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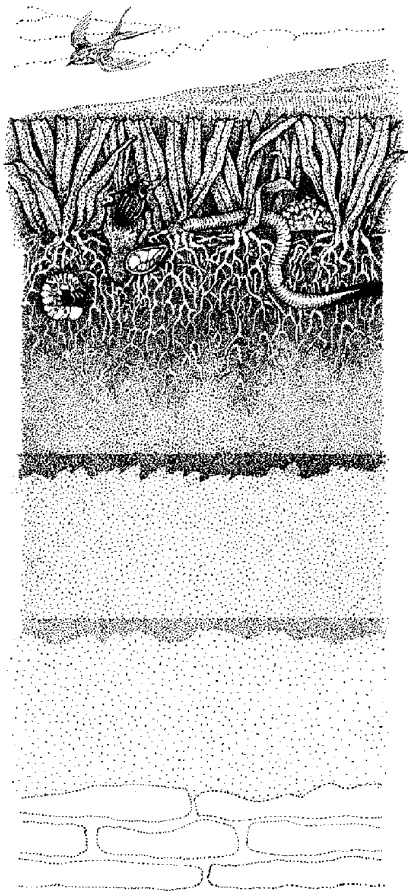

Predicting Grub Populations In Home Lawns

Scarab grubs are the major turfgrass pest in New York State and much of the Northeast. Landscape plants, including turfgrass are subject to intense feeding pressure from a number of grub species including the Japanese beetle (*Popillia japonica* Newman), the European chafer (*Rhizotrogus majalis* Razoumowsky), and the Oriental beetle (*Exomala orientalis*). Of these three species, the European chafer is considered the most difficult to control using traditional insecticides and biological control agents. Although not as widespread as the Japanese beetle, the European chafer grub is more damaging to turf in areas where both are found. Unfortunately, in upstate New York, European chafers are the most common grubs in home lawns and low maintenance turf. ■

European Chafer

The European chafer is slightly larger than the Japanese beetle grub, it feeds later into the fall and starts feeding again earlier in the spring. European chafer grubs feed most heavily on grass roots from August to November and from April to June. Even during the winter months grubs may resume feeding during warm spells. Turf damage caused by grub feeding is most severe under drought conditions when water-stressed grass plants cannot grow new roots to replace injured ones. In heavily infested areas, entire lawns may turn brown and die during prolonged periods of dry weather in the fall or spring.

Traditionally, lawn care companies and homeowners manage chafer grubs by making one or more insecticide applications annually. Turf managers seldom assess grub populations before making treatment decisions, despite the existence of damage thresholds. Insecticide applications are usually preventive or in direct response to turf damage. Our research indicates that most prophylactic applications of soil insecticides for European chafer control are wasted because most properties required no treatment. Insecticide applications for grub control could be greatly reduced if an efficient sampling plan and a reasonable set of rules for making treatment decisions (control decision rules) was available for turf managers.

We recently developed such a control decision rule for European chafer-infested residential turf sites. With this rule, mean density and

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Predicting Grub Populations

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site characteristics such as lawn age and grass species composition are used to indicate whether a site is likely to harbor a damaging (high density) patch of European chafer larvae. Based on our data, using this rule would eliminate pesticide use on roughly 65% of the sites.

Research Data

Following is a description of our research involving European chafers in home lawns, and a discussion of the practical implications for lawn care companies and homeowners.

More than 300 residential lawns were intensively sampled for grubs in the Rochester NY area, in cooperation with a local lawn care company. Data included extensive grub counts and estimates of site characteristics for each property. Golf course cup cutters were used to remove soil cores (11 cm diam.) that were examined for the presence of white grubs. Cores were taken every 10 ft in a grid pattern. Numbers and species of grubs were recorded as well as soil type, terrain, lawn age, shade, thatch, and grass species composition for both the front and rear lawn (see Figure 1).

Our results indicate that European chafers were the predominate species found. Although 1990 was generally considered a "hot year" for grubs, our mapping revealed that only 18% of the lawns required treatment (see Figure 2). This was agreed upon by both the lawn care company and researchers. Decisions were based on the presence of patches of high numbers of grubs that could cause damage. Generally, lawns requiring treatment had an average of at least 0.2-0.4 grubs per sample (2-4 per ft^2).

When comparing grub densities to site characteristics, we found that high grub populations were strongly associated with front lawns, high proportions of Kentucky bluegrass, young lawns,

