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Companion cropping of bitter goard and colocasia in riverbed under natural farming

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Abstract

The field study was undertaken during two consecutive years of 2008-09 and 2009-10 on riverbed of Ganga at village *Kallopurwa* of Unnao district. The study was done under Farmers Participatory Action Research Project on Water/Water Harvesting (Scheme Funded by Central Water Commission, New Delhi). The pilot site soil was fine to coarse sand, having nil plant nutrients. Three cropping systems i.e. bitter goard alone, colocasia alone and bitter goard + colocasia companion cropping were tested in riverbed of Ganga. The companion crop of colocasia was planted in row ratio of 3:2 with main crop of bitter goard. The 83% plant stand of bitter goard and 17% plant stand of colocasia were adjusted in introductive adaptive trial. The crops were fertilized with 250 q/ha FYM and 5 q/ha mustard cake, which provided 49.85 kg N, 49.70 kg P₂O₅ and 104 kg K₂O/ha in available form to both experimental crops. The fruits of bitter goard harvested by 102 q/ha under pure cropping, while in companion cropping bitter goard produced 85.00 q/ha fruits. Pure crop of colocasia gave 155.00 q/ha and in companion cropping it yielded 45.00 q/ha rhizomes. The highest net return of Rs. 271740/ha was found in companion cropping of bitter goard + colocasia, while pure cropping of bitter goard gave net return Rs. 235920/ha. Pure colocasia gave net return of Rs. 217088/ha, which was lowest. The BCR was recorded in order of bitter goard + colocasia (1:4.70) > bitter goard pure (1:4.37) and > colocasia pure (1:3.34). The higher LER (1.12) and yield advantage (12%) were found in companion cropping of bitter goard + colocasia.

Keywords: Bitter goard, Colocasia, Companion cropping, LER, Yield advantage.

Introduction

In companion cropping of bitter goard and colocasia under natural farming, the application of organic manure play crucial role for supply of plant nutrients and use of plant pesticides means for pest management. The organic fertilizers, however, effect soil organic matter content, structure, moisture retention and nutrients release. Some of these may affect plant vigour, cell size or content there by indirectly affecting nutritional quality and taste. Even though return from organic farming is often >70 percent of conventional production, it is argued that organic base production especially spring/summer season vegetables have higher nutritional quality or better taste. The organic matter supplied through organic manure may improve the soil's ability to retain moisture. It is well known fact that organic fertilizer is the feeding stuff of microbes. Therefore, primary difference between inorganic fertilizers and organic fertilizers is that inorganic exists in a ready nitrate state. Nutrients can be absorbed by plant roots immediately when in the presence of adequate water. In contrast, organic fertilizers must be converted by microbes in soil from an organic to an inorganic state before plant roots can absorb them. In comparison to conventional farming, the natural farming give low bitter goard and colocasia yields but fetch good market price due to better quality.

Generally in normal soils the companion cropping of bitter goard and colocasia is not follow by farming majority but in case of sandy soil open after receding of river water has been made feasible during spring/summer season is the subject matter of this manuscript.

Materials and Methods

The introductive adaptive trial was laidout during two consecutive years of 2008-09 and 2009-10 on

