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Efficiency of okra-based intercropping under subsistence farming

AC Mishra

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Okra (*Abelmoscus esculentus* L.) is an important vegetable crop of small and marginal farmers which ensures good returns in a short span. This is grown twice in a year. In the plateaus of Jharkhand, okra is grown in various systems of sole and intercropping. Major area under this crop is in sole cultivation but *Kharif* okra is also grown as intercrop with Maize and Pigeonpea. Farmers of this region are applying higher seed rates and maintaining more number of plants per unit area which leads to tall plants with less number of fruits per plant, overall poor fruit yield and higher infestation of pests and diseases. Widening of row spacing could only be possible when interspaces are ensured to be covered with some suitable intercrops. Compatibility of the crops for space, nutrition and diseases and insect-pests are important of intercropping systems. Okra is supposed to support to vine crops like cowpea (*Vigna unguiculata*), cucumber (*Cucumis sativa*), *Satputia* cultivar of ridge gourd (*Luffa acutangula*) and many other crops. Cowpea has already been reported as companion intercrop other crops like maize (Remison, 1982a). Intercropping of compatible crops increases resource use efficiency (Remison, 1982b), efficient utilization of water and soil nutrients (Sharma *et al.*, 1979), reduces cost of production (Bijay*et al.*, 1978) and ensures higher remuneration from the crops. These aspects are more important for resource poor, small and marginal holding subsistence farming population of the Jharkhand state where almost eighty per cent farming community fall under this category. Therefore, assessment and refinement of intercropping of compatible crops are more relevant for such type subsistence farming situation.

The experiments were conducted during *Kharif* (July to October), 2010&2012 in participatory mode of ten farmers of Garhwa district falling in rainfed plateaus of Jharkhand (latitude between 23^{0}34'11" and 24^{0}32'05", longitude between 83^{0}10'13" and 83^{0}56'38" and altitude 350 m above msl). Soils of experimental plots were moderately acidic (pH5.5-6.0) and organic matter content varied from 0.5 to 0.6%. The treatment included sole crop of okra grown at 30x15 cm spacing (T-1) intercropping of okra grown at 45x30 cm spacing with cowpea (pole type) cv. Gomati (Ankur Seeds (T-2)) and intercropping of okra grown at 45x30 cm spacing with ridge gourd (cv. *Satputia*) in 2:1 ratio i.e. in alternate rows (T-3). Intercropping systems were compared as against the sole okra crop grown at 30x15 cm spacing.

The fertilizer dose applied to the main crop (Okra) was NPK@ 100:60:45 kg/ha. All the three treatments were tested by growing each in plots of 100 m^2 of ten farmers' field in randomized block design. Data were recorded on fruit yield of okra (q/ha), pod yield of cowpea (q/ha) and fruit yield of ridge gourd cv. *Satputia* (q/ha).With the help of these basic data, okra equivalent yield (q/ha) and land equivalent ratios (LER) were calculated to assess the productivity of intercropping systems.Land Equivalent Ratio for okra (LERo) was calculated from component crop yields as per Mead and Willey (1980).

From the data tabulated in tables 1&2 it is evident that Okra as sole crop resulted in highest fruit yield in both the years (98.45 q/ha and 83.20 q/ha) as compared to that in any of intercropping systems. Among intercropping, lowest yield of okra was observed with *Satputia* cultivar of ridge gourd in both the years (53.60 q/ha and 48.50 q/ha). Poor yield in okra under intercropping with *Satputia* was due to vigorous vines of *Satputia* which overarched the okra plants leading to poor plant spread and fruit set. Furthermore, *Satputia* might have grown tough competition with okra for nutrients. There was marginal difference in fruit yield of okra as sole crop and intercrop with cowpea in both the years (87.58 q/ha and 71.80 q/ha) probably due to less vigorous vines of cowpea providing opportunity to flourish okra plants with good fruit set and secondly because of less competition with main crop and also nitrogen enriching by cowpea in the rhizosphere of okra leading to better synergism.

