Pesticide Applicator Report

A Publication of the Vermont Agency of Agriculture, Food & Markets
For Vermont Pesticide Applicators

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In This Issue:

News from the Agency

Antimicrobial Products to Disinfect Poultry and Other Facilities against Avian (Bird) Flu

Poultry farmers in the U.S. are watching the spread of avian influenza in Asia and Europe. The EPA Web page provides information about disinfectants that are available to help prevent the spread of this disease in this country. Avian influenza, which is sometimes called bird flu, is an infection that occurs naturally in birds. It is caused by influenza (flu) viruses. The viruses are found chiefly in birds. Infections with these viruses can occur in humans but the risk from avian influenza is generally low to most people, because the viruses do not usually infect humans. However, according to the Centers for Disease Control and Prevention (CDC), there have been more than 100 confirmed human cases reported in Asia and Europe since 1997. The World Health Organization (WHO) maintains a cumulative list of these cases.

Further, according to CDC, if there is an outbreak of avian influenza among poultry, "there is a possible risk to people who have direct or close contact with infected birds or with surfaces that have been contaminated with secretions and excretions from infected birds."

EPA registers pesticide products, including disinfectants. Currently, more than 90 disinfectant products are registered and intended for use against avian influenza A viruses on hard, non-porous surfaces. These products are typically used by the poultry industry to disinfect their facilities. Typical sites listed on these product labels include: veterinary premises, poultry houses, farm premises and equipment, and other industrial and institutional settings. The label will indicate that the product is effective against "avian influenza A." (Continued on Page 2…)

Although there are no antimicrobial products registered specifically against the H5N1 subtype of avian influenza A virus, EPA believes that the currently registered avian influenza A products will be effective against the H5N1 strain and other strains.

The U.S. Department of Agriculture (USDA) provides guidance for the disinfection of poultry facilities. See USDA's Sanitation Performance Standards Compliance Guide, Sec. 381.58-381.60 (http://www.fsis.usda.gov/OPPDE/rdad/frpubs/san_guide_app.htm) for the guidelines.

Related Links

Pandemicflu.gov (http://www.pandemicflu.gov/) - This is the official U.S. government Web site for information on pandemic flu and avian influenza.

Avian Influenza (Bird Flu) - US Department of Agriculture's link to assist in managing citizens' concerns about avian flu; also available is USDA's 24/7 food safety virtual representative tool (http://www.fsis.usda.gov/Food_Safety_Education/Ask_Karen/index.asp#Question), which is regularly updated on this topic. For those without web access, consumers can call the USDA Meat & Poultry Hotline at 1-888-MPHotline (1-888-674-6854).

Pandemic Influenza: Worldwide Preparedness (http://www.cdc.gov/flu/pandemic/) - The Centers for Disease Control and Prevention's (CDC) site contains comprehensive, up-to-date information on all aspects of pandemic, avian, and seasonal flu.

Avian Influenza (AI): A Threat to U.S. Poultry (http://www.aphis.usda.gov/lpa/issues/avian_influenza/index.html) - The Animal and Plant Health Inspection Service (APHIS), U.S. Department of Agriculture (USDA), is responsible for protecting and promoting U.S. agricultural health, administering the Animal Welfare Act, and carrying out wildlife damage management activities. The site describes avian flu viruses which affect poultry, either low pathogenicity (LPAI) or high pathogenicity (HPAI) based on the severity of the illnesses they cause, among other information.

Avian Influenza (http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/special_avian.html) - The Food and Agriculture Organization (FAO) of the United Nations leads international efforts to defeat hunger, serving both developed and developing countries. The site contains specific information on disinfectants and procedures to use against avian flu, noting that soapy water and detergents are often the first choice. See the site for a detailed chart of items to be disinfected and procedures (http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/avian_qa.html#7).

Ten things you need to know about pandemic influenza (http://www.who.int/csr/disease/influenza/pandemic10things/en/index.html) and **Avian influenza** (http://www.who.int/csr/disease/avian_influenza/en/) - The World Health Organization (WHO), the United Nations specialized agency for health, provides detailed information on numerous aspects of pandemic influenza and avian flu worldwide.

Avian Influenza: Protecting Flocks, Protecting People (http://www.avianinfluenzainfo.com/) - The site is a joint project of the National Chicken Council (NCC), National Turkey Federation (NTF), and Egg Safety Center (ESC); it addresses public concern about avian flu and contamination from poultry.

Source: USEPA May, 2006

IRAC (Insecticide Resistance Action Committee) Mode of Action Classification

Fully revised & re-issued, September 2005 (ver. 5.1)

The IRAC Mode of Action (MoA) classification provides farmers, growers, advisors, extension staff, consultants and crop protection professionals with a guide to the selection of insecticides or acaricides for use in an effective and sustainable insecticide or acaricide resistance management (IRM) strategy. In addition to presenting the MoA classification, this document outlines the background to, and purposes of, the classification list and provides guidance on how it is used for IRM purposes. The list is reviewed and re-issued at intervals as required.

