GETTING THE BUGS OUT

By R. SCOTT CAMERON

Those dried patches on tees, fairways, aprons and greens could have been caused by an insect called the turfgrass weevil. The author has come up with what he believes is a way of controlling the pest

A relatively new species of insect pest is damaging turf, particularly in the Northeast on Long Island and in Westchester County, New York. This small weevil, known as the "turfgrass weevil," kills *Poa annua* late in the spring. Turf damage varies from yellow-brown spots about the size of a dime on greens to the dying out of large areas on greens, aprons, tees, fairways and grass tennis courts. Turfgrass weevil damage was first reported on Long Island's North Shore in 1957. Damage has now spread to numerous golf courses throughout Long Island and Westchester County and also in the states of Connecticut and Pennsylvania.

Full scale research studies on the weevil were started in 1968 when the New York State College of Agriculture at Cornell University, Ithaca, N.Y., received a grant from the Long Island Metropolitan Golf Course Superintendents' Research Foundation. The foundation was established in 1967 for the specific purpose of raising an $18,000 research fund from concerned golf clubs, associations and commercial firms. For the last two years, this fund has supported research studies directed toward finding a means of controlling the turfgrass weevil.

The species of this new insect pest has not been determined. Specimens from Long Island have been classified as both *Hyperodes anthracinus* and *H. maculicollis,* but upon close inspection it appears to be a new intermediate species or subspecies.

Like the Japanese beetle and the sod webworm, the turfgrass weevil has four stages of development, including egg, larva, pupa and adult. The larva varies from one millimeter when it first hatches from

The adult turfgrass weevil (above) *grows to a size of 3.5 millimeters and can cause extensive damage* (below) *for example, this apron of a golf green on a course on Long Island, N.Y.*

the egg to 4.5 millimeters (one-sixth inch) when fully developed. The larva is legless, creamy-white and crescent shaped and it has a dark brown head capsule. The pupa is about 4.5 millimeters long, creamy-white and resembles the adult in form. The adult is oblong, about 3.5 millimeters (one-seventh inch) and the front of its head is elongated into a beak which has a pair of elbowed antennae attached near the tip. A young adult is soft and orange-brown, but it gradually hardens and darkens to a dull black. As the adult grows older, much of its tiny hairs and scales are worn off, leaving a shining black body.

Turfgrass weevil damage is difficult to distinguish from damage caused by other insects, diseases or wilt. Weevil damage has only been observed on *Poa annua* turf and it appears in late May and early June. Inspection of damaged stems often reveals U-shaped indentations at the bases where weevils have been feeding. The dead grass

in weevil damaged areas generally lies flat soon after being damaged. If damaged areas are observed when the grass stems first turn yellow, larvae can often be found in the thatch layer and inside grass stems. When patches of turf turn brown, larvae, pupae and young adults can be found in the soil just beneath the damaged turf.

Poa annua is a common and persistent weed problem on many golf courses. It invades the courses in the early spring with lush growth, but tends to die out in midsummer. *Poa annua* is prolific in the Northeast, especially on Long Island, where it often constitutes nearly 100 per cent of the grass on many fairways, tees and greens. Through necessity, many superintendents have resigned themselves to the difficult task of managing *Poa annua*. The turfgrass weevil is making this task more difficult.

Turfgrass weevils survive the winter as adults in tufts of fescue and among leaves and debris under bushes and trees. Early in the spring these adults migrate onto fairways, tees, aprons, greens and grass tennis courts where they feed, mate and deposit eggs between leaf sheaths in *Poa annua* stems. Some larvae begin feeding immediately upon hatching, while others emerge from the original stems and move to other feeding sites. Small larvae tunnel in and out of several grass stems. As the larvae approach maturity, they become more sedentary and establish burrows in the thatch and upper soil where they feed on surrounding grass stems.

When fully developed, larvae burrow about one-fourth inch into the soil where they form earthen cells and transform into non-feeding pupae. In about five days pupae transform into adults. Except when they emerge from the soil, adults spend most of the daylight hours among grass stems in the thatch. At dusk they become active and crawl to the tips of the grass blades to feed. With the aid of a strong light, adult weevils can often be spotted on the surfaces of greens at night. Adult feeding apparently causes little damage because they feed mostly on the leaves and upper stems of grass plants.

