inaequalis</i> , <i>V. pyrina</i> , <i>Monilinia laxa</i> , <i>Sphaerotecha pannosa</i> ,	Systemic fungicide with protective and curative action. Inhibits the biosynthesis of ergosterol. Mixed with other

Pesticide (1)	Crop	Pest/disease (2)	Basis for selection (3)
	Pch C Pl		pesticides such as captan, mancozeb etc.
20. Sulfur based compounds (Colloidal sulfur and Dusting sulfur)	G Apl Pch	<i>Podosphaera leucotricha</i> , <i>Uncinula nector</i> , <i>Sphaerotheca pannosa</i>	Primarily used to control powdery mildew although it can also control scab and mites. Not very toxic. Should not be used in higher temperatures.
21. Trifloxystrobin	G Apl	<i>Plasmopara viticola</i> , <i>Uncinula nector</i> , <i>Guignardia bidwelli</i> , <i>Podosphaera leucotricha</i> , <i>Venturia inaequalis</i> ,	A systemic with preventative, curative and eradicated action. Inhibits transport of electrons during breathing, and growth of mycelium. Can be used 3-4 times on the area during the year.
<b>INSECTICIDES</b>			
1. Acetamiprid	Apl Pr Pl C Pch Apr N	Sawflies ( <i>Hoplocampa sp</i> ), Green peach aphid ( <i>Myzus persicae</i> ), Leafminers ( <i>Leucoptera malifoliella</i> , <i>Lithocolletis sp.</i> ), Mediterranean fruit fly ( <i>Ceratitis capitata</i> ), European cherry fruit fly ( <i>Rhagoletis cerasi</i> )	Recommended in IPM. Systemic. Very effective on resistant populations of pests.
2. Diflubenzuron	Apl Pr	Codling moth ( <i>Cydia pomonella</i> ), Pear moth ( <i>Cydia pyrivora</i> ), Leafminers ( <i>Leucoptera malifoliella</i> , <i>Lithocolletis sp.</i> )	Growth regulator. Recommended in IPM. Very effective if applied at an optimal period. No resistance.
3. Fenoxycarb	Apl Pr G Pl Pch N Apr	Codling moth ( <i>Cydia pomonella</i> ), Pear moth ( <i>Cydia pyrivora</i> ), Leafminers ( <i>Leucoptera malifoliella</i> , <i>Lithocolletis sp.</i> ) Grape moth ( <i>Lobesia botrana</i> ), Grape bud moth ( <i>Eupocelia ambiguella</i> ), Plum fruit moth ( <i>Grapholita funebrana</i> ), Oriental peach moth ( <i>Grapholila molesta</i> )	Growth regulator. Recommended in IPM. Very effective if applied at an optimal period. No resistance.
4. Hexaflumuron	Apl Pr	Codling moth ( <i>Cydia pomonella</i> ) European pear suckers ( <i>Psylla sp.</i> )	Growth regulator. Recommended in IPM. Very effective if applied at an optimal period. No resistance.
5. Lufenuron	Apl Pr G Pch N Pl	Codling moth ( <i>Cydia pomonella</i> ), Pear moth ( <i>Cydia pyrivora</i> ), Grape moth ( <i>Lobesia botrana</i> ), Grape bud moth ( <i>Eupocelia ambiguella</i> ), Leafminers ( <i>Leucoptera malifoliella</i> , <i>Lithocolletis sp.</i> ), European pear suckers ( <i>Psylla sp.</i> ), Plum fruit moth ( <i>Grapholita funebrana</i> ), Oriental peach moth ( <i>Grapholita molesta</i> )	Growth regulator. Recommended in IPM. Very effective if applied at an optimal period. No resistance.
6. Mineral oil - Red	Apl Pr G	Over-wintered pests	Recommended in IPM. Inexpensive. Very effective if applied correctly.

