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## Alfalfa Variety Trials in South Mississippi 1992-1996

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### Introduction

Alfalfa (*Medicago sativa*) is a high-quality forage that has not been widely grown in the Deep South because information on adapted varieties is lacking. Growing conditions in the Deep South are hot and humid interspersed with extremely hot, dry conditions. Disease, insect, and weed pressures are extremely high. There are ongoing breeding programs to produce high-yielding varieties adapted to these conditions. The work reported in this report was initiated in cooperation with the Regional Plant Introduction Station at Griffin, Georgia, to compare the yield of new alfalfa varieties with currently grown standard varieties, to evaluate promising varieties for alfalfa breeders, and to provide information to farmers on the adaptability of alfalfa varieties to the southern climate.

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### Materials and Methods

Twenty alfalfa varieties were planted November 1991 on a Ruston fine sandy loam soil (Fine-loamy, Siliceous, Thermic Typic Paleudults) in 4.5-by-20-foot plots on a prepared seedbed at a seeding rate of 20 pounds per acre using a KEM small plot drill. A randomized complete block design with four replications was used. Data were analyzed using the SAS ANOVA procedure.

Before planting, phosphorous, potash, and lime were applied based on soil test recommendations and incorporated. During April of each year, 400 pounds of 0-24-24 and 2 pounds per acre of boron were applied.

Plots were harvested with a rotary mower and dry matter yields determined at 30-day intervals, when possible, during the growing season. Gramoxone® was applied immediately after each harvest at a rate of .75 pint per acre for weed control. In 1993, the number of plants in a 1 square foot area in each plot was counted, and in 1996 canopy cover was estimated on a 1-10 scale where 1=10 percent cover and 10=100 percent cover.

Weather data collected at the South Mississippi Branch Experiment Station summarized by two-week intervals are shown in [figures 1, 2, 3, 4, 5](#) and [6](#).

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## Results and Discussion

In 1992, alfalfa yields ranged from 8,058 to 10,028 pounds of dry matter per acre. There was no significant difference in yield attributable to variety ([Table 1](#)). The three highest yielding varieties and their respective dry matter yield were: Pioneer 5472, 10,028 pounds per acre; Terminator, 9,842 pounds per acre; and Vector, 9,702 pounds per acre.

In 1993, alfalfa yields ranged from 5,369 to 6,443 pounds of dry matter per acre. There was no significant difference in yield attributable to variety ([Table 2](#)). The three highest yielding varieties and their respective dry matter yield were: Pioneer 5373, 6,443 pounds per acre; Wampr, 6,430 pounds per acre; and WL 83T27, 6,281 pounds per acre. There was no significant difference in plant stand attributed to variety. All stands were adequate to produce economical yield (5).

In 1994, alfalfa yields ranged from 8,133 to 9,087 pounds of dry matter per acre. There was no significant difference in yield attributable to variety ([Table 3](#)). The three highest yielding varieties and their respective dry matter yield were: Pioneer 5373, 9,087 pounds per acre; NK 88780, 9,048 pounds per acre; and Cimarron, 8,855 pounds per acre.

In 1995, alfalfa yields ranged from 5,264 to 6,126 pounds of dry matter per acre. There was no significant difference in yield attributable to variety ([Table 4](#)). The three highest yielding varieties and their respective dry matter yields were: Pioneer 5373, 6,126 pounds per acre; Florida 77, 6,009 pounds per acre; and WL 83T27, 5,952 pounds per acre.

In 1996, alfalfa yields ranged from 3,603 to 5,874 pounds of dry matter per acre. There was a significant difference in yield attributable to variety ([Table 5](#)). The three highest yielding varieties and their respective dry matter yield are: Vector, 5,874 pounds per acre; Alfagraze, 5,162 pounds per acre; and NK 88780, 5,113 pounds per acre. After 5 years, there was no significant difference in canopy cover attributable to variety; canopy cover ratings ranged from 4.8 to 7.5

Averaged over 5 years, alfalfa yields ranged from 6,134 to 7,122 pounds of dry matter per acre ([Table 6](#)). Over 5 years, the three highest yielding varieties and their respective dry matter yields were: Pioneer 5373, 7,122 pounds per acre; Vector, 7,097 pounds per acre; and Florida 77, 7,044 pounds per acre. In 1992 and 1994 alfalfa yield was highest, with yield decreasing in 1995 and 1996 ([Table 6](#)). Low 1993 yield was attributed to a dry spring ([Figure 3](#)).

The direct cost to establish an acre of alfalfa was \$148.37, or \$29.67 per year when prorated over five years ([Table 7](#)). The estimated cost of maintaining and harvesting an acre of alfalfa five times per year with establishment prorated over 5 years is \$357.98 ([Table 8](#)) (2). Average total yield for all varieties over the life of the stand was 635 60-pound bales per acre (at 13 percent moisture), or an average annual yield of 127 bales per acre.

According to local merchants, wholesale alfalfa prices range from \$4 to \$6 per bale depending on quality. This would result in gross income ranging from \$508 to \$762 per acre. The annual net income over direct and fixed costs would range from \$150 to \$404 per acre.

Weather in the South is notoriously volatile (Figures [1](#), [2](#), [3](#), [4](#), [5](#) and [6](#)). Severe thunder showers occur without warning. Therefore, it is important that harvesting be done in a timely manner so the alfalfa can be cut at the proper growth stage and remain on the ground for a minimum length of time.

It is necessary to evaluate profit on an annual basis, rather than using an average. This is further complicated by rainfall distribution. In 1993, rainfall was less than or equal to evaporation for most of the year which was reflected in low yield ([Figure 3](#), [Table 6](#)). Rainfall in 1994 was better than 1993, which resulted in higher dry matter yields. This would imply that stands were adequate for economical yields ([Figure 4](#)). After 1994, yield dropped despite adequate rainfall.

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## Conclusions

These data show that alfalfa can be a viable cash crop in south Mississippi. Over the 5 years of this test, average annual dry matter yield was greater than 6,500 pounds per acre, which could provide an acceptable return per acre. These data are in agreement with other related research (1, 2, 4). The yield and stand of alfalfa decline over time, and the crop will need to be replanted to maintain profitable yields. In Delaware, it is recommended that an alfalfa stand be terminated if there are less than five plants per square foot in the early spring or 40 stems per square foot during the summer (6). Results from this study indicate that producers may want to use a 3- or 4-year rotation for alfalfa. Although the 5-year average yields were profitable, the last year of the study was marginal. Stands should be evaluated on an annual basis. The lower yield in 1996 was probably due to lack of rainfall more than stand decline ([Figure 4](#)).

As with most crops, production costs and yields vary depending on individual conditions. Soil testing is an integral part of any cropping enterprise to determine efficient fertilizer requirements. Fertilizer and lime costs in this experiment are based on what was actually used and may not agree with current recommendations. This makes soil test and fertilizer application more critical.

## References

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