Figure 1

Grub Distribution Pattern Example

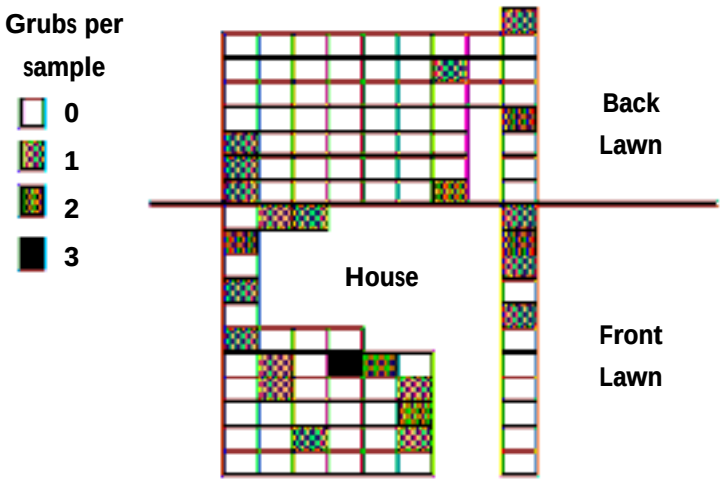
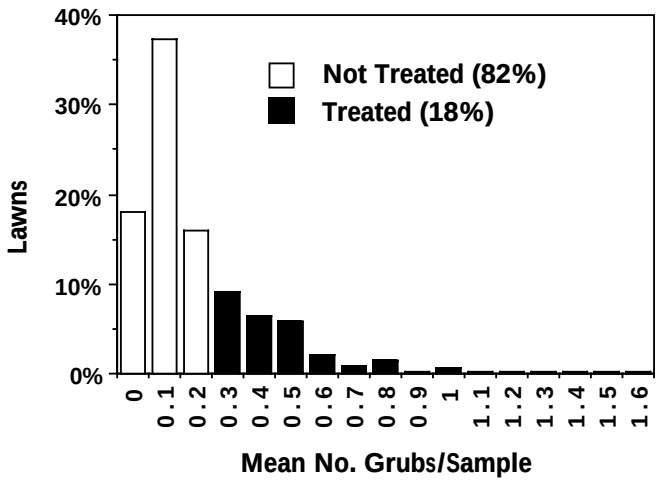
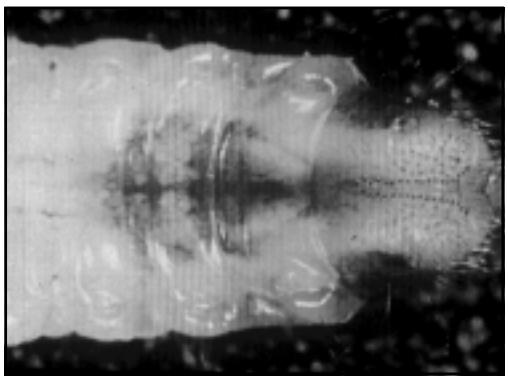


Figure 2

Grub Populations & Treatment Decisions in Home Lawns



The European chafer is the primary scarab beetle in upstate New York.



The rastal pattern of the European chafer is used for identification.

and lawns in open (non-shady) areas. A risk assessment scheme was developed based on these factors, allowing turf managers to assess how likely an area is to have high grub populations before deciding to sample (see Table 1). Lawns 5-20 years old had the greatest number of grubs in risk categories 4-9. Lawns older than 20 years had the greatest number of grubs in risk categories 5-9.

This risk assessment system can be used to determine whether a site should be sampled or not. Low risk properties would not require sampling or treatment. Moderate and high risk lawns would be sampled and treatment decisions based on the outcome. Currently, we advocate sampling a minimum of 20 soil cores from these lawns. Samples should be representatively gathered throughout the lawn. Statistical analysis of our data suggest that an average of 0.25 grubs per 11 cm diameter turf plug could be used as a threshold value for decision making. When mean densities are close to this threshold level, an additional 20 samples should be taken. Use of this sampling scheme and decision rule should result in few treatment errors and could lead to considerable reductions in pesticide use.

Results suggest that grub sampling is an economical alternative to preventative grub treatments for both lawn care companies and homeowners. In 1994, we will be validating the risk assessment model, sampling plan and treatment threshold. These studies will be conducted on 100 lawns located in four sites in the Finger Lakes region. Results will be reported at the annual NYSTA conference and in a future edition of *CUTT*.

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Table 1. Risk Analysis

Risk Rating*	Shade	Kentucky Bluegrass
1	>60%	<30%
2	>60%	30-60%
3	30-60%	<30%
4	30-60%	30-60%
5	>60%	>60%
6	30-60%	>60%
7	<30%	<30%
8	<30%	30-60%
9	<30%	>60%

*Higher numbers = greater risk of high grub populations

Summer Patch

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varieties of Kentucky bluegrass is perhaps the best strategy for controlling summer patch. Mixtures of these grasses provide the most effective control.

Systemic fungicides are effective in controlling summer patch. They should generally be applied 2-3 times at monthly intervals, beginning in the spring. Late season applications should help turf recover once symptoms appear. Fungicides must be applied with sufficient water so that they are carried down to the root zone where they can be absorbed by the plant. Without this drenching, control is much less effective and more costly. Certain contact fungicides, particularly chlorothalonil, may enhance disease development and should be avoided in sites with a history of severe summer patch problems.

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a 58% reduction in Japanese beetle grubs. However, these same nematode species were ineffective in large scale studies. Results of this year's work and similar results from past years suggest that further research needs to be conducted on the interaction and effects of soil type and climate on the nematodes.

The Turfgrass IPM program is a national leader in the IPM effort. In 1993, the program continued its commitment to develop a strong research and extension base. Working with the industry, the program achieved another prosperous season.

The continuing success of the Cornell IPM program make it one of the best examples of partnerships that span growers; managers; research and technology-transfer centers; and legislative and other governmental bodies. For more information contact your local Cooperative Extension agent, or contact the IPM Program, New York State Agricultural Experiment Station, Geneva, NY 14456; telephone (315) 787-2353 for the *1993 Annual New York State IPM Report* and the *1993 Ornamentals Report Pertinent to the IPM Effort at Cornell University*.

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