

Economic evaluation of castor-based intercropping systems

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Abstract : Field experiment was carried out at Annamalai University Experimental Farm, Annamalainagar, Tamil Nadu during Feb. - May, 2004 (*rabi*) and June - October, 2004 (*kharif*) to find out the economically viable castor based intercropping system. Intercrops *viz.*; blackgram, greengram, cowpea, sesame and soybean were grown between castor rows. Among the intercropping systems evaluated, castor + blackgram recorded higher castor seed equivalent yield, land equivalent ratio, net return and return rupee⁻¹ invested and it was followed by castor + greengram intercropping system. The least return rupee⁻¹ invested was with castor + sesame intercropping system. The highest Income Equivalent Ratio (IER) with castor + blackgram in both the seasons of study.

Key Words: *Castor, intercropping, economics, IER.*

Introduction

Castor (*Ricinus communis* L.) is an important non-edible oilseed crop and has great industrial and commercial value (Padmavathi and Raghavaiah, 2004). Being a long duration and widely spaced crop, it offers a great scope for using its interspace for growing short duration intercrops (Singh and Singh, 1988). Intercropping is one of the potential cropping systems to use the natural resources more efficiently than a single crop (Srilatha *et al.*, 2001). Intercropping in castor does increase production and net profit per unit area per unit time (Rajput and Mishra, 1995). More information on economic viability of castor based intercropping systems is lacking. Hence, the present study was initiated to assess the economic viability of introducing intercrop in castor.

Materials and Methods

Field experiments were conducted at Annamalai University Experimental Farm, Annamalainagar, Tamil Nadu during Feb. -

May, 2004 (*rabi*) and June - October, 2004 (*kharif*). The type of soil is clay loam, low in available N, medium in available P₂O₅ and high in available K₂O with a pH of 8.1. The experiment consisted of main castor crop and intercrops at their sole population under additive series and the treatments were castor + blackgram (T₁), castor + greengram (T₂), castor + cowpea (T₃), castor + soybean (T₄) castor + sesame (T₅) and castor sole (T₆). The experiment was laid out in Randomized Block Design with four replications. Castor was sown at a spacing of 60 x 30 cm. Two rows of intercrops were sown in between the castor rows adopting a spacing of 10 cm between intercrop plants *viz.*, blackgram, greengram and sesame and 15 cm for cowpea and 5 cm for soybean. A fertilizer dose of 60:40:40 kg N, P₂O₅ and K₂O ha⁻¹ was applied.

Results and Discussion

Growing castor (sole) recorded the highest seed yield of 1129 and 1201 kg ha⁻¹ during *rabi* and *kharif*, respectively (Table 1). It was

Table 1. Seed yield of main crop and intercrops in castor-based intercropping systems (kg ha⁻¹)

Treatments	Castor seed yield		Intercrops yield	
	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>
T ₁ - Castor + blackgram	1009	1064	349	385
T ₂ - Castor + greengram	984	1052	339	350
T ₃ - Castor + cowpea	930	980	323	335
T ₄ - Castor + soybean	875	888	226	280
T ₅ - Castor + sesame	804	804	224	249
T ₆ - Castor sole	1129	1201	4000	4010
SEd	24.29	26.43	--	--
CD (p=0.05)	49.88	55.93	NA	NA

NA - Statistically not analysed

Table 2. Effect of different castor - based intercropping systems on castor equivalent yield (kg ha⁻¹) and land equivalent ratio

Treatments	Castor equivalent yield		Land equivalent ratio	
	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>
T ₁ - Castor + blackgram	1429	1526	1.74	1.75
T ₂ - Castor + greengram	1346	1425	1.71	1.72
T ₃ - Castor + cowpea	1329	1398	1.64	1.65
T ₄ - Castor + soybean	1182	1224	1.54	1.55
T ₅ - Castor + sesame	1177	1220	1.30	1.31
T ₆ - Castor sole	1129	1201	1.00	1.00

followed by castor + blackgram intercropping. The least seed yield of 804 kg ha⁻¹ was recorded under castor + soybean intercropping system during both the seasons.

As far as intercropping systems are concerned, castor + blackgram intercropping was the most potential system. It provided higher castor seed equivalent yield of 1429

Table 3. Effect of different castor-based intercropping systems on income equivalent ratio and economics

Treatments	Economics (Rs. ha ⁻¹)									
	Total cost of cultivation		Gross return		Net return		Return rupee ⁻¹ invested		Income equivalent ratio	
	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif
T ₁ - Castor + blackgram	11809	11809	22655	24127	10846	12317	1.91	2.04	1.74	1.75
T ₂ - Castor + greengram	11779	11779	21660	22855	9880	11076	1.83	1.93	1.71	1.72
T ₃ - Castor + cowpea	11759	11759	21486	22644	9727	10885	1.82	1.92	1.64	1.65
T ₄ - Castor + soybean	11263	11263	19171	19901	7907	8638	1.70	1.76	1.54	1.55
T ₅ - Castor + sesame	11163	11163	18827	19470	7664	8307	1.68	1.74	1.30	1.31
T ₆ - Castor sole	10255	10255	17935	19470	7680	8755	1.74	1.85	-	-

and 1526 kg ha⁻¹ during *Rabi* and *Kharif*, respectively (Table 2). The highest castor seed equivalent yield with castor + blackgram might be due to higher intercrop yield obtained with little reduction in main crop yield and higher additional gross returns from intercrop produce. Similar findings of higher crop equivalent values were recorded by Padmavathi and Raghavaiah (2004).

Intercropping increased the yield advantage over its pure stand. The highest LER of 1.74 and 1.75 were recorded in castor + blackgram intercropping system and it was followed by castor + green gram. The lowest LER of 1.30 and 1.31 were recorded under castor + sesame treatment during *rabi* and *kharif*, respectively.

Among the different intercropping systems, castor + blackgram recorded higher net return of Rs.10,846 and Rs.12,317 and return rupee⁻¹ invested of Rs. 1.91 and 2.04 during *rabi* and *kharif*, respectively followed by castor + greengram (Table 3). In both the seasons, the least return rupee⁻¹ invested of Rs. 1.68 and 1.74 was obtained under castor + sesame intercropping. Similar findings with increased gross income, net income and return rupee⁻¹ invested were reported by Prasad and Balvir Verma (1986), Subba Reddy and Venkateswarlu (1989) for castor + blackgram intercropping system.

The highest IER of 1.74 and 1.75 was recorded in castor + blackgram intercropping system, followed by castor + greengram intercropping system. The lowest IER of 1.30 and 1.31 was observed with castor + sesame intercropping system.

Based on the above results, it was concluded that when compared to sole cropping of castor, intercropping of blackgram in castor was found to be highly remunerative to farmers.

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