What is Resistance

Resistance to insecticides may be defined as '*a heritable change in the sensitivity of a pest population that is reflected in the repeated failure of a product to achieve the expected level of control when used according to the label recommendation for that pest species*' (IRAC). This definition differs slightly from others in the literature, but IRAC believes it represents the most accurate, practical definition of relevance to farmers and growers. Resistance arises through the over-use or mis-use of an insecticide or acaricide against a pest species and results in the selection of resistant forms of the pest and the consequent evolution of populations that are resistant to that insecticide or acaricide.

MoA, Target-site resistance and Cross-resistance

In the majority of cases, not only does resistance render the selecting compound ineffective but it often also confers cross-resistance to other chemically related compounds. This is because compounds within a specific chemical group usually share a common target site within the pest, and thus share a common mode of action (MoA). It is common for resistance to develop that is based on a genetic modification of this target site. When this happens, the interaction of the selecting compound with its target site is impaired and the compound loses its pesticidal efficacy. Because all compounds within the chemical sub-group share a common MoA, there is a high risk that the resistance that has developed will automatically confer cross-resistance to all the compounds in the same sub-group. It is this concept of cross-resistance within chemically related insecticides or acaricides that is the basis of the IRAC mode of action classification.

Effective IRM strategies use alternations or sequences of different modes of action (MoA)

The objective of successful Insecticide Resistance Management (IRM) is to prevent or delay the evolution of resistance to insecticides, or to help regain susceptibility in insect pest populations in which resistance has already arisen. Effective IRM is thus an important element in maintaining the efficacy of valuable insecticides. It is important to recognize that it is usually easier to proactively prevent resistance occurring than it is to reactively regain susceptibility. Nevertheless, the IRAC MoA classification will always provide valuable guidance to the design of effective IRM strategies.

Experience has shown that all effective insecticide or acaricide resistance management strategies seek to minimize the selection for resistance from any one type of insecticide or acaricide. In practice, alternations, sequences or rotations of compounds from different MoA groups provide a sustainable and effective approach to IRM. This ensures that selection from compounds in any one MoA group is minimized. The IRAC classification in this document is provided as an aid to insecticide selection for these types of IRM strategies.

Applications are often arranged into MoA spray windows or blocks that are defined by the stage of crop development and the biology of the pest(s) of concern. Local expert advice should always be followed with regard to spray

windows and timings. Several sprays of a compound may be possible within each spray window but it is generally essential to ensure that successive generations of the pest are not treated with compounds from the same MoA group.

Non-target site resistance mechanisms

It is fully recognized that resistance of insects and mites to insecticides and acaricides can, and frequently does, result from enhanced metabolism by enzymes within the pest. Such metabolic resistance mechanisms are not linked to any specific site of action classification and therefore they may confer resistance to insecticides in more than one IRAC MoA group. Where such metabolic resistance has been characterized and the cross-resistance spectrum is known, it is possible that certain alternations, sequences or rotations of MoA groups cannot be used. Similarly, mechanisms of reduced penetration of the pesticide into the pest, or behavioral changes of the pest may also confer resistance to multiple MoA groups. Where such mechanisms are known to give cross-resistance between MoA groups, the use of insecticides should be modified appropriately.

Where the resistance mechanism(s) is unknown, the intelligent use of alternations, sequences or rotations of compounds from different MoA classes remains an entirely viable resistance management technique since such a practice will always minimize selection pressures.

The Mode of Action (MoA) classification

The following classification scheme developed and endorsed by IRAC is based on the best available evidence of the mode of action of available insecticides. Details of the listing have been agreed by IRAC companies and approved by internationally recognized industrial and academic insect toxicologists and biochemists.

It is our aim to ensure that insecticide and acaricide users are aware of mode of action groups and that they have a sound basis on which to implement season-long, sustainable resistance management through the effective use of alternations, sequences or rotations of insecticides with different modes of action. To help delay resistance it is strongly recommended that growers also integrate other control methods into insect or mite control programmes. Further advice is given in Appendix 2.

Note: Inclusion of a compound in the MoA list does not necessarily signify regulatory approval.

Rules for inclusion of a compound in the MoA list:

- Chemical nomenclature is based on that appearing in *The Pesticide Manual*, 13th edition, 2003, Ed. C.D.S. Tomlin, published by The British Crop Protection Council. 1250pp., ISBN 1 901396 13 4
- To be included in the active list, compounds must have, or be very close to having, a minimum of one registered use in at least one country. Superseded, obsolete or withdrawn compounds with no current registration are listed separately (see Appendix 3 – in preparation)
- In any one MoA classification sub-group, where more than one active ingredient in that chemical sub-group is registered for use, the chemical sub-group name is used.
- In any one MoA classification sub-group, where only one active ingredient is registered for use, the name of that exemplifying active ingredient is used
- Where more than one chemical sub-group or exemplifying active ingredient appears in a single mode of action group, each is named according to the above rules; chemical sub-groups having precedence over single active ingredients

IRAC Mode of Action Classification v5.1, September 2005 [1]

