

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.

Turf cut to a height of  $1\frac{1}{4}$  inches was greener and more vigorous than that cut at three-fourths of an inch, and there was slightly more clover in the longer turf.

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#### CAN GRASSES BE HYBRIDIZED?

Plant improvement generally is achieved by one of several methods, perhaps the two most common being by selection and perpetuation of the most desirable individuals and by hybridization. The improvement of turf grasses so far has been accomplished largely by the process of selection, but the possibility of hybridizing has not been overlooked. In 1937 and 1938 Walter Hertzsch in Germany made 57 crosses between various species of fescue, ryegrass, brome, wheatgrass and others. The results of these crosses, as published in *Der Züchter*, are not encouraging. He emasculated and cross-pollinated nearly 16,000 flowers in making these crosses, and a total of only 333 seeds were set. In 42 of the 57 crosses no seeds were set, and in 5 there was just one seed set.

Most of the grasses used were pasture grasses, but numerous crosses were tried with *Festuca rubra*. When it was used as the male parent crossed on *Festuca pratensis*, only 8

seeds were developed out of 765 crosses. However, when used as the male parent crossed on *Lolium perenne*, 41 seeds were produced out of 303 crosses. No seeds were produced when *Festuca rubra* was used as the female plant.

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#### LOSS OF VIABILITY IN NEW ZEALAND CHEWINGS FESCUE

Decline in the germination capacity of Chewings fescue seed during shipment from New Zealand to the northern hemisphere has for many years been a constantly recurring trouble. In spite of this fact, our annual import totals have remained reasonably steady. American buyers appear to have accepted Chewings fescue seed as being delicate and short-lived, and, although periodic complaints have followed unsatisfactory deliveries, particularly in unfavorable seed production seasons, the demand has been well sustained.

Many theories have been advanced, both in the United States and abroad, as to the causes of deterioration of grass seed during shipment, but results from experimental work have shown that it is largely due to unfavorable conditions of shipment. These unfavorable shipping conditions, to which seed of Chewings fescue was found to be particularly