riverbed of Ganga at village *Kallopurwa* of Unnao district. The study was done under "Farmers Participatory Action Research Project on Water/Water Harvesting" (Scheme Funded by Central Water Commission, New Delhi). The pilot site soil was fine to coarse sand, having nil plant nutrients. The companion crop of colocasia was planted in row ratio of 3:2 with main crop of bitter goard. The three rows of bitter goard were planted at the distance of 150 cm in channels. The plant to plant distance of bitter goard was maintained 50 cm. After planting of three rows of bitter goard, 100 cm wide irrigational channel was made. In both side of channel ridges the colocasia rhizomes were planted at the distance of 25 cm, therefore, 83% plant stand of bitter goard and 17 percent plant stand of colocasia were adjusted. The planting of both crops was done in first week of January during two experimental years. The 60 kg N + 40 kg P₂O₅ + 40 kg K₂O/ha was the requirement of bitter goard and colocasia required NPK @ 80:40:40 kg /ha, respectively. The 250 q/ha FYM and 5 q/ha mustard cake were applied to fulfill the requirement of NPK. Application of FYM and mustard cake provided 49.85 kg N, 49.70 kg P₂O₅ and 104 kg K₂O/ha in available form to both experimental crops. No chemical fertilizer was applied. For maintaining good soil moisture and increase the frequency of irrigational days, the gypsum was applied @ 200 kg/ha. For good spreading of bitter goard and control of weeds the mulching was done by *Sachhrum munja*. For control of aphid and bettles, applied *Beauveria bassiana* @ 2.5 kg/ha or spray the crops with insecticidal soap. The other recommended agronomical practices were followed in both crops. The fruits of bitter goard were harvested at green stage as per demand of consumers, while colocasia rhizomes harvested at full maturity stage.

Results and Discussion

The pooled data of two years are presented in Table -1 and discussed here under appropriate heads.

Table-1: Yield of main and intercrops and net income as affected by different treatments (Pooled data of two years)

S.N.	Treatment	Yield (q/ha)		LER	Yield advantage (%)	Economics			
		Main crop	Inter crop			Cost of cultivation (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	BCR
1.	Bitter goard alone	102.00	-	1.00	-	70080	306000	235920	4.37
2.	Colocasia alone	155.00	-	1.00	-	92912	310000	217088	3.34
3.	Bitter goard + colocasia	85.00	45.00	1.12	12.00	73260	345000	271740	4.70

Sale Price:

Bitter goard -Rs. 3000/quintal

Colocasia -Rs. 2000/quintal

(A) Yield of main and intercrops:

The yield of bitter goard alone was recorded by 102.00 q/ha. In companion cropping system, bitter goard yield weighed by 85.00 q/ha, which was 83.34% in comparison to pure crop of bitter goard. Pure crop of colocasia gave 155.00 q/ha, while in companion cropping colocasia gave yield by 45.00 q/ha. Pure colocasia gave 110.00 q/ha more yield over companion crop of colocasia. In companion cropping system, the colocasia utilized the benefit of wider space, which was responsible for good rhizomes yield of colocasia in companion cropping system. Similar results have also been reported by Singh *et al.* (2021) in companion cropping of garlic + colocasia.

(B) Economic study of system: The cost of cultivation of Rs. 70080/ha, Rs. 92912/ha and Rs. 73260/ha were computed under sole crop of bitter goard, sole crop of colocasia and companion cropping system, respectively. The gross return of pure bitter goard, pure colocasia and bitter goard

+ colocasia were calculated by Rs. 306000/ha, Rs. 310000/ha and Rs. 345000/ha in planting of pure bitter goard, pure colocasia and bitter goard + colocasia, respectively. The highest net return of Rs. 271740/ha was found in companion cropping of bitter goard + colocasia, while pure cropping of bitter goard gave net return Rs. 235920/ha. Similarly, pure colocasia gave net return of Rs. 217088/ha. The order of performance of BCR was bitter goard + colocasia (1:4.70) > bitter goard pure (1:4.37) and > colocasia pure (1:3.34). The similar higher BCR have also been reported Singh *et al.* (2021) in the intercropping of garlic + colocasia.

(C) LER and yield advantage:

The higher LER was found in companion cropping of bitter goard and colocasia by 1.12 in comparison to pure cropping of bitter goard and colocasia. Thus, 12% yield advantage was noted under companion cropping of bitter goard and colocasia.

Conclusion and Recommendation

Perusal of results make it clear that companion cropping of bitter goard and colocasia gave higher net return compared to pure cropping of bitter goard and colocasia from river bed cultivation, therefore, the farm families residing in the vicinity of river bank may be suggested for adoption of bitter goard + colocasia companion cropping and harvest the fruits of newly generated technology.

References

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