

2004 Field Crop Insect Management Recommendations

<http://www.ext.nodak.edu/extpubs/plantsci/pests/e1143w1.htm>

compiled by **Phillip Glogoza, Extension Entomologist,**
in cooperation with Janet Knodel, Mark Boetel, Denise Olson, and Gary Brewer
Department of Entomology
North Dakota State University

This is your reference copy of the 2004 edition of the NORTH DAKOTA INSECT MANAGEMENT GUIDE. The recommendations conform to the current federal and state laws and regulations relating to pesticidal chemicals at the time of printing. However, since pesticide recommendations are frequently subject to change and inasmuch as this publication is revised only once each year, it is extremely important that you keep in contact with North Dakota State University for up-to-date information on possible changes in certain insecticide use patterns.

The Federal Insecticide, Fungicide and Rodenticide Act as amended, makes it illegal to use any pesticides in a manner inconsistent with the label. Therefore, it is of the utmost importance that insecticide users READ, UNDERSTAND and FOLLOW all label directions and precautions.

Trade names have been used in some cases for simplicity and their usage does not imply endorsement of one product over another nor discrimination against any product by the North Dakota State University Extension Service. Some compounds have been omitted because they are not available, present unnecessary hazards to the user, or there is a lack of efficacy when compared to other available products.

CAUTION!!!

The Entomology Staff at North Dakota State University believes that the recommendations in the guide are essentially accurate. However, since we do not exercise control over their use and the manner or conditions under which they are used, we assume no responsibility for personal injury, property damage, or other types of loss resulting from the handling or use of the pesticides listed herein. PLEASE DISCARD ALL EARLIER EDITIONS OF THE NORTH DAKOTA INSECT CONTROL GUIDE.

TABLE OF CONTENTS

Insecticide Control Recommendations	2
Insecticide Classes	3
Toxicity of Insecticides	3
The Effect of Water pH on Insecticides	4
Reporting Damage Due to Pesticide Applications	5
North Dakota Field Posting Regulations	5
Managing Insecticides to Prevent Groundwater Contamination	5
Seed Treatments	7
Small Grain Insects (Wheat, Barley, Oats)	9
Corn Insects	16
Dry Edible Bean Insects	25
Forage Insects	29
Rangeland and Non-Crop Site Insects	34
Potato Insects	37
Sugarbeet Insects	42
Carrot Insects	50
Soybean Insects	51
Canola Insects	59
Mustard Insects	61
Sunflower Insects	61
Flax Insects	68
Pulse Crop Insects (Field pea, Lentil, and Chickpea)	69
Biological Control Agents of Insects (Predators, Parasites, and Pathogens)	72
Stored Grain Bin Treatments and Protectants	76
Fumigants	77
Reasons for Fumigation Failures	78
Quick Reference Charts - Insecticides for Field Crops, Vegetables, and Lawn and Ornamental	79

INSECTICIDE CONTROL RECOMMENDATIONS

The following recommendations include only the application of chemicals for the control of some of the important insect and mite pests. Keep in mind that the most effective and economical controls for many of these pests involve a complete program of cultural and mechanical as well as chemical operations.

For more complete information on any particular pest, consult reference material such as text books, bulletins, circulars, and leaflets covering the specific problem.

Some recommendations for the use of insecticides are given in terms of pounds or ounces of actual toxicant per acre or as percent of actual toxicant in the finished spray. This is necessary because of the wide variety of insecticide formulations and of equipment for applying them.

Insecticides usually are available as emulsifiable concentrates, wettable powders, dusts, granules or solutions. Each is designed for a specific method of application. For example, dusts are formulated to be applied dry; wettable powders are designed mainly for high gallonage pressure sprayers as used for spraying livestock; the emulsifiable concentrates, when diluted with water, form emulsions which may be used in low gallonage, low pressure sprayers. The job to be done and the equipment to be used will govern the type of formulation to recommend.

Actual Toxicant Per Acre

Most applications to cereal and field crops are made in the form of sprays using emulsifiable concentrates or dusts. With dusts, it is relatively simple to determine the amount of dust to apply per acre. If the recommendation calls for 2

pounds of actual insecticide per acre and a 5 percent dust is used, then 40 pounds of the dust would have to be put on each acre to get 2 pounds of actual insecticide per acre.