Main Group and Primary Site of Action	Chemical Sub-group or exemplifying Active Ingredient	Active Ingredients
1 Acetylcholine esterase inhibitors	**1A** Carbamates	Aldicarb, Alanycarb, Bendiocarb, Benfuracarb, Butocarboxim, Butoxycarboxim, Carbaryl, Carbofuran, Carbosulfan, Ethiofencarb, Fenobucarb, Formetanate, Furathiocarb, Isoprocarb, Methiocarb, Methomyl, Metolcarb, Oxamyl, Pirimicarb, Propoxur, Thiodicarb, Thiofanox, Trimethacarb, XMC, Xylylcarb
	Triazemate	Triazemate
	1B Organophosphates	Acephate, Azamethiphos, Azinphos-ethyl, Azinphos-methyl, Cadusafos, Chlorethoxyfos, Chlorfenvinphos, Chlormephos, Chlorpyrifos, Chlorpyrifos-methyl, Coumaphos, Cyanophos, Demeton-S-methyl, Diazinon, Dichlorvos/ DDVP, Dicrotophos, Dimethoate, Dimethylvinphos, Disulfoton, EPN, Ethion, Ethoprophos, Famphur, Fenamiphos, Fenitrothion, Fenthion, Fosthiazate, Heptenophos, Isofenphos, Isopropyl *O*-methoxyaminothio=phosphoryl) salicylate, Isoxathion, Malathion, Mecarbam, Methamidophos, Methidathion, Mevinphos, Monocrotophos, Naled, Omethoate, Oxydemeton-methyl, Parathion, Parathion-methyl, Phenthoate, Phorate, Phosalone, Phosmet, Phosphamidon, Phoxim, Pirimiphos-, ethyl, Profenofos, Propetamphos, Prothiofos, Pyraclofos, Pyridaphenthion, Quinalphos, Sulfotep, Tebupirimfos, Temephos, Terbufos, Tetrachlorvinphos, Thiometon, Triazophos, Trichlorfon, Vamidothion
2 GABA-gated chloride channel antagonists	**2A** Cyclodiene organochlorines	Chlordane, Endosulfan, gamma-HCH (Lindane)
	2B Phenylpyrazoles (Fiproles)	Ethiprole, Fipronil
3 Sodium channel modulators	DDT	DDT
	Methoxychlor	Methoxychlor
	Pyrethroids	Acrinathrin, Allethrin, d-cis-trans Allethrin, d-trans Allethrin, Bifenthrin, Bioallethrin, Bioallethrin S-cylclopentenyl , Bioresmethrin, Cycloprothrin, Cyfluthrin, beta-Cyfluthrin, Cyhalothrin, lambda-Cyhalothrin, gamma-Cyhalothrin, Cypermethrin, alpha-Cypermethrin, beta-Cypermethrin, theta-cypermethrin, zeta-Cypermethrin, Cyphenothrin , (1*R*)-*trans*- isomers], Deltamethrin, Empenthrin , (*EZ*)- (1*R*)- isomers], Esfenvalerate, Etofenprox, Fenpropathrin, Fenvalerate, Flucythrinate, Flumethrin, tau-Fluvalinate, Halfenprox, Imiprothrin, Permethrin, Phenothrin [(1*R*)-trans- isomer], Prallethrin, Resmethrin, RU 15525, Silafluofen, Tefluthrin, Tetramethrin, Tetramethrin [(1*R*)-isomers], Tralomethrin, Transfluthrin, ZXI 8901
	Pyrethrins	Pyrethrins (pyrethrum)

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Main Group and Primary Site of Action	Chemical Sub-group or exemplifying Active Ingredient	Active Ingredients
4 Nicotinic Acetylcholine receptor agonists / antagonists	**4A** Neonicotinoids	Acetamiprid, Clothianidin, Dinotefuran, Imidacloprid, Nitenpyram, Thiacloprid, Thiamethoxam
	4B Nicotine	Nicotine
	4C Bensultap Cartap hydrochloride Nereistoxin analogues	Bensultap Cartap hydrochloride Thiocyclam, Thiosultap-sodium
5 Nicotinic Acetylcholine receptor agonists (allosteric) (not group 4)	Spinosyns	Spinosad
6 Chloride channel activators	Avermectins, Milbemycins	Abamectin, Emamectin benzoate, Milbemectin
7 Juvenile hormone mimics	**7A** Juvenile hormone analogues	Hydroprene, Kinoprene, Methoprene
	7B Fenoxycarb	Fenoxycarb
	7C Pyriproxyfen	Pyriproxyfen
8 Compounds of unknown or non-specific mode of action (fumigants)	**8A** Alkyl halides	Methyl bromide and other alkyl halides
	8B Chloropicrin	Chloropicrin
	8C Sulfuryl fluoride	Sulfuryl fluoride
9 Compounds of unknown or non-specific mode of action (selective feeding blockers)	**9A** Cryolite	Cryolite
	9B Pymetrozine	Pymetrozine
	9C Flonicamid	Flonicamid

