

Caterpillar of the black-headed sod webworm (*Crambus mutibilis*). Enlarged $2\frac{1}{2}$ times

Science Wages WEBWORM Turf War

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Photos Courtesy of USGA Green Section

DAMAGE DONE to golf courses in 1931 by webworms was so great that greenkeepers all over the country have been curious to know what could be done to control them.

Webworms have always inhabited turf grasses, but unless climatic conditions are unusual, the damage they do generally goes entirely unnoticed. It is little wonder, therefore, that many greenkeepers should have been taken by surprise in 1931, when conditions favorable to the insects brought about their immense increase, with the subsequent damage to golf courses.

The webworm is a small grayish moth generally seen flying over grasslands at dusk or in the early hours of the night. Generally the first moths appear in May, and continue throughout the summer to September. It is not the moth, however, which does the damage, but rather the larva, or worm, the sole purpose of the moth being to mate and lay eggs from which the grass-hungry larvae soon emerge. These

eggs are dropped by the female as she flutters over the grass. Being small and dry, the eggs fall down deep among the grass stems where they are almost impossible to find.

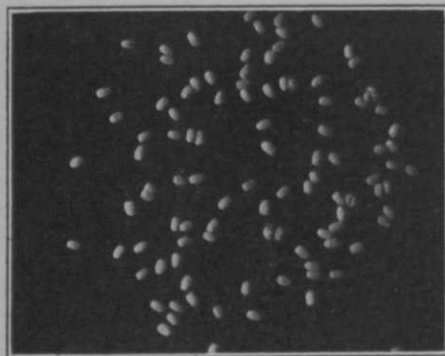
Webworm Larvae Do All Damage

The eggs hatch, in about a week or ten days, into larvae, or tiny worms. These larvae go straight to the blades of grass where they begin a continuous period of eating. At first, they locate on the leaf of grass, protecting themselves with a silken web which they spin; but when they grow too large to be concealed, they crawl down and construct a silk-lined burrow in the soil. This burrow is their home for the remainder of the larval period, food being secured by cutting off entire blades of grass which are dragged into the burrow and eaten in safety and leisure.

When the larva has at last eaten its fill, it is ready for the second stage—the pupal period. Deserting its old burrow, the larva spins a cocoon in the earth nearby and after a period varying from a few days to two months, depending on the species, the moth emerges, pauses for a moment to dry its wings, and then flies away to mate, lay eggs and start a new generation.

That, in brief, is the life history of the webworm family, of which there are 60 to 80 different members, each with slightly varying seasonal histories. Some species have a single generation in a season, while others have two or even three. Of the many species, the greenkeeper need worry about but a dozen; the rest are either too rare or else feed on weeds or grasses unimportant from the greenkeeping standpoint.

Of those webworms which do the most damage because they attack golf course

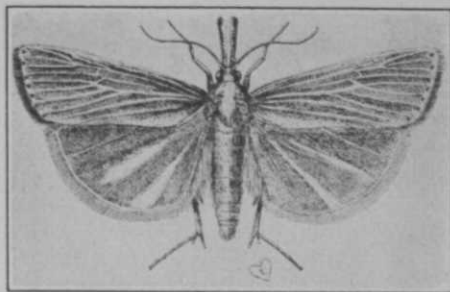


Eggs of the webworm moth (*Crambus teterrellus*)

turf, most have two generations per season, and two-generation webworms are particularly dangerous because the second generation, hatching in midsummer, comes at a time when the grass can least resist attack. Among the two-generation species are the striped webworm, the bluegrass webworm, and the leather-colored webworm. The blackhead sod webworm, although producing but one generation a season, is also capable of doing considerable damage to turf.

Control Methods

Until quite recently, scientists seemed interested in the study of controlling webworms on farms only. Obviously, the methods advocated in most government bulletins and technical papers, therefore, do not apply to golf courses. As a result, the greenkeeper has had to get along the best way he could. It is not strange, either, that he wasn't very successful, for any number of entomologists have gone on record as stating that no control methods

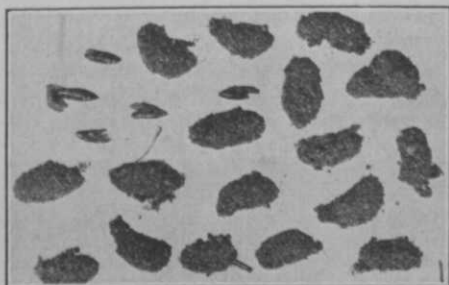


Adult of the black-headed sod webworm
(*Crambus mutibilis*)

extract is to force the webworm to the surface, where they writhe in apparent agony for a while and then die without returning to the earth. The only objection to this method of control is its cost; one gallon of the extract costing about \$17.50. This amounts to about 3½¢ per sq. ft., or \$19.50 for a green of 5,000 sq. ft. There is, however, the advantage that it is non-poisonous, will not harm the grass, and if properly applied will be very effective.

