

Short Communication

Intercropping Studies on Rainfed Castor under North Gujarat Conditions

D.K. Patel, P.G. Patel and M.M. Patel

Fruit Research Station, SD Agricultural University, Dehgam 382 305, India

Castor is grown in tropical, sub-tropical and temperate regions. Castor production in arid and semi-arid areas is characterized with risk and uncertainty due to low and erratic distribution of rainfall leading to frequent droughts. Castor (*Ricinus communis* L.) is remunerative crop under adverse conditions as it utilizes the moisture from deeper layers. Being a long duration, widely spaced crop with comparatively thin plant population in comparison with other field crops, it offers scope to grow short duration crops in the interspaces, which is remunerative under dryland conditions (Singh and Singh, 1988). The present investigation was therefore undertaken to select the best rainy season crops for intercropping with castor during rainy season for increasing net returns and land equivalent ratio.

The field experiment was conducted during the rainy season 2002 on loamy sand soil under dryland conditions at All India Coordinated Research Project for Dryland Agriculture, Dantiwada, North Gujarat. The experiment consisted of 16 treatments, viz., sole crops of castor (GCH-4), green gram (GM-4), cowpea (GC-1), moth bean (Gujarat MO-1), clusterbean (Gujarat clusterbean-1) and sesame (GT-2) and intercropping of all these arable crops with castor in 1:1 and 1:2 row ratios.

Pure crop of castor was grown at 90 x 60 cm spacing while all the intercrops were grown at 45 x 10 cm spacing in 6.0 x 5.4 m gross plots in RBD with 4 replications. Plant population of castor was maintained uniformly in sole and intercrop systems. One row and two rows of all the intercrops were intercropped between two rows of castor in intercropping treatments.

Seed yield and stalk/straw yield from component crops were recorded from net plots converted into castor equivalent seed yields, considering the prevailing prices of produce during the experimental year. Land equivalent ratio was also computed. The net returns were computed from the yield data, prevailing prices of produce and cost of cultivation.

Total rainfall received during the monsoon season of 2002 was 201.9 mm distributed over 15 rainy days. Seed yield of castor was low due to low rainfall coupled with early withdrawal of monsoon. The highest castor seed yield (752 kg ha⁻¹) was obtained in sole crop of castor. Intercropping reduced the castor seed yield. The maximum reduction (40%) in castor yield was recorded when intercropped with moth bean at 1:1 row ratio, conversely, the minimum reduction in castor seed yield was recorded

Table 1. Castor yield, component crop yield, castor equivalent yield and economics as influenced by intercropping system and planting pattern

Crop	Yield kg ha ⁻¹		Castor equivalent yield (kg ha ⁻¹)	Gross income (Rs. ha ⁻¹)	Net income (Rs. ha ⁻¹)	LER
	Sole crop	Intercrop				
Sole castor (GCH-4)	752 (1458)		760	15186	8883	1.0
Sole greengram (GM-4)	—	690 (1360)	896	17920	11926	1.0
Sole cowpea (GC-4)	—	689 (822)	730	14602	8833	1.0
Sole moth bean (GM0-1)	—	443 (1598)	523	10458	4673	1.0
Sole clusterbean (Guj. C-1)	—	415 (875)	459	9175	3448	1.0
Sole sesame (GT-2)	—	683 (1983)	693	13858	8212	1.0
Castor + greengram 1:1	595 (1020)	402 (584)	1112	22234	14864	1.37
Castor + cowpea 1:1	595 (1214)	433 (541)	1060	21222	14067	1.42
Castor + moth bean 1:1	448 (962)	139 (498)	617	12334	5173	0.91
Castor + clusterbean 1:1	570 (1223)	110 (248)	698	13970	6867	1.02
Castor + sesame 1:1	499(955)	263 (757)	771	15411	8389	1.05
Castor + greengram 1:2	576 (1244)	451 (721)	1160	23189	15214	1.41
Castor + cowpea 1:2	625 (1249)	447 (585)	1107	22150	14543	1.48
Castor + moth bean 1:2	460 (929)	135 (486)	623	12479	4829	0.92
Castor + clusterbean 1:2	506 (1092)	192 (430)	726	14499	6973	1.13
Castor + sesame 1:2	480 (911)	310 (852)	799	15976	8529	1.09
S.Em±	67.6	—	70.08	—	1401	0.10
CD at 5%	NS	—	199.7	—	4004	0.28
CV %	18.39	—	17.61	—	20.84	17.44

