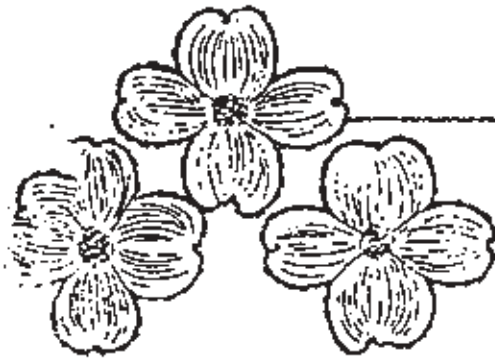


Note No. 67



Ornamentals and Turf

WHITE GRUB CONTROL IN TURF

White grubs can be damaging pests of turf throughout North Carolina. Population levels of 10 or more grubs per square foot feeding on grass roots are not uncommon. Heavily infested turf wilts or dies, and often the lawn has a soft, spongy feel. Grubs may feed for several months prior to the above ground symptoms. Severely damaged turf may be rolled back like a carpet. Bluegrass and bentgrass are most seriously attacked, but all grasses are susceptible.

Due to their underground feeding, white grubs are more difficult to detect and control than many of the above ground pests. Nonetheless, effective control can be accomplished if the pest is detected, properly identified and appropriate control measures applied in a timely manner. Outlined in this guide are proper scouting procedures for grub infestations, guidelines for the timing of insecticide applications and a key to identification.

DESCRIPTION OF WHITE GRUBS. White grubs are larvae of scarab beetles. The grubs of economic importance in North Carolina are: the Japanese beetle, green June beetle, southern masked chafer, northern masked chafer and the Asiatic garden beetle. Several other species such as May beetles and June beetles are also present but usually in low numbers. The Japanese beetle is consistently the most damaging in this state. A relatively new pest, the turfgrass ataeinus, is present on bluegrass in western North Carolina. The insect appears to be expanding its range and may become a serious problem in the near future.

All these grubs have creamy, blunted bodies with yellow to brownish heads and brownish hind parts (Fig. 1). Mature grubs vary in length from $\frac{1}{2}$ inch to $1\frac{1}{2}$ inches in length, depending on the species. White grubs usually lie in a curled or C-shaped position. Billbug larvae may also be present but can be distinguished by the absence of legs.

LIFE HISTORY. All of the important species of white grubs in North Carolina have a one year life cycle and spend about 10 months in the ground. Figure 2 illustrates the life cycle for the Japanese beetle. The other important white grubs in North Carolina have a similar life history.

Eggs are laid in late June and early July and larvae hatch in July. These larvae feed on grass roots and continue to do so until cool weather begins in October. In November the grubs burrow deeper into the soil to overwinter. The grubs return to the root area and begin feeding in March. Larvae pupate and adults emerge in May and early June. The turfgrass ataeinus has 2 generations per year, overwintering as an adult and a second generation adult developing by July.

This life cycle is the same for all species with some slight variation in timing. The green June beetle, however, is different in its feeding behavior.



Instead of feeding on grass roots, these grubs feed mainly on decaying vegetative matter. Their burrowing smothers grass and uproots seedlings. Sometimes in the fall, or after a heavy rain, green June beetle larvae come out of the soil and crawl on their backs on the surface of the ground. They can be identified by their unusual habit of crawling on their backs.

IDENTIFICATION. Since some species differ in their feeding habits and susceptibility to insecticides, proper identification is essential for effective control. Although most grubs appear very similar, a reliable indicator of species is the pattern of tiny bristles on the grub's hind end (Fig. 3). A magnifying lens is necessary to make this distinction. A green June beetle grub can be identified by distinct spiracles or dark spots, one per segment, on each side of its body.

MANAGEMENT. White grubs can be controlled in a timely and cost-effective manner if proper controls are correctly applied at the right time. To prevent serious damage, all turf should be examined in April and again in August for the presence of grubs. Do not wait for brown patches to appear in the turf before inspecting the soil. A sure sign of white grub infestations is the presence of moles or birds digging in the lawn.

Use a heavy-duty knife or a spade to cut a one foot square flap of sod on three sides and roll it back. Examine the soil and roots in the top 3 or 4 inches. Do this in several locations. An average of 5 or more grubs per square foot justifies pesticide application. The condition of the turf, its value and use (i.e., golf greens) and damage done by animals searching for the grubs may alter thresholds.

