Dead spots in an otherwise healthy lawn may be a sign of white grubs. Grub damage varies from year to year and may be severe. The annual white grub is the most common grub pest of turfgrass in Kansas. It is the larval stage of the masked chafer beetle, *Cyclocephala* spp., which completes its life cycle in a single year. Six masked chafer species have been recorded in Kansas, all with similar developmental cycles: *Cyclocephala lurida* (southern masked chafer), *C. borealis* (northern masked chafer), *C. pasadenae* (southwestern masked chafer), *C. birta* (western masked chafer), and *Cyclocephala longula* and *C. melanecephala*, which do not have common names.

**Life Cycle**
Masked chafer beetles (Figure 1) begin emerging from the soil in mid June. After mating, the female burrows back into the ground and deposits eggs. Small, first-instar grubs emerge in two to three weeks. Larvae develop rapidly, maturing by mid to late September. Cooler weather and soil temperatures in late fall cause larvae to burrow deeper into the soil, where they remain dormant during the winter. When warmer weather returns and soil temperatures rise in the spring, grubs move up to grass root zones. Most grubs will have reached full size the previous fall and do not feed much in the spring. They pupate in late May. Within two to three weeks, beetles emerge to repeat the cycle.

**Feeding Damage**
Root feeding by first- and second-instar grubs (Figure 2) may not cause serious problems until September or October (Figure 3) when larger, more ravenous third-instar grubs consume larger amounts of grass roots (Figure 4). Damage may be more severe when turf is dry or insufficiently fertilized, or in lawns where grass must compete with weeds.

**Control Methods**
Annual white grubs in turf can be managed using either preventive or rescue treatments. If perfect turf is the goal, preventive treatments are applied automatically. Applying systemic insecticides to an entire site may be an unnecessary expense when pest populations are low. It may be more cost effective to apply short-acting contact insecticides when grubs are most susceptible, ideally when 90 percent are in the first and second developmental stages. This occurs 30 to 40 days after peak flight of masked chafer beetles — typically between July 1 and 10 in Kansas, although it varies by year and location. Thus, August 10 through August 20 is the target date for treating annual white grubs in Kansas. Products containing active ingredients carbaryl and trichlorfon are recommended.

For more lasting effects and greater flexibility in timing, consider products containing the systemic active ingredients imidacloprid, chlorantraniliprole, clothianidin, thiamethoxam, and halofenozide. Although labeled for late April through August application, to ensure adequate protection systemics should be applied during mating and egg-laying, typically between mid June and late July. Table 1 lists insecticides recommended for grub control in turfgrass. Given the number of products on the market, homeowners should check local retail outlets to determine availability. Study the product label to ensure safe, proper, and effective use.
Rescue treatments are recommended when a wait-and-see
approach is acceptable. Inspect turf frequently, noting areas that
appear abnormal. Off-colored turf near dark, healthy grass; a dry
or wilted appearance; and gradual thinning may be signs of dam-
age. Where roots have been destroyed by grub feeding, turfgrass can
be easily rolled back to reveal white grubs on the surface of exposed
soil (Figure 5). Apply rescue treatments only to areas showing these
symptoms.

Grubs are often detected after turf has been disturbed by forag-
ing skunks and racoons (Figure 6). In such cases, spot insecticide
treatments can be applied to prevent further turf decline.

Other Considerations
In addition to application timing, these factors influence treat-
ment effectiveness.

Thatch. Contact insecticides applied to the soil surface may not
reach grubs, which are located underground. To come in con-
tact with grubs, insecticides must move into the soil. Thatch, an
accumulation of organic material, may interfere with insecticide
movement and reduce the amount of toxicant that enters the soil.

Application rate. Apply the amount of insecticide indicated on
the label. Cutting back to save money or expanding the treatment
area beyond specifications may result in an application that is
insufficient to kill pests.

Equipment calibration. Equipment should be calibrated to
ensure accurate delivery of insecticide at labeled rates. Even
new equipment with predetermined settings requires calibration
because of manufacturing irregularities. Rate settings vary from
brand to brand. Calibrate when switching to a different formu-
lation of the same active ingredient or to a different product. Older
spray equipment may need to be recalibrated as nozzles wear.
Repeated grinding action of granular insecticides used in rotary
or broadcast spreaders changes flow rates, and they also require
recalibration.

Water. Watering before and after treatment improves product
performance. Watering beforehand encourages grubs to move
up in the soil, bringing them closer to insecticides. Premoistened
soils facilitate the movement of water and insecticide into the soil.
Irrigating immediately after treatment removes insecticide resi-
dues from grass and the soil surface where they tend to degrade
rapidly.

Speed of kill. Contact insecticides need time to move from the
soil surface into the area where grubs are active. After making
contact, more time is needed for insecticides to kill pests. Wait
seven to 10 days to assess treatment effectiveness.

Label specifications. Study product labels to achieve maximum
grub control. The pH of the water carrier, freshness of the product
or tank mix, and agitation requirements vary by product. Weather
conditions at treatment also play a role in distribution and cover-
age. Consider granular applications when excessive winds pro-
hibit use of liquid sprays.

Robert J. Bauernfeind, Entomologist

Table 1. Insecticides for Grub Control

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Trade Name*</th>
<th>Residual Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>carbaryl</td>
<td>Sevin</td>
<td>short/contact</td>
</tr>
<tr>
<td>chlorantraniliprole</td>
<td>Acelepryn</td>
<td>extended/systemic</td>
</tr>
<tr>
<td>clothianidin</td>
<td>Arena</td>
<td>extended/systemic</td>
</tr>
<tr>
<td>clothianidin + bifen-thrin</td>
<td>Aloft</td>
<td>extended/systemic</td>
</tr>
<tr>
<td>halofenozide</td>
<td>MACH 2</td>
<td>extended/systemic</td>
</tr>
<tr>
<td>imidacloprid</td>
<td>Merit</td>
<td>extended/systemic</td>
</tr>
<tr>
<td>imidacloprid + bifenthrin</td>
<td>Allectus</td>
<td>extended/systemic</td>
</tr>
<tr>
<td>thiamethoxam</td>
<td>Meridian</td>
<td>extended/systemic</td>
</tr>
<tr>
<td>trichlorfon</td>
<td>Dylox, 24-Hour Grub Control</td>
<td>short/contact</td>
</tr>
</tbody>
</table>

*Many companies use the same active ingredients to formulate
products. Check the label to determine which active ingredient it
contains.

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not
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