Sale price Rs. kg⁻¹ of castor: 20, Greengram: 24, Cowpea: 20, Moth bean: 20, Clusterbean: 20, Sesame: 20. (Data in parenthesis indicate stalk/straw yield).

when it was intercropped with cowpea at 1:2 row ratio (1.68%), followed by green gram at 1:1 row ratio (20.8%).

Stalk yield of castor was the lowest under treatment combination castor + sesame (1:2). It was reduced to the tune of 37.5% as compared to sole castor.

Castor + green gram and castor + cowpea intercropping increased the castor equivalent yield compared with castor equivalent yields of the sole crops. The highest castor equivalent seed yield of 1160 kg ha⁻¹ was recorded in castor + green gram (1:2)

intercropping followed by castor + green gram (1:1) and castor + cowpea (1:2). The increase of 52.6% in castor equivalent seed yield was accrued from castor + green gram (1:2) followed by castor + green gram (1:1) (46.3%) and castor + cowpea (1:2) (45.6%) intercropping compared with sole castor. Gupta and Rathore (1993) reported higher castor equivalent yield in castor + green gram intercropping system. Patel *et al.* (1989) found higher castor equivalent yield from castor + cowpea intercropping.

Intercropping of all the crops increased the land equivalent ratio compared with

sole crops. The highest land equivalent ratio (48%) was recorded in the castor + cowpea (1:2) intercropping, followed by castor + cowpea at 1:1 ratio (42%), castor + green gram at 1:2 row ratio (41%) and castor + green gram at 1:2 row ratio (37%).

Similar to the castor equivalent seed yield and land equivalent ratio, the higher net returns were recorded in castor + green gram (1:2) intercropping (Table 1). The increase in net returns in this system were Rs. 6331, 3288, 6381, 10541, 11766 and 7002 ha⁻¹ than in sole crops of castor, green gram, cowpea, moth bean, clusterbean and sesame, respectively. Castor + green gram (1:1) ranked second for net returns with maximum benefit:cost ratio of 3.02. Intercropping system is more remunerative practice than sole cropping was reported by Singh and Sharma (1985), Prasad and Verma (1986), Singh and Singh (1988), Gupta and Rathore (1993) in castor + green gram intercropping system.

It is concluded that intercropping of green gram (1 row in the inter-row space of castor grown at 90 cm spacing) is a highly remunerative and it may be adopted by the farmers.

References

- Gupta, I.N. and Rathore, S.S. 1993. Intercropping in castor (*Ricinus communis* L.) under dryland condition in Rajasthan. *Indian Journal of Agronomy* 38: 182-186.
- Patel, P.G., Patel, I.D., Patel, M.K and Patel, J.V. 1989. Studies on intercropping in castor. *Journal of Oilseeds Research* 6: 113-117.
- Prasad, S.M. and Verma, B. 1986. Effect of intercropping castor with green gram, blackgram sesamum and sorghum on yield and net return. *Indian Journal of Agronomy* 31: 21-25.
- Singh, B.P. and Sharma, H.C. 1985. Yield, total productivity, water use efficiency and returns as affected by intercropping in castor in semi-arid tropics. *Haryana Agriculture University Journal of Research* 15: 29-35.
- Singh, J.P. and Singh, B.P. 1988. Intercropping of mung bean and guar in castor under dryland condition. *Indian Journal of Agronomy* 33: 177-180.