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EXTENSION SERVICE

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White Grubs

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Identifying the species and lifecycles of beetles, as well as the damage they cause is essential for determining the best method of control.

Species

White grubs are the larvae of beetles in the family Scarabaeidae (commonly called scarabs). Although there are many different species of scarab beetles in West Virginia, the larvae of only a few are considered significant pests. Among native white grub species (species that occur naturally in a region), the most important and widespread include the masked chafers (*Cyclocephala* species), May beetles (*Phyllophaga* species), black turfgrass ataenius (*Ataenius spretulus*), and green June beetle (*Cotinis nitida*). Important invasive white grub species (species that are not native to an area, and that cause economic/environmental damage) include the Japanese beetle (*Popillia japonica*), oriental beetle (*Anomala orientalis*), Asiatic garden beetle (*Maladera castanea*), and European chafer (*Rhizotrogus majalis*).

White Grub. (Photo credit: www.flickr.com/creative commons)

Description

All white grubs are similar in appearance except for their size, which varies with the species and with age. When fully developed, they can range from $^{3}/_{8}$ inch to nearly 2 inches in length. Grubs are whitish to cream-colored with a brown head and three pairs of short legs. White grubs are soft bodied and exhibit a characteristic C-shape posture when feeding or at rest.

Adult beetles are stout bodied, oval in shape, and have clubbed antennae. Depending upon species, they can be green, tan, brown, or black and can range from about $^{3}/_{16}$ inch to 1 inch in length. With the exception of Japanese beetles and green June beetles, most species are active at dusk or during the night and are not noticed except when attracted to outdoor lights.

Life cycles

Green June beetles, masked chafers, European chafers, Japanese beetles, oriental beetles, and Asiatic garden beetles have annual life cycles, meaning they complete one generation in a year. Adults mate and lay eggs in mid-summer (June to August). Newly hatched grubs immediately begin feeding on grass roots and organic matter. They continue to feed until around the time of the first frost, at which point the nearly full-grown grubs move deeper into the soil and remain

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inactive during the winter. As the soil warms in the spring, the grubs move back into the root zone and resume feeding until turning into pupae (life stage where larvae transform into adults) in May or June. Pupae transform into adult beetles and emerge from the soil several weeks later to complete their one year life cycle.

May beetles (also known as June beetles) typically require two or three years to complete one generation. Adults mate and lay eggs from mid-April to June. Newly hatched grubs feed throughout the summer until the onset of cooler fall temperatures forces them deeper into the soil. As the soil warms in the spring, the grubs move back into the root zone and resume feeding. Species with two year life cycles pupate by the end of the second summer, typically transforming into adult beetles by late fall and emerging from the soil the following spring. Species with three year life cycles pupate midway through the third summer, transforming into adults by early fall and emerging from the soil the following spring.

Black turfgrass ataenius have two generations per year. Adult beetles spend the winter in loose soil, leaf litter, or other organic debris before emerging in the spring. They lay eggs from May to mid-June. After hatching, the grubs typically feed for about four weeks before pupating. First generation adult beetles emerge from the soil in June and July to mate and lay eggs. Second generation grubs mature and pupate from late August to September, producing adults that mate in the fall then overwinter.

Damage

White grubs feed below the soil surface on the roots of grasses. Early symptoms of feeding injury include grass wilting or yellowing, and the appearance of scattered dead patches of grass. Over time, dead patches can increase in size and begin to join together. Grass that is damaged by white grubs is loosely attached to the soil and can easily be pulled up or rolled back like a carpet. Damaged areas may also feel spongy underfoot.

Sampling

Scouting for the presence of white grubs in turf and pasture grasses should begin early during the predicted grub activity period to determine if the application of a control procedure is warranted. Since white grub infestations are usually patchy throughout an area of grass, several evenly spaced samples should be collected. At each sample site, cut three sides of a square turf section (up to 1 ft^2 in size) and peel back the sod. Examine the roots and soil to about 3 inches deep for the presence of white grubs. After examining the soil, replace the grass and water it to encourage regrowth. Finding a few grubs is not cause for alarm. Healthy grass can outgrow the root loss caused by a small number of grubs without showing signs of damage. If areas of grass are dead or dying and grubs are not detected, examine the sod and soil for other causes of injury such as disease, moisture and/or heat stress, excessive thatch, or other insect feeding.

Control measures

Cultural

Soil moisture can affect white grub populations and the severity of feeding damage. Since wet periods during July and early August normally favor survival of eggs and young grubs, limit the watering of lawns and turf during this time. However, once the eggs have hatched (around late August through September) increased soil moisture can reduce feeding damage by encouraging the regrowth of grass roots.

Biological

Milky spore disease and insect-parasitic nematodes are two commercially available biological control products for management of white grubs. Milky spore is a disease that is caused by the spore-forming bacteria *Bacillus popilliae*. Dusts containing the bacterial spores are fatal to Japanese beetle grubs when ingested. An alternative biological control product marketed to control a variety of white grub species is insect-parasitic nematodes (*Steinernema* and *Heterorhabditis* spp.). These microscopic roundworms seek out and kill white grubs in the soil. The effectiveness of biological control products can be affected by a number of environmental factors (e.g. soil moisture, soil type/texture, temperature). Furthermore, it often takes time for the biological control's numbers to build to levels high enough to impact grub populations.

Chemical

If white grubs are abundant and causing damage, and if non-chemical options have failed, application of an insecticide may be necessary. Rescue treatments with products containing the active ingredient trichlorfon or carbaryl should be applied in late summer (mid to late August) or when young grubs are present. In areas with a history of white grub problems, a preventative treatment with products containing imidacloprid, halofenozide, clothianidin, thiamethoxam or chlorantraniliprole may be beneficial. These products allow some flexibility in the timing of applications, and can be applied a month or so before egg hatch (mid-June to July). Insecticide applications are generally not recommended during the spring since they are not as effective against older grubs. For best results, mow and rake out dead grass and thatch before treatment with a grub insecticide. All insecticide products should be applied as directed on the label. For more information, please contact your county WVU Extension Office.

Further reading

Potter, D.A. 1998. *Destructive Turfgrass Insects: Biology, Diagnosis, and Control.* Ann Arbor. Press. Chelsea, MI.

For more information

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