

the water renewed 3 times during the afternoon. Control was perfect at the heavier rates and practically so at the 9-pound rate, both when the area was covered with paper and when it was kept wet. When present in sufficient amount, the water prevented the escape of the gas.

While the cost of treatment would be too great on a large area, it seems quite practical for small areas. The cost is given as \$1.00 per 100 square feet for chloropicrin, plus a few cents for paper. The use of chloropicrin for killing weeds in soil and in compost has been described in the January, 1939, number of *TURF CULTURE*, pages 63-79.

CONTROL OF SOD WEBWORMS

There are several species of sod webworms, but they all have similar habits and cause the same kind of damage to turf. They are present in turf from early spring to late fall, but during periods of abundant rainfall the grass plants are not severely injured. In dry seasons, particularly in midsummer, severe injury may result from their feeding on the grass blades, and the grass may even be killed. In a Kentucky Agricultural Experiment Station Bulletin, H. H. Jewett has described three species of webworms common in Kentucky

bluegrass sod and has given an account of control experiments carried out during 1934, 1935, and 1937.

Preliminary trials were run with kerosene emulsion, barium carbonate, nicotine oleate, pyrethrum, arsenate of lead, beta dichloroethyl ether, Loro, Lethane Jr., Derris powder and a poison bait composed of cornmeal, Paris green and nitrobenzene. The kerosene emulsion, pyrethrum, and arsenate of lead were found to be the most efficient and were given more extensive trials during the three seasons, 1934, 1935, and 1937.

The kerosene emulsion was prepared from $\frac{1}{2}$ pound of hard soap, 1 gallon of water and 2 gallons of kerosene. One part of this emulsion was diluted with 10 parts of water and applied at the rate of 1 gallon to 10 square feet. When carefully prepared, this emulsion did not injure the grass except for a slight burn to the tips of newly clipped grass or grass bruised with trampling.

The arsenate of lead was applied in a spray prepared from 1 pound of arsenate of lead in 10 gallons of water at the rate of 1 quart to 10 square feet. This was the equivalent of applying arsenate of lead at the rate of 2.5 pounds to 1,000 square feet. It was recommended that soap or some other material should be

added to the spray to make the arsenate stick to the grass. No injury to the grass resulted from this treatment.

Pyrethrum extract containing 2 grams of pyrethrin in 100 cc. was diluted at the rate of 1 ounce in 4 gallons of water and applied at the rate of 1 gallon to 10 square feet. This was equivalent to applying pyrethrin at the rate of approximately one-half ounce to 1,000 square feet. It did not injure the grass.

With these three materials 86 to 96 percent of the webworms were killed in different trials during the three seasons, 1934, 1935, and 1937. Considering all trials, it was concluded that the pyrethrum extract gave slightly better control than either the kerosene emulsion or the arsenate of lead, and the latter gave the least control, particularly in 1937.

MANAGEMENT OF LAWNS IN NEW ENGLAND

The Rhode Island Agricultural Experiment Station has carried on lawn experiments for a number of years and H. F. A. North, T. E. Odland and J. A. De France have reported on this work in Rhode Island Bulletin 264.

Some plots have been under continuous observation for 30 years, but in the main the report covers the

results for the 5 years 1931-1935. The plots were variously treated as to fertilizers, lime, compost and other factors studied, and were rated during each season for vigor, color, texture, density and uniformity.

The continuous use of sulfate of ammonia is said to have produced a very acid reaction in the soil, but when an equal weight of lime was added with the sulfate of ammonia the resulting turf had a higher rating than when the nitrogen was applied as nitrate of soda. Where sulfate of ammonia alone was used the increasing acidity favored the accumulation at the surface of a felty mass of dead grass roots.

A mildly acid soil condition was found to be more desirable than a very acid or alkaline one. The grass on plots fertilized with nitrate of soda became green earlier than that on plots receiving sulfate of ammonia, but there appeared to be a gradual decline in the quality of the grass on the nitrate of soda plots.

Plots receiving sulfate of ammonia and lime contained less white clover than those receiving nitrate of soda. Cottonseed meal added to the regular fertilizer in an amount equal to 1 pound of nitrogen to 1,000 square feet improved the color, vigor and density of the turf but increased the number of worm casts.