When using emulsifiable concentrates, read the label on the container to determine the amount of actual toxicant, or active ingredient, per gallon. Generally, for 25 percent concentrates, there are 2 pounds of actual toxicant per gallon; for 45 percent concentrates, there are 4 pounds of actual toxicant per gallon, etc.

The following tables may be used for determining the amount of material to use per acre. It is important to calibrate sprayers so that applications will be made accurately. This will ensure effectiveness and will tend to avoid waste of chemicals and accumulations of possibly dangerous residues.

Tolerance and Preharvest Intervals

A "tolerance" is the maximum amount of pesticide residue that may lawfully remain in or on food. Some pesticides, because of their chemical structure, leave no residue at all. Others are not harmful to humans when present in minute quantities. Still others are known to be harmful when present in food and so cannot be present even in minute quantities.

A preharvest interval is the time required between applications and harvest which will ensure conformance with the tolerance. The preharvest intervals established vary with the pesticide and the ultimate usage of it. In many instances, a pesticide cannot be used simply because it is not possible to adhere to the recommended preharvest interval.

ABBREVIATIONS USED THROUGHOUT THIS DOCUMENT

A = acre	FM = flowable microencapsulated	RUP= Restricted Use Pesticide
AI = active ingredient	G = granular	sol = solution
bu = bushel	GPA= gallons per acre	SP = soluble powder
D = dust	gal = gallon	sq ft = square feet
EC = emulsifiable concentrate	lb = pound	T = tablespoon
F = flowable	oz = ounce	t = teaspoon
fl = fluid	pt = pint	ULV = ultra low volume
fl oz = fluid ounce	qt = quart	WP = wettable powder

INSECTICIDE CLASSES

Insecticides can be classified in a number of ways. The following table provides a listing of some common insecticide products used in North Dakota with their chemical classification designated.

Alternating the class of insecticide used for controlling insects can delay or even prevent resistance to those compounds. Reliance on a single compound or a group of compounds in the same class of insecticides could lead to

development of resistance at a faster rate.

Resistance develops when survivors of a chemical application are able to pass on the genetic trait responsible for survival to their offspring. If a control failure occurs with a compound, do not use it in a follow-up treatment, nor should a compound from the same class be used (cross-resistance).

Trade Name	Active Ingredient	Insecticide Class ¹	Trade Name	Active Ingredient	Insecticide Class ¹
Actara	thiamethoxam	N	Lorsban	chlorpyrifos	OP
Actellic	pirimiphos-methyl	OP	Malathion	malathion	OP
Admire	imidacloprid	N	Margosan-O	azadirachtin	B
Agrimek	abamectin	M	Marlate	methoxychlor	CH
Ambush	permethrin	P	Mavrik	fluvalinate	P
Apistan	fluvalinate	P	MesuroI	methiocarb	C
Asana XL	esfenvalerate	P	Methyl Parathion	methyl parathion	OP
Aztec	cyfluthrin + tebupirimiphos	P + OP	Mocap	ethoprop	OP
Bt	<i>Bacillus thuringiensis</i>	M	Monitor	methamidophos	OP
Baythroid	cyfluthrin	P	Mustang	zeta-cypermethrin	P
Capture	bifenthrin	P	Nolobait	<i>Nosema locustae</i>	M
Counter	terbufos	OP	Orthene	acephate	OP
Cruiser	thiamethoxam	N	Parathion	ethyl parathion	OP
Cygon	dimethoate	OP	Penncap-M	methyl parathion	OP
Di-Syston	disulfoton	OP	Phaser	endosulfan	CH
Diacon II	methoprene	IGR	Platinum	thiamethoxam	N
Diazinon	diazonon	OP	Pounce	permethrin	P
Dibrom	naled	OP	Provado	imidacloprid	CN
Digon	dimethoate	OP	Pydrin	fenvalerate	P
Dimethoate	dimethoate	OP	Reldan	chlorpyrifos-methyl	OP
Dimilin	diflubenzuron	IGR	Scourge	resmethrin	P
Dyfonate	fonofos	OP	Scout X-Tra	tralomethrin	P
Force	tefluthrin	P	Sevin	carbaryl	C
Fortress	chlorethoxyfos	OP	SpinTor, Tracer	spinosad	S
Fulfill	pymetrozine	PA	Temik	aldicarb	C
Furadan	carbofuran	C	Tempo	cyfluthrin	P
Gaucho	imidacloprid	N	Thimet	phorate	OP
Guthion	azinphos-methyl	OP	Thiodan	endosulfan	CH
Helix	thiamethoxam	N	Tiguvon	fenthion	OP
Imidan	phosmet	OP	Triumph	isazophos	OP
Karate	lambda cyhalothrin	P	Vapona	dichlorvos, DDVP	OP
Kelthane	dicofol	CH	Vydate	oxamyl	C
Lannate	methomyl	C	Warbex	famphur	OP
Lindane	lindane	CH	Warrior	lambda cyhalothrin	P

