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Managing Soil Insects in Corn

Michigan State University

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IPM Facts

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FACTS

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Managing Soil Insects in Corn

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A number of different soil insects including wireworms¹, white grubs² and seedcorn maggots³ can damage corn. Managing these pests depends on a knowledge of their biology to determine when they may threaten corn.

Description of life stages:

Seedcorn maggot -- The seedcorn maggot is a yellowish-white larva that reaches a length of 1/4 inch. It has a rounded tail that tapers to a sharply pointed head, giving it a spindle shape. After the maggot stage, it changes into a brown capsule-like puparium, then matures into the adult fly. The gray, black-legged fly resembles a house fly, but is only half as large (5 mm) and folds its wings over the body when at rest. Eggs are small, white and elongated.

Wireworms -- Wireworm larvae are hard, wire-like and off-white to copper-colored. They have three pairs of legs just behind the head. Although the several species which attack corn are similar in appearance, they can vary greatly in size when fully grown; some species are 1 1/2 inches long. The dark adult is referred to as a "click beetle" because, when placed on its back, it flips into the air making an audible click when righting itself.

White grubs -- White grubs have white, thick, soft bodies that curl into a C-shape when disturbed. They have a definite head and three pairs of legs just behind the head. White grubs move very sluggishly. They may have 1-, 2- or 3-year life cycles and are commonly known as May or June beetles when fully developed.

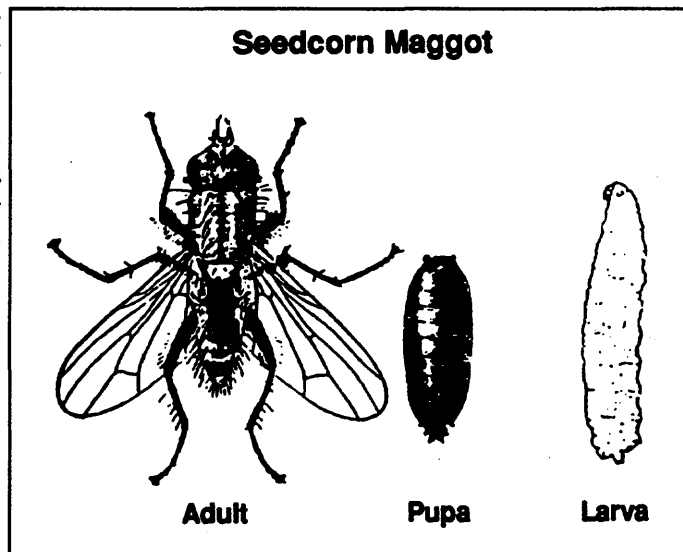
Life cycle:

Seedcorn maggots -- Winter is passed in the puparia stage in the soil. Adult flies emerge during early April to mid-May to lay eggs in soils high in decaying organic matter (muck soils or fields with abundant weeds, stubble or manure that have been plowed down). The maggots hatch in 2 - 4 days and readily burrow into germinating corn. These maggots mature into puparia after about

two weeks. Adults emerge from puparia in about two weeks. There are 4 - 5 generations per year.

Wireworms --

Larvae spend the winter deep in the soil, moving up in the spring to feed or pupate as soil temperatures warm. Adults emerge from pupae during the spring, mate and lay eggs in grassy areas. The tiny larvae hatched from these eggs feed on the roots of grasses and other weeds. By midsummer, when soil temperatures rise and moisture falls, the larvae return again to lower soil



¹Wireworms: *Melanotus* and *Conoderus* spp.

²White grubs: *Various species*

³Seedcorn maggot: *Hylemya platura* (Meigen)

depths. Because some species can take 4 - 6 years to complete a generation, wireworm damage can occur in a particular field for several years.

White grubs –Adults of common white grub species in Michigan deposit eggs on the soil surface of grass sods during late spring. Larvae from these eggs feed on plant roots near the soil surface. Larvae tunnel downward to overwinter when cool autumn temperatures arrive. Most white grub damage is caused during the second year when these larger larvae return to the surface in the spring to feed voraciously on plant roots before pupating and emerging as adults. Some species have a longer life cycle and will feed for a third year before changing into adult beetles.

