Nursery Pest Management

Dr. Charles J. Masters
360-736-6196
chuck.masters@weyerhaeuser.com
Weyerhaeuser Company
505 N. Pearl Street
Centralia WA 98531 USA

Abstract

The field of pest management is rapidly changing. Due to significant environmental pressure and the Food Quality Protection Act (FQPA), a number of chemical tools available today will likely not be available in the future. Users can affect the outcome of FQPA implementation and minimize impact on current management protocols. However, integrated pest management tools are needed to deal with future pest problems. The current situation is that we have pest management problems to deal with. Therefore, a couple management protocols are discussed. However, it seems appropriate to focus on what can make the practitioner successful. Understanding pesticide laws and being aware of important sources of information on pesticides gives the user the ability to develop management protocols. Being aware of new products, finding funding to do efficacy work, and information on how to get products registered paves the way for the future.

Introduction

The title of this paper probably should have been 'A practitioners approach to pest management'. I place myself in this category, because it is information I have needed to handle pest management needs. Hopefully, this information will help you as well.

The Food Quality Protection Act of 1996 stands to significantly change pesticide use in this country. What the Act does, its potential impact on the forest industry, what you need to do, and important contact information will be discussed.

Knowing which chemicals can be used in a particular situation, is often a daunting task. There always seems to be unanswered questions. Does the product have to be labeled for my particular use site? Can I use a product if the pest is not on the label? What rate is legal to use, or how can it be applied? Therefore, it is important for the practitioner to be knowledgeable about current pesticides laws, and to be aware of current legislation being considered. Pesticide laws will be discussed, as well as sources of information for finding chemicals that can be used. How these chemicals are then

put together into a pest management plan will be discussed using a couple of existing protocols as example.

Information on some new products to keep an eye on is provided. Also, information on how to get these products registered, and sources of funding are discussed.

Food Quality Protection Act

What is the Food Quality Protection Act (FQPA)? The short answer is that it is a 1996 amendment to FIFRA, the Federal Insecticide, Fungicide, and Rodenticide Act. FIFRA was passed to regulate the distribution, sale, and use of pesticides in the United States. It replaced the court-mandated Delany Clause, which contained a zero risk provision with respect to potentially carcinogenic pesticides; with a reasonable certainty of no harm statute. The Environmental Protection Agency (EPA) took the old No Observable Effect Level (NOEL), and divided it by a 100-fold uncertainty factor to get a Reference Dose, which is now used as the cutoff for the reasonable certainty of no harm level. The EPA also has the ability to increase the uncertainty factor an additional 10-fold when concerned about exposures to infants and children. The Act provides for a system of periodic review for all pesticides, with emergency suspension authority. It considers (1) exposures to infants and children, (2) aggregate exposure (food, drinking water, and residential), (3) cumulative effects due to a common mode of toxicity, and (4) effects on the estrogen and endocrine systems.

Impact on the forest industry

Since FQPA is not just a 'Food' issue, the impact on the forest industry in large part has to do with our ability to practice intensive management, which means retaining the ability to control pests that can impact that management. Since our production land base is shrinking due to urban sprawl and environmental pressures, being able to increase the yield of wood on remaining acres is of critical importance. Two key strategies for maintaining a viable industry through intensive management are genetic improvement and vegetation management. These key strategies allow us to remain competitive.

The bottom line is, that if we cannot control weed competition in the forest, the result will be a significant loss in the yield of wood (30 – 60%). This loss would be a result of poor survival, significantly reduced growth, and increased animal damage. It would lengthen the time to reforestation and harvest, and reduce return on investment. If we can not protect our seed and seedling crops in seed orchards and nurseries from weed, insect and disease pests, the result will be a loss in yield from lost genetic gain potential, and a failure to realize a costly investment. The potential impact of the FQPA should not be taken lightly.

Getting involved

The current focus by the EPA is on the organophosphates, carbamates, organochlorines, other probable and possible carcinogens, and the high hazard inerts. Re-eligibility decisions on the organophosphates will be completed by the end of this year.

Your first line of defense will be through the American Forest and Paper Association (AFPA). The AFPA, industry representatives, and the United States Forest Service (USFS) have been working with the EPA on a process to establish lines of communication, and provide to the EPA the forestry pesticide use information they require to complete risk assessments. In addition, the AFPA will be working on a process for mitigating any risk assessment issues. The first step is to understand which chemicals are important to our industry and to communicate those needs to the EPA. To that end, chemical use forms have been distributed to the membership and are in the process of being filled out. These data will be collated, and pertinent use information communicated to the EPA. If you are concerned that your pesticide needs are not being accounted for, contact the AFPA (John Festa, (202) 463-2587, or by email at john_festa@afandpa.org). It would be wise to become an active participant.

