



## **Effect of Primary and Secondary Nutrient for Augmenting The Productivity Of Castor + Blackgram Intercropping System**

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### **ABSTRACT**

Field investigations were carried out at Annamalai University Experimental Farm, Department of Agronomy, Annamalainagar to study the nutrient management practices for augmenting the productivity of castor + blackgram intercropping system. The experiment was laid out in Randomized Block Design with three replications. There were twelve treatments consist of different levels of recommended dose of NPK viz., 100%, 125%, 150% and 75% with and without Sulphur application at two levels like 20 kg ha<sup>-1</sup> and 30 kg ha<sup>-1</sup>. The results of the present study clearly concluded that application of 125 per cent of recommended dose of NPK with 30kg S ha<sup>-1</sup> through gypsum will favourably improve the seed yield, yield equivalent and net return of castor + blackgram intercropping system.

**Keywords:** castor + blackgram intercropping system, seed yield, yield equivalent and net return

### **INTRODUCTION**

India, is blessed with an array of agro-ecological condition that favourable for raising oilseed crops. India holds a premier position in global oilseed scenario accounting for 19 per cent area and 9 per cent of total oilseed production. However, the productivity of oilseeds is only 935 kg ha<sup>-1</sup> as against world's average of 1632 kg ha<sup>-1</sup> (Hegde, 2000). Castor is one of the ancient oilseed crop of the world. It is the most important non-edible and industrially used oilseed crop which brings sizeable amount of foreign exchange to the country (Tiwari, 1994). From a meager 2.00 lakh tonnes in nearly 80's, the castor production has increased to 8.01 lakh tonnes in twentieth century, with foreign earning of Rs. 1100 crores through export of nearly 2.48 lakh tonnes of castor oil and its derivatives (Damodharan and Hegde, 2005). In Tamil Nadu, the castor crop is grown in an area of 38.9 thousand hectares, with a production of 12.7 thousand tonnes with an average yield of 326 kg ha<sup>-1</sup> (Damodharan and Hegde, 2002). Intercropping is being looked as an efficient and most economical production system as it not only increases production per unit area and time but also improves resource use efficiency and economic standard of the growers. Castor is a long duration and widely spaced crop and there is good possibility of growing intercrops to harness the potentiality of natural resources for increasing production and net profit. Intercropping blackgram in castor is found to be more remunerative and effective in utilizing the resources (Malarvizhi, 2005). Information's regarding manuring the castor based intercropping system is lacking and there is an imperative need to develop an appropriate nutrient management practices for castor + blackgram intercropping system. Hence, the present study was carried out at Annamalai University Experimental Farm, to fix an optimum level of N, P, K and S levels on yield, yield equivalent and economics of castor + blackgram intercropping.

### **MATERIALS AND METHODS**

Field experiments were conducted at Annamalai University Experimental Farm, Annamalai Nagar, Tamil Nadu to find out the suitable nutrient management for castor + blackgram intercropping system. The soil of the experimental site was clay loam having pH 7.6 E.C 0.4 dSm<sup>-1</sup>, low in available nitrogen (236.01 kg ha<sup>-1</sup>), medium in available phosphorus (20.51 kg ha<sup>-1</sup>) and high in available potassium (338.56 kg ha<sup>-1</sup>). The experiment was laid out in Randomized Block Design (RBD) with three replications. The treatment consisted of four levels of primary nutrients (NPK) with and without two levels of secondary nutrient S. viz., T<sub>1</sub> - 100 per cent recommended dose of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O (RDF 30:15:15 kg ha<sup>-1</sup>), T<sub>2</sub> - 125 per cent RDF NPK (37.50:18.75:18.75 kg ha<sup>-1</sup>), T<sub>3</sub> - 150 per cent RDF NPK (45: 22.50: 22.50 kg ha<sup>-1</sup>), T<sub>4</sub> - 75 per

cent RDF NPK (22.50: 11.25: 11.25 kg ha<sup>-1</sup>), T<sub>5</sub>- 100 per cent RDF NPK + 20 kg S, T<sub>6</sub> - 125 per cent RDF NPK + 20 kg S, T<sub>7</sub> - 150 per cent RDF NPK + 20 kg S, T<sub>8</sub> - 75 per cent RDF NPK + 20 kg S, T<sub>9</sub> - 100 per cent RDF NPK + 30 kg S, T<sub>10</sub> - 125 per cent RDF NPK + 30 kg S, T<sub>11</sub>- 150 per cent RDF NPK + 30 kg S, T<sub>12</sub> - 75 per cent RDF NPK + 30 kg S. The castor seeds were sown in rows at 60 cm apart with a plant to plant spacing of 30 cm and covered with soil. One row of blackgram was sown in between the castor rows adopting a spacing of 10 cm between blackgram plants in each row.

