

tural Experiment Station, has found it doing serious harm on lawns in southeastern Ohio and has described its habits in the *Journal of Economic Entomology*.

The adult beetle looks like a brown June bug, perhaps a bit smaller than average. The grub too would be taken by the untrained observer for that of the June bug. The life history of the bug, called the annual white grub, is different from that of the true June bugs. While the latter require 2 to 4 years to mature, this grub matures in 1 year. Eggs are deposited in Ohio through late June and July. They hatch in 19 days and the young grubs grow fast and are nearly full grown on the approach of cold weather. They then move downward and start up again in April. By May 1 most of the grubs are at the soil surface feeding on the grass roots. From 10 to 47 grubs have been found to the square foot. When so numerous they may completely destroy the grass and the turf feels soft and springy to the step.

In early June the grubs move down to about 6 inches and pupate. In the latter part of June the adults emerge to begin a new life cycle. So far the adults have not been observed feeding, and it is not yet known on what plants they feed, if at all.

Neiswander tried some control experiments with carbon disulfide and lead arsenate. While the death rate in these experiments was higher with the carbon disulfide treatment than with the lead arsenate, the latter applied in the fall at the rate of 10 pounds to 1,000 square feet gave a fairly good kill. The writer favors the arsenical treatment because of its known residual effect.

"BETTER LAWNS"

Although its name would appear to indicate that the recent book "Better Lawns" was written primarily for the home owner, its author, Dr. Howard B. Sprague, makes it clear in the opening paragraph of the preface that his book is intended "for all those who are interested in good turf, whether it be on lawns, parks, estates, golf courses, or other recreational fields." This book was published in 1940 by Whittlesey House, a division of the McGraw-Hill Book Company, and is the most recent American text on the general subject of the establishment and maintenance of better turf.

Recognizing the fact that climatic and soil conditions vary so widely in diverse sections of the country that it is impossible to make recommendations which could be applied equally satisfactorily in all parts of the

United States, Dr. Sprague has attempted to give in a clear, non-technical style the principles underlying the various turf management practices. This is done in the belief that an understanding of these principles should make possible the solution of particular problems as they arise in connection with turf maintenance under any particular set of conditions. The book is easily read and understood, and is fully illustrated with photographs, drawings, charts and tables.

The author considers that the successful establishment and maintenance of turf "depends on choosing grasses that are suited to the light conditions and other climatic factors, improving the soil to suit the needs of the turf grasses, and following the types of treatment—mowing, watering, fertilizing, etc.—that are necessary for healthy growth of the grasses under the use being made of the turf."

Accordingly, one chapter was wisely devoted to descriptions and sketches of the various grasses as they appear in turf, by means of which the reader may readily identify the grasses in his turf. Such descriptions are given for five species of *Poa* (bluegrasses), four of *Agrostis* (bents), five of *Festuca* (fescues), two of *Lolium* (ryegrasses),

and *Trifolium repens* (white clover).

Other chapters deal specifically with soils, soil acidity and the use of lime, the use of fertilizers, seed germination, controlling weeds in turf, and controlling diseases and insect enemies of turf, in addition to more general chapters on planting new lawns, renovating poor turf, and general maintenance practices such as rolling, mowing, spiking, etc.

SOIL CHARACTERISTICS AFFECT TOXICITY OF HERBICIDES

It has long been recognized that the rates at which herbicides must be applied to be effective vary with the soil as well as with the weed to be destroyed. A. S. Crafts and his collaborators in California have been working with various herbicides on some 80 different soils. They are primarily concerned with killing all vegetation in weed-infested soils rather than with selective action such as we are working for in turf where the aim is to kill the weeds and leave the grass. The results which they have obtained concerning the effect of fertility and texture of the soil on the toxicity of the herbicides, however, are equally as applicable for our purposes as for theirs.

In the Journal of Agricultural Research and in Hilgardia, Crafts and