Sampling Techniques

The techniques required to sample the soil underlying turfgrass areas are the most arduous and the most disruptive to the turf. The population of soil insects such as white grubs usually is distributed unevenly, so soil samples often must be as large as one sq. ft. Because some turf damaging grubs remain strictly in the soil, disruption of the soil is necessary to obtain accurate counts. When samples are taken with a spade, the depth of sampling is often variable because of the rooting habits, soil moisture, and soil texture. Most often sampling is much deeper than necessary in order to ensure that all grubs are found. One method of examining samples of sod and soil is to cut three sides of a square to a depth of five inches and turn back the cut area to expose the soil This procedure allows many of the plants to keep their root system intact. Samples which involve one sq. ft. sometimes heal very slowly, leaving dead or dying patches of turf. Smaller samples often provide nearly as accurate an assessment of the grub population but recover much more quickly.

The quickest and least destructive method of collecting a soil sample is to use a cup cutter, four inches in diameter, to collect samples to a depth of five inches. Samples can be taken and inspected very quickly, enabling a scout to check several different locations and to provide more accurate information about spatial distribution of white grubs. The use of a cup cutter to determine grub populations in an area often reduces the need for blanket insecticide treatments for grub control. In general, treating grubs when they are small and feeding at the thatch soil interface produces the best control.

Analyzing the Sample

Grub sampling determines where the highest grub populations are found, which grub species is the most common, and what is the predominant development stage of the grubs found. Systematic sampling also indicates if a large number of the grubs are infected with bacterial or fungal pathogens, turf root health, thatch density, and soil texture, compaction and moisture. Long term benefits of systematic sampling are the identification of susceptible or favorable turf areas, the development of personal thresholds, and when undertaken before and after the application of an insecticide, treatment efficacy.

Fewer than five grubs per sq. ft. indicates a low population, lower than the standard damage threshold of seven to ten grubs, and no need to treat, whatever the kind of white grub. However, the specific situation should be taken into account in the decision whether to spray. Personal values should be incorporated in setting up the threshold level. The tolerance level, or action threshold, for turfgrass insects is site-specific and depends on many factors, such as pest species or complex, turfgrass species and cultivar, turf use, turf vigor, time of years, expectations, availability of curative control options, and budget. Turf managers often are less concerned with insect infestations that are found in autumn on cool season grasses, because most insects are noticeably less active at cooler temperatures and the turf is more able to recover from any damage that occurs.

Jennifer Grant, working with the New York State IPM Program, sampled and mapped thirty-six golf courses in Central New York each fall over a four year period for Japanese beetle and European chafer grubs. Each fairway was sampled using a standard cup cutter; four cores were taken across the fairway at 30 yard intervals, with sampling skewed toward roughs on wide fairways. The sampling team consisted of three to eleven people all trained to recognize grubs and larval stages and one or more persons capable of species identification. By carefully monitoring the time it took to map the golf course, Jennifer determined that it took an average of two labor hours to sample and map a typical hole, or 36 hours to map a typical 18 hole golf course (this means that it take one worker 36 hours, six workers 6 hours, and ten workers 3.5 hours). Using these estimates the cost of mapping a typical course would be $180 if your workers were paid $5.00 an hour, $252 if they were paid $7.00 an hour, or $360 if they earned $10.00 an hour. The estimated cost of grub insecticides would have been considerably higher; the cost for treating 25 acres of turf could range from $1,825 to $3,684, while treating 60 acres could cost between $4,380 to $8,842 using standard grub insecticides. Over the four years of this study 17 golf courses required no grub insecticide treatments, 16 golf courses required spot treatments, and only three courses required treatments on all fairways.