Main Group and Primary Site of Action	Chemical Sub-group or exemplifying Active Ingredient	Active Ingredients
10 Compounds of unknown or non-specific mode of action (mite growth inhibitors)	**10A** Clofentezine Hexythiazox	Clofentezine Hexythiazox
	10B Etoxazole	Etoxazole
11 Microbial disruptors of insect midgut membranes (includes transgenic crops expressing *Bacillus thuringiensis* toxins)	***11A1*** B.t. *subsp*. israelensis	Bacillus thuringiensis *subsp.* israelensis
	11A2 *B. sphaericus*	*Bacillus sphaericus*
	11B1 *B.t.* subsp. *aizawai*	*Bacillus thuringiensis* subsp. *aizawai*
	11B2 *B.t.* subsp. *kurstaki*	*Bacillus thuringiensis* subsp. *kurstaki*
	11C B.t. *subsp*. tenebrionis	Bacillus thuringiensis *subsp.* tenebrionis
12 Inhibitors of oxidative phosphorylation, disruptors of ATP formation (inhibitors of ATP synthase)	**12A** Diafenthiuron	Diafenthiuron
	12B Organotin miticides	Azocyclotin, Cyhexatin, Fenbutatin oxide
	12C Propargite Tetradifon	Propargite Tetradifon
13 Uncouplers of oxidative phosphorylation via disruption of proton gradient	Chlorfenapyr DNOC	Chlorfenapyr DNOC
14 vacant		
15 Inhibitors of chitin biosynthesis, type 0, Lepidopteran	Benzoylureas	Bistrifluron, Chlofluazuron, Diflubenzuron, Flucycloxuron, Flufenoxuron, Hexaflumuron, Lufenuron, Novaluron, Noviflumuron, Teflubenzuron, Triflumuron

Main Group and Primary Site of Action	Chemical Sub-group or exemplifying Active Ingredient	Active Ingredients
16 Inhibitors of chitin biosynthesis, type 1, Homopteran	Buprofezin	Buprofezin
17 Moulting disruptor, Dipteran	Cyromazine	Cyromazine
18 Ecdysone agonists / moulting disruptors	**18A** Diacylhydrazines	Chromafenozide, Halofenozide, Methoxyfenozide, Tebufenozide
	18B Azadirachtin	Azadirachtin
19 Octopaminergic agonists	Amitraz	Amitraz
20 Mitochondrial complex III electron transport inhibitors (Coupling site II)	**20A** Hydramethylnon	Hydramethylnon
	20B Acequinocyl	Acequinocyl
	20C Fluacrypyrim	Fluacrypyrim
21 Mitochondrial complex I electron transport inhibitors	METI acaricides Rotenone	Fenazaquin, , Fenpyroximate, Pyrimidifen, Pyridaben, Tebufenpyrad, Tolfenpyrad Rotenone
22 Voltage-dependent sodium channel blockers	Indoxacarb	Indoxacarb
23 Inhibitors of lipid synthesis	Tetronic acid derivatives	Spirodiclofen, Spiromesifen
24 Mitochondrial complex IV electron transport inhibitors	**24A** Aluminium phosphide	Aluminium phosphide
	24B Cyanide	Cyanide
	24C Phosphine	Phosphine
25 Neuronal inhibitors (unknown mode of action)	**25** Bifenazate	Bifenazate

Main Group and Primary Site of Action	Chemical Sub-group or exemplifying Active Ingredient	Active Ingredients
26 Aconitase inhibitors	Fluoroacetate	Fluoroacetate
27 Synergists	**27A** P450-dependent monooxygenase inhibitors	Piperonyl butoxide
	27B Esterase inhibitors	Tribufos (DEF)
28 Ryanodine receptor modulators	Flubendiamide	Flubendiamide
un Compounds with unknown mode of action[2]	**una** Benzoximate	Benzoximate
	unb Chinomethionat	Chinomethionat
	unc Dicofol	Dicofol
	und Pyridalyl	Pyridalyl
ns Miscellaneous non-specific (multi-site) inhibitors[3]	**nsa** Borax	Borax
	nsb Tartar emetic	Tartar emetic

Notes to be read in association with the above classification:

1 Inclusion of a compound in the list above does not necessarily signify regulatory approval
2 A compound with an unknown mode of action or an unknown mode of toxicity will be held in category 'un' until evidence becomes available to enable that compound to be assigned to a more appropriate mode of action class
3 Category 'ns' is used for compounds or preparations with a non-specific, multisite action.

Groups and Sub-groups – Although sharing the same primary target site, it is possible that not all members of a single major MoA class have been shown to be cross-resistant. Different resistance mechanisms that are not linked to the target site of action, such as enhanced metabolism, may be common for such a group of chemicals. In such cases, the MoA grouping is further divided into sub-groups. For the purposes of this classification it should be assumed that cross-resistance exists between compounds in any one MoA sub-class. Alternation of compounds from different sub-groups within a class *may* be an acceptable part of an IRM strategy. Consult a local resistance expert for further advice.

Products containing multiple or stacked toxins will be differentiated from those containing single toxins only. This will be done by adding a suffix of "m" for multiple toxin products and "s" for single toxin products. Products containing spores will be differentiated from those without spores by adding "+" for spore-containing products and "-" for those which do not contain spores. For example, *Bacillus thuringiensis* subsp. *kurstaki* products containing multiple toxins and spores may be designated as 11Dm+, while the same product without spores and expressing only one toxin would be designated as Group 11Ds-

Superseded, obsolete or withdrawn compounds for which no current registration exists, and that are no longer in common usage, will be listed in Appendix 3 (in preparation).