## RESULTS AND DISCUSSIONS

The data on castor + blackgram yield and castor yield equivalent are presented in Table 1. The highest castor seed yield equivalent was obtained with combined application of 150 per cent RDF NPK and 30 Kg S kg ha<sup>-1</sup> (T<sub>11</sub>) in both the crops. Significantly higher castor seed yield of 1206 and 1225 kg ha<sup>-1</sup> and blackgram seed yield of 424 and 432 kg ha<sup>-1</sup> in summer and kharif seasons, respectively were recorded in the above treatment compared to control (T<sub>1</sub>-100 per cent RDF NPK kg ha<sup>-1</sup>). However, the treatment T<sub>11</sub> was on par with 125 per cent RDF NPK with 30 kg S ha<sup>-1</sup>(T<sub>10</sub>). Increased seed yield might be due to enhanced rate of photosynthesis and carbohydrate metabolism as influenced by S application through gypsum. Castor is a deep – rooted crop having tolerance to moisture stress, wider spacing and produce higher yield coupled with higher market price which ultimately leads to higher castor yield equivalent. This might be due to maximum yield obtained with litter reduction in main crop yield and higher price of inter crop produce. Similar findings of higher castor yield equivalent values were reported by Padmavathi and Raghavaiah (2004).

The economics of castor + blackgram intercropping system is presented in Table 2. Among the treatments, the application of 125 per cent RDF NPK + 30 kg S (T<sub>10</sub>) recorded the higher net return (Rs.18, 539 ha<sup>-1</sup>) and (Rs.18, 988 ha<sup>-1</sup>) and B:C ratio (2.47) and (2.50) during summer and kharif 2006, respectively. Highest net return and B:C ratio with (T<sub>10</sub>) might be due to low amount of NPK nutrients compared to T<sub>11</sub> treatment and almost similar growth attributes, yield attributes and yield with T<sub>11</sub>. Therefore it is suggested that application of 125 per cent RDF NPK and 30 kg S ha<sup>-1</sup> was found to be effective for castor + Blackgram intercropping system.

**Table 1. Effect of N, P, K and S levels on seed yield of castor and yield equivalent of castor + blackgram intercropping system**

Treatments	Castor seed yield (Kg ha <sup>-1</sup> )		Blackgram seed yield (kg ha <sup>-1</sup> )		Castor yield equivalent (Kg ha <sup>-1</sup> )	
	Summer	Kharif	Summer	Kharif	Summer	Kharif
T <sub>1</sub>	810	821	228	232	456	464
T <sub>2</sub>	861	872	253	258	506	516
T <sub>3</sub>	870	881	260	263	520	526
T <sub>4</sub>	750	762	202	205	404	410
T <sub>5</sub>	976	991	311	317	622	634
T <sub>6</sub>	1027	1045	338	342	676	684
T <sub>7</sub>	1034	1051	344	347	688	694
T <sub>8</sub>	920	934	283	288	566	576
T <sub>9</sub>	1148	1165	394	400	788	800
T <sub>10</sub>	1197	1217	419	425	838	850
T <sub>11</sub>	1206	1225	424	432	848	864
T <sub>12</sub>	1083	1101	367	372	734	744
SE <sub>D</sub>	21.87	22.92	10.14	11.18	25.90	27.03
CD (p = 0.05)	45.35	47.54	21.04	23.18	53.70	56.08

**Table 2. Effect of N, P, K and S levels on the economics of castor + blackgram intercropping system\***

Treatments	Total cost of cultivation (Rs.ha <sup>-1</sup> )	Economics (Rs ha <sup>-1</sup> )					
		Summer			Kharif		
		Gross return (Rs.ha <sup>-1</sup> )	Net return (Rs.ha <sup>-1</sup> )	B: C ratio	Gross return (Rs.ha <sup>-1</sup> )	Net return (Rs.ha <sup>-1</sup> )	B: C ratio
T <sub>1</sub>	12201	19273	7072	1.57	19562	7361	1.60
T <sub>2</sub>	12393	20807	8414	1.67	21127	8734	1.70
T <sub>3</sub>	12585	21154	8569	1.68	21145	8830	1.70
T <sub>4</sub>	12008	17573	5565	1.46	17830	5822	1.48
T <sub>5</sub>	12333	24314	11891	1.97	24726	12393	2.00

T <sub>6</sub>	12526	25910	13384	2.06	26307	13781	2.10
T <sub>7</sub>	12718	26197	13479	2.05	26549	14408	2.08
T <sub>8</sub>	12141	22613	10472	1.86	22980	10839	1.89
T <sub>9</sub>	12401	29447	17046	2.37	29890	17489	2.41
T <sub>10</sub>	12593	31132	18539	2.47	31441	18988	2.50
T <sub>11</sub>	12785	31240	18455	2.44	31773	18848	2.48
T <sub>12</sub>	12640	27640	15432	2.26	28068	15860	2.30

\*Data statistically not analysed

### CONCLUSION

Based on the above results, it can be concluded that application of 125 per cent RDF NPK (37.50: 18.75: 18.57) along with 30 kg S ha<sup>-1</sup> through gypsum @ 200 kg ha<sup>-1</sup> will favourably improve the seed yield, yield equivalent and net return of castor + blackgram intercropping system

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