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Original Research Article

Effect of Fertilizer Levels on Growth and Yield of Castor Hybrids in Central Dry Zone of Karnataka, India

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Keywords

Castor hybrid, Fertilizer levels, Total dry matter and seed yield

A B S T R A C T

A field experiment was conducted during *Kharif* 2017-18 at Zonal Agricultural Research Station, Babbur Farm, Hiriyur, UAHS, Shivamogga. The trial was laid out in RCBD with factorial concept with three hybrids (DCH- 177, DCH- 519 and HCH- 6) consisting of three fertilizer levels (100 % RDF, 125 % RDF, 150 % RDF, respectively). Seed yield differed significantly due to hybrids, among different hybrids DCH- 177 recorded significantly higher yield (1642.33 kg ha^{-1}) over other hybrids DCH- 519 and HCH- 6 (1302.44 kg ha^{-1} and 1093.11 kg ha^{-1} respectively). Among fertilizer levels 150 percent RDF recorded significantly higher numbers of branches, total dry matter production, stalk yield and seed yield (9.74, 113.18 g, 4224.56 kg ha^{-1} and 1515.89 kg ha^{-1}, respectively) as compared to other fertilizer levels. None of the interaction effects of hybrids and fertilizer levels were found to be significant. Application of 150 percent RDF along with growing of DCH- 177 recorded higher numbers of branches, total dry matter production seed yield (11.22, 133.06 g, and 1837.67 kg ha^{-1}, respectively) as compared to other interactions.

Introduction

Among oilseeds, castor (*Ricinus communis* L.) is the most prehistoric non-edible industrial crops of India belonging to family Euphorbiaceae grown under tropical, sub-tropical and temperate regions. Its cultivation is spread over thirty countries of the world. India, Mozambique, China, Brazil, Angola, Phillippines and Thailand are the leading countries and producing nearly 85 percent of the total castor production of the world. India occupies a premier position in the area, production and productivity. The castor was grown an area of 11.48 lakh ha with a production 18.24 lakh tonnes and productivity of 1666 kg/ha. The castor oil export decreased from 4.72 lakh tonnes in 2013-14 to 4.59 lakh tonnes in 2014-15. Domestic consumption is expected about 1.70 lakh tonnes in 2014-15. As a consequence, the area might be increased for increasing production under use of different genotypes with different fertilizer levels, since the existing castor crop is cultivated as a border crop or bund or catch crop. Thus, there is a scope for horizontal expansion of cultivable area and production cannot be achieved through area expansion, but only through adopting proper agronomic management practices.

It is most important oilseed crop of India because its oil has diversified uses and has great value in the foreign trade. Unfortunately, in India, castor along with other oilseed crops are raised under limited resources condition which leaving the crop thirsty and hungry by the resource-poor farmers. However, castor is long duration, widely spaced crop with comparatively thin plant population as compared to other oil seed crops, provide ample scope for nutrient management practices to enhance the growth and yield of hybrid castor, although it's one of the major crop grown in the central zone of Karnataka, become the castor cultivating tracts inherently blessed with meager amount of rainfall coupled with poor soil resources base, where rest of crops not be grown economically under such situations castor being is one of the promising option for the poor and marginal farmers. However, the productivity experienced by the farmers of this region is significantly lower. Thus the selection of potent hybrid and optimum fertilization plays a most important role and hence with that intension field experiment was planned for two consecutive years to transfer the growing technique for higher productivity of castor in the study area in a nutshell.

Materials and Methods

The experiment was conducted during *Kharif* season of 2017-18 Zonal Agricultural Research Station, Babbur Farm, Hiriyur, UAHS, Shivamogga. The experimental site showed medium black, slightly alkaline in pH (8.05), low in organic carbon (0.14%), medium in available nitrogen (274 N ha^{-1}), low in available phosphorus (41 Kg P_2O_5 ha^{-1}) and high available potassium (317 Kg K_2O ha^{-1}). An experiment consists of 9 treatments and as follows: T_1: DCH-177+100 % RDF, T_2:DCH-177+125 % RDF, T_3: DCH-177+150 % RDF, T_4: DCH-519+100 % RDF, T_5: DCH-519+125 % RDF, T_6: DCH-519+150 % RDF, T_7: HCH-6+100 % RDF, T_8 - HCH-6+125 % RDF and T_9 - HCH-6+150 % RDF. The experiment trial was laid out in a factorial Randomized Block Design (RBD) with three replications, plot size of 7.2 X 4.8 m and seeds of castor hybrids DCH-177, DCH-519 and HCH-6 were dibbled in the second fortnight of June with spacing of 90 cm (between rows)x 60 cm (plant to plant). The crop harvested in three pickings manually based on the physiological maturity of the capsule, five representative plants were collected randomly to assess the parameters *viz.*, the number of branches, total dry matter, seed yield and stalk yield were collected at harvest. The data was analyzed. For the test of significance the following procedure Gomez and Gomez, 1984. The results have been discussed at the probability level of 5 percent.

Results and Discussion

The data pertaining to the number of branches, total dry matter, yield attributes like seed yield and stalk yield of castor as influenced by fertilizer levels are presented in Table 1.

