INSECT REFERENCE

Earthworms

DESCRIPTION OF INSECT

All stages live in the soil and are only seen on the surface after rain or irrigation, or rarely at night.

Immature stage:

Eggs are laid underground in cocoons

• All stages appear similar and vary only in size

Mature stage:

Adults are elongated cylindrically shaped Annelids, generally with a pinkish color.

Damaging stage(s):

Juveniles and adults can produce castings at the soil surface

Predictive models (degree day, plant phenology, threat temperatures, other)

Earthworms are active at the surface when the soil is moist and soil temperatures are moderate. Generally most activity is seen in spring and fall with less activity during the hot dry summer months.

• Castings produced at the surface are the best indicator of earthworm activity. However, feeding activity by birds, moles and other worm-eating mammals is also an indicator.

Life cycle:

Many earthworms are long-lived with a multi-year life cycle.

• Eggs are generally laid in spring and are contained in a cocoon produced by the female.

Occurrence and surface activity are primarily influenced by soil moisture and temperature

Conducive environmental conditions:

moist soil conditions, high levels of soil organic matter.

Geographic distribution:

worldwide

DAMAGE CAUSED:

Plants attacked:

The primary concern are the castings (mounds of extruded waste soil) deposited on the surface in short mowed, high maintenance turfgrass areas (such as greens and tees) where appearance or playing surface is of critical importance. Mowing during moist soil conditions can smear soil over growing grass and affect growth and appearance.

Earthworms exiting the soil and moving to adjacent impervious surfaces (sidewalks) during rainfall and irrigation can also be considered as a problem in some areas.

Symptoms of damage:

Castings produced at the soil surface.

• Earthworms on sidewalks

Timing of damage:

Castings can be produced at any time of year, but most often occur in spring and fall.

• Earthworm may exit the soil in response to high soil moisture caused by rainfall and irrigation.

Pests that look similar; Pests that cause similar damage:

Some beetles produce small mounds of soil, but these mounds do not have an 'extruded' appearance.

MONITORING TECHNIQUES:

Soap flush, mustard solution flush or heavy application of irrigation can cause earthworms to surface.

Casting counts can be used as an index of abundance

THRESHOLDS:

There are no thresholds for earthworms. Earthworms are generally considered as beneficial organisms and are not a problem in most turfgrass situations. The primary concern are the castings (waste soil mounding) deposited on the surface in short mowed, high maintenance turfgrass areas such as greens and tees where appearance or playing surface is of critical importance. Low to moderate populations can be considered undesirable in these situations, especially on greens where ball roll can be affected.

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MANAGEMENT STRATEGIES:

Earthworms are most often a problem where moist soil conditions occur. Improving drainage reduces soil moisture and earthworm activity. Where drainage is not a viable solution, flooding can cause earthworms to come to the surface where they can be preyed upon by birds. No pesticides are labeled for earthworm control.

<table>
<tr><td colspan="5">Earthworm management strategies</td></tr>
<tr><td>TYPE</td><td>TIMING/ THRESHOLD</td><td colspan="2">PRACTICE</td><td>COMMENTS</td></tr>
<tr><td>Cultural</td><td>N/A</td><td colspan="2">Reduce soil moisture by managing irrigation or improving drainage
Sand topdressing
Avoid organic fertilizers, manage organic matter</td><td></td></tr>
<tr><td>Biological</td><td>N/A</td><td colspan="2">——-</td><td></td></tr>
<tr><td rowspan="4">Chemical</td><td rowspan="4">There are no pesticides registered for control of earthworms. However, those listed to the right are registered for use on golf course turf and have been shown to be effective against earthworms</td><td>Active Ingredient (Product)</td><td>Label signal word</td><td rowspan="4"></td></tr>
<tr><td>Carbaryl (Sevin)</td><td>Warning</td></tr>
<tr><td>Thiophanate-methyl (Cleary’s 3336)</td><td>Caution</td></tr>
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