Damage:

Seedcorn maggots and wireworms damage germinating and seedling corn while white grubs cause damage throughout the season. Seedcorn maggot problems are generally worse on soils with decaying organic matter or when germination is delayed, such as during cool, wet springs. Unlike the spotty nature of wireworm or white grub damage, seedcorn maggot damage may cover most of the field. Seedcorn maggots feed on the seed contents (often leaving only the empty shells) causing seed death or poor germination.

Wireworm damage is most likely when infested pastures or alfalfa sod are plowed under and planted to row crops. Because of their extended lifecycles, wire-

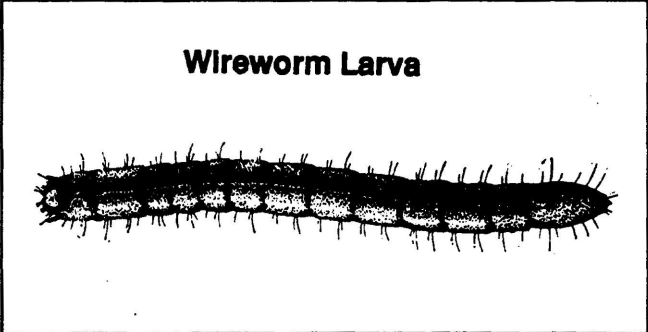
worm damage may persist 2-3 years after a sod is tilled. The most significant damage occurs to germinating seeds and seedling plants during cold, wet springs. Like seedcorn maggots, they

also leave behind empty seed hulls as well as snipped-off roots. Stem feeding at the crown node causes plants to wilt and die.

White grub damage is usually patchy, resulting in plant stunting or death. Plants with severely pruned roots may grow no more than 1-2 feet tall and can be easily lifted from the ground.

Management:

Biological Control –Naturally occurring predators and diseases help to check populations of these pests, but do not provide total control. Seedcorn maggots are regularly killed by a fungal pathogen in late spring. Dead flies may be seen clinging to upright structures, frequently the heads of small grains. These flies have succumbed



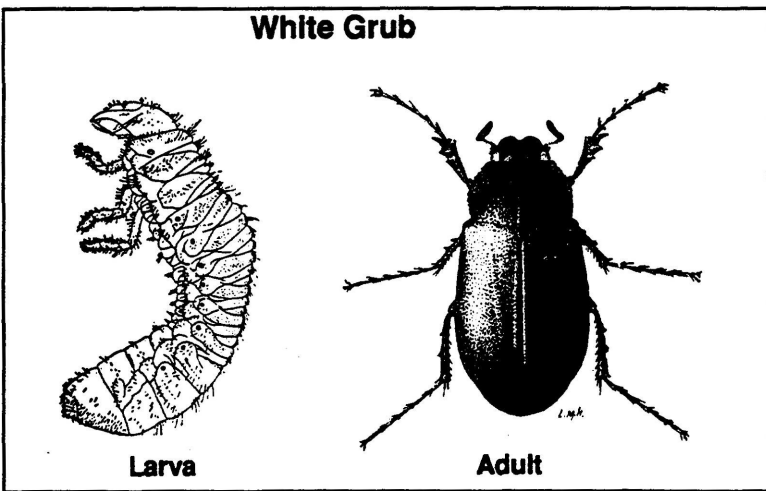
Wireworm Larva

to the disease and the fungus releases spores which re-infest the soil.

Cultural Control –Fall plowing before October and rotating corn with more feeding-tolerant, deep-rooted legumes will help reduce damage from these pests. Fall plowing makes the field less attractive to egg-laying flies and also kills large numbers of wireworm pupae and adults by breaking up their cell-like chambers. Late planted corn is especially susceptible to seedcorn maggot injury.

Scouting & Economic Thresholds:

No specific thresholds have been established for any of these soil insect pests. Treatment may be justified in fields that have a history



White Grub

Larva

Adult

of damage or if pests are seen while preparing the fields for planting - look for wireworms and white grubs in the plow furrow during spring plowing. When poor stands or damaged plants are found,

check for grub or wireworm damage by digging around injured plants. White grub damage is generally localized and may occur in a circular pattern.

