



## Growth and Yield of Hybrid Castor (*Ricinus communis* L.) under Different Spacing during *Rabi* Season in Tamil Nadu

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A field experiment was conducted at Tapioca and Castor Research Station, Yethapur, Salem district, Tamil Nadu during the year 2012 – 2014. The following treatments were imposed and replicated thrice in split plot design. In main plot, different hybrids viz., YRCH 1 (M<sub>1</sub>), GCH 4 (M<sub>2</sub>), DCH 519 (M<sub>3</sub>) and DCH 177 (M<sub>4</sub>) and in sub plot, different spacing viz., 90 x 90 cm (S<sub>1</sub>), 120 x 90 cm (S<sub>2</sub>) and 120 x 120 cm (S<sub>3</sub>) were evaluated during *rabi* season under irrigated condition. The results revealed that, castor crop grown well during *Rabi* season under irrigated condition. It is mainly due to the reason that, in *Rabi* sown crop there is no incidence of Botrytis gray mold disease and also cool dry season promotes seed setting in castor which results higher seed yield was obtained. Hybrids performed better in wider spacing because, they produce more number of spikes and effective spike length in castor. This is mainly due to in wider spacing, there is lesser competition between the plants. In the nutshell, hybrid YRCH 1 with a spacing of 120 x 120 cm recorded 19 per cent higher seed yield (2572 kg ha<sup>-1</sup>) than closer spacing of 90 x 90 cm (2157 kg ha<sup>-1</sup>) under irrigated condition.

**Key words:** Castor Hybrid, YRCH 1, Spacing, Season, Seed Yield

Castor (*Ricinus communis* L) is important non-edible oilseed crop of India, having immense industrial and commercial value. India is the world leader in castor production followed by China and Brazil. India accounts for 59 % of global castor area and 81 % of world castor production and ranks first in area and production in the world. India meets more than 80 % of world's requirement of castor oil and its derivatives. India dominates the international castor oil trade and earned foreign exchange to the tune of ₹ 3000 crores through export of castor oil and its derivatives (Pathak, 2009). In India, the major castor growing states are Gujarat and Andhra Pradesh followed by Rajasthan and Tamil Nadu. In Gujarat and Rajasthan castor is cultivated under irrigated ecosystem with proper input management and high yield is realized. Whereas, in Andhra Pradesh and Tamil Nadu, castor is being cultivated mainly during *Kharif* season. In Tamil Nadu, the normal sowing time of *Kharif* castor is June - July. However, hybrid castor as pure crop planted during June - July, comes to peak flowering during North East monsoon period i.e., during October – November. The cloudy weather coupled with heavy spell of rain pre disposes the crop to the devastating disease botrytis grey mold and other pests like defoliators and capsule borer. This in turn drastically reduces the yield of castor hybrid planted during June - July. Botrytis grey mold affects the castor yield up to 80 % (Hegde, 2008).

In Gujarat and Rajasthan due to the absence of the North East monsoon, flowering period of *Kharif* planted castor is free from cloudy weather and rainfall

and hence no Botrytis grey mold disease incidence is recorded. Hence, they are realizing higher yield. Whereas, in Tamil Nadu and Andhra Pradesh, Botrytis gray mold is a recurring threat for *Kharif* castor and it severely affects the yield. The only way to escape the Botrytis grey mold disease is to go for *Rabi* castor cultivation, which comes to flowering during cool dry period after the North East monsoon and free from dreaded disease of Botrytis grey mold.

The potential castor growing districts in Tamil Nadu are Salem, Namakkal, Erode and Perambalur districts. Different hybrids will be subjected to evaluation in *Rabi* season. Based on the growth performance and yield obtained from each hybrid, the best hybrid will be identified for promotion of *Rabi* castor cultivation in Tamil Nadu. Castor exhibits considerable plasticity to spacing variation (Venkattakumar *et al.*, 2012). It has profound compensatory mechanism for loss of plant stand through putting forth more branches. With these objectives, this study was proposed to study the performance of hybrids with different spacing under irrigated condition during *Rabi* season.

### Material and Methods

A field experiment was conducted at Tapioca and Castor Research Station, Yethapur (11° 35' N latitude, 78° 29' E longitude and at an altitude of 282 m above MSL), Salem district, Tamil Nadu during the year 2012 – 2014. The experimental soil was red loamy soil with a pH of 7.18 and it was low in organic carbon (0.29%), medium in available N (195 kg ha<sup>-1</sup>), low in available P (11 kg ha<sup>-1</sup>) and high in available K (346 kg ha<sup>-1</sup>). The field trial was laid out in split plot

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design with three replications. The gross plot size for individual treatment is 7.2 x 7.2 m. In main plot, different hybrids viz., YRCH 1 ( $M_1$ ), GCH 4 ( $M_2$ ), DCH 519 ( $M_3$ ), and DCH 177 ( $M_4$ ) and in sub plot, different spacing viz., 90 x 90 cm ( $S_1$ ), 120 x 90 cm ( $S_2$ ) and 120 x 120 cm ( $S_3$ ) were imposed under irrigated condition during *rabi* season. Recommended dose of fertilizer was applied for hybrid castor as 60:30:30 kg N:  $P_2O_5$ :  $K_2O$  /ha, respectively. Rainfall received during the cropping period is 484 mm and 438 mm and mean average temperature is 36<sup>o</sup> C and 36.5<sup>o</sup> C during 2012 and 2013, respectively. All the recorded data were analysed statistically as per the method suggested by Gomez and Gomez (1984).

