



Grain Protectants and Top-dress Treatments for Stored Grains

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Introduction

Protecting grain in storage is important for maintaining the quality of grain for the best economic gain. Preparing storage structures prior to harvest is an important part in achieving this goal. There are multiple steps to take to ensure grain quality is preserved. Sanitation through cleaning all equipment that will be in contact with new grain is essential. This includes storage structures, grain handling equipment and transportation vehicles. It is necessary to keep the area surrounding storage structures free of vegetation and spilled grain. Maintenance of all equipment is critical to safeguard all equipment is functioning properly and the storage structure is properly sealed to prevent moisture and insects from entering. Insecticides for the treatment of empty structures and surrounding perimeters aid in controlling insect activity and minimize initial insect infestations. More information can be found on these topics in Fact Sheet BAE-1112, *Preparing Grain Bins and Flat Storages Prior to Harvest or Incoming Product Storage*.

Grain Protectants

The cleaner the grain is when being stored, the fewer problems there will be in the future. Grain quality never improves with storage, so the goal is to maintain grain as near to harvest quality as possible. Grain protectants help in preserving the quality of the grain from insect damage. Grain protectants are insecticides applied to the grain as it is being loaded into the storage structure. Apply the insecticide to a moving grain stream at the bottom of the bucket elevator, auger or belt to ensure the insecticide comes into contact with as many grain kernels as possible while the grain is moving to its final destination. Table 1 shows a list of insecticides labeled for use as grain protectants.

Most grain protectants are applied to the entire grain mass. However, a few products allow for an alternative treatment where the insecticide is only applied to certain layers of the grain mass. One method is to treat only the top 2 to 3

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feet of grain. Another method is to treat only the bottom and top layers of the grain mass. The last method is to treat the bottom layer of grain, every fifth load and the top layer, if the structure is large enough to accommodate multiple loads of grain. Please read the label carefully to see if the product allows for layer treatments. Products labeled for the option of layer treatments are noted in Table 1.

Top-dress Treatments

Many of the grain protectants also can be used as a top-dress treatment where the insecticide is applied to the grain surface to prevent insect infestation from occurring from the top of the structure. In most cases, the insecticide is incorporated into the top four inches of grain, but one product requires mixing the product to a grain depth of 1 foot from the top surface. A few insecticides are applied to the grain surface without mixing. Two insecticides are applied in two stages, where the first half of the calculated amount of product is applied and incorporated, then the second half is applied to the grain surface and left undisturbed. A list of insecticides labeled for top-dress treatments can be found in Table 2.

Insecticide Application

It is the law to read the insecticide label and follow all instructions. Not all of the products listed in Tables 1 and 2 are to be used on all stored grains. Be sure to apply the appropriate insecticide on the correct commodity and as they are intended as instructed on the label. Always wear personal protective equipment as the label instructs when mixing and applying insecticides. Safety is a critical component when using insecticides.

Table 1. Grain Protectants.

