Studies on Palatability of Some Tropical Legumes

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Probably the most important character to be sought in a forage legume is the ability to grow and produce well under given environmental conditions. Other factors of importance, especially with tropical species for which there is little or no information, are toxicity and palatability. It is obvious that plants which are toxic or which are poorly palatable are of limited interest in a forage program.

The purpose of the present study was to investigate the relative palatability of a group of species which were selected from some 150 introductions as showing promise from the standpoint of vigor and climatic adaptation. Studies on possible toxicity of some of these species are also being made.

MATERIALS AND METHODS

The following species were tested: (1) Indigofera endecaphylla Jacq. (trailing indigo), (2) I. subulata V., (3) Pueraria phaseoloides (Roxb.) Benth. (hairy tropical kudzu), (4) P. phaseoloides (Roxb.) Benth. (hairless tropical kudzu), (5) Canavalia bonarensis Lindley (red bean) (6) Calopogonium coeruleum Benth., (7) Desmodium intortum (Mill.) Urb., (8) D. nicaraguense Oerst., (9) Dolichos lablab L., and (10) Centrosema pubescens Benth. The two varieties of tropical kudzu were included in order that the palatability of "hairless" (9) and common tropical kudzu might be compared.

The experiment was set up as a pasture cafeteria, in which dairy animals were admitted to the plots and allowed free choice in grazing. The 10 legumes were planted in the form of a rectangular block, in two randomized replications. Individual plots were 12 X 30 feet, laid out with the 30-foot faces adjacent. Planting times were arranged so that all species would be ready for grazing as nearly as possible at the same time. Plant spacing was varied according to species to give optimum ground cover. The area was fenced, leaving an 8-foot alleyway around the periphery, and an adjacent corral providing shade and water for the animals was constructed. After the first round of grazing, when some weed competition was experienced, all plots were weeded by hand to maintain purity of stands.

At first and later three Guernsey heifers (two weighing approximately 1,000 lb. each, and one 600 lb.) were used as test animals. These animals were accustomed to grazing on the regular station pastures, which consist largely of grass (Panicum purpurascens, with some areas of Melinis minutiflora) in association with tropical kudzu. During the tests the heifers were admitted to the legume plots at 8 o'clock in the morning and again at about 3:30 in the afternoon, with observers constantly present to record choice and duration of grazing on each species. During each grazing period the animals were allowed to graze until they were satisfied (usually 2–2½ hours); then they were returned to the adjacent corral, where they remained until the next period of grazing. No green forage was available in the corral, but each animal was given one pound of a 20% protein concentrate mixture twice a day after grazing.

Grazing was continued in this manner until most of the forage had been removed from all of the plots. At this time (after some 40 to 70 cow-hours of grazing) the animals were returned to regular pasture. During the ensuing rest period the plots were fertilized (500 lb. 10–10–5 commercial fertilizer irrigated when necessary. After the legumes had recovered the grazing trials were repeated. In all three grazing rounds were made. The first round was from May 16 to 27, 1951 (2 animals), the second from June 25 to 29 (3 animals), and the third from September 18 to October 2 (2 animals).

Relative palatability was estimated in two ways, measuring the amount of each legume consumed, and recording and recording the choice and duration of grazing. The amount consumed was estimated by recording the yield of dry forage of a representative one-square-yard area from each plot before, and again after, each grazing round. The difference in these weights was taken to represent the amount of each legume consumed.

Legume preference was determined by record- ing the time each animal spent on each plot during the grazing periods, times being recorded to the nearest minute. These data were evaluated by determining the percentage of the time each legume was grazed during successive periods from the beginning until the end of each round. Data were not eaten until later in the round. By arranging the data in 5-cow-hour grazing periods, consecutively from the end of each round of grazing, it was possible to compare the three rounds, even though different numbers of animals were used and the grazing times were not of equal length. Since each grazing round was short (60 to 80 cow-hours), the influence of difference in stage of growth of the most palatable and the least palatable species was reduced.

RESULTS

The relative yields and percent consumption of various legumes for each grazing round, and the percentage of these three rounds combined, are given in table 1. The legumes are arranged in descending order of average consumption (dry matter basis), beginning with Indigofera deeringiana (64%) and ending with Desmodium coeruleum (25%). Indigofera endecaphylla had the highest mean percent consumption, followed by Desmodium intortum and I. subulata. The kudzu varieties were the seventh in consumption, with 40 and 37%, respectively.

Determinations of consumption by this method are subject to error in species which suffer from trampling damage.

The two Indigofera species (endecaphylla and deeringiana) led in forage production, with averages of 35 and 13 pounds of dry matter per acre per round in 1951. Desmodium nicaraguense was third in average production, followed by common tropical kudzu (Canavalia bonarensis). The yield data given in table 1 also show the recovery ability of the various species. The two Indigoferas, the two kudzus, and Stizolobium deeringianum, for example, were able to maintain or increase their forage yields in successive grazing rounds.