The Effect of Rate and Method of Seeding on the Yield and Botanical Composition of Alfalfa-Orchardgrass and Alfalfa-Tall Fescue

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In recent years, alfalfa has become an important forage crop in the southeastern United States. Most alfalfa is seeded in pure stands throughout this region, and mixtures with grasses have not been evaluated intensively. Several alfalfa-grass mixtures have shown some promise, but little is known concerning the performance of these mixtures over a period of years under hay or grazing conditions.

The objectives of the experiment reported herein were to determine the most desirable grass species to be grown in combination with alfalfa in North Carolina and the best method of establishment and maintenance of these mixtures.

MATERIALS AND METHODS

This experiment was seeded August 31, 1946, near Raleigh, N.C., in the lower Piedmont area. The soil was a Cecil sandy clay loam. The individual plots were 4 by 17 feet, and they were uniformly fertilized prior to seeding with the following rates designated on a per-acre basis: 2000 pounds dolomitic limestone, 200 pounds P₂O₅ (18% superphosphate), 100 pounds K₂O (60% muriate of potash), 20 pounds of nitrogen (32% ammonium nitrate) and 30 pounds of agricultural borax. An annual application of 60 pounds per acre of P₂O₅, 120 pounds of K₂O, and 20 pounds of agricultural borax was made. The first year following seeding no fertilizer was applied.

Five rates and three methods of seeding alfalfa-orchardgrass and alfalfa-tall fescue were studied. The treatment variables are outlined as follows: Mixtures (treatment variables):

A. Alfalfa (Medicago sativa, var. Kansas Common) and orchardgrass (Dactylis glomerata L.)

B. Alfalfa and tall fescue (Festuca elatior, var. arundinacea—alu) Rates of seeding (treatment variables in pounds per acre):

Alfalfa—Grass
a. 20 — 5
b. 20 — 10
c. 20 — 15
d. 10 — 10
e. 15 — 10

Methods of seeding (treatment variables):

a. Broadcast. Seed of each species was broadcast uniformly over the plot and covered.
b. Mixed in the row. Each plot consisted of eight rows spaced 6 inches apart. Alfalfa and grass were seeded in a mixture in each of the eight rows.
c. Alternate row. Each plot consisted of eight rows spaced 6 inches apart. Alfalfa and grass were seeded alternately in the eight rows.

d. Mixed at 6 inches. Each plot consisted of eight rows spaced 6 inches apart. Alfalfa and grass were seeded in a mixture in each of the eight rows.

e. Broadcast. Seed of each species was broadcast uniformly over the plot and covered.

Tests of germination percentage before planting for orchardgrass and tall fescue and 80% for alfalfa being considered hard seed.

A split block design was used for this experiment being the whole plots, the rate of seeding being the method of seeding the second split. Two replications.

The plots were harvested four or five times per cutting with a cutter bar power mower. The vegetation was cut to 2 1/2 inches and the forage was dried at 130°F for reaching equilibrium with a dry atmosphere.

Actual stand counts were made on all plots 4 weeks after seeding in 1946 by the count-list quadrat 18 inches by 24 inches, subdivided into 9 divisions, was employed. Three readings were made on a similar area, one square yard, by excavating the soil making a total area of one square yard. At the other harvests only one seeding rate, 20 pounds alfalfa—grass, was botanically separated. For individual harvested sample which was obtained from an area 6 inches by 6 inches, was used for botanical separations.

Individual cutting yields of the total mixture are presented for only one seeding rate. Yields of individual cuttings for the individual species mixture are presented for one third of the total yields were obtained from plots receiving a high seeding rate of grass and those receiving a low rate of alfalfa (table 1). Rate of seeding had less influence on yields in subsequent years, although similar trends continued. As the rate of seeding of grass increased, the yield of the alfalfa-grass mixtures was decreased from 7808 to 6936 pounds of forage per acre in the first year period, stand counts of alfalfa being considered hard seed.

Individual cutting yields of the total mixture are presented for only one seeding rate.

During the first 3 years, botanical analyses were made of all treatments by hand separations at the first and third harvests.

At the other harvests only one seeding rate, 20 pounds grass, was botanically separated. For harvested sample which was obtained from an area 6 inches by 6 inches, was used for botanical separations.

Total nitrogen percentages were determined by the A.O.A.C. method, and K₂O content by Ceric sulfate method on individual species on certain treatments. Seasonal K₂O individual species is presented for a 3-year period rate. Nitrogen content data is not presented for individual cuttings, but the summary data is referred to in the presentation of results.

The data were subjected to an analyses of variance and significant differences are presented at the 5% level. All interactions are noted in the presentation of results.

RESULTS

Yield Results of Mixture

Alfalfa-orchardgrass and alfalfa-tall fescue produced similar total yields for 3 years following seeding (table 1). In the fourth year, the alfalfa-orchardgrass mixture was more than twice as productive as the tall fescue.

In the first year following seeding, large total yields were obtained from plots receiving a high seeding rate of grass and those receiving a low rate of alfalfa (table 2). Rate of seeding had less influence on total yields in subsequent years, although similar trends continued. As the rate of seeding of grass increased, the yield of the alfalfa-grass mixtures was decreased from 7808 to 6936 pounds of forage per acre in the first year period, stand counts of alfalfa being considered hard seed.

A split block design was used for this experiment being the whole plots, the rate of seeding being the method of seeding the second split. Two replications.

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Individual cutting yields of the total mixture are presented for only one seeding rate.

During the first 3 years, botanical analyses were made of all treatments by hand separations at the first and third harvests.

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