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The range in water available for crop growth was 13.4-17 acre-inches. Over this range of water use the total dry matter yield of Millex ranged from 6,150-17,480 lb/A while the dry matter yield of Tift 23B ranged from 2,600-13,110 lb/A. Tift 23B yielded less than Millex at all levels of irrigation, however the decrease in yield with declining water was similar. Additionally, the number of heads per length of row greatly decreased with Tift 23B as water declined but not with Millex.

Introduction

Pearl millet is generally raised in climates subject to periods of severe plant water stress. Thus, a knowledge of how this crop responds to decreased water availability is important. Further, a knowledge of genotypic differences in crop water response curves would be very useful to both the plant breeder and the farmer to select and produce the hybrids best suited to their needs. Therefore, the objective of this study was to compare two pearl millet cultivars under varying levels of water to determine crop water response curves for each.

Procedure

The study was conducted on a Pullman clay loam soil at Bushland, Texas in 1984. The plot area was land planed, disked, fertilized, swept, and bedded up prior to planting. Nitrogen and phosphorus fertilizer were applied to nonlimiting levels. Propazine was applied for weed control at the rate of 2 lb/A. The pearl millets (Millex and Tift 23B) were seeded on May 23, 1984. After establishment, gradient sprinkler irrigations were applied throughout the season whenever soil water content in the most heavily irrigated area (3 feet from the sprinkler) fell below 70 percent available as determined by a neutron probe. Neutron tubes, 10 feet deep, were placed at distances of 3, 13, 23, 33, and 43 feet from the sprinkler. Water collections at the same locations were made for each irrigation and rainfall occurrence to determine total water applied. Plant height measurements and total plant dry matter yield were taken August 30, 1984.

Results and Discussion

The dry matter yield range for Millex was from 17,480 lb/A on the adequately watered area to 6,150 lb/A on the driest treatment (Fig. 1). The comparable dry matter yield range for Tift 23B was from 13,110-2,600 lb/A. Millex is a hybrid and, as such, would be expected to show more vigor and yield potential than Tift 23B which is a pure line. The slopes of the two lines were not significantly different, indicating similar responses to water for the two pearl millet types. However, Millex consistently produced more yield per unit of water than did Tift 23B.

Plant height responses to water (Fig. 2) were similar to the yield differences. Millex was taller than Tift 23B

KEYWORDS: Pennisetum americanum/water stress/water use/biomass.

Response of Two Pearl Millets to Water

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Summary

Millex and Tift 23B pearl millets were planted under a gradient irrigation system at Bushland, Texas in 1984.