¹ C=carbamate; OP=organophosphate; P=pyrethroid; CD=cyclodiene; CH=chlorinated hydrocarbon; N=nicotinic; B=botanical; M=microbial, S=spinosyn, IGR=insect growth regulator, PA=pyridine azomethines.

TOXICITY OF INSECTICIDES

All insecticides are classified as poisons, although there are considerable variations in the degree of toxicity to warm-blooded animals. Toxicity refers to the degree to which a specific insecticide is poisonous to animals. TOXICITY is classified as acute (severe) or chronic (long term) and it varies with the species, age, sex and method of administration to animals, nutritional state, and the type of insecticidal formulation used.

Poisoning with insecticides may occur through the mouth and nose (oral) or through skin contact (dermal). It

usually requires less insecticide to kill when administered through the mouth, although the greatest potential for occupational hazard in the use of insecticides is more closely associated with skin contamination.

The tests used to determine the toxicity of insecticides involve laboratory animals. Toxicity is expressed as LD₅₀ which means the lethal dosage required to kill 50 percent of the test animal population. The amount of material needed to produce a lethal dose is expressed as milligrams of toxicant per kilogram of live animal weight (mg/kg).

CLASSIFICATION OF ACUTE ORAL TOXICITY FOR DIFFERENT CHEMICALS AND LETHAL DOSAGE FOR 150 POUND MAN			
Class	Signal Word	LD ₅₀ , mg/kg	Lethal Dose For 150 Pound Man
Highly toxic	Danger / Poison	50 & below	few drops to 1 teaspoon
Moderately toxic	Warning	above 50 - 500	1 teaspoon to 1 ounce
Toxic	Caution	above 500 - 5,000	1 ounce to 1 pint or 1 pound
Non-toxic	Caution	above 5,000	1 pint to over 1 quart

North Dakota Pesticide Poison Information Toll - Free Number **1 - 800 - 222 - 1222**

THE EFFECT OF WATER PH ON INSECTICIDES

In recent years, another consideration in the application of insecticides is the pH of the water to be used for spraying. This is particularly important when organophosphate and carbamate insecticides are to be used such as Guthion, parathion, malathion, carbaryl, and others. Experience in the Red River Valley area of North Dakota indicates that water

with a pH of 8.0-8.2 or higher will cause rather rapid degradation of these insecticides while in solution. Buffering effects occur while the insecticide is in the spray solution, from mixing, through storage in the tank and continues until the water has evaporated from the spray droplet lying on the leaf.

