

Checklist/Guidance for Integrated Pest Management

The goal of IPM is to maintain pest populations at tolerable levels (not to eradicate them). The philosophy of IPM involves using ecological concepts and knowledge of pest biology to establish the natural checks and balances between crop plants, pests, beneficial insects, and the physical environment. This approach reduces the reliance on pesticides. Because these interactions are unique for each system, a site-specific strategy must be used. This checklist and guidance will assist you in developing an IPM strategy for your land.

As a first step, list the crops that you grow. For each crop, list the major crop pests that you need to control on your lands. Pests include insects, diseases, weeds, vertebrates, etc. Describe where and when the pests are problematic. Use the table below or attach separate sheets.

Crop 1: <i>Mint</i>	Crop 2: <i>W. Wheat</i>	Crop 3: <i>Onions</i>
Insect pests	Insect pests	Insect pests
<i>Spider mites</i>	<i>Cereal leaf beetle</i>	<i>Thrips</i>
<i>Aphids</i>	<i>Aphids</i>	<i>Onion maggot</i>
Diseases-<i>Nematodes</i>	Diseases	Diseases
<i>Root lesion nematode</i>		<i>Downy mildew</i>
Weed pests	Weed pests	Weed pests
<i>Grass weeds</i>	<i>Grass weeds</i>	<i>Grass weeds</i>
<i>Annual broadleafs</i>	<i>Annual broadleafs</i>	<i>Annual broadleafs</i>
Other	Other	Other

Scouting, Forecasting and Economic Thresholds

Scouting is done:

- *To determine when levels of a pest reach or exceed threshold levels*
- *To reduce the amount of pesticides used*
- *To check effectiveness of pest control method*
- *In response to a local pest report*
- *To monitor areas where known pests occur or have occurred*
- *To monitor plant productivity and health*

Pest populations must be scouted by individuals trained to recognize pests and their damage, and scouters should understand the proper way to record their findings. Ideally, the field will be scouted during the prior crop, between crops, at preplant, at planting, at crop emergence, at vegetative growth and/or reproductive growth, and at harvest. For some pest-crop problems in Idaho, specific scouting procedures have been recommended by the University of Idaho. Where there is no specific guidance, the "Basic Scouting Procedures" developed by the Department of Entomology at Purdue University should be used (Attachment 1). The information and scouting forms in this attachment provide guidance for proper scouting and record keeping.

A. What method of scouting did you use most? (select only one and write the number in the box below)

- 1 Weekly scouting (or timing based on pest biology and crop interaction) by crop scouts utilizing GPS technology and field mapping
- 2 Weekly scouting (or timing based on pest biology and crop interaction) by crop scouts and use of remote sensing to observe patterns of infestation
- 3 Weekly scouting (or timing based on pest biology and crop interaction) by crop scouts looking for potential hot spots and spot checking
- 4 Planned scouting at least several times during the season at specific times to identify pests and extent of problem
- 5 Informal observation during routing farming/ranching operations
- 6 Informal observations of what was happening at edge of field
- 7 Informal observations during drive-by

Write in the number of your scouting method in the box to the right. Scouting must be done by person trained in IPM (CCA, U of I Extension, producer who has attended appropriate training, etc.). Provide documentation of training.

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B. Which method best describes your record keeping of scouting activities? (select only one and write the number in the box below)

- 1 A hand-held electronic device used to record field scouting data for mapping
- 2 Written scouting records transferred to field map to identify hot spots and patterns
- 3 Written records
- 4 No records kept

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Write in the number of your record keeping method in the box to the right.

Maps drawn by hand, or notes taken on pest locations within field, with scouting form

The more information sources you can incorporate into your decision-making process, the better. Pest forecasting needs to be reliable and science-based. Weather influences some pests and can be used to help make decisions, run certain pest or disease models, etc.

C. Did you have access to weather data and did you use it in your forecasting and management decisions? Check all that apply.

- Wind data
- Degree days (source: _____)
- Rainfall (source: *Agrimet*)
- No access

D. Did you utilize the PNW Pest Alert system (<http://www.tvpestalet.net/index.php3>), BEACON, or any other pest forecasting information to help in your decision-making? Yes *xx* No _____

E. Did you use soil analysis to detect the presence of insects, disease, or nematodes? Yes *xx* No _____

F. What are the economic thresholds (see Attachment 2 for definition of economic threshold and examples) for major pests on specific crops you grow? Describe (or attach documents showing proper thresholds):

Utilize thresholds indicated on the University of Idaho Pest Management Center website:

Spider mites - 5 mites per leaf in several areas of field

Aphids in mint - 15-20 per sweep

Downy mildew - treat when conditions are favorable for disease

Cereal leaf beetle - 3 larvae/eggs per plant

Aphids in wheat - 2-4 per head at flowering

For weeds, treat (spray) when present, and use pre emergent (in addition to tillage) when field history warrants

- Descriptions of pest damage and economic thresholds can be found in the Pacific Northwest Insect Management Handbook (<http://pnwpest.org/pnw/insects>). If no thresholds have been determined through research, how do you make your decision on when/if to use suppression methods? Describe:

Where no thresholds are available, use best judgement, past experience, and field history to determine when/if to treat with chemical. Decision based on scouting and observations, no set spraying schedule used.