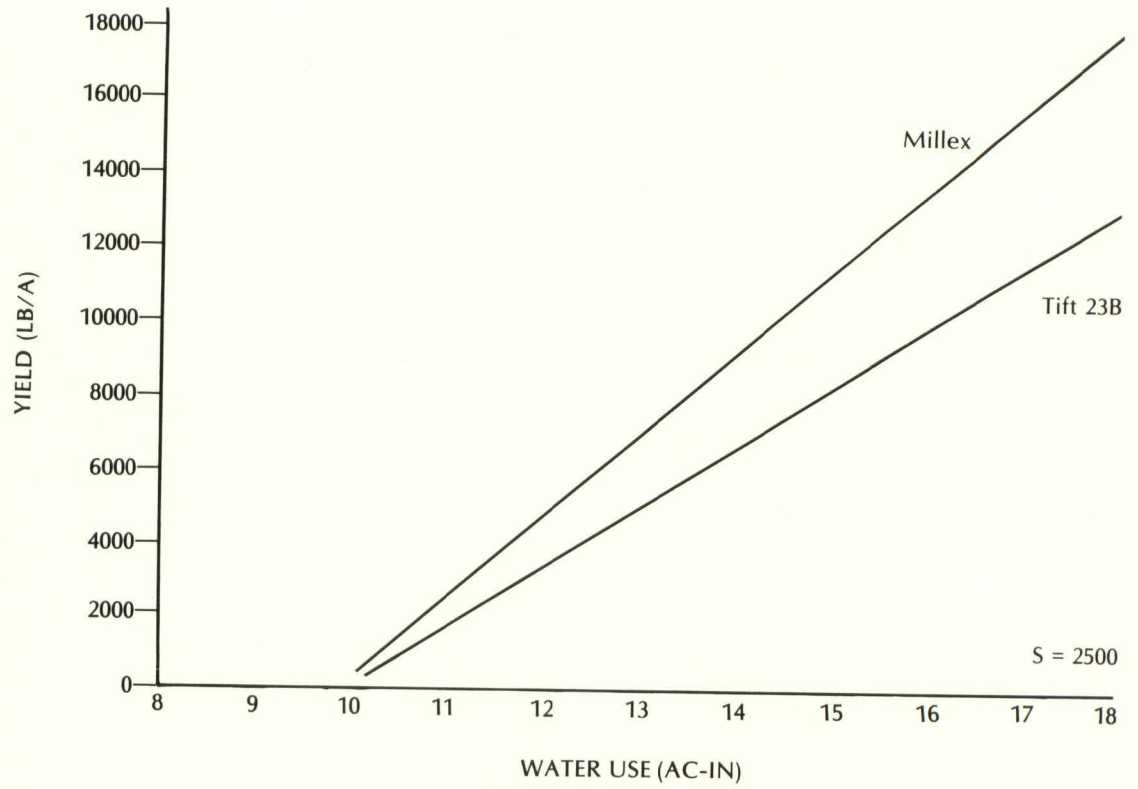


Figure 1. Yield of Pearl Millet at Different Water Levels.