General notes

This document has been prepared using the most up-to-date information available to IRAC. It is provided to user groups, grower organizations, extension personnel, regulatory authorities such as the US EPA and all those involved in resistance management, as an agreed definitive statement by the agrochemical industry on the mode of action of insecticides currently in use. Given the broad nature of this user community and the many uses that are demanded of this document, readers should be aware that IRAC has sought to provide a workable listing that serves the needs of as many of these users as possible.

In a continued effort to refine the list, readers are kindly asked to inform IRAC of factual errors or omissions, citing definitive evidence wherever possible. Such submissions should be directed to IRAC via the website at: www.irac-online.org. Suggestions for improvements are likewise welcome.

Updates

The IRAC MoA classification is reviewed and reissued at intervals as required. The latest version is always available for reference via IRAC's website www.irac-online.org

Submissions for new active ingredients together with recommendations for their inclusion in specific new or existing MoA classes, together with citations or evidence for classification should be made to IRAC through the website. IRAC member companies review draft versions before an agreed final version of any update is published. In addition, a number of internationally well-known insect toxicologists and biochemists are also consulted regarding additions, deletions or other changes to the list.

Changes to the listing may have serious consequences. In those countries where insecticide labels display the IRAC MoA number or class name as an aid to good IRM (see Appendix 1), changes may be especially costly to implement. In general, changes are therefore only endorsed when the scientific evidence supporting the change is compelling.

Appendix 1

Product labels: Indication of MoA of active ingredient and accompanying IRM advice

To assist users in the selection of insecticides for use in IRM strategies employing sequences, rotations or alternations of MoA groups, IRAC is encouraging producers to clearly indicate the IRAC MoA group number and description on the product label, and to accompany this with appropriate advice of the type indicated below. Thus, in addition to the detailed product information, handling, and safety information required by local regulations, a typical title label should clearly indicate the IRAC MoA Group number & description, and minimal, brief advice on IRM as indicated in the example below.

(Example)

Insecticide ® 50 SC

IRAC MoA Group 15
Inhibitors of chitin biosynthesis, type 0, Lepidopteran Benzoylureas

Active Ingredient: [Compound name]
Formulation details

For resistance management purposes, Insecticide 50SC is an IRAC Mode of Action Group 15 insecticide. Any insect population may contain individuals naturally resistant to Insecticide 50SC and other Group 15 insecticides. If these insecticides are used repeatedly, the resistant individuals may eventually dominate the pest insect population. These resistant insects may not be controlled by Insecticide 50SC or by other Group 15 insecticides. To delay the development of resistance:

- Avoid exclusive repeated use insecticides from the same chemical subgroup, (indicated by the IRAC Mode of Action Group number).
- Alternate with products from other IRAC Mode of Action Groups
- Integrate other control methods (chemical, cultural, biological) into insect control programs.

For further information on resistance management and advice on IRM programmes contact your local distributor."

Appendix 2

The following IRM principles are recommended and endorsed by IRAC:

a. Consult a local agricultural advisor or extension services in the area for up-to-date recommendations and advice on IPM and IRM programmes
b. Consider options for minimizing insecticide use by selecting early-maturing or pest-tolerant varieties of crop plants
c. Include effective cultural and biological control practices that work in harmony with effective IRM programmes. Adopt all non-chemical techniques known to control or suppress pest populations, including biological sprays such as Bt's, resistant varieties, within-field refugia (untreated areas) and crop rotation
d. Where possible select insecticides and other pest management tools which preserve beneficial insects
e. Use products at their full, recommended doses. Reduced (sub-lethal) doses quickly select populations with average levels of tolerance, whilst doses that are too high may impose excessive selection pressures
f. Appropriate, well-maintained equipment should be used to apply insecticides. Recommended water volumes, spray pressures and optimal temperatures should be used to obtain optimal coverage
g. Where larval stages are being controlled, target younger larval instars where possible because these are usually much more susceptible and therefore much more effectively controlled by insecticides than older stages
h. Use appropriate local economic thresholds and spray intervals
i. Follow label recommendations or local expert advice for use of alternations or sequences of different classes of insecticide with differing modes of action as part of an IRM strategy
j. Where there are multiple applications per year or growing season, alternate products of different MoA classes
k. In the event of a control failure, do not reapply the same insecticide but change the class of insecticides to one having a different mode of action and to which there is no [locally] known cross-resistance

l. Mixtures may offer a short-term solution to resistance problems, but it is essential to ensure that each component of a mixture belongs to a different insecticide mode of action class, and that each component is used at its full rate
m. Consideration should be given to monitoring for the incidence of resistance in the most commercially important situations and gauge levels of control obtained
n. Withholding use of a product to which resistance has developed until susceptibility returns may be a valid tactic if sufficient alternative chemical classes remain to provide effective control.

