Effects of Nitrogen Fertilization and Rate and Method of Seeding on Grass Seed Yields in Pennsylvania

Roderic E. Duller, J. S. Bubar, H. R. Fortmann, and H. L. Carnahan

SEED production of improved forage grasses has developed into a highly specialized enterprise in the United States. Progress has been made towards fulfilling the seed requirements of farmers in the northeastern United States by producing seed of improved varieties in western states. However, the production and maintenance of breeder seed of new varieties will continue to be a responsibility of the originating station.

The objectives of this study were: (1) to determine the cultural practices which stimulate maximum seed production of orchardgrass, smooth bromegrass, timothy and reed canarygrass; (2) to determine the effects of the various cultural treatments on the plant characteristics which are components of seed yield. Results and conclusions pertaining to this last objective will be presented in another paper.

REVIEW OF LITERATURE

Although investigations on grass seed production have been conducted in many different geographical regions of the United States, very little information has been accumulated in the Northeast. Nitrogen is generally considered the key element in grass seed production (1, 3, 10, 11, 14, 15) with a lesser emphasis on phosphorus and potash. Metcalfe (9) in Iowa and Churchill (2) in Michigan have shown that approximately 80 pounds of nitrogen per acre on broadcast stands was the most practical application for increasing seed yields of smooth bromegrass. Spencer (14) in Kentucky found that approximately 64 pounds of nitrogen per acre doubled the seed yields over the check of both Kentucky 31 fescue and commercial orchardgrass. Early spring applications were best on orchardgrass, whereas, spring and fall applications were equally effective on fescue. Knowles and Cooke (7) found that fall applications superior to spring applications on smooth bromegrass. Evans (4) in England found that applications of sulfuric acid increased seed yields of orchardgrass which resulted from applications higher than 4 cwts. per acre. Seed yields were increased by nitrogen applications for the second year.

Grasses in rows generally yield more seed per cast seedings; however, in some studies orchardgrass is capable of producing yields on broadcast seedings (2, 5, 6, 14). Smith (11) at the Pennsylvania Agricultural Experiment Station concluded that cultivated row seed production was superior to the stand for tall fescue, orchardgrass, and common tall oatgrass. The only grass that produced solid stands was Schwanbon and Froier (12) reviewed studies on timothy and orchardgrass conducted in Canada, German, and Dutch investigators. We reported evidence which favored 14- to 20-inch drill spacings while 18- to 24-inch drill spacings were preferred for timothy with a seeding rate of 7 pounds per acre.

Sears (13) recommended seeding rates of 6 to 8 pounds per acre for broadcast seeding of orchardgrass for seed in New Zealand. Spencer (14) found that seed yields of 31 fescue and orchardgrass decreased as seeding rates increased from 3 pounds to 7 and 15 pounds per acre in New Zealand. Knowles et al. (7) recommended a seeding rate of 6 pounds per acre for bromegrass in western Canada.

MATERIALS AND METHODS

The experiment was located on the Pennsylvania Agricultural Experiment Station Farm, University Park, Pa. The experimental site has been classified as Hublersburg silt loam which is a deep soil from low to medium fertility with a pH of approximately 6.7. Prior to seeding, the field received ammonium nitrate at the rate of 0–20–0 per acre; 300 pounds of 0–20–20 plus 300 pounds of ammonium sulfate per acre. Seed was sown on May 1 and 2, 1951. A top-dressing of 300 pounds per acre was made on April 11, 1952, and again on April 23, 1953.

The four perennial grasses included in this study were tall fescue, smooth bromegrass, Climax timothy, common reed canarygrass. The experiments were conducted using methods of seeding (36-inch rows vs. broadcast).