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Influence of Legume Intercropping on Yield of Castor

Keywords : *Castor equivalent yield, Intercropping and Legumes*

A field experiment was carried out to study the effect of intercropping legumes in castor on clay soil in agricultural college farm - Bapatla during *kharif* 2019. The trial was laid out in RBD with four replications. Legumes studied were soybean, cowpea, blackgram and greengram in 1:2 ratio with castor. Results indicated that intercropping of castor with greengram resulted in higher castor equivalent yield which was comparable with castor + blackgram. Legumes when grown as sole crops recorded more yield than when intercropped.

Intercropping refers to growing of two or more crops simultaneously on the same field with definite row arrangement. The most common goal of intercropping is to produce a greater yield on a given piece of land by making use of resources or ecological processes that would otherwise not be utilized by a single crop. Recent evidence suggests that there are substantial advantages of legumes intercropping, which are achieved not by means of costly inputs but by the simple expedient of growing crops together in an appropriate geometry. Intercropping of castor with different legumes are the most dominant intercropping system of castor growing regions of India (Kumawat *et al.*, 2016). The intercropping of castor with suitable crops has been found to be beneficial in fetching higher monetary returns. Intercropping crops with varied growth habit, root system and canopy adoption can be easily tried with least competition to castor. Choice of intercrops can vary depending on the ecological conditions, land holding size and marketing possibilities (Brintha and Seran, 2009).

Castor being a long duration crop with slow initial growth favours for intercropping with legumes. These legumes provide stability in production and also provide pulses for consumption. In Andhra Pradesh, castor is an important dryland crop for marginal and resource poor farmers. As a sole crop, it is less remunerative and hence fails to provide adequate economic security to the growers and also fails to meet the varied demands of farm family. In order to provide adequate economic security to farmers, intercropping in castor would be a viable option. In Krishna agro climatic zone of AP, intercropping in castor is not common. Hence, the present experiment was conducted to study the legume intercopping effect in castor.

A field experiment was conducted at Agricultural College Farm, Bapatla during *kharif* 2019 under rainfed conditions in randomized block design with nine treatments and replicated four times. The treatments comprised of T_1**:** Sole castor, T_2**:** Castor + Soybean (1:2), T_3**:** Castor + Cowpea (1:2), T_4**:** Castor + Blackgram (1:2), T_5**:** Castor + Greengram (1:2), T_6**:** Sole Soybean, T_7**:** Sole Cowpea, T_8**:** Sole Blackgram, T_9**:** Sole Greengram. The soil was clay, slightly alkaline in soil reaction, low in available nitrogen and medium in organic carbon and high in available phosphorus and medium in available potassium. The main crop castor was sown at 90 cm × 60 cm and intercrops were sown in two rows in between the lines of castor. Recommended dose of 60:40:30 NPK kg ha^{-1} was applied in the form of Urea, SSP and MOP, respectively to Castor.

Table 1. Castor bean yield, intercrop yield and castor equivalent yield as influenced by different intercrops (kg ha^{-1})

Treatments	Castor bean yield (kg ha^{-1})	Intercrop yield (kg ha^{-1})	Castor equivalent yield (kg ha^{-1})
Sole castor	2454	0	2455
Castor + Soyabean	2108	677	2659
Castor + Cowpea	2276	609	2905
Castor + Blackgram	2179	666	3140
Castor + Greengram	2218	631	3157
Sole Soyabean	0	1255	1021
Sole Cowpea	0	1198	1237
Sole Blackgram	0	1254	1807
Sole Greengram	0	1228	1827
SE m ±	67.58		73.57
CD (P= 0.0 5)	197		214
CV %	6		6.6

Entire dose of phosphorus and potassium were applied basally. In castor, nitrogen was applied in two splits at 30-35 and 60-65 DAS by pocketing method. The recommended dose of 20:50 NP kg ha^{-1} were applied for Greengram, Blackgram and Cowpea as basal. For soyabean, 30:60:40 NPK kg ha^{-1} was applied at the time of sowing as basal dose. Castor hybrid was PCH-111, and the legumes were soybean (JS – 335), cowpea (Gomati), blackgram (LBG – 787) and greengram (LGG - 460). A total of 703.2 mm rainfall was received in 28 rainy days during the crop growth period. Castor equivalent yield was calculated by converting the seed yield of legume intercrops into castor bean equivalent yield on the basis of selling prices in markets. The data was analyzed by following the analysis of variance (ANOVA) for randomized block design with factorial concept as suggested by Panse and Sukhatme (1985).

Castor bean yield (kg ha^{-1}) :

Castor bean yield was significantly highest with sole castor (2454 kg ha^{-1}) compared to castor + soybean (2108 kg ha^{-1}) and was comparable with other intercrops studied. Castor bean yield decreased by 7.8, 10.6 and 12.6 percent with castor + cowpea, castor + greengram and castor + blackgram (1:2), respectively compared to sole castor (Table 1).

Among the intercrops, total castor bean yield recorded was maximum with castor + cowpea (1:2) and it remained comparable with other legumes tested as intercrops with castor.

Maximum bean yield of castor may be due to production of increase in various yield attributes viz., length of spike, number of capsules spike^{-1}, weight of spike and effective translocation of photosynthates from source to sink resulting in maximum yield. It may also be due to less competition for various nutrients and moisture in sole cropping than intercropping. Intercropping of castor + cowpea recorded the maximum castor bean yield which might be due to high nitrogen fixing capacity of the legumes, maximum ground coverage and These results corroborate the findings of Mudalagiriyappa *et al* ., (2011) and Veghasia *et al* .,(2016).

Castor equivalent yield (kg ha^{-1})

The crop equivalent yield is the indicator for testing the sustainability of intercrops in a system. Therefore, the seed yield of intercrops were converted into equivalent yields of castor using the market prices of the respective crops (Table 1).

Economic yield potential was known by the equivalent yield of that particular intercropping system. Highest castor equivalent yield was obtained with castor + greengram (1:2) intercropping system (3157 kg ha^{-1}) which was on par with castor + blackgram (1:2) (3140 kg ha^{-1}) and significantly superior over the treatments castor+ cowpea (2905 kg ha^{-1}), castor + soybean (1:2) (2659 kg ha^{-1}) and sole castor (2455 kg ha^{-1}). Among sole crops also castor equivalent yield was highest with sole greengram which was significantly superior to sole soybean, and sole cowpea.

The higher castor equivalent yield was due to good yields and better prices of greengram intercrop and lesser reduction in castor yield. Castor equivalent yield was increased by 8.3, 18.3, 27.9 and 28.5 per cent by growing soybean, cowpea, blackgram, greengram as intercrops, respectively as compared to sole castor.

CONCLUSION

It can be concluded that though sole castor recorded highest bean yield, castor equivalent yield was higher in castor + greengram followed by castor + blackgram under rainfed conditions of Krishna agroclimatic zone.

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