A.C. Mishra
Birsa Agricultural University, KrishiVigyan Kendra,
Garhwa - 822 114 (Jharkhand)

Table 1: Performance of okra under different cropping systems during *Kharif* 2010

Technologie sAssessed	Yield. (q/ha)		Okra Equivale nt Yield (q/ha)	Land Equivalent Ratio of Okra (LERo)	B:C Ratio
	Okra	Intercrop			
FP	98.45	-	98.45	-	3.63
TO-1	87.58	47.54	135.17	0.89	4.28
TO-2	53.60	56.57	96.023	0.54	3.23
CV (%)	-	-	5.69	-	-
SE (m)	-	-	1.98	-	-
CD (at 0.05)	-	-	4.16	-	-

Note: Selling rate of okra Rs.400/-q^{-1}, Ridge gourd Rs.300/q^{-1} and cowpea Rs.400/q^{-1}

Table 2: Performance of okra under different cropping systems during *Kharif* 2012

Technologies Assessed	Yield. (q/ha)		Okra Equivalen t yield (q/ha)	Land Equivalent Ratio of Okra (LERo)	B:C Ratio
	Okra	Intercrop			
FP	83.20	-	83.20	-	3.50
TO-1	71.80	47.50	119.30	0.86	4.20
TO-2	48.50	50.90	88.10	0.58	3.0
CV (%)	-	-	7.5	-	-
SE (m)	-	-	1.7	-	-
CD (at 0.05)	-	-	3.57	-	-

Note: Selling rate of okra Rs.450/-q^{-1}, Ridge gourd Rs.350/q^{-1} and cowpea Rs.450/q^{-1}

Main crop equivalent yield is the ultimate measure of productivity of the intercropping systems. Maximum okra equivalent yield was observed in okra-cowpea intercropping system viz., 135.17 q/ha in first year and 119.30 q/ha in second year. Okra-ridge gourd cv. *Satputia* intercropping system exhibited okra-equivalent yield (96.023 q/ha and 88.10 q/ha) comparable to the fruit yield in okra sole crop in both the years (98.45 q/ ha and 83.20 q/ha). Land equivalent ratio was higher in okra-cowpea intercropping system in both the years (0.89 and 0.86). The benefit/cost ratio (B:C ratio) was worked out for each intercropping systems and sole crop for assessing theprofitability. It was found that okra-cowpea was the most remunerative intercropping system as maximum B:C ratio was observed for this system in both the years (4.28 and 4.20) followed by sole crop of okra (3.63 and 3.50). Corresponding to present findings, Adeniyi (2011) have also reported maximum yield and benefit /cost ratio (2.50) in other geometry. This geometry allows growing cowpea in alternate rows of okra which okra-cowpea intercropping system grown in 2:1 ratio as compared to those grown in any facilitates easy harvesting of both the crops without damaging. Intercropping in 2:1 ratio was also found the most suitable and productive in okra-tomato and tomato-cowpea intercropping systems. Contrary to this, in okra-*Satputia* system vines grow vigorously to cover the alternate rows without intercropping creating problems in harvesting and intercultural operations.

From this study,it can be concluded that okra and cowpea was found the most compatible crops for intercropping in 2:1 ratio on the basis of yield of individual crops, okra equivalent yield, land equivalent ratio of okra and benefit/cost ratio during rainy season. Okra-cowpea based intercropping system was also suitable for enhanced resource use efficiency in the agro climatic and socio-economic conditions of Jharkhand.

References

Adeniyi OR (2011) Economic aspects of intercropping systems of vegetables (okra, tomato and cowpea). African J. Plant Sci. 5(11): 648-688.

Bijay S, Rana DS and Sekhon GS (1978) Some measures of reducing leaching loss of Nitrate beyond rooting zone. Intercropping Plant Soil 49(3): 633-639.

Mead R and Willey RW(1980) The concept of 'land equivalent ratio' and advantages in yields from intercropping. Experimental Agriculture 16: 217-228.

Remison SU (1982 a) Neighbour effect between maize and cowpea at varying level of N and P. Exp Agric 14: 205-212.

Remison SU (1982 b) Interaction between maize and cowpea at various frequencies. J. Agric. Sci. 94(3): 617-621.

Sharma KN, Rama DS, Bishnoi SR and Sodhi, JD (1979) Effect of fertilizer application in an intercropping system. Indian J. Agric. Res. 13(1): 41-50.