Pesticide (1)	Crop	Pest/disease (2)	Basis for selection (3)
	Pl Apr Pch C N		
7. Mineral oil - White	Apl Pr G P	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.
8. Pymetrozine	Pch	Green peach aphid ( <i>Myzus persicae</i> ),	Recommended in IPM. Systemic. Very effective on resistant populations of green peach aphids.
9. Tebufenozide	Apl Pr G Pl Apr C N Pch	Codling moth ( <i>Cydia pomonella</i> ), Pear moth ( <i>Cydia pyrivora</i> ), Grape moth ( <i>Lobesia botrana</i> ), Grape bud moth ( <i>Eupocelia ambiguella</i> ), Fruit tree tortrix moth ( <i>Archips podana</i> ), Apple brown tortrix ( <i>Pandemis heparana</i> ), Plum fruit moth ( <i>Grapholita funebrana</i> ), Oriental peach moth ( <i>Grapholita molesta</i> )	Growth regulator. Recommended in IPM. Very effective if applied at an optimal period. No resistance.
10. Thiamethoxam	Apl Pr Pl Pch	Apple sawflies ( <i>Hoplocampa testudinea</i> ), Aphids ( <i>Disaphis plantaginea</i> , <i>D. devectora</i> , <i>D. pyri</i> , <i>Aphis pomi</i> ), European pear suckers ( <i>Psylla sp.</i> ),	Recommended in IPM. Systemic. Very effective on resistant populations of aphids.
<b>HERBICIDES</b>			
1. Glufosinate-ammonium	Apl Pr Pl Pch G C N Apr	Annual weeds in fruit orchards more than 2 years old	Very effective and fast acting.
2. Glyphosate	Apl Pr Pl Pch G C N Apr	Perennial weeds in fruit orchards more than 2 years old	Very effective.
<b>BIOLOGICAL/BOTANICAL PESTICIDES/REPELLENTS</b>			
1. Abamectin (Avermectin)	Apl Pr G Pl	Fruit tree red spider mite ( <i>Panonychus ulmi</i> ), Two spotted spider mite ( <i>Tetranychus urticae</i> ) European pear suckers ( <i>Psylla sp.</i> )	Very effective at controlling resistant strains.
2. Azadirachtin (Neem oil extract)	Apl Pch C G	Apple small ermine moth ( <i>Yponomeuta malinellus</i> , <i>Yponomeuta sp.</i> ), Aphids, Fruit tree red spider mite ( <i>Panonychus ulmi</i> ), Two spotted spider mite	Plant-based insecticide. Effective control of a wide range of pests.

Pesticide (1)	Crop	Pest/disease (2)	Basis for selection (3)
		( <i>Tetranychus urticae</i> ) Leafminers ( <i>Leucoptera malifoliella</i> , <i>Lithocolletis blancardella</i> , <i>Lithocolestis corylifoliella</i> )	
3. <i>Bacillus thuringiensis</i>	G	Grape moth ( <i>Lobesia botrana</i> ), Grape bud moth ( <i>Eupocelia ambiguella</i> )	Bioinsecticide. Ecologically acceptable
4. Spinosad	Apl G	Summer fruit tortrix moth ( <i>Capua reticulana</i> ), Leafminers ( <i>Leucoptera malifoliella</i> , <i>Lithocolletis blancardella</i> , <i>Lithocolestis corylifoliella</i> ), Grape moth ( <i>Lobesia botrana</i> ), Grape bud moth ( <i>Eupocelia ambiguella</i> ),	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

(2) and (3) LAMP technical experts

**(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 three 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.

Since IPM is still not widely practiced or understood, LAMP will be training farmers in safer use of pesticides and IPM, and will assist individual farmers, and also work through the cooperative and association structure, to implement IPM. In addition, since they are in contact with farmers on a regular basis, LAMP technical staff must have the most recent IPM information on hand. Monitoring will take place to ensure that farmers are practicing IPM and that the IPM approach is effective.

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 fruit sector, it is expected that through LAMP interventions, farmers will be much more careful with pesticide use on market crops. LAMP 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 LAMP technical staff 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 LAMP-requested pesticides. Rather than list all protective clothing for each pesticide, which varies by formulation, LAMP 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. 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.

Farmers apply pesticides in their own fields, and do not use trained applicators. The majority of mentioned pesticides are applied by spraying; an exception is thiamethoxam which is applied through the irrigation system. 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 some EU buyers under EUREPGAP and are verified by field audits. LAMP will promote the safe application of pesticides and IPM, gradually introducing EUREPGAP standards to make local producers aware of EU standards should they wish to export these products in the future and to gradually prepare BiH for the eventual accession into the EU. The introduction to EUREPGAP standards will first be undertaken through the MASHAV trainers (plant protection specialists from Israel) and then continually reinforced through BiH technical specialists in the field.