However, some cite savings under this estimate and there is no doubt of the effectiveness.

The second method is the use of kerosene emulsion. W. R. Noble of the U. S. Department of Agriculture has worked out the following emulsion which is still in an experimental stage. The stock mixture is prepared as follows: "dissolve 1 lb. of laundry soap in 1 gal. of boiling water; add ½ gal. of kerosene; stir rapidly until a creamy emulsion is obtained. This stirring may be accomplished by pumping the mixture into itself through a spray pump or by churning in an inexpensive household butter churn. Small quantities



Cocoons and pupae of the striped webworm
(*Crambus mutibilis*). Reduced

had been developed which were successful on grasslands. This may have been true before 1931, but it is no longer.

The "plague of 1931" set many to work experimenting with various poisons to combat this pest. At the end of the season, two general control methods had been developed which have proved effective.

Pyrethrum Poisons Worms

The first of these treatments is the use of pyrethrum extracts, of which there are several commercial brands. When used in dilutions as great as 1 oz. in 5 gal. of water, the kill has been nearly 100 per cent. Care should be exercised, however, that immediately upon opening the container in which the extract is received it be mixed and used, otherwise the efficiency of the treatment will be greatly impaired.

The characteristic action of pyrethrum



Pupa of bluegrass webworm (*Crambus teterrellius*)

have been prepared with an egg beater. For use as a spray, 1 part stock emulsion should be mixed with 50 parts water and this mixture applied to the infested turf at the rate of about 1 gal. to a square yard (555 gals. to 5,000 sq. ft.). In tests it was applied with a sprinkling can.

Other Methods Not So Good

Other control methods have been tried without much success. Some have reported good control with lead arsenate, but experiments carried on by the Bureau of Entomology failed to prove their effectiveness.

It has been proved, conclusively, that except under the most unusual conditions,

grass in a healthy condition will be better able to withstand without appreciable injury the attacks of insect pests. The fact that the summer generation of webworms is the most injurious is a case in point, for it is at this time that the natural spring growth has ceased and the harmful effects of attack can less be sustained than when new grass is constantly replacing that eaten. In conclusion, therefore, it may be said that webworms can be successfully fought by (1) developing strong, healthy grass through the proper care of turf (fertilizing, watering, drainage, soil mixture, etc.); (2) use of effective chemicals, such as pyrethrum extracts or kerosene emulsion.

Course Owner Builds Novel Leave Remover

OAKWAY Public Golf Course (Eugene, Ore.) is heavily wooded with huge maple trees. Each fall the leaves become quite a problem on this course—there are spots, it is said, where the leaves fall so thickly that not only a golf ball but an entire golf bag may very easily be lost. To combat these tons of leaves

Commenting on the machine, Babcock says: "The machine while only an experiment, was a real boom last fall. The machine works beautifully, leaving the fairways very neat with every blade of grass standing upright. It picks up any light object which is not too large to pass into the mouth of the intake.

"In 1930 my extra raking labor, not including that which was done by my regular staff, cost over \$300. After the ma-



which hurt business each fall, George L. Babcock, owner of the course, and his greenkeeper, W. L. Crisp, invented and constructed the unique vacuum sweeper pictured herewith.

The machine consists of a 30-in. planing-mill blower of 2500 r.p.m.'s powered with an old Buick six motor, all of which are mounted on a trailer which is hooked to a Ford truck. The leaves are picked up by the intake nozzle and are carried forward into a screened body on the truck. Leaves are handled only twice, once in the pick-up and once on the unload.

chine had been built in the fall of 1931, extra labor cost only \$30 and this was employed in raking leaves out of spots inaccessible to the machine.

"Being a first attempt my machine has many defects and is capable of many improvements. For example, it should be mounted on wide rimmed wheels to keep from cutting into soft fairways. Likewise the intake should be hinged in order to drag flexibly instead of being stiffly upright. However, in spite of the defects, the machine works and more than paid for itself last fall."