To deal with your needs on an individual level, you can become an active participant by communicating your pesticide needs to the Registrant to assure continued support. Next, discuss your use with The EPA's Chemical Review Manager to be sure it will be considered in the risk assessment process. Become an active participant in the risk assessment process through

review and any required mitigation. Table 1, lists the FQPA contacts in the EPA you will find useful in this process.

Table 1. FQPA contacts at EPA

Web Site	Contact
FQPA implementation	www.epa.gov/oppfead1/fqpa/background.htm#implementation
Pesticide Program Contacts	www.epa.gov/opp00001/contacts.htm#srd
Office of Pesticide Programs • Click open comment period for organophosphates	www.epa.gov/pesticides
Preliminary risk assessments • Click on 'table' to get status • Click on pesticide for CRM • Click on public participation for link to sending comments electronically	www.epa.gov/pesticides/op
Status summary of organophosphates	www.epa.gov/pesticides/op/status.htm
Federal Register on-line	www.epa.gov/reg5oair/fr/fr.htm

The Law

We all know that it is a violation of Federal law to use this product in a manner inconsistent with its labeling. However, the aspects of the law that seem to be the most confusing relate to the definition of the crop or site, and whether the target pest has to be on the label. The question with regard to the target pest is answered adequately in FIFRA Section 2(ee). However, with regard to the use site, interpretation can be confusing. For example, if the label says the product can be used on ornamentals, can the product be used on forest tree nurseries? On the surface, the answer would appear to be no. However, the EPA views a nursery as a stage of crop development, and in practice, a nursery has also been labeled as the site. Therefore, if the label says ornamentals it can be used in ornamental nurseries. So, if the product is labeled for use on ornamentals or ornamental nurseries, can it be used on forest tree nurseries? The answer appears to be yes. In a letter from the EPA's Office of Compliance Monitoring dated April 24, 1990, it states, '…it is consistent with the intent of the Act to consider nursery forest trees as ornamentals and the nursery as a noncropland site, unless the label specifically prohibits or otherwise restricts such use'. This is only one example. The EPA and the state pesticide office responsible for enforcement should clear questions regarding unclear definitions or broad interpretation of the use site.

Legally, each site must appear on the label. If your use does not, and is required, the easiest fix is to pursue supplemental labeling through the Registrant, or the IR-4 Ornamentals Program. If there is existing data to support ornamental use it is unlikely additional data will be required for seed orchard or nursery use.

FIFRA section 2(ee)

This section of FIFRA states that:

- A product may be applied at a dosage, concentration, or frequency less than label, unless prohibited.
- A product can be applied against any target pest not listed on the label, given the crop/animal/site is on the label, unless prohibited.
- Any method of application not specified on the label, or forbidden in the text may be used.
- A pesticide may be mixed with a fertilizer unless prohibited.

So, the bottom line here is that as long as the site is on the label, the target pest need not be, given the label rate is not exceeded.

Sources of Information on Pesticide Use

Below is a list of the various sources of information that can be used to help identify pesticides that can be used on your crop, and to address other questions about pesticide use. Often the most reliable source is what is learned through business relationships. Experience is the best teacher when it comes to phytotoxicity and efficacy, so avoid inventing the wheel. Try these additional sources of information.

- Registrant Technical Reps
- IR-4 Minor Use Program/Newsletter (cook.rutgers.edu/ir4)
- Pacific Northwest insect, disease, and weed control handbooks (Extension Services of OSU, WSU, and Idaho)
- Literature search
- Internet
- The Farm Chemicals handbook (meisterpro.com)
- Agricultural Chemical handbook (Thomson Publications)
- The IPM Practitioner (Bio-Integral Resource Center, (510) 524-2567)
- Agrichemical Insider (Agriculture Development Group, juliana@moscow.com)

Pest Management Protocols

Included for review is a couple of pest management protocols used in forest nurseries: one for Douglas-fir (*Pseudotsuga menziesii*) seedbeds, and the other for indoor containers (Tables 2 and 3, respectively). Treat them as examples. They should be individualized for a specific crop. There are a number of different approaches that can be taken in developing a protocol. However, the protocol you select should consider your environmental conditions, growing techniques, any known phytotoxic effects, efficacy (chemical resistance issues?), and your pest management philosophy.