LAMP will implement a monitoring program, through farmer groups or local agronomists as appropriate, 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 (in the fruit sector), and improve application methods so that they are safer for farmers and less potentially harmful to the environment. This training will be provided by two technical specialists from the Agriculture Faculty of Sarajevo University, both of whom have specialized training and experience in IPM and safety aspects of pesticide use (furthermore, one of the specialists is one of the leading experts in BiH on pesticide residues and EU standards).

**Table 4: Example of Protective Clothing Required for Some LAMP-requested Pesticides**

<b>Pesticide</b>	<b>Protective Clothing (1)</b>
<b>FUNGICIDES</b>	
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 LAMP.

**Table 5: User and Environmental Hazards Associated with LAMP Requested Pesticides**

	<b>Pesticide</b>	<b>Acute/Chronic Toxicity (human hazards)</b>	<b>Eco-toxicity</b>	<b>Groundwater (GW) Contamination Potential</b>
<b>FUNGICIDES</b>				
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>
2	Captan	Irreversible eye damage Unknown endocrine disruptor; cholinesterase inhibitor-no; probable carcinogen	HT to fish; MT to insects, amphibians	Insufficient data
3	Copper + mineral oil	Similar to other copper based compounds	Similar to other copper based compounds.	Similar to other copper based compounds.
4	Copper hydroxide	Severe eye irritation. Skin and respiratory tract irritation. Carcinogenicity unknown.	HT to molluscs. RNT to crustaceans.	Not known.
5	Copper oxide	Similar to other copper based compounds.	Similar to other copper based compounds.	Similar to other copper based compounds.
6	Copper oxychloride	Acute effects: RNT Chronic toxicity includes hepatic cirrhosis & brain damage	HT to earthworms; MT to fish, aquatic inverts; RNT to birds, beneficial arthropods	No evidence of contamination potential, unlikely to enter GW
7	Cymoxanil	Acute oral, dermal-ST; inhalation-RNT No chronic symptoms known	ST to fish, aquatic inverts; RNT to birds, bees, earthworms	Low persistence in soils thus minimal threat to GW
8	Cyprodinil (+fludioxonil)	Causes moderate eye irritation. Harmful if absorbed through the skin. Carcinogenicity unclassifiable.	T to fish 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>
9	Difenoconazole	Slight acute toxicity. Possible carcinogen.	ST-HT to fish.	Insufficient data.
10	Dodine	High acute toxicity as it may cause severe eye irritation. ST via inhalation or ingestion. ST to skin. Does not appear to be mutagenic.	RNT to fish. ST to birds. NT to bees.	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>

	<b>Pesticide</b>	<b>Acute/Chronic Toxicity (human hazards)</b>	<b>Eco-toxicity</b>	<b>Groundwater (GW) Contamination Potential</b>
11	Fenarimol	Slight toxicity. Not a likely carcinogen. Suspected endocrine disruptor.	MT to fish. ST to birds. LT to bees.	Potential water contaminant. Not mobile but is persistent. <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>
12	Fenhexamid	Acute oral, dermal, inhalation-RNT. Not a likely carcinogen.	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>
13	Folpet	Not acutely toxic. Probable carcinogen.	HT to fish. ST to birds. NT to bees.	Insufficient data.
14	Iprodione	Low acute toxicity, no other concerns	Practically non-toxic to slightly toxic to birds; practically non-toxic to small mammals; relatively non-toxic to bees; moderately toxic to freshwater fish; moderately toxic to 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>
15	Kresoxim-methyl	Slight acute toxicity. Likely carcinogen.	T 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>
16	Mancozeb (dithiocarbamate)	Acute oral, dermal, inhalation-RNT. Probably carcinogen; endocrine disruptor (on 4 of 4 lists), development or reproductive toxin.	HT to fish, aquatic inverts, MT to bees, aquatic plants; RNT to birds	Does not accumulate in soil; moderate potential to contaminate GW
17	Metalaxyl	Causes eye irritation; harmful if inhaled or absorbed through skin. Carcinogenicity unknown. No other effects on humans.	Practically non-toxic to birds, bees, & fish	Potential water contaminant; <i>For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water.</i>
18	Metiram (dithiocarbamate)	Not acutely toxic Suspected endocrine	ST to fish; MT to other aquatic organisms; T to	Potential water contaminant;