G. Where noxious weeds are a concern, I am involved with or aware of the local Cooperative Weed Management Area (CWMA) and follow the Integrated Weed Management Plan recommendations developed by the CWMA (Attachment 3). Yes _____ No xx

Pesticide Use

A key to intensifying natural enemy effectiveness is a sparing use of insecticides. "If you kill the pests' natural enemies, you inherit their jobs." Pesticide use requires proper handling, storage and application, and it is required by law that the applicator follows the label specifications. Proper application includes the following considerations:

Were pesticide applications made by a certified applicator? Yes xx No _____

Was the application equipment calibrated:

- Regularly during the season?
 Before the season?
 Not at all?

Did you keep accurate and complete pesticide application records according to USDA Recordkeeping Requirements for Private Applicators? Yes xx No _____

Did you reduce the risk of off-site transport of pesticides by applying at proper times (based on weather reports, at appropriate crop stage, etc.), rates, and placement (need for banding, incorporation, etc.)? Yes xx No _____

Do you use any new technology such as precision agriculture, hooded sprayer, low volume directed spray, chlorophyll sensor, etc. to limit pesticide use? Yes _____ No xx

Do you use chemicals with the same mode of action continuously on the same field?

Yes _____ No xx *always rotate*

Do you spot spray strips (or use non-chemical suppression methods) along fence rows or areas with acute infestations rather than broadcast pesticide application of the entire field?

Yes xx No _____

Do you spot spray or cultivate small infested areas in the field immediately after identification through field scouting? Yes xx No _____ *always spot treat where practical, use chemical or hand tillage*

Do you use Reduced Area and Agent Treatment (RAAT) strategies on rangelands for insect control (especially for grasshopper control)? Yes _____ No _____ *N/A*

Do you avoid the use of broad-spectrum pesticides wherever/whenever feasible? Yes xx No _____

Do you use vegetative buffers in sensitive areas or adjacent to water bodies to minimize chemical movement to surface waters? Yes _____ No _____ *N/A*

Non-Chemical Alternatives to Pest Management

A single-treatment approach to pest management is ineffective, and short-term effects will not provide long-term solutions to pest problems.

Prevention –

the practice of keeping a pest population from infesting a crop or field, and should be the first line of defense. It includes such tactics as using pest –free seeds and transplants, preventing weeds from reproducing, irrigation scheduling to avoid situations conducive to disease development, cleaning tillage and harvesting equipment between fields or operations, using field sanitation procedures, and eliminating alternate hosts or sites for insect pests and disease organisms.

Avoidance –

when pest populations exist in a field or site, the impact of the pest on the crop can be avoided through some cultural practice. Examples of avoidance tactics include crop rotation, choosing cultivars with genetic resistance to pests, using trap crops or pheromone traps, choosing cultivars with maturity dates that may allow harvest before pest populations develop, fertilization programs to promote rapid crop development, and not planting certain areas of fields where pest populations are likely to cause crop failure.

Suppression –

may become necessary to avoid economic loss if prevention and avoidance tactics are not successful. Non-chemical suppression tactics may include:

- *cultural practices like narrow row spacings, alternative tillage approaches, cover crops or mulches.*
- *physical suppression such as cultivation or mowing, bait or pheromone traps, and temperature management or exclusion devices.*
- *biological controls such as mating disruption, conservation of beneficial insects, predatory or parasitic insects*

Listed are some potential practices. Check all that apply (or add additional practices) and describe how you use these practices (how they are effective in pest management), or document information sources. In some cases, suggested practices may conflict with management for other resource concerns – seek assistance to determine management that best addresses all resource concerns.

Prevention

- Tilling, mowing or chopping field lanes, field perimeters, or roadways where pests are resident or before weeds go to seed
- Crop residue management to control pests
- Clean tillage or harvesting implements after completing fieldwork to reduce the spread of weeds, disease or other pests *Clean equipment to prevent pest spread between fields*
- Control drainage or irrigation scheduling for water management to control pests *Maintain proper field moisture for each crop through proper irrigation to maintain vigor and reduce disease*
- Create habitat for beneficial insects, birds, or animals (like windbreaks, pivot corner plantings, etc.)
- Use of certified seeds and ~~compost~~ *rootstock*
- Use of weed-free hay
- Use soil sampling and testing to determine optimal fertilizer amount and placement to benefit emerging crop *Follow NRCS 590*
- Increased crop seeding rates and/or decreased crop row widths *Higher seeding rate used in wheat to increase competition with weeds*
- Adjusting crop planting dates to escape pest colonization *Plant winter wheat a bit late to avoid high aphid infestations*
- Field selection to avoid planting crops next to landuses that serve as reservoirs for pests
- Graze areas with weed infestations before they go to seed
- Don't move livestock from a weedy area to a weed-free area if livestock are a dispersal mechanism
- Screen irrigation system when the water is coming from an irrigation canal
- Proper sanitation practices
- Use of green manures
- Use of properly composted manure to reduce/eliminate viable weed seeds
- Plant seed at proper soil temperatures *Plant onions when soil sufficiently warm*
- Grazing regimes that provide cover characteristics unfavorable for grasshoppers
- Dust control in mint to reduce spider mites*



