

Effect of Intercropping Systems on Intercrops & Weeds

Ashish Kiroriwal¹ and R.S. Yadav²

College Of Agriculture, Swami Keshwanand Rajasthan Agricultural University,
Bikaner-334006, Rajasthan.

Keywords: Weed, Intercropping, Pearlmillet, Clusterbean, Mothbean.

1. Introduction

Pearlmillet [*Pennisetum glaucum* (L.) Br. *Emend Stuntz.*] is an important coarse grain cereal crop of dry land agriculture. It can be grown on light textured soil under low moisture conditions. India has the distinction of having the highest area under pearlmillet in the world. In India, the total area under this crop is 8.91 million ha. However, the production and productivity is 8.52 million tonnes and 957 kg ha⁻¹, respectively.

The arable land is a scarce resource, so among the options to increase production, the cropping intensity and efficient utilization of available resources seem feasible over increasing area under cultivation. Intercropping provides better opportunity to accommodate legume which are otherwise neglected crops in the space provides for cereal crop. Clusterbean and Mothbean are grown in inter/mixed cropping system with pearlmillet in arid and semi arid region of Rajasthan.

Besides other production constraint, weed infestation is considered as one of the most important constraint to limit the yield as well as intercropping system. Different kind of weeds which may reduce the yield of pearlmillet up to 16 to 94 per cent (Umrani *et al.*, 1980).

A field experiment was conducted at the College of Agriculture, Swami Keshwanand Rajasthan Agricultural University, Bikaner, Rajasthan. The soil was sandy loam (6.98% clay, 7.36% silt, 84.48% sand) in texture, low in organic carbon (0.08%) and available N (86.40 kg ha⁻¹), medium in P (21.91 kg ha⁻¹) and high in K (234.00 kg ha⁻¹) contents with a pH of 8.5.

There were 21 Treatments consisting of 3 treatments of intercropping (Pearlmillet Sole, Pearlmillet + Clusterbean and Pearlmillet + Mothbean) and 7 treatments of weed control. The treatments were replicated three times in a factorial randomized block design. The seed of crops were sown in lines spaced 60cm in pearlmillet and 30 cm in intercropping treatments by “*kerā*” method in open furrow. A basal dose of N (40 kg

ha⁻¹) and P (20 kg ha⁻¹) were drilled uniformly before sowing. Weed population and dry weight was recorded by putting a quadrat (0.25 m²) at random spots at two places in each plot.

2. Effect of intercropping systems

2.1 Weed growth

Pearlmillet intercropped with clusterbean and mothbean significantly reduced the density and dry matter of individual and total weeds as compared to sole pearlmillet. The lower density and dry matter production of different weeds *viz.*, *Tribulus terrestris*, *Cenchrus biflorus*, *Corchorus tridense* etc. under intercropping systems may be ascribed probably to higher crop canopy than sole pearlmillet. The highest removal of N and P by different weeds noted under sole pearlmillet whereas, the lower removal of N and P was recorded under pearlmillet intercropped with clusterbean/ mothbean. Sole pearlmillet recorded the maximum mean removal of nutrients by different weeds to an extent 16.29 kg N ha⁻¹ and 2.38 kg P ha⁻¹, respectively. Lower uptake of nutrients by different weeds under intercropping systems may be attributed to hang up of weed growth and reduced crop weed competition due to smothering effect of intercrops on weeds which led to lower dry matter production, consequently resulting in lower uptake of nutrient by weeds. Similar findings were also reported by Rana *et al.* (1999). Higher weed control efficiency recorded under intercropping system than sole cropping.