	<b>Pesticide</b>	<b>Acute/Chronic Toxicity (human hazards)</b>	<b>Eco-toxicity</b>	<b>Groundwater (GW) Contamination Potential</b>
		disruptor; not a cholinesterase disruptor; probable carcinogen	birds and other wildlife	<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>
19	Myclobutanil	Slight acute toxicity. Not likely carcinogen. Likely developmental or reproductive toxin.	MT to fish.	Insufficient data.
20	Sulfur based compounds (Colloidal sulfur and Dusting sulfur)	Acute-RNT Chronic-RNT	Minimal threat to non-target species; essentially non-toxic to birds, fish, aquatic inverts, bees, livestock, mammals; T to beneficial mites.	Insufficient data, not expected to have negative impact
21	Trifloxystrobin	Slight acute toxicity. Not likely carcinogen. Not a cholinesterase disruptor.	ST to fish.	Insufficient data.
<b>INSECTICIDES</b>				
1	Acetamiprid	Low dermal and inhalation toxicity. May irritate eyes and the skin and may absorb through the skin. Unlikely human carcinogen.	ST to MT to bees. NT to MT to birds. NT to fish.	Not known.
2	Diflubenzuron	Slight acute toxicity. Non-irritating to skin and slight irritation to eyes. Not likely carcinogen. Not a cholinesterase disruptor.	NT to fish. NT to birds. ST to HT to insects. NT to bees.	Insufficient data.
3	Fenoxycarb	Slight acute toxicity. Likely carcinogen. Developmental or reproductive toxin. Practically non-toxic to mammals via the oral route.	MT-HT to fish. NT to birds. HT to insects. NT to 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>
4	Hexaflumuron	Slight acute toxicity. Moderate eye irritation. Harmful if absorbed through the skin.	HT to fish.	Insufficient data.
5	Lufenuron	Causes moderate eye irritation. Harmful if absorbed through the skin.	No information available	Insufficient data. Do not apply directly to water.
6	Mineral oil - Red	Slight acute toxicity. Not a cholinesterase	NT to fish.	Insufficient data.

	<b>Pesticide</b>	<b>Acute/Chronic Toxicity (human hazards)</b>	<b>Eco-toxicity</b>	<b>Groundwater (GW) Contamination Potential</b>
		disruptor.		
7	Mineral oil - White	Slight acute toxicity. Not a cholinesterase disruptor.	NT to fish.	Insufficient data.
8	Pymetrozine	Slight acute toxicity. Likely carcinogen. Not a cholinesterase disruptor.	RNT to birds, bees, fish	Potential water contaminant; <i>For terrestrial uses only; should not be applied directly to water or in a way that will contaminate water.</i>
9	Tebufozide	Slight acute toxicity. Not likely carcinogen. Not a cholinesterase disruptor.	MT to fish. HT to 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>
10	Thiamethoxam	Moderate eye irritation. A likely human carcinogen.	HT aquatic invertebrates. HT to 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>
<b>HERBICIDES</b>				
	1. Glufosinate-ammonium	Not listed acute toxicity. Not likely carcinogen. Not a cholinesterase disruptor.	NT-ST to fish.	Insufficient data
	2. Glyphosate	Acute oral, dermal, inhalation-RNT 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
<b>BIOLOGICAL/BOTANICAL PESTICIDES</b>				
1	Abamectin (Avermectin)	High acute toxicity. Slight to moderate eye irritation and mild skin irritation. Developmental or reproductive toxin. Unlikely carcinogen.	ST-HT to fish. Extremely toxic to aquatic invertebrates. Non-toxic to birds. HT to insects. HT to bees.	Immobile and unlikely to leach in soils and therefore unlikely to contaminate water.
2	Azadirachtin (Neem oil extract)	Acute oral: RNT; No chronic toxicity noted	HT to fish; 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	Unlikely to cause problems because of rapid

	<b>Pesticide</b>	<b>Acute/Chronic Toxicity (human hazards)</b>	<b>Eco-toxicity</b>	<b>Groundwater (GW) Contamination Potential</b>
			affected adversely. Not toxic to most beneficial insects.	biological breakdown.
4	Spinosad	Slight acute toxicity. Unlikely carcinogen.	RNT-ST to birds. ST to fish. HT to bees.	Immobile and unlikely to leach in soils and therefore unlikely to contaminate water.

