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EFFECT OF SOWING DENSITY ON WATER CONSUMPTION, DEVELOPMENT AND PRODUCTIVITY OF YAM BEAN (*Pachyrhizus erosus* (L.) Urban)

Introduction

The introduction of new crop species with improved level of adaptation to water deficit constitutes a strategy for increasing or maintaining crop production in semi-arid zones. The yam bean (*Pachyrhizus erosus* (L.) Urban) presents several advantages including the production of tubers of high nutritional value for human consumption. abundant forage for livestock and seeds containing rotenone - a crop protective agent (Sorensen, 1988 ; Halafihi. 1994). Preliminary experiments have shown that the EC114 accession of *P erosus* is the most productive in semi-arid conditions (Annerose *et al.*, 1996). In this work, we report the effects of sowing density on water use efficiency, development and productivity of *Pachyrhizus*

Material and Methods

The experiments were conducted in the field on a sandy-clay soil at Thiès (14" 81' N. 16° 28' W) in Senegal Seeds of *Pachyrhizus* EC1 14 accession were sown in lune during the long day period. The experiment extended into October, a short day period. Three sowing densitirs :111,111, 250,000 and 444,444 stands ha^{-1} were examined. The experimental design was randomised complete block with each treatment replicated four times. Measurement of Ieaf water potential (pressure chamber). relative water content (gravimetri'). leaf area index (LAI 2000 de LICOR), soil moisture content (neutron probe) and biomass production measurements were made weekly. Monitoring of soil water content, evaporative demand (potential evapotranspiration - PET). irrigation and rainfall. allowed the detet-mination of crop water consumption (actual evapotranspiration - AET). Water use efficiency (WUE) was detertnined from the relationship betwcen biomass production and crop water consumption

Results

AET increased with density throughout the growth cycle (Fig. 1). The amount of water consumed by Dl, D2 and D3 were 515 mm, 560 mm and 641 mm, respectively

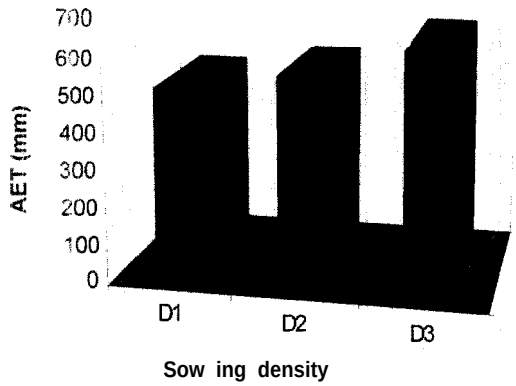
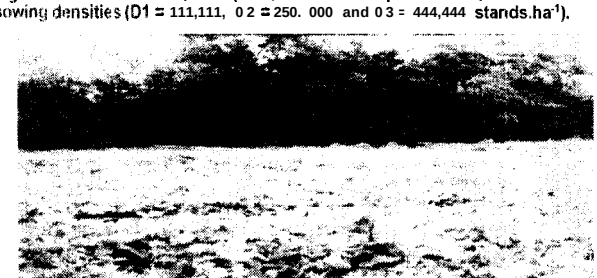


Figure 1 Water consumption (AET) over the experimental period at three sowing densities (D1 = 111,111, 0 2 = 250. 000 and 0 3 = 444,444 stands.ha^{-1}).



The best vegetative growth was obtained with a sowing density of 444,444 stands.ha^{-1} (Fig. 2).

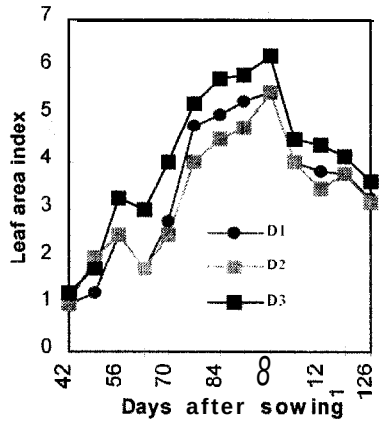


Figure 2. Leaf area index (LAI) over the experimental period for three swing densities (01 = 111,111, D2 = 250,000 and 03 = 444,444 stands.ha^{-1}).

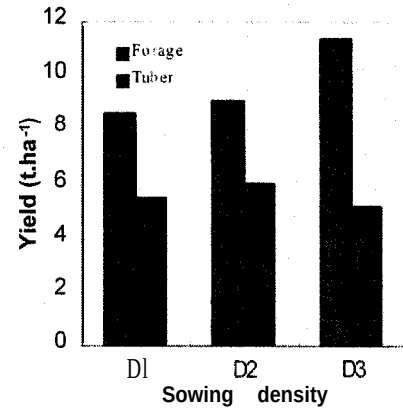


Figure 3 Tuber and forage yields for three swing densities (D1 = 111,111, D2 = 250. 000 and 03 = 444,444 stands.ha^{-1}.

Despite the differences in water consumption. sowing density had no significant effect on fresh tuber and forage yields (Fig. 3). However, a higher WUE was obtained with Dl and D2 (0.011) than with D3 (0.008) for tuber production. On the contrary, a lower WUE was obtained with Dl and D2 (0.016) than with D3 (0.018) with respect to forage production.

Conclusions

From the results obtained, the production objectives could be guided by the sowing density. A high sowing density of the order of 444.114-1 stands.ha^{-1} is desirable for forage production. whilst a low sowing density of the order of 111,111 stands.ha^{-1} is desirable for tuber and pod production

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