Half-Life* of Some Insecticides At Different Water pH

Insecticide Product	Buffering Advised	Optimum pH	Half-Life for given pH						
			9.0	8.0	7.0	6.0	5.0	4.0	
Actara		7.0	Susceptible to alkaline hydrolysis in pH<9.0						
Actellic		7.0		12 days	35 days		7 days		
Admire		6.0	355 days		Fully stable at a pH of 5 and 7				
Ambush (permethrin)		7.0	Stable at pH 6.0 - 8.0						
Asana XL		7.0	Stable over a pH 5.0 - 9.0 range						
Di-Syston	U	5.0	7.2 hours			32 hours	60 hours		
Diazinon		7.0	29 days		70 days		14 days		
Dibrom	U	5.0	Hydrolyzed in 48 hours In pH > 7						
Dimethoate / Digon	U	5.0	48 min.			12 hours		20 hours	
Dipel (Bac.		6.0	Unstable in pH>8.0						
Furadan	U	5.0	78 hours			8 days			
Guthion	U	5.5	12 hours		10 days		17 days		
Imidan	U	5.0		4 hours	12 hours			13 days	
Lannate		6.5	stable in slightly acidic water						
Lindane			11 days		27 weeks				
Lorsban		7.0		1.5 days	35 days		63 days		
Malathion	U	5.0	5 hours	19 hours	3 days	8 days			
Monitor	U	5.5	Decomposes rapidly at pH > 7						
Orthene (acephate)		7.0	16 days		46 days		40 days		
Pounce (permethrin)		7.0	Stable at pH 6.0 - 8.0						
Provado		7.0	Stable over wide range of pH						
Reldan		7.0		3 days		38 days		10 days	
Sevin (carbaryl)	U	7.0	24 hours	2.5 days	12 days				
Spintor		7.0	Stable in pH from 6.0 to 11.0					12 hours	
Thiodan		6.5	some alkaline hydrolysis						
Vydate	U	5.0	3 hours		8 days		stable at 4.7 pH		
Warrior		6.0	stable in pH 4.5 - 7.5						

* Half-life is the time it takes for 50% of the chemical to decompose

REPORTING DAMAGE DUE TO PESTICIDE APPLICATIONS

The filing of the "Report of Loss" is required by North Dakota Century Code, Chapter 4-35, prior to any civil action proceedings regarding pesticide loss. This is merely a reporting procedure and any civil action must be pursued by you. The completed "Report of Loss" form must be filed with the following:

1. **Commissioner of Agriculture**
2. **Operator or applicator allegedly responsible**
3. **Person contracting the work other than yourself**

The "Report of Loss" form must be filed with the Commissioner of Agriculture within 60 (sixty) days from the occurrence of such loss or prior to the time when 50% of the crop was harvested. If, however, the applicant does not inform the claimant of the legal requirements for the claimant to file a verified report of loss, the claimant shall have one year from the date of the incident to file a verified report of loss. It is recommended that you establish evidence by pictures and/or by using an expert in the pesticide drift field. This verification is necessary in a court of law.

The "Proof of Service" form should be served upon (1) the operator or applicator, and (2) the person who has

contracted the work. As you notice, the form can be served by a county sheriff or a disinterested person of legal age. Should you request the sheriff's service, there will be a cost to you. The "Proof of Service" form should also be filed with the Commissioner of Agriculture within the specified time frame.

"Report of Loss" and "Proof of Service" forms are available from the North Dakota Department of Agriculture. Request of forms and further inquiries should be directed to:

Jeff Olson
Department of Agriculture
State Capitol Building
Bismarck, North Dakota 58505
Phone: (701) 224-2231

North Dakota Department of Agriculture

<http://www.agdepartment.com>

NORTH DAKOTA FIELD POSTING REGULATIONS

All pesticides that require posting on the label and pesticides from the following list must be posted by the farm operator or the farm operator's designee, which may include commercial applicators. The signs must be a minimum of eight inches by eleven inches with one-half inch lettering and be easily readable. The signs must be posted at all normal entrances to the field and on all corners which are along normally traveled roads. These signs can be maximum of one-half mile apart. The signs must contain the following information: Danger field sprayed with (pesticide name). The field is safe for re-entry on (date).

Insecticides Requiring Posting Under North Dakota Posting Regulations

Chemical	Re-entry interval (REI)
Dyfonate (fonofos)	Do not enter or allow worker entry for 48 hours. The REI increases to 72 hours in outdoor areas where average rainfall is less than 25 inches per year.
Dy-syston (disulfoton)	Do not enter or allow worker entry into treated areas for 48 hours. The REI increases to 72 hours in outdoor areas where average rainfall is less than 25 inches per year.
Furadan (carbofuran)	REI of 48 hours except after foliar applications on corn, sunflowers, and sorghum, when REI is 14 days. Exception: for the last 12 days of the REI in corn, sunflower, and sorghum, workers may enter treated area to perform hand labor and other tasks if they wear the early entry personal protective equipment listed on the label.
Methyl parathion (methyl parathion)	Do not enter or allow worker entry for 48 hours. The REI increases to 72 hours in outdoor areas where average rainfall is less than 25 inches per year.
Parathion (ethyl parathion)	REI is 3 days after treatment or 6 days if the crop is corn.