Chemical control—Insecticide seed treatments can be applied to protect seeds from seedcorn maggot. Diazinon, lindane or combination treatments are available. A lindane seed treatment will help to protect against low populations of wireworm, but will not be adequate for high populations. Seed treat-

ments are not effective against white grubs. A soil insecticide is required in areas where high populations of wireworms or white grubs are present (see table for details).

Additional considerations:

If stands are seriously reduced by any of these pests, replanting is the only recourse as rescue treatments are generally not effective.

Recommended insecticide applications for controlling seedcorn maggot, wireworms, and white grubs in field corn.

Seedcorn Maggot³

<u>Chemical</u>	<u>Formulation*</u>	<u>Rate¹</u>	<u>RUP²</u>	<u>Restrictions/suggestions</u>
diazinon		1 oz per 100 lb seed	N	Apply as a seed/planter box treatment.
lindane		1 oz per 100 lb seed	N	Apply as a seed/planter box treatment.

Note: Various corn rootworm insecticides also provide maggot control.

Wireworms⁴

<u>Chemical</u>	<u>Formulation*</u>	<u>Rate¹</u>	<u>RUP²</u>	<u>Restrictions/suggestions</u>
Dyfonate	10G	12 oz per 1000 ft; (B)	N	Cover with soil at planting. Do not allow Dyfonate to contact seed.
Dyfonate II	20G	6 oz per 1000 ft; (B)	Y	Same
Lorsban	15G	8 - 16 oz per 1000 ft; (IF, T)	N	Cover with soil at planting. Max. 13.5 lb Lorsban/acre per season
Counter	15G	8 oz per 1000 ft; (IF, T)	Y	Cover with soil at planting.
Counter	20CR	6 oz (IF) 12 oz (B, T)	Y	
Furadan	15G	8 oz per 1000 ft; (IF, T)	Y	Wait at least 10 months before planting or rotating crops not registered for Furadan.
phorate	20G	6 oz per 1000 ft; (T, B)	Y	Cover with soil. Do not allow phorate to contact seed.
Force	1.5G	8 - 10 oz per 1000 ft; (IF, T, B)	Y	For suppression only. Do not rotate to any crop other than corn or soybeans.

White Grubs⁴

<u>Chemical</u>	<u>Formulation*</u>	<u>Rate¹</u>	<u>RUP²</u>	<u>Restrictions/suggestions</u>
Counter	15G	8 oz per 1000 ft; (T,B)	Y	Do not exceed 13.1 lbs. Counter/acre per season
Counter	20CR	6 oz per 1000 ft; (T,B)	Y	
phorate	20G	6 oz per 1000 ft; (B)	Y	Do not allow phorate to contact seed.
Lorsban	15G	8 - 16 oz per 1000 ft; (IF, T)	N	Do not exceed 13.5 lbs Lorsban/acre per season
Force	1.5G	8 - 10 oz per 1000 ft; (IF, T, B)	Y	For suppression only. Do not rotate to any crop other than corn or soybeans.

* Other formulations may be available.

¹ Be sure your equipment is properly calibrated. Refer to Extension Bulletin E-1582 **Chemical Control of Insects and Nematodes in Field and Forage Crops**, available at your county Extension office.

IF = In Furrow; T = T-Banded; B = Conventional band.

² Restricted use pesticide. If yes (Y), a pesticide applicator certification is required.

³ Treat where corn is planted in soils high in organic matter, that have been manured, or that have had a heavy vegetative growth plowed down.

⁴ Treat when wireworms or white grubs are seen while preparing old pasture or fields that had grasses, or where damage has occurred.

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This publication contains pesticide recommendations based on research and pesticide regulations. However, changes in pesticide regulations occur constantly. Some pesticides mentioned may no longer be available, and some uses may no longer be legal. If you have questions about the legality and/or registration status for using pesticides, contact your county Cooperative Extension Service office or manufacturer's representative.

To protect yourself and others and the environment, always read the label before applying any pesticide.

Illustrations courtesy of United States Department of Agriculture.



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