

Cropping Indices and Economics of Pearl millet [*Pennisetum glaucum* (L.) R. Br. Emend Stuntz] - Based Intercropping Systems under Rainfed Conditions

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ABSTRACT

A field experiment was conducted during kharif, 2015 at S.V. Agricultural College Farm, Tirupati to study the comparative performance of different pearl millet based intercropping systems. The results revealed that pearl millet + groundnut in 2:2 paired row spacing (PRS) produced higher pearl millet grain equivalent yield and land equivalent ratio and gross and net returns and benefit cost ratio. While these parameters were lowest with sole pearl millet in paired row spacing of 40/80 cm.

Key words: Pearl millet, Groundnut, Legume, Cropping indices, Economics.

INTRODUCTION

Pearl millet [*Pennisetum glaucum* (L.) R.Br. emend. Stuntz] is the fourth most important food grain crop after rice, wheat and sorghum. As an arid and semi-arid crop, traditionally it is the component of dryland system; usually grown on the soil with depleted fertility receiving less rainfall 150-750 mm per annum. It is one of the staple food crops of quite a large population of India. India and Africa together account for 93.2 per cent of the total pearl millet production of the world. Intercropping is a common practice in the low level equilibrium farmers of semi-arid and arid tropics, whose primary concern is to insulate investment on labour and meagre capital against adversities of nature in order to sustain living. Cereal + legume mixture is an ideal

crop mixture in respect of mutualism and soil health. Hence, it is worthwhile to find out best combination of pearl millet intercropped with short duration grain legume crops like green gram and black gram.

MATERIAL AND METHODS

A field experiment was carried out during kharif, 2015 at S.V. Agricultural College Farm, Tirupati. The experimental soil was sandy loam in texture, slightly acidic in soil reaction, low in available nitrogen and medium in organic carbon, available phosphorus and available potassium. The experiment was laid out in a Randomized Block Design with eight treatments and replicated thrice.

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The treatments comprised of sole pearl millet planted at 45 cm x 12 cm (T₁), sole pearl millet in paired row spacing 40/80 cm (T₂), pearl millet + cowpea in 1:1 uniform row spacing (URS) (T₃), pearl millet + cowpea in 2:2 paired row spacing (PRS) (T₄), pearl millet + groundnut in 1:1 uniform row spacing (URS) (T₅), pearl millet + groundnut in 2:2 paired row spacing (PRS) (T₆), pearl millet + green gram in 1:1 uniform row spacing (URS) (T₇), pearl millet + green gram in 2:2 paired row spacing (PRS) (T₈). The hybrid and varieties tested in this experiment were ABH-1 (Pearl millet), TPTC-29 (Cowpea), Dharani (Groundnut) and LGG - 460 (Green gram). Sole crop of pearl millet was sown at 45 cm x 12 cm and in paired rows at 40/80 cm with an intra row spacing of 10 cm. While under intercropping systems, pearl millet was sown at 60 cm x 10 cm in 1:1 ratio and in paired rows of 40/80 cm in 2:2 ratio with an intra row spacing of 10 cm. Two rows of intercrops *viz.*, cowpea, groundnut and green gram were sown at 30 cm x 10 cm in between paired rows of pearl millet in 2:2 ratio, while in 1:1 ratio the intercrops cowpea, groundnut and green gram were sown at 60 cm x 10 cm in between the pearl millet rows. The recommended dose of 60 kg N, 30 kg P₂O₅ and 20 kg K₂O ha⁻¹ was applied through urea, single super phosphate and muriate of potash for pearl millet, 20 kg N, 50 kg P₂O₅ kg ha⁻¹ for cowpea and green gram and 20 kg N, 40 kg P₂O₅ and 50 K₂O kg ha⁻¹ for groundnut respectively. For pearl millet, entire dose of phosphorous, potassium and half of the dose of nitrogen were applied as basal at the time of sowing and the remaining half of the nitrogen was top dressed at 30 DAS Jackson *et al*³.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads.

CROPPING INDICES

The pearl millet grain equivalent yield were the highest with pearl millet + groundnut in 2:2 paired row spacing (PRS) (T₆) which was however on par with pearl millet + groundnut in 1:1 uniform row spacing (URS) (T₅). Lowest pearl millet grain equivalent yield and land equivalent ratio were documented with sole pearl millet in paired row spacing of 40/80 cm (T₂). This might be due to additional yield of intercrops due to better complementary relationship and good price coupled with better utilization of natural resources. Similar results were reported earlier by Patel *et al*⁷, Hooda *et al*² and Kumar *et al*⁴ and Choudhary *et al*¹.

The land equivalent ratio (LER) recorded with pearl millet + groundnut in 2:2 PRS intercropping system was high compared to other intercropping systems. This might be due to higher yield of groundnut which resulted in higher land utilization. These results matched with the findings of Kumar *et al*⁴, Kuri *et al*⁶ and Yadav *et al*⁸.

ECONOMICS

The gross returns, net returns and benefit: Cost ratios were significantly higher in pearl millet + groundnut in 2:2 PRS (T₆), and were significantly superior to other planting systems (Table 1). This might be due to additional yield advantage of intercrop yield due to better complementary relationship and its higher price in the market. Similar findings were also made by Kunadia *et al*⁵, Yadav and Jat *et al*⁹ and Kumar *et al*⁴.

Table 1: Cropping indices and Economics of pearl millet at harvest as influenced by pearl millet + legume intercropping

Treatments	Pearl millet grain equivalent yield (kg ha ⁻¹)	Land equivalent ratio	Gross returns (kg ha ⁻¹)	Net returns (kg ha ⁻¹)	Benefit: cost ratio
T ₁ : Sole pearl millet (45 cm x 12 cm)	1661	1.0	34563	17071	1.98
T ₂ : Sole pearl millet in paired row spacing of (40/80 cm)	1624	1.0	33763	16271	1.93
T ₃ : Pearl millet + cowpea in 1:1 URS	2665	1.5	55220	31354	2.31
T ₄ : Pearl millet + cowpea in 2:2 PRS	2802	1.5	58075	34209	2.43
T ₅ : Pearl millet + groundnut in 1:1 URS	3732	1.5	76063	46514	2.57
T ₆ : Pearl millet + groundnut in 2:2 PRS	3886	1.6	80612	51063	2.73
T ₇ : Pearl millet + green gram in 1:1 URS	2627	1.4	54037	30671	2.31
T ₈ : Pearl millet + green gram in 2:2 PRS	2750	1.5	56666	33300	2.43
SEm±	195	0.03	982	982	0.04
CD (P=0.05)	597	0.1	3009	3009	0.1

CONCLUSION

Pearlmillet grain equivalent yield, land equivalent ratio, gross returns, net returns and benefit: cost ratio was significantly higher with pearlmillet + groundnut in 2:2 paired row spacing (PRS) in sandy loam soils of Tirupati. Among sole crop of pearlmillet, sole pearlmillet planted at 45X 12 cm recorded yields and returns when compared with sole pearlmillet in paired row spacing of 40/80 cm.

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