MANAGING INSECTICIDES TO PREVENT GROUNDWATER CONTAMINATION

The potential for insecticide movement into groundwater exists wherever insecticides are used, but the extent varies with the chemical nature of the insecticide, the soil and other factors such as volatilization (with subsequent loss to the atmosphere), decomposition, soil retention, and transport by water. Volatilization and decomposition reduce the total amounts of insecticides available for downward movement, soil retention decreases the availability of the insecticide for downward movement, and transport by water relates to the movement of insecticides with soil water. In addition, small quantities of insecticides are removed from the land in agricultural products.

The amount of insecticide applied affects the potential for groundwater contamination. The potential movement to groundwater of relatively mobile water-soluble insecticides may be much increased where large amounts have entered the soil, such as areas fused for fill stations, tank rinsing, and equipment washing. In most areas, these practices should be carried out on concrete pads (or pads made from other impermeable material) and the liquid should be collected for disposal.

Organochlorines such as DDT and endrin were among the early synthetic organic insecticides. Low water solubility and a strong tendency to adsorb to soil have virtually

precluded their appearance as groundwater contaminants resulting from agricultural applications.

Organophosphorus insecticides present a wide spectrum of both physicochemical properties and agricultural uses. They are generally less persistent than organochlorines and have been used to replace some organochlorine insecticides no longer registered in the United States. Breakdown in soil typically begins from reaction with water by natural and microbial hydrolysis. Examples of organophosphorus compounds include mevinphos, malathion, and methyl parathion, listed in order of increasing persistence. This class of insecticides has not been detected in groundwater.

Three important members of the carbamate group are carbaryl, carbofuran, and aldicarb. These are listed in order of increasing mobility, susceptibility to hydrolysis, and mammalian toxicity. Aldicarb (used also as a nematocide) is readily oxidized in soil. Aldicarb, aldicarb metabolites, and carbofuran have all been detected in groundwater.

Pyrethroids include natural products and the newer family of synthetic derivatives, e.g., permethrin, cypermethrin, esfenvalerate, and lambda cyhalothrin. They are usually degraded quickly in soil and are unlikely to leach.

The following table gives the relative persistence and mobility of insecticides used in North Dakota. Bear in mind that the persistence and mobility classification assigned to each insecticide is approximate because environmental variation will influence persistence and mobility. Whenever several insecticide options exist for the pest/site to be treated, this data will help pesticide users and advisors select the insecticide that presents the least potential for movement to groundwater. This is particularly true when insecticide applications are anticipated in areas with a high risk for groundwater contamination.

Summary of Groundwater Contamination Potential As Influenced by Water, Pesticide and Soil Characteristics

	Low Risk	High Risk
Pesticide Characteristics		
water solubility	low solubility	high solubility
soil adsorption	highly adsorbed	poorly adsorbed
persistence	short half-life (a few days)	long half-life (several weeks)
Soil Characteristics		
texture	fine clay	coarse sand
organic matter	high O.M.	low O.M.
macropores	few, small	many, large
depth to groundwater	deep (20+ ft)	shallow (<10 ft)
Water Volume		
rain/irrigation	small volumes at infrequent intervals	large volumes at frequent intervals

Summary of Suggested Pesticide Management Practices to Prevent Groundwater Contamination

Since site conditions, pest and crop patterns, and agricultural practices vary widely, specific recommendations for practices to reduce the risk of pesticide contamination must be specific and cannot be appropriate for all situations. However, measures to protect groundwater from pesticides generally involve the following objectives:

- @ Reduce the quantity of pesticide used (use the lowest effective rate).
- @ Use pesticides with less potential to leach.
- @ Use pesticides that are not persistent.
- @ Avoid pesticide application if conditions favor leaching.
- @ Prevent spills leading to a concentration of pesticide at a site which can leach to groundwater.
- @ Prevent back-siphoning or direct movement of pesticides down a well.