Information in this table is primarily from [www.pesticideinfo.org](http://www.pesticideinfo.org), [www.epa.gov/pesticides](http://www.epa.gov/pesticides), [www.extoxnet.orst.edu](http://www.extoxnet.orst.edu)

VHT=very highly toxic

HT=highly toxic

MT=moderately toxic

T=toxic

ST=slightly toxic

RNT=relatively 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 LAMP and 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.

#### **(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. In the case of the berry sector, this issue was not a particular problem as berry plantations are on hillsides away from waterlogged sites and streams. LAMP will ensure that the effect of pesticides on water is addressed in the fruit sector 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. 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. Thiamethoxam, spinosad and abamectin are 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; use 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 should 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. Similar can be applied with fruit growers.

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

*Summarized mostly from NEAP (2003).*

Varied agro-climatic conditions and the potential for low-cost irrigation allow production of a wide range of crops. The inland mountain areas experience a continental climate, with harsh winters of 3-4 months at higher altitudes. Rainfall in these areas averages 800-1,000 mm per year with the majority of precipitation falling in the winter months, although much of the winter precipitation is snow. Temperatures range from 22 °C in July to 0 °C in January. Moving towards the coast, in Herzegovina, the climate becomes more Mediterranean with wet winters, dry summers and higher temperatures. Mostar has an annual average rainfall of 1,500 mm (of which less than 200 mm falls from June-September), summer temperatures of 25-30 °C, and winter temperatures of 5 °C. These agro-climatic conditions allow most forms of crop and livestock production.

Growing of cherries, peaches, nectarines, apricots and grapes is concentrated in Herzegovina, in the lowland areas close to urban markets and/or processors. Plums, apples and pears are generally grown in the hilly areas throughout BiH.

BiH is contained within the Black Sea catchment (75.7%) and the Adriatic Sea catchment (24.3%). In spite of the relative abundance of water resources, there is spatial and time variation resulting in some areas experiencing heavy flooding in winter months and drought in the summer. Water resources are under due to inadequate catchment protection, insufficient wastewater treatment plants, poor maintenance of sewage systems, intense exploitation of forests and uncontrolled use of pesticides. Only about 2% of arable land is irrigated.

Soils in BiH are very heterogeneous. Automorphous soils make up 86% of the total, while the remaining 14% are hydromorphous soils. The content of humus in agricultural soils is approximately 50% lower than in soils covered with forest vegetation and is showing a tendency to decline. Hydromorphic soils with good conditions for agricultural production dominate the northern part of BiH on flat and moderately undulating terrain in the valleys of the Sava River and its tributaries. The central part of BiH is mainly hilly and mountainous region with steep and sloping terrain. This area is covered mainly by dystric cambisol, humus that overlies limes and dolomites and lessivated soil as well as diluvial soils that are mainly covered by forests and pastures. Southern part of BiH, the Herzegovina region, is dominated by shallow layers of soil on lime/dolomite substrata and with sparse covering of vegetation and rock outcrops. Mainly the narrow strips of land located along the Neretva and Trebisnjica rivers are used for agriculture such as fruits, fruits, vineyards and tobacco.

**(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 reduces 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 labdacihalotrin (not to be recommended by LAMP). 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 removal methods.

**Table 6: Pest control methods available:**

<b>Crop</b>	<b>Main Pest/Disease Problems</b>	<b>Integrated Pest Management</b>
<b>Apples – Jabuka</b>	Apple scab ( <i>Venturia inaequalis</i> )	Agrotechnical measures: selection of ventilated and sunny locations, tolerant cultivars, removal of leaves. Plant protection needs to preventative-curative as pathogens are always present to some extent. Copper-based pesticides can

