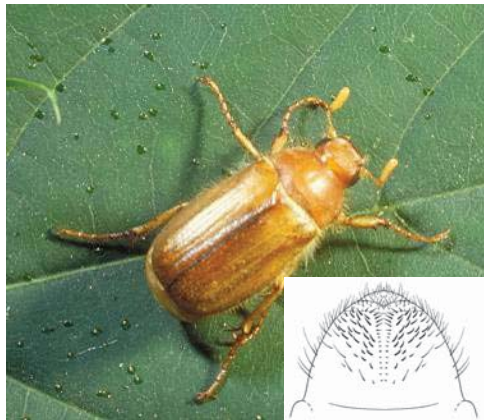


New White Grub Pests of Indiana

Although Indiana turfgrass managers have grown accustomed to managing Japanese beetle and masked chafer grubs, three new species of white grubs seem poised to cause additional management concerns across the State. Over the last two years (2006-2007), state-wide survey efforts have detected adults of the European chafer, Asiatic garden beetle and Oriental beetle in one or more Indiana counties and damaging grub populations of at least one species have been confirmed. Although these invasive white grubs are biologically similar to other annual white grub species, differences in their seasonal ecology, habitat and host-plant preference may pose new challenges for turfgrass managers. This fact sheet provides information on the known distribution, biology, identification and management of these new white grub species.

European chafer *Amphimallon majalis* (Razoumowsky)



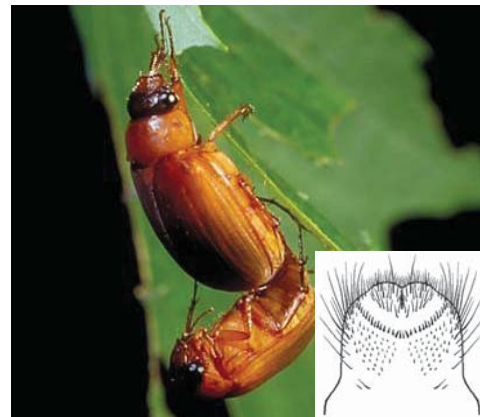
Hosts: Although adults are not known to feed, grubs of the European chafer will attack the roots of turfgrass, clover, alfalfa, small grains, soybean and a variety of nursery stock including containerized plants.

Threat: European chafer grubs damage plants by feeding on roots. Grubs typically feed from July through October and may remain high in the soil profile into winter. If conditions are favorable, European chafer grubs are able to feed under the cover of snow and are the first grubs to resume feeding in the spring (as early as March). Dead and dying spots in lawns where adult chafer flights have been observed the previous June should be suspect and this type of injury is usually visible by late summer. European chafers are capable of infesting areas that other white grub species do not, especially drier, less

intensively managed areas. Relatively light grub infestations can cause extensive root loss in containerized nursery stock.

Distribution: The European chafer was likely introduced to North America from Europe during the first half of the 20th century and was first detected in Newark, New York in 1940. Since then, it has spread westward into lower Ontario, Michigan and Ohio and southward into Maryland and West Virginia. Now, for the first time, European chafer has been collected from traps in Porter, Allen, Kosciusko and Knox Counties in Indiana.

Asiatic garden beetle *Maladera castanea* (Arrow)



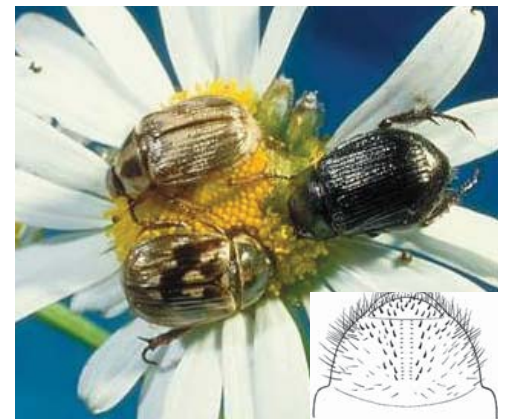
Hosts: Grubs of the Asiatic garden beetle occasionally attack and damage turfgrass, but they seem to prefer the roots of a variety of perennial plants, flowers, vegetable and field crops and they have caused serious problems in newly planted field corn in Northern Indiana. Grubs are sometimes found clustered in areas where orange hawkweed grows and around flower beds containing adult food plants. The adults feed on more than 100 species of plants, but they have an apparent preference for certain flowers including asters, dahlias, mums and roses. Adults will also feed on the leaves of a variety of trees, shrubs and vegetable crops.

Threat: Adult beetles emerge from the soil mainly from mid-July to mid-August, but may be found anytime from late June through October. Adults can be a serious pest of vegetables and ornamentals, feeding on foliage at night and returning to the soil during the day. Unlike Japanese beetle, adults do not skeletonize leaves, but rather strip or notch the foliage. Grubs become active in late July and feed on organic matter and the roots of a variety of different grasses, vegetables and herbaceous plants and extensive damage

to seedling corn has been documented during the spring of 2007 and 2008 in Northern Indiana.