Consider first, pest management philosophy. Your philosophy might be preventative or reactive, which will dictate which chemical you use, when, and how often. Following are some additional questions that should be asked to guide your decisions. What do you know about the life cycle of the pest? At what point in the crop cycle do you expect to see the damage, and what does it look like? What environmental conditions favor or deter the pest? If the control option is chemical, what is the mode of action? Can the chemical only be used preventatively, or is it locally systemic or systemic with curative properties? What is the degree of efficacy expected? How can chemical resistance within the pest population be avoided? Hopefully, the answers to these and other questions will guide decisions about what to do and when.

Table 2. Example of pest management plan for Douglas-fir seedbeds

Week	Month	Biological Benchmarks	Chemical Treatment
13	March	Prepare beds and sow	Subdue (Pythium, Phytophthora, locally systemic, stops propagule attack
14			Goal (pre-emergent, after sow)
15	April	Emergence begins	
17		Emergence complete	Aliette (foliar systemic, Pythium, Phytophthora) + Cleary's 3336 (locally systemic, Fusarium)
18		Initiate early growth	
19	May		Aliette + Chipco 20619 (locally systemic, Fusarium)
21		Initiate rapid growth	Subdue + Banner (foliar systemic, Fusarium, Pythium (?))
24	June		Aliette + Banner
26			Captan (contact, heat stress Fusarium)+ Subdue
27	July		Devrinol
28			Asana XL (Lygus)
29			Aliette + Banner
31		Undercut & wrench	Asana XL (Lygus)
32	Aug.		Captan (heat stress Fusarium attack) + Subdue
34		If buds not set	Cycle Cleary's of Chipco every two weeks
			Asana XL (Lygus)
37	Sept.		Asana XL (Lygus)
40	Oct.		Subdue; and just prior to lift.Goal (?)
45	Nov		Treat for botrytis if needed, through to lift (Cycle Chipco, benlate, and Banner)

New Products

Included for your information are several tables (Tables 4-7) of new products to keep an eye on. Some may already be available for your application; requiring only a quick check on phytotoxicity and efficacy. If these products cannot be used, see the section on getting new products registered.

Table 3. Example of pest management plan for indoor containers

Pest	Product	Organism	Situation
Disease	Zero-Tol		Greenhouse sanitation
	Cleary's 3336	Pre-emergent damping off	Drench after sow; before germ
	Zero-Tol	Pre-emergent damping off	First irrigation after Cleary's, 3 Days @1:100 - sanitation
	Chipco 26019	Post-emergent damping-off	Drench, only if getting post-emergent damping off
	Zero-Tol	Post-emergent damping off	Generally used as rinse (1:300)+ R-11after each fertilization[1]
	Chipco, then Cleary's	Root Rot	As needed + Subdue if Pythium
	Ornalin, Banner,Chipco	Botrytis	Use different one after each irrigation
	Curalan	Storage diseases	Before pack to suppress storage diseases
Insects	Duraplex	Fungus gnats Root weevil	As needed

[1] Some damage possible on newly emerged Fraser, noble, and some Douglas-fir. Always be sure to check for phytotoxicity in your situation.

Getting New Products Registered

It seems there are two 'reasonably' easy ways to get new products registered, whether it is a Federal label (Section 3), a supplemental label to the Federal label, or labeling at the state level (Special Local Needs, or 24C). In our business, the first and most familiar approach is to work directly with the Registrant for the chemical of interest. Contact their technical representative and gain their support for your request. Once that has been accomplished, test protocols will be worked out. The work is generally completed together. After the phytotoxicity and efficacy data is collected and analyzed, the Registrant's regulatory people will submit the results and the proposed label to the appropriate regulatory agency.