Crop	Main Pest/Disease Problems	Integrated Pest Management
		be used during vegetative rest periods. Contact pesticides are used before flowering and systemics after flowering until the end of June. 7-15 treatments.
	Brown rot ( <i>Monilinia fructigena</i> , <i>Monilia laxa</i> )	Preventative: removal of diseased fruits, ventilated tree tops, removal of infected branches, selection of more resistant cultivars. Control relying purely on pesticides is only 50-70%. Suitable pesticides are contact and systemic fungicides.
	Powdery mildew ( <i>Podosphaera leucotricha</i> )	Preventative: selection of resistant cultivars, balanced N-fertilizers to prevent tertiary growth, removal of infected branches, ventilated tree tops. Chemical application should focus on preventative action. Apply pesticides on time (April to early May). Contact fungicides are not very effective.
	Codling moth ( <i>Cydia pomonella</i> )	Monitor using pheromone traps and apply growth regulators.
	Fruit tree red spider mite ( <i>Panonychus ulmi</i> ),	Winter monitoring and winter treatment with red oil, monitoring during vegetative periods and intervention with white oil as needed.
	Aphids	Winter monitoring and winter spraying with red oil, monitoring during the vegetative period using yellow sticky traps and intervention with white oil as needed.
<b>Apricot – Kajsija</b>	<i>Stigmina carpophila</i> (shot- hole disease)	Preventative: balanced N-fertilizer application and spring cutting to increase ventilation and reduce surplus growth. Removal of infected branches. Apply copper-based fungicides during leaf fall or during vegetative rest period.
	<i>Monilinia laxa</i> (brown rot)	Balanced feed, ventilated tree tops, removal of diseased fruits. Pesticides applied at the beginning of flowering when up to 10% of flowers have opened.
	<i>Podosphaera tridactyla</i> (powder mildew)	Ventilated tree tops, removal of diseased branches, balanced N-fertilizer feed.
	Oriental peach moth ( <i>Grapholita molesta</i> )	Monitoring using pheromone traps and the application of growth regulators.
	Mediterranean fruit fly ( <i>Ceratitis capitata</i> ),	Monitoring using yellow sticky traps and the application of acetamiprid as needed.
<b>Cherry – Tresnja</b>	<i>Stigmina 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.
	European cherry fruit fly ( <i>Rhagoletis cerasi</i> ),	Monitoring using yellow sticky traps and the application of acetamiprid as needed.
<b>Grape – Vinova loza</b>	<i>Plasmopara viticola</i> (downy mildew)	Chemical treatments are preventative. Initially use contact fungicides when shoots are 10cm. Follow up treatments

Crop	Main Pest/Disease Problems	Integrated Pest Management
		every 7-10 days (12-14 in dry weather) using systemic and contact pesticides.
	<i>Uncinula necator</i> (grapevine powdery mildew)	Balanced feed to prevent overgrowth. Use sulfur-based compounds initially (every 5-6 days). Preventative treatments are undertaken if the previous season was particularly infectious. First treatment when shoots are 10-15cm (sulfur or systemic fungicides). Plant protection can be combined with protection against late blight. Curative treatment using systemic fungicides after noticing the first symptoms every 5-7 days using 1000-1200 l/ha of water)
	<i>Phomopsis viticola</i> (dead-arm disease)	Preventative: selection of healthy seedling material, resistant cultivars, disinfection of tools prior to pruning, removal of infected parts and burning after cutting. Chemical treatment is the same as that against late blight.
	<i>Botrytis cinerea</i> (gray mold)	Balanced feed, balance out fruiting and growth, protection against powdery mildew and moths. Since gray mold appears early in rainy season then chemicals which are used against late blight can also be used to control gray mold. Early infections are usually linked with the overuse of N-fertilizers. Generally, the first treatment is done before bunch formation and the second when bunches change colour.
	<i>Pseudopeziza tracheiphila</i> (parasitic rash)	No special treatment is necessary as it is controlled at the same time when control measures are placed for the control of powdery mildew and late blight.
	Grape moth ( <i>Lobesia botrana</i> ), Grape bud moth ( <i>Eupoecelia ambiguella</i> ),	Monitoring using pheromone traps, using confusion technique, applying growth regulators.
	Fruit tree red spider mite ( <i>Panonychus ulmi</i> ),	Winter checking and application of red oil in winter, monitoring during vegetation and intervention with white oil as needed.
<b>Nectarine – Nektaria</b>	<i>Taphrina deformans</i> (leaf curl)	Agrotechnical: selection of suitable spacing depending on the soil type and sorts. Balanced feed and irrigation. Chemical treatment: preventative – during leaf fall (November-december); during budding. Curative pesticides are applied when leaves are formed: timely application with first symptoms or when weather conditions which encourage the development of pathogens.
	( <i>Coryneum beijerinckii</i> = <i>Wilsonomyces carpophilus</i> <i>Stigmia carpophila</i> )	Agrotechnical: limit N-fertilizer application in the infected orchard. Remove and burn diseased branches in winter and during vegetative period. Chemical treatment suitable for the control of leaf curl is also suitable for shot-hole disease.
	<i>Sphaeroteca pannosa</i> var. <i>persicae</i> (powdery mildew)	Agrotechnical: use more resistant cultivars in areas where there is a high risk of disease. Manage fertilization and irrigation. Chemical: apply maximum 5 treatments for nectarines.
	<i>Monilinia laxa</i> M. <i>fructigena</i> (brown rot) –	Agrotechnical: use more resistant cultivars. Choose suitable spacing between stems. Manage irrigation and fertilization to prevent overgrowth. Remove and burn all disease parts. Apply chemical treatment only when it is economical to do so.
	Aphids	Winter monitoring and spraying using red oil, monitoring disease during the vegetative period using yellow sticky