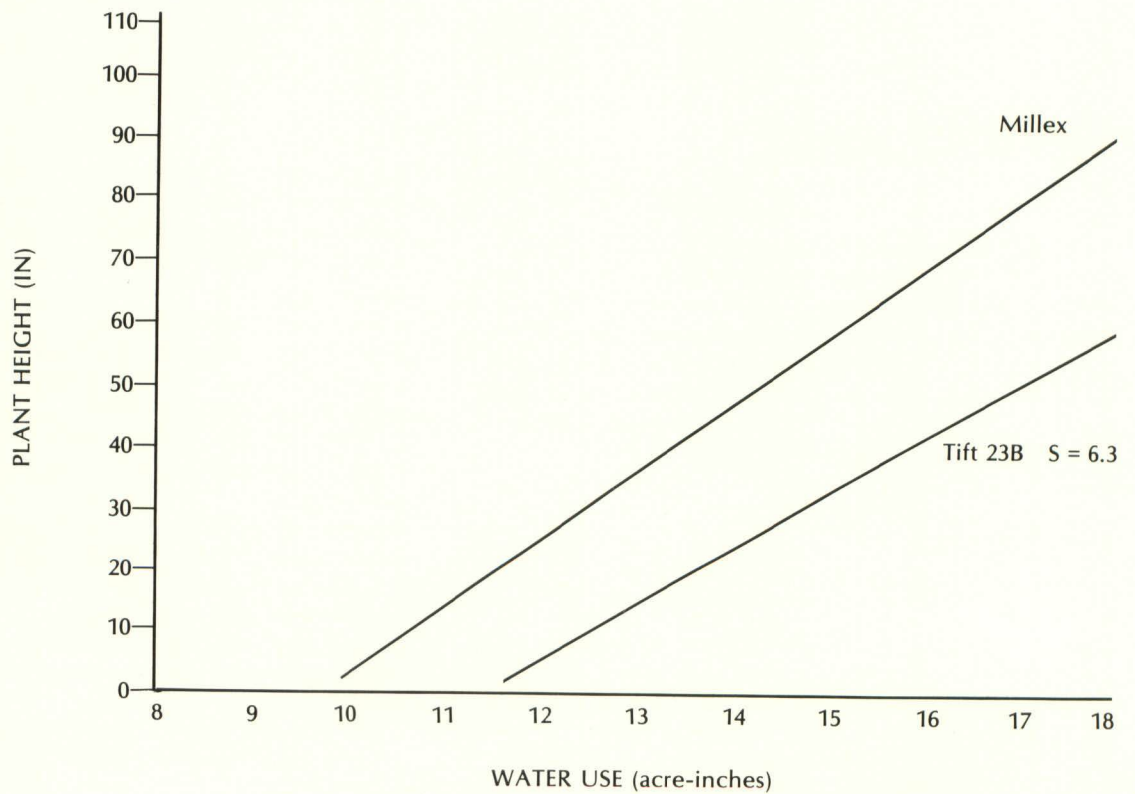


Figure 2. Plant Height of Pearl Millet at Different Water Levels.

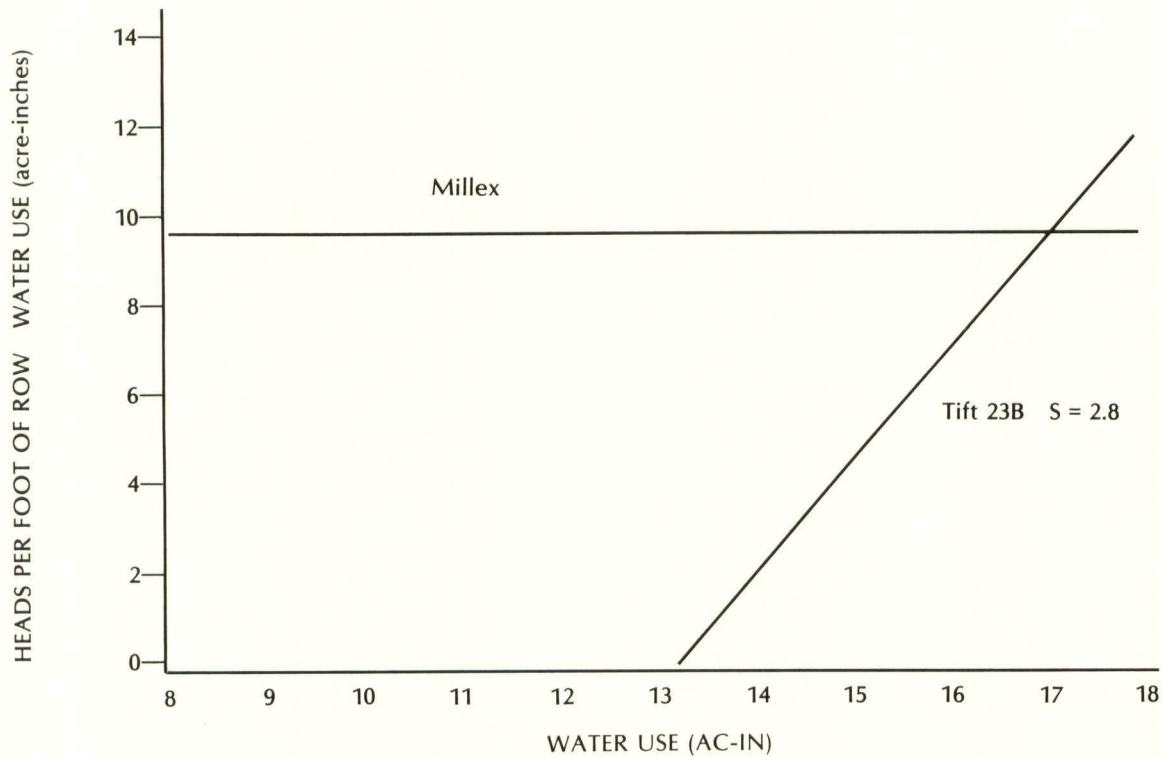


Figure 3. Number of Heads of Pearl Millet at Different Water Levels.

and demonstrated a greater increase in height with added water than Tift 23B.

Grain yields were not taken, however, number of heads were measured for each plot. Tift 23B showed a severe depression in number of heads with declining water (Fig. 3). In Millex, number of heads did not decline with decreasing water.