PLANTING DATE AFFECTS GRAIN YIELD AND HEIGHT OF TIFGRAIN 102 PEARL MILLET IN THE SOUTHEASTERN COASTAL PLAIN

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INTRODUCTION

Pearl millet (Pennisetum glaucum L. R. Br.) is a drought-tolerant cereal grain typically grown as a forage crop in the United States. This crop is grown for grain throughout the world, but primarily in India and Africa on more than 20 million ha. With the advent of high yielding dwarf millets, it is now being considered as a substitute for sorghum and corn throughout the United States. The ability to reliably produce on marginal lands and under low rainfall conditions (Xenawise et al., 1997) makes pearl millet an attractive choice for the sandy, low fertility, acidic soils of the southeastern United States.

‘Tifgrain 102’ released in 2004 (Hanna et al., 2005 a & b) matures in 75-85 days allowing for a large planting window of frost free days for the southeastern states. Hanna and Wright (1995) looked at the effects of planting date on three hybrids differing for maturity and rust resistance. Their findings indicated that planting date was significant for all characters measured with June plantings having lower yields than May. Much of this yield reduction was attributed to rust susceptibility as rust inoculum becomes more prevalent later in the season, and with increased plant maturity (Wilson et al., 1995). Studies to date have focused primarily on forage production with conflicting results for grain production in the southeastern United States (Xenawise et al., 1997). Additionally, many of these previously published studies utilized the grain hybrid ‘HGAM 100’ (Hanna, 1995). Because of these issues additional information is needed to optimize crop management of pearl millet in the southeast. The objectives of this study were to determine optimum planting date, row spacing, and nitrogen rate for ‘Tifgrain 102’ production.

MATERIALS AND METHODS

• ‘Tifgrain 102’, a rust (Puccinia substriata EF) resistant hybrid, was conventionally planted into a split-split plot, randomized complete block design with four replications.

• Main effect planting date with 7 in 2001 (12 April, 31 May, 18 June, 28 June, 12 July, 19 July, and 02 August) and 8 in 2002 (16 April, 29 April, 13 May, 28 May, 10 June, 24 June, 08 July, and 22 July) divided into 4 replications.

• Data was split treatment into four row spacings of 0.2 m, 0.4 m, 0.5 m and 0.9 m rows.

• Row spacing was split into two nitrogen levels of 90 kg ha-1 and 140 kg ha-1.

• No fertilizer was added, and 5mm of water was applied after planting to establish a uniform stand. The field site was at the Coastal Plain Experiment Station at Tifton, Georgia.

• The soil was a Funky sandy loam.

• Plot received 58 kg ha-1 pre-plant and 50 kg ha-1 split 10 to 14 days later with N as NH4NO3. Plots received 6 mm water immediately after planting and were irrigated with 10 mm of water per irrigation if thehoot group were heavier than 1.6 kg ha-1.

• Grain yield was determined from a 4.6m by 1.8m area in the center of each split split plot.

• Yields were then converted to kilograms per hectare for statistical analysis. Generalized least squares were used to determine means of grain yield and height.

• SAS statistical package was utilized for all data analysis (SAS Institute, 2003). Unless otherwise indicated, a significance level of p<0.05 was used to determine significant differences between treatments.

RESULTS AND DISCUSSION

There was a significant (p<0.01) interaction of year by planting date. Planting date within years was significant (p<0.05) for increased yield (Table 1) and height (Table 2). Row spacing at 0.4 m and 0.5 m within years tended to give the highest yield (Table 1), but were not significant. Height significantly (p<0.05) increased within and across years as row spacing increased. No significant (p>0.05) differences for nitrogen rate were found for yield (Table 1) or height (Table 2).

A significant factor that may have contributed to the date by year interaction was an early season drought in 2002. Total rain fall averaged over the growing period for the April and May planting dates in 2001 was 20.2 cm which is near the normal thirty year average of 20.8 cm for the same period. April and May planting dates in 2002 received only an average of 12.3 cm over the entire growing periods resulting in less than half the normal rainfall. Based on rain fall, 2001 represented a more typical growth response pattern within a normal year. 2001 results suggest a general reduction in yield from earliest to latest dates. As pearl millet is largely a qualitative short day plant flowering early under 12h photoperiod, and may be delayed by 14h photoperiods these changes in yield relative to day length would be expected (Yong et al. 1999). Date of planting 6/24 in 2002 seemed anomalous to basic daily growth and rainfall responses, out- yielding any other date in 2002 for 4444 kg ha-1 with only 15 cm of water. This response may need to be further investigated. Other responses in 2002 tended to be in line with rainfall (average of 22 cm versus 28 cm) and day length. Early plantings in 2002 tended to be in line with rainfall (average of 22 cm versus 28 cm) and day length responses, out-yielding any other date in 2002 at 4454 kg ha-1.

CONCLUSIONS

Based on current data and plant growth habit planting dates in late April and May will be significantly higher yielding in an average year and tend not to be significantly worse under low rainfall conditions early.

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REFERENCES


Hanna, W. W. 1995. Pyramiding rust resistance into a split split plot, randomized complete block design with four replications.