A similar approach is taken when you work together with the Ornamentals Program of the Interregional Research Project (IR-4). The first step is to contact Ray Frank, Ornamentals Manager

Table 4. New Products List for Fungicides

Fungicide (Trade)	Registrant	Pests Controlled
Azoxystrobin (Heritage 50)	Zeneca	Broad spectrum
Cyprodinil+Fludioxonil (Switch)	Novartis	Broad spectrum
Fenbuconazole others (Enable 2F)	Rohm & Haas	Clodasporium, Septoria, Rhizoctonia,
Myclobutanil (Eagle 40)	Rohm & Haas	Broad spectrum
Fenhexamid (Decree 50 WDG)	Sepro Corp.	Botrytis
Trifloxystrobin (Compass 50W)	Novartis	Broad spectrum
Kresoxim-methyl (Cygnus WG50)	BASF	Fusarium, rust, Septoria

Table 5. New Products List for Biological Fungicides

Biological Fungicides (Trade)	Registrant	Pests Controlled
Candida oleophila (Aspire)	Ecogen	Post-harvest diseases
Gliocladium catenulatum (Primastop)	AgBio Dev. Inc.	Rhizoctonia, Pythium
Milsana Bioprotectant (KHHUBF-99-001)	KHH Bioaci. Inc.	Induces phytoalexins, resistant to Powdery mildew, Botrytis
Pseudozyma floccuosa (Sporodex)	Plant Products	Powdery mildew
Burkholderia cepacia (Blue Circle)	Stine Microbial	Fusarium, Pythium, Phytophthora
Burkholderia cassi (Leone)	Valent	Botrytis, Phytophthora, Septoria
Harpin Protein (Messinger)	Eden Bioscience	Bacterial leaf spot, wilt, and other fungal diseases
Bacillis subtillis (Serenade)	AgraQuest	Phytophthora, Alternaria, others

Table 6. New Products List for Insecticides

Insecticide (Trade)	Registrant	Pests Controlled
Cyromazine (Citation)	Novartis	Growth reg., selected insects, dipterous leafminers and fungus gnats
Deltamethrin Decis, Deltagard	Aventis, Scotts	Pyrethroid, beetles, bugs, leps
Halofenozide (Mach 2)	Am. Cyanamid, Rohm & Haas	Growth reg, effects molting, grubs and leps
Novaluron (Rimon)	Makhteshim-Agan	Growth reg.works against leps, coleoptera, homoptera and diptera
Pyridaben (Sanmite)	BASF	Mites, leafhoppers, psyllids, whiteflies
Pyriproxyfen (Distance)*	Valent	Scale, whiteflys, thrips, pear pslla, codling moth; on eggs and immatures
Azadirachtin (Azatin XL)	Thermo Trilogy	Growth reg., disrupts molting, whitefly, leafminer, and leps

* Reduced Risk Pesticide

Table 7. New Products List for Herbicides

Herbicides (Trade)	Registrant	Pest Controlled
Clethodim (Envoy)	Valent	Post-emergent control of grasses
Demethenamid (Frontier, X-2)*	BASF	Pre-emergent, early post for annual grasses, broadleaf's, yellow nutsedge
Diquat Bromide (Reward LS)	Zeneca	Contact herbicide, desiccant
Flumioxazin (Valor)	Valent	Pre-emergent broadleaf with contact activity and residual soil activity
Imazapi (Plateau)	American Cyanamid	Post-emergent control of grasses, broadleaf's, and vine species
S-Metolachlor (Pennant Magnum)*	Novartis	Selective pre-emergent
Thiazopyr (Visor)	Rohm and Haas	Pre-emergent on annual and perennial broadleaf, crabgrass, and nutsedge

* Reduced Risk Pesticide

(301) 898-5332. You then get on their radar screen by submitting a Pesticide Clearance Form. The Registrant is consulted, and a study protocol is distributed. Anyone can do the work. Upon completion, the IR-4 program will submit the proposed label. You may also find that funding or scientific support may be available.

Sources of Funding

Finally, there are a number of sources of funding that can be tapped to work on integrated pest management projects (IPM). IPM work would include anything from work on understanding insect life cycles to better time or choose a control approach, to work on refining pesticide application rates, work on biological control, non-chemical control, and pesticide resistance work. Following is a list of sources the author is aware of.

- IR-4 Ornamentals Program (inform Ray Frank, Ornamentals Manager, (301) 898-5332, and for those in the West submit request with Ron Hampton, Western Regional Coordinator, U.C. Davis)
- Washington State Commission on Pesticide Registration (projects can be submitted from WA or OR if it benefits both states; contact Alan Schrieber, Administrator, (509) 543-9757, aschreiber@cbvcp.com)
- EPA support through the Pesticide Environmental Stewardship Program and the FQPA Issues Program (Sandy Halstead, EPA Region 10, Prosser, WA, halstead.sandra@epa.gov)
- USDA Initiative for Future Agriculture and Food Systems (reeusda.gov.ifafs)
- USDA Integrated Research, Education, and Extension Grants (reeusda.gov/1700/funding/11_99-406)