- _____
- _____
- _____

Avoidance

- Seed varieties with insect or disease resistance *When available*
- Rotate crops to control pests
- Use of trap crops to attract and concentrate pests within a small portion of the field
- Implement any practice that improves general biodiversity around your lands, such as windbreaks, buffers, or planting pivot corners
- Immediate response to new, localized weed infestations on range and pasture followed by rehabilitation of site
- Use of cover crops during the year to manage weeds
- Preplant tillage to remove early emerging weeds
- Field cultivate or chisel plow following harvest to control weeds and volunteers
- Post harvest irrigation to promote germination of weed seed
- Use cultivation to control small weed patches when found through field scouting
- Release of beneficial insects during growing season (see Attachment 4 for PNW beneficials) *Introduced wasp predators and cereal leaf beetle parasites, currently monitoring to determine long-term effectiveness*
- Light irrigation pre-plant to flush weeds, and then spray with Roundup*
- Very limited use of miticides to maintain naturally occurring predator mites*
- _____
- _____
- _____

Suppression:

- Seed varieties modified to be resistant to specific herbicides
- Biological pesticide use such as Bt, insect growth regulators, microbial insecticides, natural products
- Grazing sheep and goats at appropriate times to reduce weed infestations



- Flame weeding
- Allelopathic cover crops that control weed seed establishment and/or growth. For example, substances released from sorghum-sudangrass and winter rye inhibit germination of many weeds.
- Use cover crops such as mustard, radish, sudangrass or rapeseed which act as biological fumigants
- Biological control agents (primarily for long term control goals). See Attachment 5 for some biological control agents used in Idaho. *See previous page*
- Use mechanical methods (like hilling, cultivation, rotary hoeing, mechanical weeder) to control weeds *Spot treatment especially in mint*
- _____
- _____
- _____
- _____
- _____

Information Sources

In the past year, did you attend a U of I Crop School, field tours, private consultant field days, or educational meetings where research information on pest management was presented?

Yes xx No _____ *UI Crop schools*

Did you utilize any information from other sources (list after each checked)?

- Private research reports _____
- University publications *Use Extension publications available for insect and weed management*
- Farm publications _____
- Internet pest alerts *Subscribed to Treasure Valley pest alert, get email alerts*
- Idaho Oneplan (<http://www.oneplan.org/PestMgmt.shtml>)
- Other _____

Have you conducted on-farm/on-ranch research or a demonstration project in collaboration with the U of I, private research companies, etc.? Yes _____ No xx

If yes, briefly describe the collaboration:

Potential Information Sources:

PNW Weed Management Handbook	http://weeds.ippc.orst.edu/pnw/weeds
PNW Insect Management Handbook	http://insects.ippc.orst.edu/pnw/insects
PNW Plant Disease Management Handbook	http://plant-disease.ippc.orst.edu/index.cfm
Idaho Weed Awareness	http://www.idahoweedawareness.org/
University of Idaho Pest Management Center	http://www.ag.uidaho.edu/pmc/Pests/cropPests.htm
Pesticide Information Profiles	http://extoxnet.orst.edu/pips/ghindex.html
Idaho Weed Resources (still under construction)	http://www.uidaho.edu/weeds/FRA/FRA.htm
Biological Control	http://www.nysaes.cornell.edu/ent/biocontrol/index.html
Idaho Plant Disease Reporter	http://www.uidaho.edu/ag/plantdisease/
University of California – Statewide IPM Program	http://www.ipm.ucdavis.edu/
Western IPM Center	http://www.wrpmc.ucdavis.edu/

Putting it all Together – Integrated Pest Management

Combining field scouting, forecasting, and economic thresholds; judicious use and application of pesticides (reducing amounts and hazards); and use of non-chemical methods is Integrated Pest Management in practice. An example of recommendations for a specific crop-pest combination can be found in Attachment 6, and will help in understanding how to formulate an IPM strategy for your lands.

Routine scouting is the basis for all suppression decisions, whether chemical or mechanical/physical. Maintain all scouting forms, with beneficials, and map pest pressures over time to understand field histories. Limited use of chemicals, use lower hazard chemicals when effective. Maintain records of all pesticide applications and non-chemical treatments.