Evaluation of Grass-Legume Associations, with Emphasis on the Yields of Bromegrass Varieties

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The evaluation of perennial forage crops presents problems not encountered in the testing of corn and small grain varieties. Experimental methods with forages have included the use of single or multiple row plots, broadcast plots, and solid drilled plots. Species are grown alone or are established in association with other species. Because of the hazards of stand establishment and the subsequent possible effects of severe drought and winter injury, errors of yield determination often are high. The specific environmental conditions at the time the seed germinates may well set the stage for all the results to be obtained from a given experiment, extending over a period of years. It is only by repeated trials, over a long period of time, and under various conditions of soil and management, that the proper evaluation of varieties can be made.

Smooth bromegrass (Bromus inermis) has become increasingly popular among Corn Belt farmers since 1934 and 1936, when drouth conditions resulted in a marked loss of stands of Kentucky bluegrass (particularly in western Iowa). At the same time bromegrass came through these unfavorable seasons much more successfully.

While many fields were planted to solid stands of bromegrass 10 to 15 years ago, seldom is this grass now grown alone. Alfalfa is the most popular legume used in association with bromegrass, although red clover, sweetclover, Ladino clover, and birdsfoot trefoil also have been used.

As was pointed out in 1937 by Rather, et al. (6) particularly on soils favorable for alfalfa, bromegrass and alfalfa grow well together, producing a successful mixture for hay and pasture.

Previous studies of bromegrass varieties by Newell and Keim (5), Wilsie, Peterson, and Hughes (8), and Churchill (3) and others have shown a superiority for the strains originating in the southern part of the bromegrass area, namely, Nebraska, Kansas, and southwestern Iowa. In the discussion of strains in this paper, these will be called “southern” varieties as distinguished from Canadian or other northern varieties.

Strain differences, as reported, usually have been greater where the varieties were grown alone than when grown in spaced plantings or in broadcast seedings.

On the other hand, Torrie and Allison (7), working with red clover and timothy, found that red clover performed in a similar manner whether grown in alternate rows (9 inches) or seeded broadcast with timothy. Hawk and Welch (4) found that clover grown in alternate rows (9 inches) and the proportion of the forage mixture, however, varied to some extent with the vigor of the strain of red clover which it was grown. Wilsie found that red clover grown in alternate rows (9 inches) and early, midseason, and late strains of timothy, showed no differences in yield as influenced by the particular strain. In a similar type of planting, strains of red clover and timothy performed in a similar manner whether grown in mixed and pure stands or in broadcast seedings.

In stand establishment of varieties, particularly from the standpoint of seedling diseases, differences have been noted. Hawk and Welch (4) found under conditions of heavy infestation by Pythium graminicola, and one strain of A. tricophorum, that northern varieties suffered greater losses than were suffered by the southern varieties.

Field Experiments in Iowa

A number of field trials of bromegrass varieties have been conducted at the Iowa Agriculture Station starting in 1937 and continuing to the present time. These have included comparisons of bromegrass with timothy and orchardgrass, single and mixed stands of bromegrass alone and with alfalfa and timothy, and trials of frequent cutting as related to the composition of the forage. Varieties tested have included several from Nebraska, such as Lincoln and Min-