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EVALUATION OF PERENNIAL VIGNA SPECIES IN BAHIAGRASS PASTURES IN PENINSULAR FLORIDA

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ABSTRACT

Plantings of the perennial **Vigna** species, **V. adenantha** and **V. parkeri,** are being evaluated for potential value as pasture plants on a Spodosol site in peninsular Florida. The **V. parkeri** accession being evaluated was recently released in Australia as Shaw creeping vigna. A low seeding rate of 1.4 kg ha^{-1} resulted in sparse stands of this legume. Two 0.5-ha pastures have been grazed for two years with good survival of individual **V. parkeri** plants, but plant spread has been limited. **Vigna adenantha** was seeded at 2.0 kg ha^{-1}. Initial plant populations were sparse, but vigorous viney growth provided **Vigna** dominant pastures when deferred from grazing for the establishment year. Subsequent grazing has produced average daily gains of 0.4, 0.6, and 0.7 kg at stocking rates of 6, 4, and 2 head of yearling steers ha^{-1}, respectively, during grazing periods of approximately 75 days each in mid Summer of 1985 and 1986.

INTRODUCTION

Evaluations of survival of several tropical forage legumes as small plantings in grass pastures under grazing have indicted potential pasture value in peninsular Florida of perennial **Vigna** species (Pitman & Kretschmer, 1984). **Vigna adenantha, V. luteola,** and **V. parkeri** accessions persisted to various extents over a three-year period. Subsequent pasture plantings revealed differing responses from the three species (Pitman & Singer, 1985). **Vigna adenantha** seedlings transplanted on 1.5 and 3.0 m spacings provided essentially complete coverage in one year when deferred from grazing during the planting year. Similar plantings of **V. parkeri** gave only limited plant spread but excellent survival of individual plants. Two accessions of **V. luteola** were included in the study with both accessions failing to survive.

Additional plantings of **V. adenantha** and **V. parkeri** have been made to evaluate performance of seeded pastures and yearling steers grazing these pastures.

MATERIALS AND METHODS

Small pastures of **V. adenantha** (University of Florida, Agricultural Research Center at Ft. Pierce Accession Number 1806) and **V. parkeri** (Accession Number 2977, recently released in Australia as Shaw creeping vigna) were seeded along with Pensacola bahiabrass **(Paspalum notatum)** on Spodosol sites near Ona, Florida (27º 30' N latitude) in March 1984. Seeding rates were low to limited seed supplies, with **V. adenantha** seeded at 2.0 kg ha^{-1} and **V. parkeri** seeded at 1.4 kg ha^{-1}. Legume stands were monitored throughout subsequent growing seasons with transects across each pasture used to determine frequency of occurrence of each legume.

Pastures were grazed for approximately 75 days during mid-Summer 1985 and 1986 to evaluate the response of the legumes to grazing defoliation and the performance of young growing cattle grazing these pastures. Grazing was limited to this short period to allow as much opoortunity for seed production as possible. The two 0.5-ha **V. parkeri** pastures failed to develop adequate stands of legumes for meaningful animal performance, so only plant response data were obtained. Three **V. adenantha** pastures were established to good stands. These were stocked at three different stocking rates--2, 4, and 6 head of yearling steers per ha^{-1} during each grazing period.

RESULTS AND DISCUSSION

Initial legume stands were sparse as a result of the low seeding rates. During the establishment year **V. parkeri** populations gradually increased by growth of short stolons to occur on approximately 10% of the pasture area by September. During this time, dense grass competition was evident. The initial grass stand was primarily common bermudagrass **(Cynodon dactylon)** with the seeded bahiagrass gradually replacing the bermuda over the following two growing seasons. As is characteristic of bahiagrass when not heavily stocked, spot grazing occurred on the **V. parkeri** pastures during both years. In areas with the legume present where heavy grazing occurred, **V. parkeri** spread into the grass stand. The legume grew up rather than spreading in areas where dense grass growth was not grazed. **Vigna parkeri** populations varied through the growing season. As temperature and moisture became favorable for growth following winter frosts, grass growth began before legume growth. Growth of the legume progressed slowly until mid-Summer. From mid-Summer until late fall, **V. parkeri** growth was competitive with the grass. Since the establishment year, increases in legume stands have been slow. Both higher seeding rates and stocking rates to utilize grass growth will be needed to allow **V. parkeri** to be competitive with bahiagrass in peninsular Florida.

Sparse initial populations of **V. adenantha** spread by viney growth which grew over the grass and rooted at nodes along the vines. During the establishment year, **V. adenantha** occurred on approximately 10 per cent of the pasture area in May and on two-thirds of the area by September. The short grazing periods in 1985 and 1986 dramatically affected pasture composition. The low stocking rate resulted in a **Vigna** dominant pasture with the legume canopy restricting bahiagrass establishment. A dense ground cover of common bermudagrass persisted beneath an overstory of **Vigna** in this treatment. At the other extreme, the high stocking rate produced an open legume canopy with only a small proportion of the herbage being legume. In this treatment, bahiagrass developed and was the dominant pasture plant after the first grazing period. The dynamic nature of these pastures indicates potential for manipulation of pasture composition by adjustments in stocking rate, season of grazing, and length of grazing period.

Although the grazing period was not long enough to quantify production potential per unit area or to indicate the limits of tolerance to grazing of the legume, indications of animal performance on pastures of **V. adenantha** were obtained along with the above discussed plant responses. A negative relationship was obtained between stocking rate and average daily gain. Stocking rates of 2, 4, and 6 head ha^{-1}, resulted in average daily gains of0.7, 0.6 and 0.4 kg, respectively. Since this is the characteristic

relationship expected between stocking rate and individual animal gain, respponsibility for the higher gain cannot be automatically attributed to the higher legume content of the low-stocked pastures. However, the common bermudagrass, which was the dominant grass at the low stocking rate, is not as readily grazed as bahiagrass and thus greater selectivity for preferred grass would not be expected.

The major limitation to further evaluation of these two **Vigna** species in peninsular Florida is seed production. Both flower in resposne to short days, thus seed production is primarily in the fall and winter period in Florida. Flowering has been late enough that only a small amount of seed has had sufficient time to mature before frost the past three years at Ona, Florida. As pasture plants, this seed production limitation should not be a problem in peninsular Florida since both species have shown to be strong perennials. Seed production will be required for initial establishment for these species to be commercially successful as pasture plants. **Vigna parkeri** is widely adapted to a range of tropical and subtropical locations as shown by Jones (1984) for Australia and Bogdan (1977) for East Africa. Thus, seed production of **V. parkeri** is anticipated eventually. **Vigna adenantha** has not been as widely evaluated, and its area of adaptation is essentially unknown. In addition to adaptation to conditions of low fertility, seasonally-waterlogged, acid, sandy soils in peninsular Florida, **V. adenantha** has persisted under grazing in small plantings at a higher fertility site in the Guanacaste Province of Costa Rica (Kretschmer, personal communication). Current data indicates that both of these species warrant efforts in suitable locations to develop seed supplies.

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