2.2 Crop

All the growth *viz.* plant height, dry matter accumulation, root weight & length and yield attributing characters *viz.*, effective tillers plant⁻¹, length of ear and test weight of pearlmillet were non-significant among different intercropping treatments and hence seed and stover yield of pearlmillet was also found non-significant among intercropping of clusterbean/ mothbean and sole pearlmillet. It means that both the intercrops *i.e.* clusterbean and mothbean were not competitive with pearlmillet for nutrients and environmental resources in this intercropping system (one row of intercrop in between the two rows of pearlmillet (60 cm apart). In this system of intercropping, there was no significant effect on the yield of main crop while intercrops gave substantial yield which leads to the significantly higher pearlmillet equivalent yield of pearlmillet + clusterbean and pearlmillet + mothbean intercropping system compared to sole pearlmillet beside some smothered effect on density and dry matter of weeds by these intercropping systems. It may be attributed to additional seed yield of intercrops *viz.* clusterbean (8.33 q ha⁻¹) and mothbean (8.05 q ha⁻¹). Finding of present investigation are in the line with those of Ram *et al.* (2004) in pearlmillet. Nitrogen and phosphorus uptake by pearlmillet grain and stover were also not affected significantly by intercropping system further, supported the present finding. Similar results were also reported by Tetarwal and Rana (2006).

3. Summery

Individual and total weed density was reducing significantly due to intercropping systems at 25 DAS and physiological maturity as compared with sole pearl millet. There was no significant difference observed between pearl millet + clusterbean and pearl millet + mothbean in reducing weed density at 25 DAS. Pearl millet intercropped with clusterbean and mothbean significantly reduced the mean dry matter of total weeds by 2.67 and 4.51 per cent of 25 DAS and 18.27 and 18.56 per cent at physiological maturity, respectively over sole pearl millet. Pearl millet intercropped with clusterbean and mothbean significantly reduced the N uptake by total weeds with percentage reduction of 12.70 and 12.15 per cent, respectively, over sole pearl millet. In the respect of P uptake by total weeds sole pearl millet being at par with pearl millet + mothbean. Pearl millet + clusterbean decreased the P uptake by 14.28 per cent over pearl millet sole. The higher mean value of 67.84 and 67.82 per cent of weed control efficiency was observed under pearl millet intercropped with clusterbean and mothbean over pearl millet sole (65.58).

There was no significant difference among different intercropping systems for growth characters *viz.*, plant stand, plant height, dry matter plant⁻¹ and length of roots. The yield attributing characters i.e. effective tillers plant⁻¹, ear length and test weight of pearl millet were not effected by intercropping systems and consequently no significant difference was recorded in yields of pearl millet. Higher mean pearl millet grain equivalent yield of 31.34 q ha⁻¹ recorded under pearl millet + mothbean and was statistically at par with pearl millet + clusterbean and both of the intercropping systems were significantly higher over sole pearl millet. Pearl millet intercropped with clusterbean and mothbean were not influence significantly in respect of N and P content and uptake by pearl millet over sole pearl millet system.

Intercropping systems influenced the net return. Both the intercropping systems gave higher net return over sole pearl millet. Pearl millet intercropped with clusterbean gave highest mean net return of Rs. 23133 ha⁻¹ followed by pearl millet + mothbean (Rs. 21143 ha⁻¹). (Table.1)

Table 1: Effect of intercropping Systems on Net return (Rs. ha⁻¹) and B: C ratio.

Treatments	Net return	B : C ratio
Intercropping		
Pearlmillet Sole	16700	3.75
Pearlmillet + Clusterbean	23133	4.14
Pearlmillet + Mothbean	21143	3.87
SEm±	838	-
CD (0.05)	2397	-

References

- [1] Ram, B., Chaudhary, G.R. and Jat, A.S. 2004. Nutrient depletion by weeds, weed control efficiency and productivity of pearl millet (*Pennisetum glaucum*) as influenced by intercropping systems and integrated weed management. *Indian J. Agron.* **74** (10): 534-538.
- [2] Rana, K.S., Pal, M and Rana, D.S. 1999. Nutrition depletion by pigeonpea (*Cajanus cajan*) and weeds as influenced by intercropping system and weed management under rainfed condition. *Indian J. Agron.* **44**(2): 267-270.
- [3] Tatarwal, J.P. and Rana, K.S.V. 2006. Impact of cropping system, fertility level and moisture conservation practice on productivity, nutrient uptake, water use and profitability of pearl millet (*Pennisetum glaucum*) under rainfed conditions. *Indian J. Agron.* **51**(4) : 263-266.
- [4] Umrani, M.K., Bhoi, P.G. and Patil, N.B. 1980. Effect of weed competition on growth and yield of pearl millet. *J. Maharashtra Agric. Univ.* **5**: 56-57.