Relative Persistence and Mobility of Insecticides in Soils

Insecticide	Persistence ^a	Mobility ^b
acephate (Orthene)	M	VM
aldicarb (Temik)	M	MM
aziphos-methyl (Guthion)	N	NI
carbaryl (Sevin)	N	NI
carbofuran (Furadan)	M	MM
chlorpyrifos (Lorsban, Dursban)	N	NI
diazinon	M	SM
dimethoate (Digon)	N	MM
disulfoton (Di-Syston)	N	NI
endosulfan	N	NI
esfenvalerate (Asana)	M	I
fenvalerate (Pydrin)	M	I
fonofos (Dyfonate)	M	NM
malathion (Cythion)	N	NI
methomyl (Lannate)	N	SM
methyl parathion (PennCap-M)	N	I
methidathion (Supracide)	N	SM
monocrotophos (Azodrin)	N	MM
parathion	N	I
permethrin (Ambush, Pounce)	N	I
phorate (Thimet)	N	NI
phosphamidon (Dimecron)	N	MM
terbufos (Counter)	N	NI
tralomethrin (Scout)	M	I
trichlorfon (Dylox)	N	VM
trimethacarb (Broot)	M	NI

^a P = persistent; M = moderately persistent; N = nonpersistent;

^b BM = very mobile; MM = moderately mobile; SM = slightly mobile; NI = nearly immobile; I = immobile

Protecting Your Groundwater Through Farmstead

Assessment: There are numerous NDSU Extension circulars which address the issue of protecting groundwater from agricultural products. A listing and access to these circulars can be found on the internet at:

<http://www.ext.nodak.edu/extpubs/watgrnd.htm>

SEED TREATMENTS

Seed or planter box treatments are used on a wide variety of North Dakota crops for protection from **seedcorn maggot, seedcorn beetle, and/or wireworms**. The following tables highlight labeled crops and composition of common seed treatments. Always follow label directions. Protective clothing and equipment for mixing and handling are specified on the label. Mix thoroughly to ensure adequate protection. Treat only enough seed needed for immediate use. Do not store treated seed near feed or foodstuffs. Do not feed to livestock. Dispose of excess treated seed as specified on the label (usually burial).

Slurry Seed Treatment: Seed treatments may be applied as a slurry as seed is being augered into a drill, planter or truck. The treating equipment meters chemical into an auger conveyor where it is mixed with seed. The equipment is designed to mount to a truck bed, bin or transport augers and drill fill augers. Treaters consist of a metered pump, hoses and tank. The equipment is commonly used in bulk seed operations, providing uniform application of chemical to seed which enhances seed treatment performance.

Planter-box Treatment: Seed treatments should be thoroughly mixed with seed to ensure sufficient coverage. Recommendations for maximizing the effectiveness of planter-box seed treatments are as follows:

1. Fill box half full of seed.
2. Add half of required amount of product and mix thoroughly with paddle or stick.
3. Add remainder of seed to planter-box and the rest of product.
4. Mix well - thorough coverage is essential.
5. At end of day, clean planter population monitors.

Inoculants in Combination with Seed Treatments: Do not confuse seed inoculation with chemical seed treatment. Most seed disinfectants, including fungicides, are toxic to *Rhizobia* bacteria. Do not apply inoculum to seeds that are treated with a bactericide, such as streptomycin, unless you use a resistant strain of the *Rhizobia*. Although some *Rhizobia* species are slightly tolerant to certain chemical compounds, inoculating chemically treated legume seed requires special precautions. Check with the inoculum manufacturer regarding compatibility when considering combining products.

The following are some general guidelines when using seed treatments and inoculants:

- Insecticides are more toxic than fungicides, which are more toxic than herbicides.
- In-furrow inoculant applications are preferred when seed treatments have been used.
- If a seed treatment and inoculant are combined on the seed, minimize exposure time, less than 4 hours is best. Some *Rhizobia* may be killed immediately, check compatibility charts prior to use. The 2003 Fungicide Guide also has information about fungicide seed treatment effect on inoculants.
- If liquid pesticides are used, apply first and allow to dry before inoculant is applied.
- Powder-based inoculants protect *Rhizobia* better than liquid based inoculants.
- When using pre-treated seed, check with the inoculant formulator for comments on compatibility.

