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Seed treatments labeled for corn and soybeans

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Seed treatments labeled for corn and soybeans

Abstract

Corn producers battle a variety of soil-dwelling insect pests. Seedcorn maggots, wireworms, white grubs, and several species of cutworms can attack either the seed or seedling plants and reduce the plant stand. Corn rootworm larvae feed on corn roots during midsummer and can significantly reduce the uptake of moisture and nutrients, which can lead to lodging and harvest losses.

Keywords

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INTEGRATED CROP MANAGEMENT

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Corn producers battle a variety of soil-dwelling insect pests. Seedcorn maggots, wireworms, white grubs, and several species of cutworms can attack either the seed or seedling plants and reduce the plant stand. Corn rootworm larvae feed on corn roots during midsummer and can significantly reduce the uptake of moisture and nutrients, which can lead to lodging and harvest losses.

Corn producers have traditionally relied upon some form of insecticide to control soil-dwelling insects. Planting time applications of either a liquid or granular formulation are commonly used and occasionally seed treatments, such as Agrox D-L Plus and Kernel Guard Supreme, have been historically considered as an alternative form of control. The performance of these two seed treatments, however, was dependent upon the grower manually mixing the insecticide with the seed in an attempt to get an adequate coating of material on the seed coat. This required time and effort, and sometimes produced less than the desired protection. Also, these seed treatments did not have systemic action and they did not protect against black cutworms or corn rootworms.

In 2005, three systemic insecticides will be commercially available as pre-applied seed treatments to seed corn. These insecticides are clothianidin (Poncho), imidacloprid (Gaucho), and thiamethoxam (Cruiser) and are in the neonicotinoid chemical family.

Thiamethoxam (Cruiser) was recently labeled for use in soybeans. Imidacloprid (Gaucho) was granted a Section 18 label in Iowa for soybeans last year but as of February 15, this crop does not appear on the full label.

These insecticides sometimes are referred to as nicotinoids or cholinergic agonists, and they closely resemble nicotine in their mode of action. They have high activity against sucking insects, such as aphids, but also chewing pests such as beetles and some Lepidoptera, particularly the cutworms. These chemicals are highly systemic--being moved into the plant roots and new leaf tissue--and offer a spectrum of control activity as seed treatments.

All neonicotinoids have a mode of action that binds at a specific site in the central nervous system of insects. This causes excitation of the nerves and eventual paralysis, which leads to death. Due to this mode of action there is no cross resistance to conventional insecticide classes such as carbamates, organo-phosphates, and pyrethroids. They act as acute contact and stomach poisons, combining systemic properties with relatively low application rates.

The neonicotinoids are relatively nontoxic to vertebrates (Table 1). They pose a low toxicity hazard to predatory ground beetles and a moderate toxicity hazard to another predator--the green lacewing--that can be common on soybean foliage.

Studies with clothianidin have shown only a low risk to soil-dwelling invertebrate species since the predicted environmental concentrations are lower than the no-observed effect concentration for the most sensitive tested species. Three rates of clothianidin sprayed to a field in Europe revealed no significant differences between the total numbers or the total biomass of earthworms collected from the plots treated at the highest rates (225 grams active substance per hectare) compared to the untreated control.

Of the three neonicotinoids, thiamethoxam (Cruiser) is the most soluble in water. This might give it an advantage in dry soil conditions, although other factors such as toxicity, persistence, and soil adsorption are important attributes of overall performance.

These three neonicotinoids have not been widely field tested in the Midwest against minor pest species. Their performance against black cutworms, seedcorn maggots, white grubs, and wireworms has remained relatively unknown. However, I completed a few experiments last summer that evaluated some of these products against black cutworms and white grubs.

The results can be accessed by [downloading this file \[1\]](#) (PDF).

Table 1. Neonicotinoid seed treatments used in corn and soybeans.

Common name	clothianidin	imidacloprid	thiamethoxam
Trade name	Poncho	Gaucho	Cruiser
Manufacturer	Bayer	Bayer/Gustafson	Syngenta
Solubility in water	327 mg/L	610 mg/L	4,100 mg/L
LD50 (acute rat oral)	>5,000 mg/kg	4,870 mg/kg	5,523 mg/kg
Labeled for corn	Yes	Yes	Yes
Labeled for soybean	No	Section 18 (2004 only)	Yes

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[1] http://www.ent.iastate.edu/dept/faculty/rice/rice_seed_treat_2004.pdf