

macher of Germany. Government programs for weed control are described by L. W. Kephart in the United States and by B. Rademacher in Germany. The biological method is mentioned particularly in Australia and New Zealand. This method involves the introduction of insect pests and therefore necessitates extensive tests on many species of insects to determine those which will feed on the weed or weeds concerned and which at the same time will not feed in any stage of their life history on plants of economic value.

The weeds common to each of the countries are listed in the various articles, the most completely organized lists being those given for Germany by B. Rademacher and for Australia by C. H. Currie.

Bibliographies on weed control are also included by T. K. Pavlychenko of Canada, Currie of Australia, Rademacher of Germany, and Crafts and Raynor of the United States.

Poisonous plants are also discussed. R. H. F. Manske of Canada presents the possibility of classifying poisonous plants on the basis of their chemical analysis rather than their morphological characteristics. These plants are given particular emphasis by D. G. Steyn of South Africa who states that already more than 200 poisonous plants are known in the

Union of South Africa, only some of the most important of which are discussed in his article.

The only discussion of weed control in turf is given by John Monteith, Jr., who names the most common weeds in turf in the United States and discusses the possibility of controlling them by means of proper maintenance practices, by the judicious use of fertilizers, and by the use of selective herbicides such as arsenicals which will kill many of the weeds and yet not seriously burn the turf grass.

THE ANNUAL WHITE GRUB

The annual white grub (*Ocbrosidia villosa*) has been known to occur in various places in this country, but only occasionally has it been reported as the cause of serious turf injury. In 1937 the attention of the Green Section staff was called to a set of fairways in Pennsylvania where this insect had caused extensive and severe damage. It has been observed elsewhere causing serious damage in more limited areas of turf. It is possible, however, that in many instances it may have been responsible for some of the damage believed to be caused by one of the 2 to 4-year broods of the June beetle. C. R. Neiswander, of the Ohio Agricul-

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