Appendix 3

IRAC Mode of Action Classification

- Superseded or Obsolete Compounds (Withdrawn compounds for which a registration no longer exists, but for which a searchable directory of MoA classification is historically of interest) ***(In preparation for 2006)***

Source: IRAC (Insecticide Resistance Action Committee) website. For more information, please visit **http://www.irac-online.org**

Editor's Note: A similar and equally important system has been created by HRAC (Herbicide Resistance Action Committee) to manage resistance development in herbicides. Watch future copies of this newsletter for more information on this subject, or visit ***http://www.plantprotection.org/hrac/index.html*** *for more information.*

* * *

Indar Approved For Mummyberry Control in Vermont

Indar has been shown to be one of the most effective materials for managing mummyberry disease in blueberries, but since it is not labeled for this use, many states have applied to EPA for special permission to use it. A Section 18 Exemption has now been issued for the use of Indar 75WSP for mummyberry control in blueberries in Vermont. The exemption runs from April 1 to September 1, 2006. You have to be in possession of the supplemental label at the time of application. The supplemental label is available on the Vermont Agency of Agriculture web site www.vermontagriculture.com. Indar used to be a Rohm and Haas product, but is now manufactured by Dow AgroSciences. If growers have existing stocks of the Rohm and Haas product they may be used. The recommended application rate is 2-oz per acre using ground equipment. Sprays should begin at early green tip and subsequent applications should be made at ten to fourteen day intervals. Do not make more than five applications per season or use within 30 days of harvest. Do not use any spray adjuvants with Indar 75WSP. Applications are not permitted within 75 feet of streams, rivers, ponds, lakes, or reservoirs. Carefully read the label before use.

* * *

Aquatic Weed Control

In coordination with the Vermont Agency of Natural Resources, Aquatic nuisance control permit program, the Vermont Agency of Agriculture Pesticide program has restricted the use of aquatic herbicides by classifying them as Class A restricted use products. This does not mean that these products are unavailable in Vermont, but they are only available to customers with an aquatic nuisance control permit, or applicators who meet the exemption outlined in the regulations. These regulations can be obtained from the following link http://www.vtwaterquality.org /permits/htm/pm_anc.htm , or by contacting Susan Jary at Vermont Department of Environmental Conservation, Water Quality Division, 103 South Main Street - Building 10 North, Waterbury, VT 05671-0408.

To express concerns about these changes or if you have any other questions please contact:

Cary Giguere, Vermont Agency of Agriculture
Ag. Resource Mngmt & Env. Stewardship
116 State Street, Montpelier VT 05620
Phone (802) 828-6531

Pesticide Applicator Companies and Commercial Applicators: A Reminder about Changes in Job Status

Commercial and non-commercial applicators and companies that hold a Vermont pesticide company license, you have 30 days to notify the Agency of Agriculture of any changes in job status.

- For commercial applicators that have changed jobs, you must submit a new application with the appropriate fees to renew your certificate under your new employer.
- For companies that have just hired a new certified applicator, you must submit a letter stating the name of the newly hired employee.
- For companies that have let a certified applicator go, please submit a letter to us letting us know that this person is no longer employed by you.

This will help us keep our records up-to-date. Please contact me with any questions or to request an application:

Vermont Agency of Agriculture
Attn: Matthew Wood
116 State Street – Drawer 20
Montpelier, VT 05620

Ever wonder how many re-certification credits you have?

You can find out how many credits you have and when your exam expires (which is why you need to earn these credits) by visiting the Vermont Pesticide Applicator Website:

http://www.vermontagriculture.com/pest.htm

Once there, click on the "Certified Pesticide Applicators Database" link and select the type of search you would like to do, such as "Search by Applicator Last Name." Enter your name, and click on your name when it pops up to check on your status. Note your categories, the date your exam expires, and how many credits you currently have. This number may not include any credits that you have sent in recently, but will serve as a general guide to how well you are keeping up with your credits.

Be sure to send in credits as you earn them. It is fine to hold on to them and send them in once per year, but do not wait until your exam expires to send them to me. Please keep ahead of it so you can renew automatically when we print renewals at the end of the year.

News from the UVM Extension Service

UVM Extension Pesticide Education and Safety Program Updates

Ann Hazelrigg, PESP Coordinator

Pesticide Education and Safety Funds

For the past several years, Extension departments across the country have received Federal EPA funds for administering Pesticide Education and Safety Programs (formerly known as Pesticide Applicator Training Programs.) These programs have been charged with educating pesticide applicators in the safe use of pesticides and have helped Vermonters to both attain a Pesticide Applicator's License and to retain this license by offering educational programs providing pesticide recertification credits. The Vermont program funds have also been used for training opportunities, covering costs of the *Pesticide Applicator Report,* updating website information plus other educational programs. EPA has recently informed Cooperative Extension these funds will no longer be available as of 2007. EPA has chosen to offer the funds as competitive grants to be used expressly for the development of initial certification training materials, with no funds allocated for recertification programs, Pesticide Coordinator positions, etc. The New England states have been informed we will have access to about 10% of the total monies allocated for the grants or about $95,000. Discussions are currently taking place among the Pesticide Coordinators, Extension Directors and State Lead Agencies in the NE states concerning the ramifications of EPA's decisions.

New Resources Available From UVM:

New Calibration Guide

A new Agricultural Pocket Calibration Guide has been produced by University of Maine Cooperative Extension and the NE IPM Center in cooperation with the NE Pesticide Coordinators. Calibration procedures for backpack, boom, band and air blast sprayers plus granular applications are covered in the small free booklet.
If you would like a copy, contact me at 656-0493 or by email at ann.hazelrigg@uvm.edu.