Distribution: The Asiatic garden beetle was introduced to North America from Japan during the 1920's. Since then, it has expanded its range westward from New England along the great lakes corridor to Ohio and south along the eastern seaboard into South Carolina. In 2006, Asiatic garden beetle was collected from traps in Allen, Porter, St. Joseph, Elkhart, Kosciusko, Marshall, Starke, Jasper, Newton, Allen and Knox Counties in Indiana.

Oriental beetle *Exomala orientalis* (Waterhouse)



Hosts: Although adult beetles apparently do little feeding, they have occasionally been found feeding on the petals of daisies and other flowers including roses, phlox and petunia. Grubs feed on the roots of turfgrasses, perennial plants, weeds, nursery stock and potted or containerized plants.

Threat: Adults emergence typically begins in mid-June and may continue into September with the bulk of adult emergence taking place in late June and July. Adults are capable of causing minor damage to an assortment of flowering plants, but are particularly attracted to daisies. By mid-July, grubs are actively feeding on soil organic matter and plant roots. Grubs can cause serious damage to turfgrass and ornamental plants and have been known to damage nursery stock and containerized plants.

Distribution: The oriental beetle was introduced into North America from Japan during the early 20th century and was first detected in Connecticut in 1920. Since then, it has expanded its range mainly by being transported in the soil of nursery

stock. Oriental beetle is now present in most of New England, and has moved westward to Ohio and as far south as South Carolina. The Oriental beetle has only been found in Tippecanoe County in Indiana, but official surveys are being initiated this spring to determine how widespread this species is.

Identification of Grubs

White grub species can be identified by the characteristic pattern of short hairs and spines located on the underside of the tip of the abdomen. A 10x hand lens is useful when examining the "raster pattern".

Managing Invasive White Grubs

For the most part, management options for these three white grub species are the same as for Japanese beetle and masked chafer. However, reducing irrigation during the critical egg stage, which can seriously lower the survival of other white grubs, may not impact European chafer. Cultural practices that promote turfgrass root development (deep, infrequent irrigation, core cultivation and fall fertilization) and reduce plant stress can enhance the ability of turfgrass to tolerate white grub feeding and improve recovery should damage occur. As always, judicious insecticide use can help conserve important natural enemies of white grubs including ants and parasitic wasps. The insect parasitic nematode *Heterorhabditis bacteriophora* is a good biological management alternative and commercial suppliers can be found on the internet. However, use of nematodes requires some degree of diligence and strict adherence to labeled directions will

greatly enhance efficacy.

There are four basic chemical management options for white grubs and choosing the appropriate insecticide and application timing will usually depend on the scenario. Regardless of the approach chosen, it is important to remember that white grubs are soil-inhabiting insects and that no insecticide will be effective unless it reaches the target zone where the grubs are feeding. Therefore, post-application irrigation or rainfall of at least ¼ inch is recommended and close adherence to labeled directions is always important.

Preventive Control

(June/July) Preventive control consists of the prophylactic application of insecticides to prevent damaging populations from occurring. This approach is most often used in areas with a history of repeated grub damage or where the risk of grub damage is high. This strategy may also be employed as part of a multiple targeting effort aimed at controlling multiple pest species with a single application should the situation arise. Suitable chemicals will have extended residual activity in the soil or plant roots and may include any of the following compounds:

- imidacloprid (Merit)
- clothianidin (Arena)
- thiamethoxam (Meridian)
- halofenozide (Mach II)
- chlorantraniliprole (Acelepryn)

Early Season Reactive Control

(July/August) Early season reactive applications are generally made in

response to high populations of first and early second instar grubs before damage is visible. Scouting for white grub populations in the soil can aid in decision making at this time and treatment thresholds ranging from 5-15 grubs/ft² are typical benchmarks for insecticide treatment. While treatment thresholds vary depending on the situation, thresholds for European chafer tend to be lower than those for the Asiatic garden beetle or Oriental beetle. Suitable chemistries for early season reactive control will include most any registered soil insecticide. In addition to the preventive insecticides above, the following chemistries are also effective during this time frame:

- carbaryl (Sevin)
- trichlorfon (Dylox)

Late Season Reactive Control (rescue treatments)

(September and later) Late season reactive applications are generally made in response to visible grub damage or damage caused by skunks and raccoons foraging for the white grubs. This is usually an attempt to rescue the turf from more serious damage. Suitable chemistries will have good knockdown capacity which usually requires good contact or oral activity. Any of the previously mentioned insecticides can be effective when used in this way, but their activity may be reduced considerably. Although chlorantraniliprole (Acelepryn) does not kill large grubs quickly, it does reduce white grub feeding. Trichlorfon (Dylox) and carbaryl (Sevin) may require two applications made at 10 to 14 day intervals and thorough post-application irrigation is extremely important.

Spring control

(April) Spring applications may be warranted in some situations, especially if severe secondary damage occurs as a result of skunk or raccoon activity, or if spring renovation activities are being undertaken to repair grub damage the previous fall. Otherwise, this approach is not suggested, as the window of opportunity is small and the grubs difficult to control at this time. Suitable chemistries will only include compounds with good contact/oral activity such as trichlorfon (Dylox) and carbaryl (Sevin) and grubs must be actively feeding in order for the insecticides to be even marginally effective. The efficacy of most soil insecticides has not been thoroughly examined for use in this capacity.