Crop	Main Pest/Disease Problems	Integrated Pest Management
		traps and intervention with white oil or other pesticides as needed.
	Oriental peach moth ( <i>Grapholita molesta</i> )	Monitoring using pheromone traps, applying growth regulators.
	Mediterranean fruit fly ( <i>Ceratitis capitata</i> ),	Monitoring using pheromone traps, applying acetamiprid as needed.
<b>Peach – Breskva</b>	<i>Taphrina deformans</i> (leaf curl)	Agrotechnical: Select suitable spacing according to soil type and variety Balanced N-fertilization and irrigation. Chemical: preventative during leaf fall (November-December); during budding; Curative when leaves are forming with first symptoms or weather conditions which encourage the development of pathogens.
	<i>Coryneum beijerinckii</i> = <i>Wilsonomyces carpophilus</i> = <i>Stigmina carpophila</i> (shot – hole disease)	Agrotechnical: limit N-fertilization in diseased orchard. Remove and burn diseased branches. Chemical treatment: Chemical treatment suitable for the control of leaf curl is also suitable for shot-hole disease.
	( <i>Sphaeroteca pannosa</i> var. <i>persicae</i> )	Agrotechnical: use more resistant cultivars in areas where there is a high risk of disease. Manage fertilization and irrigation. Chemical: apply maximum 2 treatments when peaches are fruiting.
	<i>Monilinia laxa</i> M. <i>fructigena</i> (brown rot) –	Agrotechnical: use more resistant cultivars. Choose suitable spacing between stems. Manage irrigation and fertilization to prevent overgrowth. Remove and burn all disease parts. Apply chemical treatment only when it is economical to do so.
	Oriental peach moth ( <i>Grapholita molesta</i> )	Monitoring using pheromone traps, applying growth regulators.
	Mediterranean fruit fly ( <i>Ceratitis capitata</i> ),	Monitoring using pheromone traps, applying acetamiprid as needed.
<b>Pear – Kruska</b>	<i>Venturia pyrina</i> pear scab)	Agrotechnical: selection of sunny and ventilated areas, tolerant cultivars, removal of diseased parts.
	<i>Monila fructigena</i> (brown rot)	Same as with apples.
	European pear suckers ( <i>Psylla</i> sp.)	Winter monitoring and winter spraying with red oil, intervention with white oil and growth regulators as needed.
	Pear moth ( <i>Cydia pyrivora</i> )	Monitoring using pheromone traps, applying growth regulators.
	Aphids	Winter monitoring and winter spraying with red oil, monitoring during the vegetative period using yellow sticky traps and intervention with white oil or other pesticides as needed.
<b>Plum – Šljiva</b>	<i>Stigmina carpophila</i> - (shot- hole disease)	Preventative: balanced N-fertilizer feed and spring pruning to increase ventilation and reduce overgrowth. Removal of diseased branches. Use copper-based compounds during leaf fall or during vegetative rest periods.
	<i>Taphrina pruni</i> (plum pockets)	Pesticides which can control shot-hole disease can also control bladder plums/plum pockets although there are no registered pesticides for this pathogen.
	<i>Monilinia laxa</i> , M. <i>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.

Crop	Main Pest/Disease Problems	Integrated Pest Management
	<i>Tranzschelia pruni-spinosae</i> (peach rust)	Treat susceptible cultivars on time, as soon as first symptoms are noticed. Repeat once or twice every 8-12 days if necessary.
	Aphids (as vectors of virus diseases)	Winter monitoring and winter spraying with red oil, monitoring during the vegetative period using yellow sticky traps and intervention with white oil or other pesticides as needed.
	Sawflies ( <i>Hoplocampa sp.</i> ),	Cultivation of topsoil to destroy overwintered pests, removal and destroying of fallen fruits, monitoring of pests with yellow sticky traps, intervention with acetamiprid.
	Plum fruit moth ( <i>Grapholita funebrana</i> ),	Monitoring of disease, monitoring using pheromone traps, use of growth regulators.