PRO New England Pest ID Cards though the NE Pest Management Network

You can access great pest information for New England through the PRONewEngland website at PRONewEngland.org. The goals for the website are to enhance public understanding of pest management practices in New England and to improve public access to pest information. The website provides comprehensive, focused public access to a wide variety of content relevant to pest management in New England, including information on expertise contacts for each state, specific pest topics including biotech, crop and livestock, health and indoor, invasive pests, organic info, etc. The website also strives to facilitate and increase stakeholder participation in prioritizing regional pest management needs and presenting a coordinated New England perspective to federal regulatory agencies. The NE Pest Management Network is instrumental in helping to represent New England in national regulatory decisions.

PRONewEngland has produced 8 different Pest ID cards available for no cost;

Tree Fruit Insect and Disease Pests
Health and Nuisance Pests
Household Insect Pests
Non-harmful Household Invaders
Major Invasive Pest Threats
Ornamental Plant Insect Pests
Vegetable Diseases
Vegetable Insect Pests

These promotional cards were printed to advertise the PRONewEngland.org website,

but they also have stand-alone use for pest identification. With color pest photos and useful pest facts on the front side, they are proving to be popular handouts at farm stands, garden centers and other retail outlets. Also available is a PRO NE magnet. If you would like to have one or more sets of these cards or magnets to hand out to clients or for your own use, please contact me at 656-0493 or ann.hazelrigg@uvm.edu. A picture of the cards can be seen on the website under "outreach" and PRO-motional materials.

Extension Offices to Move

During the summer, the State Extension and the Chittenden County Office (formerly off Spear Street) will be moving to new quarters in Colchester. This is part of an overall effort on the part of the UVM campus to renovate and provide academic space to programs that focus primarily on undergraduate needs. As the available academic space on the core campus has been stressed with renovation and increased student numbers as part of the overall University growth, several units are moving to nearby campus locations. The University is providing high quality office space to Extension in Colchester that includes continued connection to the University phone and internet system. For exact time of move and location call Extension at 656-2990.

New Hire for PSS

UVM Plant and Soil Science Department has hired a new Landscape Faculty member, Dr. Sarah Lovell. She will be specializing in Landscape Plant Science and Sustainable Design.

Dr. Lovell comes from the University of Illinois, where she recently completed a Masters of Landscape Architecture. Prior to this Dr. Lovell received a BS in Agricultural Science, and both a MS and PhD in Agronomy, all from U of I. After receiving her PhD, Dr. Lovell worked for 4 years with Dow AgroSciences throughout the Midwest as a Senior Research Biologist.
Dr. Lovell will teach two landscape design courses in the Department, as well as two other landscape related courses to be determined.

* * *

Pesticide Drift

Ann Hazelrigg, PESP Coordinator UVM
Adapted from EPA: Pesticides and Spray Drift

With the urban/agriculture interface increasing in Vermont each year, farmers spraying fields need to be even more conscious of the risk of pesticide drift. Drift issues are not just an issue on farms. Calls have already come into the Vermont Agency of Agriculture this spring regarding drift and odor issues related to lawn care applications in neighborhoods. Drift is defined as the physical movement of a pesticide through air at the time of application or soon thereafter, to any site other than that intended for application (often referred to as off target). EPA does not include in its definition the movement of pesticides to off-target sites caused by erosion, migration, volatility, or contaminated soil particles that are windblown after application, unless specifically addressed on a pesticide product label with respect to drift-control requirements.

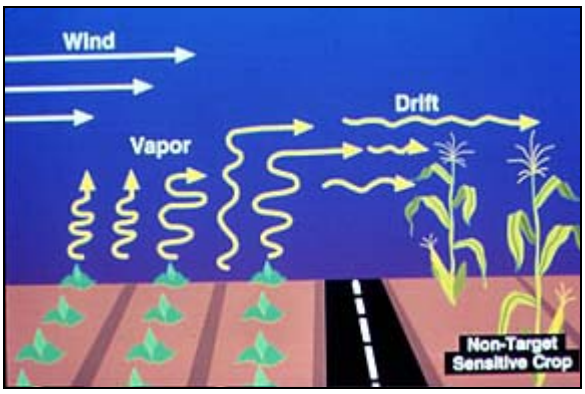
How Does Spray Drift Occur?

When pesticide solutions are sprayed, droplets are produced by the nozzles of the sprayer equipment. Many of these droplets can be so small that they stay suspended in air and are carried by air currents until they contact a surface or drop to the ground. There are many factors that can influence drift, including

weather conditions, topography, the crop or area being sprayed, application equipment and methods, and decisions by the applicator.

What Are the Impacts of Spray Drift?

Off-target spray can affect human health and the environment. For example, spray drift can result in pesticide exposures to the applicator, farm workers, children playing outside, plus wildlife and its habitat. Drift can also contaminate a home garden or another farmer's crops, causing illegal pesticide residues and/or plant damage. The proximity of individuals and sensitive sites to the pesticide application, the amounts of pesticide drift, and toxicity of the pesticide are important factors in determining the potential impacts from drift.