Seed yield differed significantly, among different hybrids DCH-177 recorded substantially higher castor yield (1642.33 kg ha^{-1}) over other hybrids DCH- 519 and HCH-6 (1302.44 kg ha^{-1} and 1093.11 kg ha^{-1} respectively).

Among fertilizer levels percent RDF recorded significantly higher number of branches, total dry matter production, stalk yield and seed yield (9.74, 113.18 g, 4224.56 kg ha^{-1} and 1515.89 kg ha^{-1}, respectively) as compared to other fertilizer levels.

Table.1 Number of branches, TDM, stalk and seed yield of castor as influenced by hybrids and fertilizer levels

Treatments	Number of branches	TDM (g/ plant)	Stalk yield (kg ha^{-1})	Seed yield (kg ha^{-1})
Hybrids (S)				
H_1: DCH - 177	10.23	123.64	4102.78	1642.33
H_2: DCH - 519	8.46	114.16	3926.11	1302.44
H_3: HCH - 6	7.52	79.62	2756.89	1093.11
S. Em. ±	0.20	3.24	99.66	48.99
C. D. (p=0.05)	0.58	9.71	298.78	146.87
Fertilizer (N)				
F_1	7.81	102.62	3001.56	1059.56
F_2	8.66	104.79	3559.67	1462.44
F_3	9.74	113.18	4224.56	1515.89
S. Em. ±	0.20	3.24	99.66	48.99
C. D. (p=0.05)	0.58	9.71	298.78	146.87
Interactions (H XF)				
H_1F_1	9.33	108.19	3692.33	1294.00
H_1F_2	10.15	129.67	4105.67	1795.33
H_1F_3	11.22	133.06	4510.33	1837.67
H_2F_1	7.33	102.95	3049.00	982.67
H_2F_2	8.28	116.64	3816.67	1340.00
H_2F_3	9.77	122.90	4912.67	1584.67
H_3F_1	6.77	71.86	2263.33	902.00
H_3F_2	7.55	80.02	2756.67	1125.33
H_3F_3	8.24	86.98	3250.67	1252.00
S. Em. ±	0.34	5.61	172.61	84.85
C. D. (p=0.05)	1.01	16.82	517.49	254.39

F_1: 100 % RDF (38:38:25 Kg/ha),
F_2: 125 % RDF (47.5:47.5:31.25 Kg/ha),
F3:150 % RDF (57:57:37.5 Kg/ha),

RDF: Recommended dose of fertilizer
TDM: Total dry matter

Fig.1 Total dry matter and number of branches of castor as influenced by hybrids and fertilizer levels

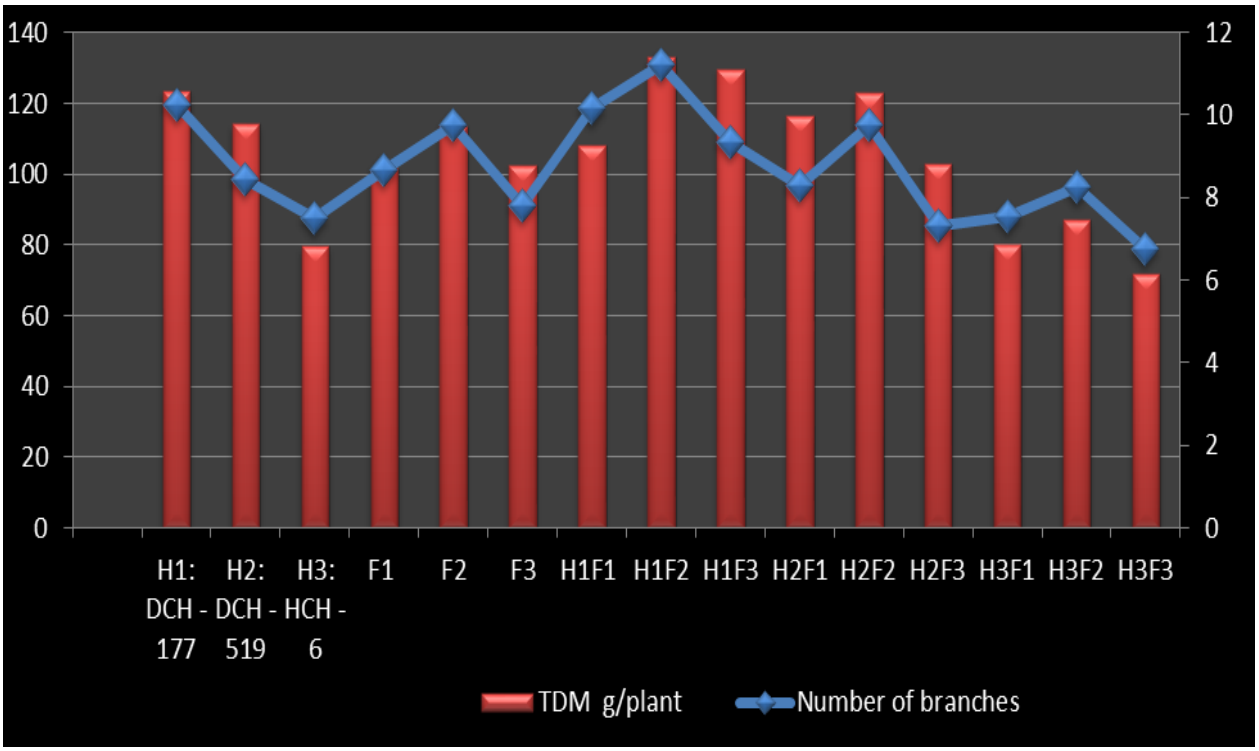

Fig.2 Seed yield and stalk yield of castor as influenced by hybrids and fertilizer levels