Note: Information in this table provided by LAMP technical staff and Ciglar (1998), and Friedrich and Rode (1996).

**(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**

LAMP training will target LAMP staff and project beneficiaries. LAMP will also include agricultural service providers (Government extension workers and pesticide dealers, if possible). In general, the 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 should give specific instructions about protecting aquatic habitats and groundwater. For pesticides highly toxic to birds, bees, and other wildlife, trainers/technicians should give specific instructions about protecting habitat, including preventing drift.

The summary of the LAMP PERSUAP for the fruit sub-sector will be translated and made available to LAMP partners in the sub-sector, and it will be used as a basis for training.

Proposed Training Methods:

- LAMP shall provide training in IPM to farmer groups and agricultural advisors. This will be incorporated within farmer training on fruit production as well as more intensive IPM training focusing particularly on agricultural advisors (extension agencies, agronomists at food processors, LAMP agronomists and other pesticide advisors). The initial 2-day training in IPM and safe pesticide use will be provided through the Israeli MASHAV program and continued on by two BiH technical specialists who will also take part in the training but already are leading experts in BiH in IPM and safe pesticide use.
- Any LAMP supported training to farmer groups on pesticide application in fruits shall incorporate IPM and training in safe pesticide use. This will be undertaken by BiH technical specialists.

**(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 strengthen farmer capacity to use field observation within an overall IPM program.

LAMP 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.

Besides monitoring at the farmer/field level, LAMP 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 9/30/06
- 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 LAMP's overall monitoring plan.

### III. RECOMMENDATIONS: SAFER USE ACTION PLAN

LAMP shall report to USAID on mitigation measures required herein, including training courses, in project quarterly reports.

1. Remove and phase-out more hazardous pesticides from trainings which LAMP may organize beyond September 30, 2006, unless no suitable alternatives exist. LAMP 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. By September 30, 2006, except for those with no practical alternative, LAMP shall replace pesticides in USEPA Toxicity Class II or WHO Toxicity Class II. Table 7 shows EPA/WHO Toxicity Class I or II pesticides that LAMP is requesting, and that will be phased out by September 30, 2006. LAMP 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) will not be phased out, and mitigation for this is given below. If no suitable alternative exists for the more hazardous pesticides (EPA/WHO Toxicity Class II), LAMP will submit a justification for retaining each specific pesticide beyond September 30, 2006. 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, LAMP 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 9/30/06.	Only to be applied by trained applicators (see training); protective clothing and equipment mandatory; part of IPM program. <b>Phase out EPA II formulations by 9/30/06</b>
Captan: EPA warns on potential for severe eye and skin irritation.	This can be mitigated, and LAMP 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.	This can be mitigated, and LAMP 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.	This can be mitigated, and LAMP requests to retain this pesticide, and not phase it out.	Will ensure applicators use protective eye wear. Safer use training will include this

Pesticide/Issue	Justification	Mitigation
Metalaxyl: Some formulations are EPA II	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.	precaution. 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,	<b>Phase out EPA II formulations by 9/30/06</b>
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. LAMP 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.

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

3. LAMP 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. LAMP, through extension agencies and trainers, shall promote the use of protective clothing and equipment by farmers and shall monitor use:

a) LAMP shall encourage chemical suppliers to store appropriate protective clothing and equipment;

b) LAMP 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) LAMP shall inform farmers how the safety clothing should be used; and

d) LAMP shall monitor, through farmer groups or agronomists as appropriate, to ensure that the protective clothing and equipment is well-maintained and spare parts are available.

5. LAMP shall encourage farmers to read and follow labels.

a) LAMP 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) LAMP shall assist farmers to understand and abide by the information provided on the pesticide label.

6. LAMP shall train LAMP staff, farmer groups, extension agents, and pesticide suppliers in pesticide safer use and handling, and environmental protection: LAMP shall provide 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)).

a) 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 LAMP, 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.

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

7. LAMP 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.

8. LAMP shall implement a Mitigation and Monitoring Plan: LAMP 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, LAMP shall report to USAID and develop means to respond to the problem.

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

## REFERENCES

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

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