Timing of insecticide application is critical if control is to be effective. The best time to apply insecticides is while the grubs are near the soil surface actively feeding. As indicated in Figure 2, this is from April to early May and August through October. Pesticides applied any other time will be ineffective. Timing may vary with the turfgrass species. After treatment, green June beetles may be found on the soil surface while other species of grubs will die in soil. Insecticides will work more effectively if watered in after application. The only exception is Sevin (carbaryl) applied for green June beetle. It should not be watered in. In areas where irrigation is not available, Mocap (ethoprop) appears to be more water soluble and moves into the soil more rapidly following a rain. However, its residual activity is short. Overall, Oftanol (isofenphos) appears to be the most effective insecticide for white grub control.

Another technique useful only against Japanese beetle grubs is the application of milky spore disease. This is a commercially available bacteria applied to the soil that results in a disease affecting the grubs. Grubs in the soil come in contact with the spores through ingestion. The spores germinate inside the grubs eventually killing them.

These spores work best when applied in late September or early October to soil of pH between 6 and 7. The results are not as rapid as with chemical insecticides, but the effects last many years. When milky spore becomes established it will spread naturally to adjoining, untreated areas. This product is available at many garden shops under such trade names as Doom®, Japidemic® or Milky Spore®.

Recent studies on traps for Japanese beetle adults have indicated these have no real impact on the subsequent population of grubs in the soil.

White Grub Control Recommendations

Insecticide	Rate of formulation per 1000 square feet	Remarks and precautions
bendiocarb (Turcam) 76WP	1 to 2 oz.	
diazinon 4EC	4 oz.	Apply in 15 to 30 gallons water. Irrigate immediately.
AG500	4 oz.	
diazinon (Spectracide)		
25EC	8 oz.	
2G	5 lb.	
5G	2-1/2 lb.	
trichlorfon (Proxol or Dylox) 80SP	3-3/4 oz.	
isofenphos (Oftanol)		
5G	0.9 lb.	Broadcast spray early. Water in spray or granules immedi- ately.
1.5G	3 lb.	
2L	3 oz.	
carbaryl (Sevin) green June beetles only		
80WP	2 oz.	Do not water in.
50WP	2 oz.	
10G	1 lb.	

WP = wettable powder, EC = emulsifiable concentrate, G = granular, SP = soluble powder, L = liquid

THE USE OF TRADE NAMES IN THIS INSECT NOTE DOES NOT CONSTITUTE ENDORSEMENT OF ONE PRODUCT OR THE EXCLUSION OF OTHERS

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Fig. 1 Typical white grub

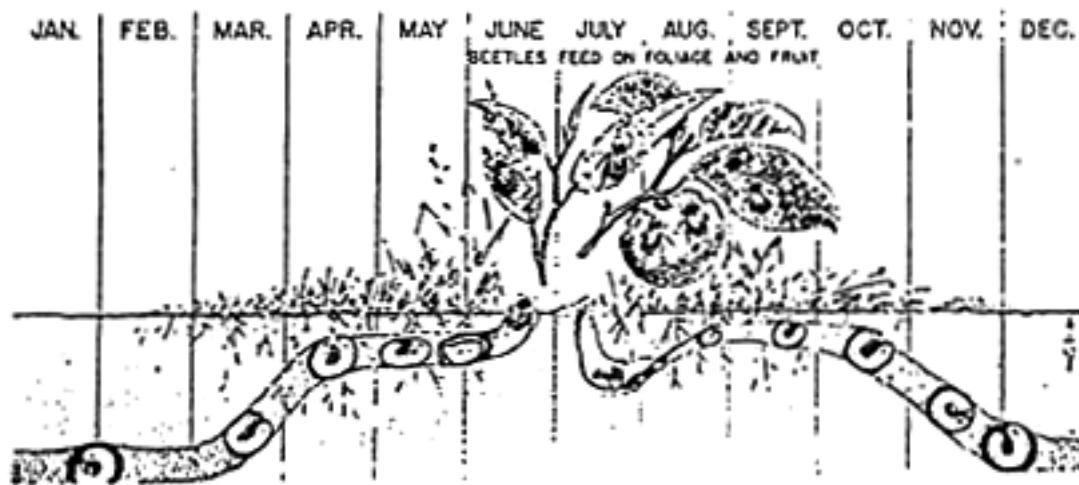


Fig. 2 Life Cycle of Japanese beetle



Black Turfgrass Ateletus



Masked Chafer



Asiatic garden beetle



Japanese beetle

Fig. 3 Eristle pattern of important white grub species in North Carolina