<i>Product (active ingredient)</i>	<i>Application</i>	<i>Notes</i>
Actellic 5E Insecticide (pirimiphos-methyl)	9.2 - 12.3 fl oz/5 gal water/30 tons grain	Only for use on corn and grain sorghum.
Centynal Insecticide (deltamethrin)	4.88 - 9.14 fl oz/5 gal water/1,000 bu	Rates vary depending on type of grain.
Centynal EC Insecticide (deltamethrin)	5.15 - 19.20 fl oz/3-5 gal water/1,000 bu	Rates vary depending on type of grain and desired concentration of insecticide.
D-Fense SC Insecticide (deltamethrin)	4.88 - 9.14 fl oz/gal water/1,000 bu	Rates vary depending on type of grain.
Diacon IGR ((s)-methoprene)	1.0 - 7.0 fl oz/5 gal water/1,000 bu	An insect growth regulator that will not kill adults but prevents development of larvae into adults. May apply as a tank mix with Centynal. Rates vary depending on type of grain and desired concentration of insecticide.
Diacon IGR Plus (deltamethrin and (s)-methoprene)	5.15 - 19.20 fl oz/3-5 gal water/1,000 bu	An insect growth regulator Plus adulticide. Rates vary depending on type of grain and desired concentration of insecticide.
Diacon-D IGR ((s)-methoprene)	8.0 - 10.0 lbs/1,000 bu	An insect growth regulator that will not kill adults but prevents development of larvae into adults. Wear dust mask and protective gloves.
DiPel DF (<i>Bacillus thuringiensis</i>)	0.05 lb/gal water	Apply 0.6 pint of this mixture per bushel as the last (top) 4 inch layer of grain is augered into bin. Only controls moths.
DiPel ES (<i>Bacillus thuringiensis</i>)	1.45 fl oz/gal water	Apply 0.6 pint of this mixture per bushel as the last (top) 4 inch layer of grain is augered into bin. Only controls moths.
Dryacide 100 (diatomaceous earth)	28.0 - 56.0 lb/1,000 bu	Wear respirator. Optimal performance is achieved with low grain moisture (<12%). Layer treatments are an option.
EverGreen Crop Protection EC 60-6 (pyrethrins and piperonyl butoxide)	1.0 qt/7.5 gal water and apply at 4 - 5 gal/1,000 bu	Thoroughly mix the emulsion.
EverGreen Pyrethrum Concentrate (pyrethrins)	30.0 fl oz/5 gal water/1,000 bu	Thoroughly mix the emulsion.
Insecto (silicon dioxide from diatomaceous earth)	1.0 - 2.0 lb/ton	Wear respirator. Layer treatments are an option.
PBO-8 Synergist (piperonyl butoxide)	0.43 - 0.91/100 lb	Rates vary depending on type of grain. Usually applied in mixture with an insecticide registered for use on stored grains.
Protect-It (diatomaceous earth and silica gel)	9.6 - 18.0 lb/1,000 bu	Rates vary depending on type of grain. Optimum effectiveness when grain is below 14.5% moisture content with relative humidity at 70% or less. Layer treatments are an option.
Pyronyl Crop Spray (pyrethrins and piperonyl butoxide)	1.0 pt with 3.625 gal water and apply at 4 - 5 gal/1,000 bu	Thoroughly mix the emulsion.
Sensat (spinosad)	5.9 - 10.5 fl oz/5 gal water/1,000 bu	Rates vary depending on type of grain.
Storicide II (chlorpyrifos-methyl and deltamethrin)	6.6 - 12.4 fl oz/5 gal water/1,000 bu	Rates vary depending on type of grain. Not for use on corn.

Table 2. Top-Dress Treatments.

<i>Product (active ingredient)</i>	<i>Application</i>	<i>Notes</i>
Actellic 5E Insecticide (pirimiphos-methyl)	3.0 fl oz/2 gal water/1,000 ft ²	Only for use on corn and grain sorghum. Apply one-half of mixture evenly across grain surface and rake into the grain to a depth of 4 inches. Apply remaining half to the grain surface and leave undisturbed.
Diacon IGR ((s)-methoprene)	1/30 fl oz/1,000 ft ²	Do not flood top-dress area.
Diacon-D IGR ((s)-methoprene)	8.0 lbs/1,000 ft ²	An insect growth regulator that will not kill adults but prevents development of larvae into adults. Wear dust mask and protective gloves. Rake into grain to a depth of 1 foot.
DiPel DF (<i>Bacillus thuringiensis</i>)	0.5 lb/5-10 gal water/500 ft ²	Mix into top 4 inches of grain.
DiPel ES (<i>Bacillus thuringiensis</i>)	15.0 fl oz/5-10 gal water/500 ft ²	Mix into top 4 inches of grain.
Dryacide 100 (diatomaceous earth)	2.0 - 3.0 lb/1,000 ft ²	Wear respirator. Optimal performance is achieved with low grain moisture (<12%).
EverGreen Crop Protection EC 60-6 (pyrethrins and piperonyl butoxide)	1.0 qt/19 qts water and apply at 1 - 2 gal/1,000 ft ²	Mix into top 4 inches of grain.
EverGreen Pyrethrum Concentrate (pyrethrins)	1.0 qt/14 qts water and apply at 2 gal/1,000 ft ²	Mix into top 4 inches of grain.
Insecto (silicon dioxide from diatomaceous earth)	4.0 lb/1,000 ft ²	Wear respirator. Apply at monthly intervals with the first appearance of moths and continue until early fall.
Protect-It (diatomaceous earth and silica gel)	3.0 or 40.0 lb/1,000 ft ²	Optimum effectiveness when grain is below 14.5% moisture content with relative humidity at 70% or less. Lower rate if entire grain mass treated with insecticide at loading or higher rate if entire grain mass is untreated.
Pyronyl Crop Spray (pyrethrins and piperonyl butoxide)	1.0 qt/19 qts water and apply at 1 - 2 gal/1,000 ft ²	Mix into top 4 inches of grain.
Sensat (spinosad)	2.6 fl oz/2 gal water/1,000 ft ²	Apply one-half of mixture evenly across grain surface and rake into the grain to a depth of at least 4 inches. Apply remaining half to the grain surface and leave undisturbed.

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