Seed Treatments Approved by Crop

Seed Treatment	Corn	Wheat	Barley	Soybean	Sunflower	Dry Bean	Peas	Sugarbeet	Canola	Mustard
Agrox Premiere	U									
Assault 25	U			U						
Barracuda *	U			U						
Cruiser 5FS	U	U	U		U					
DB Green	U	U	U							
Diazinon 50W	U						U			
Enhance Plus		U	U							
Gaicho 75ST*, 480*, 600*	U	U	U					U	U	U
Gaicho XT *		U	U							
Germate Plus	U									
Grain Guard Plus	U	U	U	U						
Helix *									U	
Helix XTra*									U	
Isotox F	U	U								
Kernel Guard	U									
Kernel Guard Supreme	U			U						
Lorsban 30 *	U	U					U	U		
Lorsban 50SL*	U						U	U		
Poncho 600 *	U								U	
Prosper *									U	
Raze	U									
Seedmate Lindane 25	U	U	U	U			U			
Sorghum Guard	U	U	U	U			U			

Insecticide/Fungicide Composition of Seed Treatments

Seed Treatment	% insecticide								% fungicide								
	Lindane	Diazinon	Chlorpyrifos	Permethrin	Tefluthrin	Imidacloprid	Thiamethoxam	Clothianidin	Maneb	Carboxin	Captan	Metaxyl	Tebuconazol	Difenoconazol	Mefanoxam	Fludioxnil	Thiram
Assault 25	-	-	-	-	25	-	-	-	-	-	-	-	-	-	-	-	-
Barracuda *	-	-	-	-	25	-	-	-	-	-	-	-	-	-	-	-	-
Cruiser 5FS	-	-	-	-	-	-	-	47.6	-	-	-	-	-	-	-	-	-
DB Green	18.8	-	-	-	-	-	-	-	-	50	-	-	-	-	-	-	-
Diazinon 50W	-	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Enhance Plus	18.8	-	-	-	-	-	-	-	-	35	20	-	-	-	-	-	-
Gaicho XT *	-	-	-	-	-	-	75	-	-	-	-	-	0.82	0.62	-	-	-
Gaicho 480 *	-	-	-	-	-	-	40.7	-	-	-	-	-	-	-	-	-	-
Gaicho 600 *	-	-	-	-	-	-	48.7	-	-	-	-	-	-	-	-	-	-
Gaicho 75ST *	-	-	-	-	-	-	75	-	-	-	-	-	-	-	-	-	-
Germate Plus	25	15	-	-	-	-	-	-	-	-	14	-	-	-	-	-	-
Grain Guard Plus	18.8	-	-	-	-	-	-	-	-	50	-	-	-	-	-	-	-
Helix *	-	-	-	-	-	-	-	10.3	-	-	-	-	-	-	1.3	0.4	0.13
Helix Xtra *	-	-	-	-	-	-	-	20.7	-	-	-	-	-	-	1.3	0.4	0.13
Isotox F	25	-	-	-	-	-	-	-	-	-	-	12.2	-	-	-	-	-
Kernal Guard	25	15	-	-	-	-	-	-	-	-	-	15	-	-	-	-	-
Kernel Guard Supreme	-	-	-	-	10.4	-	-	-	-	-	14.4	-	-	-	-	-	-
Lorsban 50SL*	-	-	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Poncho 600 *	-	-	-	-	-	-	-	-	48.0	-	-	-	-	-	-	-	-
Prosper *	-	-	-	-	-	-	-	-	9.5	-	4.43	-	0.32	-	-	-	9.5
Raze	-	-	-	-	-	27	-	-	-	-	-	-	-	-	-	-	-
Seedmate Lindane	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sorghum Guard	16.6	-	-	-	-	-	-	-	-	-	-	32.8	-	-	-	-	-

*Available only through commercial seed treatment.