The Production of Seed and Forage by Mountain Brome as Influenced by Nitrogen and Age of Stand

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Mountain brome, *Bromus marginatus*, is a recently domesticated native grass that is extensively used in the Pacific Northwest. It is planted with sweetclover and red clover. These mixtures are used for green manure or as dual-purpose pasture and green manure crops. The mixtures are superior to clover alone for controlling erosion, improving soil structure, and maintaining soil fertility and for pasture (3, 6). The grass is also used to seed mountain range lands (4). Its relative palatability is good (8).

Mountain brome is a variable species and several distinct strains have been isolated. One of them has proved superior for legume-grass mixtures and has been released as Bromar mountain brome (6).

Mountain brome produces high yields of seed from new plantings, but production usually declines rapidly after the first crop. Preliminary trials showed that nitrogen was limiting to seed production of mountain brome, and this agreed with published findings on other grasses (1, 2, 5, 7).

Mountain brome is a rapid-developing grass that germinates quickly, has a strong seedling, and reaches full development the year after planting. These characteristics make it ideal for use with sweetclover and red clover, but when it is planted alone forage yields usually decline rapidly after the first full crop and the stands thin out unless they are allowed to reseed. Preliminary results indicated that forage yields might also be maintained with addition of nitrogenous fertilizers.

The present study was made to determine the influence of different levels of nitrogen availability on seed production of a foundation seed field of Bromar mountain brome. The same field was used for 3 successive years to determine the effect of age of stand and of the interaction between age and nitrogen on seed production. The influence of these factors on yields of forage was also studied. The work was done on irrigated land so that the influence of differences in precipitation from year to year was not a factor affecting the results.

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2Figures in parenthesis refer to “Literature Cited”, p. 512.

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Procedure

These trials were conducted at the Aberdeen Branch Station, Idaho Agricultural Experiment Station. The field was classified under land use capability I. The soil in the field had been cropped to alfalfa for several years. Potatoes were grown in 1940, Bromar mountain brome seed in May 1941 in rows spaced 30 inches apart. The mixture was 3 pounds per acre. A grass seed crop averaging 100 pounds per acre was harvested in 1942. This first seed crop was used without the addition of nitrogen.

Irrigation during the establishment year was done in intervals or as needed to assure continued seedling growth. The production years the stand was irrigated would maintain a vigorous plant growth. This was determined by field inspection.

The trials were designed to permit the use of 3 rates of nitrogen for the application of fertilizer. Plots 58 feet wide were used. Broadcast applications of nitrogen were made at five different rates in the spring of 1941 prior to the time the grass broke dormancy. This was determined as needed to control weeds.

The data obtained each year from these trials were air-dry weights of three quadrats harvested at random from each plot. Each quadrat represented 41.25 square feet. The plots were based on weight of seed cleaned to a uniform moisture. Seed purity was 98.59% in 1943, 99.84% in 1944, and 99.66% in 1945. Quadrats for forage production were taken in the same manner, and yields are on an air-dry basis (appreciation of moisture).

The field design resulted in an unequal number of replications for the different rates of fertilizer application. The number of replications varied from four to nine. Therefore, the variance for different rates of nitrogen were analyzed according to the variance method when a single criterion of classification was encountered.

Results

The effect of additions of nitrogen on the seed production of Bromar mountain brome is summarized. The average yield of seed was increased with each additional amount of nitrogen applied. The yields obtained in each of the 3 years of the test showed that seed declined as the age of the stand increased. The decrease is evident from the weighted average yield remaining from the yield of the plots receiving no nitrogen. The results are supported by the analysis of variance method that gave significant F values for treatment (amount of nitrogen) and for the interaction of treatment by years. The F value for the interaction of treatment by years is significant at the 1% level of probability.