

conditions and others showing only slight and purely accidental variations. It should be possible, therefore, to select plants which set seed without fertilization and uniformly well under different conditions.

Another variation in the seed of Kentucky bluegrass which was studied was the weight of 1,000 seed. He found this weight to vary from .15 to .20 grams in some of his types to .60 to .65 in others, with that for the majority of plants being between .3 and .5 grams. He found some of the Swedish bred strains to have a considerably higher 1,000-grain weight than did American seed which was imported by Sweden.

This ability of certain types of Kentucky bluegrass to set seed without fertilization should be of inestimable value in the development of improved strains by selection. Once a strain has been selected and established vegetatively it could be reproduced readily on a commercial scale, should it be a type which sets seed without fertilization. If this phenomenon is as common in our strains of Kentucky bluegrass as Åkerberg has found it to be in Sweden, the chances should be good that some of our vegetative selections could be propagated by asexual seed.

#### THE QUANTITY OF ROOTS UNDER BLUEGRASS

One who has handled sod knows that the surface area under grass is full of roots, but few know the tremendous quantities of roots produced by such a plant as Kentucky bluegrass. Howard J. Dittmer studied this matter in Iowa and published his results in the American Journal of Botany. He also determined the quantity of roots produced by rye and oats, but our interest lies in his results with Kentucky bluegrass. Dittmer took soil samples 3 inches square and 6 inches deep. The soil was carefully washed away. All roots, no matter how small, were counted and representative lots were measured for length and diameter. From these figures it was calculated that the 84,000 separate roots found represented a total length of 1,250 feet with a total root surface of 332 square inches.

Even the root hairs, the organs through which the plant absorbs water and nutrients, were counted. Kentucky bluegrass had in each soil sample an average of 51.5 millions of root hairs which, if extended in one line, would reach 32 miles, with a surface exposure of 16.9 square feet. Kentucky bluegrass had 12 times as many roots as rye, 6 times the root length and the roots had 5

times the surface area of those of rye. His study showed one reason why Kentucky bluegrass is so much more effective in holding soil than rye or oats.

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#### TEMPERATURE OF GERMINATION OF CRABGRASS

E. H. Toole and Vivian K. Toole, of the United States Department of Agriculture, recently presented before the Physiological Section of the Botanical Society of America a paper covering the results of their study of the relation of temperature to the germination of crabgrass seed.

Seed of the smooth crabgrass, *Digitaria ischaemum*, germinated more rapidly under alternating high temperatures of 68° to 100° F. and progressively slower at temperatures of 68° to 95° F., 68° to 86° F., and 59° to 77° F. While the common crabgrass, *Digitaria sanguinalis*, also required alternating high temperatures, the rate of germination decreased as the upper temperature limit was raised but was also lowest at 59° to 77° F.

When chilled at 38° F. seed of both species germinated more quickly. The period of chilling required was shorter when the seed was put out to germinate at the most favorable temperature than at other temperatures.

#### GERMINATION OF CANADA BLUE-GRASS SEED

The testing of seed has been pretty much perfected, but there are still seeds that require special treatment to bring out the best germination. One of these seems to be Canada bluegrass (*Poa compressa*). In some studies made by Alice Anderson at the Seed Laboratory in Washington and published in the Proceedings of the International Seed Testing Association, it was found that seed kept for 17 hours at 68° F. in alternating light and darkness, and for 7 hours at 86° F. in the dark, gave a higher percentage of germination than seed kept under other conditions. It is recognized that the factors controlling the germination of this seed are not well understood.

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#### RESEARCH WORK IN VICTORIA, AUSTRALIA

The Victoria (Australia) Golf Association is conducting research at its Riversdale Station. Their investigations in 1938 have been concerned primarily with the relative value of various manurial treatments, with trying out numerous commercial strains of velvet bent, creeping bent, Colonial bent and couch grass (Bermuda grass), and with the control of weeds in turf.

Estimates of the weed population