How Does EPA View Off-Target Spray Drift?

EPA recognizes the importance of exposures to pesticides resulting from spray drift. There are thousands of reported complaints of off-target spray drift each year. Reports of exposures of people, plants, and animals to pesticides due to off-target drift (often referred to as "drift incidents") are an important component in the scientific evaluation and regulation of the uses of pesticides. Other routes of pesticide exposure include consuming foods and drinking water which may contain pesticide residues, applying pesticides, and contacting treated surfaces in agricultural, industrial, or residential settings. EPA considers all of these routes of exposure in regulating the use of pesticides.

When labels of pesticide products state that off-target drift is to be avoided or prohibited, EPA's policy is straightforward: pesticide drift from the target site is to be prevented. However, EPA recognizes that some degree of drift of spray particles will occur from nearly all applications. Nevertheless, applicators and other responsible parties must use all available application practices designed to prevent drift that will otherwise occur. In making their decisions about pesticide applications prudent and responsible applicators must consider all factors, including wind speed, direction, and other weather conditions; application equipment; the proximity of people and sensitive areas; and product label directions. A prudent and responsible applicator must refrain from application under conditions that are inconsistent with the goal of drift prevention, or are prohibited by the label requirements. EPA uses its discretion to pursue violations based on the unique facts and circumstances of each drift situation.

Pesticide applicators and others, including landowners, play a very important role in pesticide application -- deciding whether or not to apply a pesticide and if so how best to make that application. It is their responsibility to know and understand a product's use restrictions. They are responsible for complying with all other pesticide laws regarding pesticide applications and ensuring that their application equipment and techniques will produce a minimum of spray drift. EPA also expects applicators to exercise a high level of professionalism in making decisions about applications.

* * *

Home Study Quiz 1 – Spray Drift

The following set of questions pertains to the **Spray Drift** article and table on pages 15 - 16. Fill out the information on the back of the completed quiz and mail it to the Vermont Agency of Agriculture to receive **one pesticide recertification credit.**

1. How does EPA define pesticide drift?

2. There is always some degree of drift of spray particles occurring from nearly all applications. True or False.

3. What is meant by “off target.”

4. List three methods you can use to avoid drift?

5. What are the impacts of spray drift?

6. Name 3 factors that can influence drift?

7. Discuss how you can minimize drift in your operation given your spray equipment and the type of pesticide applications you would make.

Pesticide Applicator Report – Page 18

Fill out the following information and mail the completed quiz to the Vermont Agency of Agriculture to receive one (1) pesticide recertification credit.

Name:	
Certificate #:	Please check: ☐Commercial or Non-Commercial ☐Private
Street Address:	
City/State/Zip	
Company/Farm:	
Signature:	**Date:**

Mail to:

Vermont Agency of Agriculture
Attn: Matthew Wood
116 State Street - Drawer 20
Montpelier, VT 05620-2901

Home Study Quiz 2 – IRAC (Insecticide Resistance Action Committee) Mode of Action Classification

The following set of questions pertains to the **IRAC (Insecticide Resistance Action Committee) Mode of Action Classification** article and table on pages 3 – 12. Fill out the information on the back of the completed quiz and mail it to the Vermont Agency of Agriculture to receive **one pesticide recertification credit.**

1. Define "Resistance to Insecticides."

2. Fill in the Blanks. Resistance arises through the_____ or _____ of an insecticide or acaricide against a pest species and results in the selection of resistant forms of the pest and the consequent _____ of populations that are resistant to that insecticide or acaricide.

3. Define Cross-resistance.

4. Multiple choice: MoA is:

A. one of the Three Stooges
B. a type of snake
C. short for Mode of Action
D. a microbial disruptor of insect midgut membranes
E. all of the above

5. True____, False____ If you were concerned about the development of resistance to your insecticide containing **Aldicarb**, (IRAC MoA Group 1A) it would be appropriate to alternate with an insecticide containing **Pyrethrins**.

6. True____, False____ If you were concerned about the development of resistance to your insecticide containing **Chlordane**, (IRAC MoA Group 2A) it would be appropriate to alternate with an insecticide containing **Endosulfan**.

7. True____, False____ If you were concerned about the development of resistance to your insecticide containing **Acetamiprid**, (IRAC MoA Group 4A) it would be appropriate to alternate with an insecticide containing **Abamectin**.

8. True____, False____ This IRAC Mode of Action classification Table v5.1 includes Herbicide Active ingredients as well.

9. True____, False____ Integrating other control methods such as biological, cultural or mechanical controls would also help to manage the development of resistant insect populations.

10. True____, False____ If you smoked a lot of cigarettes, your blood would be considered a pesticide with an IRAC Mode of Action classification of 4B.

Pesticide Applicator Report

June 2006

Vermont Agency of Agriculture
Agriculture Resource Management & Environmental Stewardship
116 State Street - Drawer 20
Montpelier, VT 05620-2901

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Fill out the following information and mail the completed quiz to the Vermont Agency of Agriculture to receive one (1) pesticide recertification credit.

Name:	
Certificate #:	Please check: ☐Commercial or Non-Commercial ☐Private
Street Address:	
City/State/Zip	
Company/Farm:	
Signature:	**Date:**