GAU Res. J. 1998. 23 (2) : 97-99

Short Communications

Crop Diversification for Conservation and Sustainable Production on Marginal Lands of Mahi River in Gujarat

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Marginal lands, which are slopy (2 to 6%) table lands, 6 to 60 m away from gully rim and very sensitive to erosion and extending from about one to six kilometers along the banks of Mahi river, suffer from accelerated erosion because of dominace (more than 80% area) of row crop like Tobacco. Problem of erosion is aggravated when in the *kharif* season fields are left fallow during intense monsoon and before taking of Tabacco crop and tillage and cultural practices are performed along the slope.

To overcome the problem on such lands, a package of conservation agronomic practices (Singh *et al.* 1995) with a diversified cropping system was transferred to the farmers' field under Lab to Land Programme. Castor and Castor based intercropping systems and contour cultivation alongwith conservation agronomic practices were introduced in the area where surface cover is more to reduce the soil erosion, more conservation of rain-water in the soil profile. Farmers' adoption of the various systems were spread over three different years, viz., 1988-89, 1989-90 and 1990-91 at different locations and observations on farmers' cultivation practices were taken regularly. The observations were recorded from plot size of 0.2 ha and the physical input-output data were analysed. Farmers were advocated the recommended doses of fertilizers but they used fertilizer according to their choice, availability and buying capacity. The results were compared on the basis of yield and net returns on per cent basis. The economics of various intercropping systems was worked out at 1995-96 prices. Considering phosphorus application, its fixation and availability in a cropping system over a period, out of the total crop response to phosphate 60 per cent was utilized to the first crop and balanced 40 per cent carried over to the next crop and is reflected in the crop yield (Tondon and Tondon, 1995).

Castor (*Ricinus communis*)) crop is intercropped with legunimous crop like Cowpea (*Vigna unguiculata*), Cluster bean (*Cyamospsis tetragonoloba*) and Sesamum (*Sesamum indicum*). Castor intercropped with above crops have given higher yield of castor than the pure Castor crop without much extra inputs (Table 1). This is due to better utilisation of interspaces and moisture conserved due to lesser runoff and erosion in intercropping

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system as compared to pure crop. There is more moisture intake, absorption and conservation due to lesser soil loss and run off as compared to the sole crop (Prasad *et al.*, 1993). Cowpea is harvested in early stage and hence there may not be much compition with Castor crop. Cluster bean, though, is harvested at later stage but due to fast growth it has competed with base crop, reducing the yield of castor. Sesamum has not suppresed the base crop, Castor and has given higher yield.

When the two intercropping systems are compared, it is observed that almost similar castor equivalent yield and, therefore, net returns are realized. However, it is relevent to note that there is much variation in applied in N and P_2O_5 doses. While Castor + Cowpea (1:2) intercropping system was applied 58 kg and 35 kg per ha of N and P_2O_5, respectively, Castor + Sesamum (1:3) was applied 97 kg and 50 kg per ha of N and P_2O_5, respectively. This may be due to the legume effect enhancing the soil fertility and productivity.

TABLE 1

Performance of castor Intercrops on farmers' field.

Sr. No.	Cropping systems	Fertilizers N-P-K (kg/ha)	Yield (kg/ha)*			Net returns (Rs./ha)	
			Castor Tobacco	Intercrop (green pod/ grain)	Castor equivalent	I	II
1.	Castor pure (7)	49-29-0	701	—	701	4816	4663
2.	Castor + Cowpea (1:2) (8)	58-35-0	822	783	1399	11292	10939
3.	Castor + Cluster bean (1:3) (2)	45-42-0	618	276	807	7210	6839
4.	Castor + Sesamum (1:3) (2)	97-50-0	1028	121	1346	11191	10659
5.	Tobacco i) Improved (42)	174-0-0	2058	—	—	—	10268
	ii) Traditional (14)	139-0-0	1682	—	—	—	7572

*Average of 3 years.

Figures in parentheses indicate number of farmers.

I 60% P benefit credited to first crop and 40% to next crop.,

II 100% P benefit to first crop.

As compared to monocropping system of Tobacco cultivation, Castor + Cowpea (1:2) and Castor + Sesamum (1:3) intercropping systems realized 10 per cent higher net returns as compared with improved system and 49 per cent as compared with traditional system, respectively.

The Castor based systems (Castor + Cowpea and Castor + Sesamum), thus, performed better than the improved Tobacco cultivation on demonstration plots. Since Tobacco is erosion permitting crop and affect the soil productivity and fertility on longer period of crop cultivation specially on slopy lands. Hence traditional monocropping system of Tobacco may be replaced with Castor + Cowpea (1:2) and Castor + Sesamum (1:3) intercropping system on slopy marginal lands of Mahi ravines.

(Received on 16th July, 1996)

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