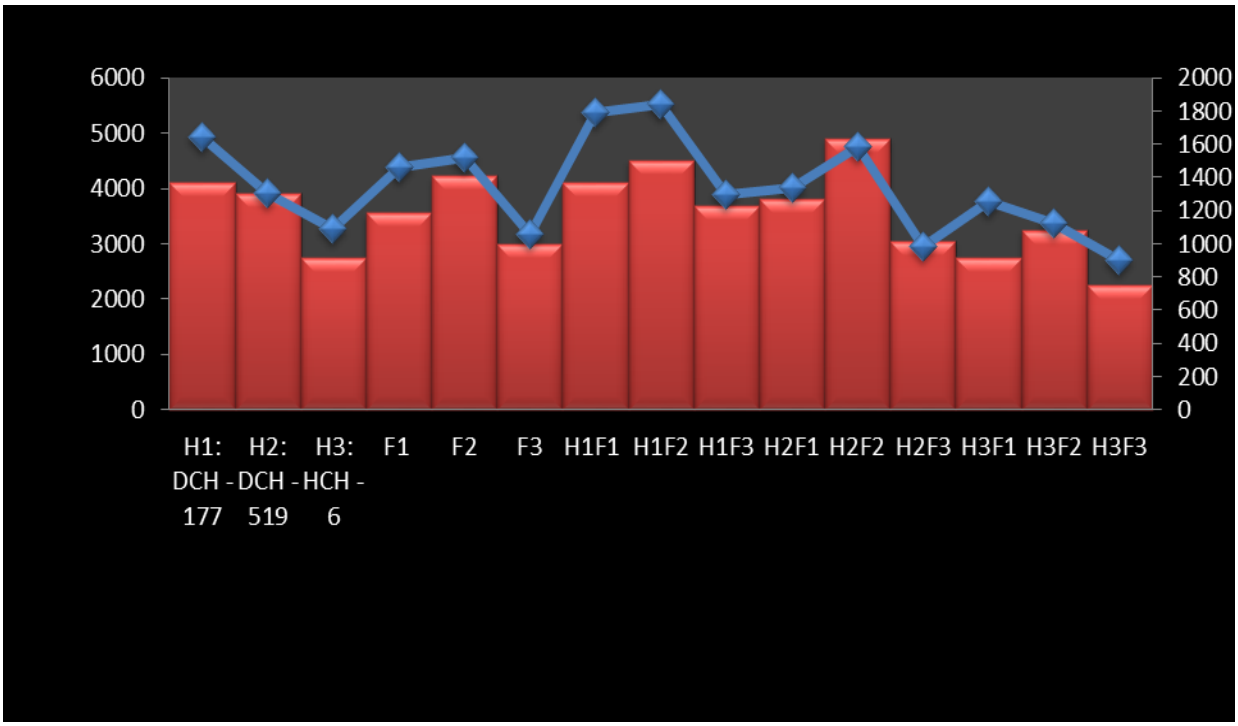

Plate 1: T_2: DCH-177+125 % RDF

Plate 2: T_5: DCH-519+125 % RDF

Plate 3: T_8: HCH-6+125 % RDF

Plate 4: General view of the experimental plot

None of the interaction effects of hybrids and fertilizer levels were significant, whereas, growing of DCH- 177 along with an application of 125 percent RDF recorded higher stalk yield and seed yield (11.22, 133.06 g, and 1837.67 kg ha^{-1}, respectively) as compared to other interactions. This increased growth due to increased levels of N and P might have resulted in more root proliferation and vigorous seedling growth, which in turn was used for higher uptake of moisture and nutrients from soil reservoir. These findings are in closely related with those Sudha Rani (2001) and Sarada Devi *et al.*, (2002) of Hussaini *et al.*, (2002) and Suryavanshi *et al.*, (2008). Significantly higher seed yield and stalk yield was observed in H_1F_1 as compared to the rest of the treatments might be due to better availability of the nutrients and better uptake of nutrients which aided in better growth parameters, yield attributes and ultimately

higher seed and stalk yields. Similar results were also reported by DOR (1994), Kathle *et al.,* (2008) and Shirisha *et al.,* (2010).

Based on the experimental results, it can be concluded that, among the hybrids, growing of DCH- 177 recorded the significantly higher seed yield (1642.33 kg ha^{-1}) and stalk yield (4102.78 kg ha^{-1}) followed by DCH-519. Among the fertilizer levels, growing of DCH- 177 with the application of 125 percent RDF resulted in higher growth and yield (1837.67 kg ha^{-1}).

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