On Long Island, there is a complete spring generation and what appears to be a partial second generation. The spring generation has been observed on fairways, tees, greens and tennis courts, while the partial second generation has only been observed on greens and tennis courts. The spring generation causes significant damage whereas the second generation is most often overlooked.

Eggs of the first generation are laid throughout April and May. Larvae are numerous from mid-May through early June. Pupae and new adults are most numerous throughout June.

Initial efforts of golf course superintendents to control the turfgrass weevil were unsuccessful because chemicals were applied after most of the damage had been inflicted and the larvae had burrowed into the soil. The key to control was found in biological studies on this insect. Chemicals should be applied early in the spring and directed toward the adults before they lay their eggs or toward the young adults before they cause significant damage.

In order to determine which in-

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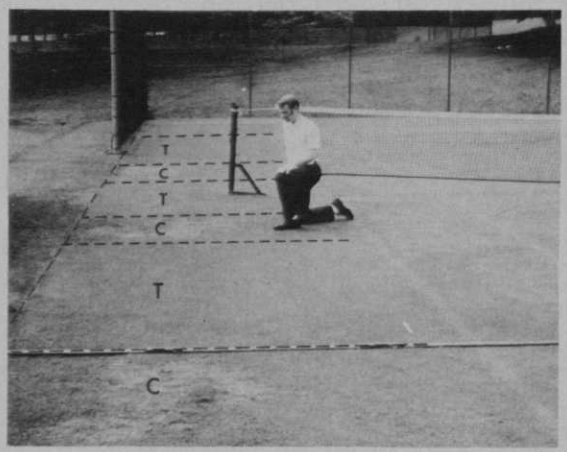
secticides might be effective in the field, 25 insecticides were tested on adult turfgrass weevils in laboratory experiments. Several organophosphate materials, including Guthion, Baytex, Supracide and Dursban, were most effective whereas several chlorinated hydrocarbon materials, including heptachlor and chlordane were the least effective.



Field plots in 1969 show damaged grass in control plots (C) and healthy grass in treatment plots (T).

The materials which were most promising in the laboratory bioassay experiments were selected for field testing in 1969, along with Di-Syston, which looked promising in 1968 field tests; and diazinon, an insecticide commonly used against soil dwelling insects.

Nearly all the 1969 plots treated in both April and again in May were conspicuously healthier than their surrounding control plots. Dursban applied at a rate of 2½-pounds active ingredient per acre in April and again in May gave the best control. Diazinon applied at a rate of five pounds active ingredient per acre in April and May consistently gave good control, while diazinon applied at a rate of two pounds active ingredient per acre in April and May gave only fair control. The diazinon plots treated only once in mid-April showed considerable weevil damage.

Operational trials conducted by several golf course superintendents in 1968 and 1969 showed that granular diazinon applied in the early spring successfully controlled the turfgrass weevil.

To control the turfgrass weevil, granular diazinon at a rate of three to four pounds active ingredient per acre or Dursban emulsifiable concentrate at a rate of 1½ to two-pounds active ingredient per acre should be applied on suspected problem areas in mid-April and again in mid-May. Neither diazinon nor Dursban are registered for use against the turfgrass weevil, but both are registered for use against other turf insects.

Diazinon (14G) at a rate of 3½-pounds active ingredient per acre will cost the golf course superintendent approximately $10 per acre for each application, a total of $20 per acre per year. Dursban (2E) at a rate of 1½-pounds active ingredient per acre will cost approximately $18 per acre for each application, a total of $36 per acre per year. More extensive field tests could prove that lower rates of application or one treatment per year would adequately control the turfgrass weevil. □

Mr. Cameron is a candidate for a M.S. degree in entomology at Cornell University, Ithaca, N.Y. His research on the "turfgrass weevil" was reported to the delegates at the 23d Cornell Turfgrass Conference held last February.