**Table 1. Growth parameters of hybrid castor under different spacing during *Rabi* season**

Treatments	Plant height (cm)					Effective primary spike length (cm)				
	Hybrids					Hybrids				
Spacing	YRCH 1 ( $M_1$ )	GCH 4 ( $M_2$ )	DCH 519 ( $M_3$ )	DCH 177 ( $M_4$ )	Mean	YRCH 1 ( $M_1$ )	GCH 4 ( $M_2$ )	DCH 519 ( $M_3$ )	DCH 177 ( $M_4$ )	Mean
90 x 90 cm ( $S_1$ )	72	69	79	80	75	42	42	37	33	39
120 x 90 cm ( $S_2$ )	61	64	73	71	67	48	45	42	39	44
120 x 120 cm ( $S_3$ )	60	61	63	63	62	54	52	47	43	49
Mean	64	65	72	71		49	46	42	38	
	M	S	M x S				M	S	M x S	
S.Ed	3	3	5			S.Ed	1	1	2	
CD(0.05)	6	5	NS			CD(0.05)	3	2	5	

Effective primary spike length was recorded higher in YRCH 1 and GCH 4 hybrids (Table 1). In spacing, 120 x 120 cm recorded higher effective primary spike length than 90 x 90 cm spacing. In combination, YRCH 1 with a spacing of 120 x 120 cm recorded higher effective primary spike length

## Results and Discussion

### Growth attributes

Growth parameters of castor hybrid varied considerably under different spacing (Table 1). Among the different hybrids, DCH 519 registered higher plant height (72 cm) than other hybrids. In different spacing, plant height was recorded higher in closer spacing (90 x 90 cm) than under wider spacing (120 x 120 cm). Closer planting shows higher competition between the plants for obtaining more solar energy which results higher plant height. Such findings were earlier reported by Patel and Patel (2012).

(54 cm) followed by GCH 4 with a spacing of 120 x 120 cm (52 cm). This may be due to in wider spacing there is lesser competition between the plants when compared to closer spacing, which exhibits higher effective primary spike length in castor. These results are in close conformity with the findings of Mukesh Kumar Man *et al.* (2017).

**Table 2. Yield parameters and Seed yield of hybrid castor under different spacing during *Rabi* season**

Treatments	Number of spikes / plant					Seed yield (kg ha <sup>-1</sup> )				
	Hybrids					Hybrids				
Spacing	YRCH 1 ( $M_1$ )	GCH 4 ( $M_2$ )	DCH 519 ( $M_3$ )	DCH 177 ( $M_4$ )	Mean	YRCH 1 ( $M_1$ )	GCH 4 ( $M_2$ )	DCH 519 ( $M_3$ )	DCH 177 ( $M_4$ )	Mean
90 x 90 cm ( $S_1$ )	14	13	12	11	13	2157	1984	1839	1776	1939
120 x 90 cm ( $S_2$ )	18	16	14	14	16	2316	2219	1984	1854	2073
120 x 120 cm ( $S_3$ )	20	18	16	15	18	2572	2354	2162	1923	2253
Mean	17	16	14	13		2348	2186	1995	1851	
	M	S	M x S				M	S	M x S	
S.Ed	1	1	2			S.Ed	93	84	169	
CD(0.05)	2	2	4			CD(0.05)	188	169	336	

### Yield attributes

Yield attributes of castor hybrid varied considerably under different spacing (Table 2). Hybrid YRCH 1 recorded higher number of spikes per plant (17) which was on with the hybrid GCH 4. In sub plot, wider spacing of 120 x 120 cm and 120 x 90 cm produces more number of spikes per plant which is mainly due to lesser competition between the plants than closer spacing of 90 x 90 cm. Wider planting produces more number of branches due to lesser competition between the plants (Vala *et al.*, 2000).

### Seed yield

Seed yield of castor hybrid varied considerably under different spacing (Table 2). Two years of experimental results revealed that, hybrid YRCH 1 recorded higher seed yield of 2348 kg ha<sup>-1</sup> which was on par with GCH 4 with a seed yield of 2186 kg ha<sup>-1</sup>. In sub plot, wider spacing 120 x 120 cm recorded higher seed yield (2253 kg ha<sup>-1</sup>) which was followed by 120 x 90 cm spacing (2073 kg ha<sup>-1</sup>). In combination, hybrid YRCH 1 with a spacing of 120 x 120 cm recorded higher seed yield of 2572 kg ha<sup>-1</sup> which was on par

with GCH 4 with a spacing of 120 x 120 cm with a seed yield of 2354 kg ha<sup>-1</sup>. This is mainly due to in *Rabi* sown crop there is no incidence of *Botrytis* gray mold disease and also cool dry period promotes seed setting and records higher seed yield.

In the nutshell, castor hybrid YRCH 1 with a spacing of 120 x 120 cm recorded 19 per cent higher seed yield (2572 kg ha<sup>-1</sup>) than closer spacing of 90 x 90 cm (2157 kg ha<sup>-1</sup>) under irrigated condition. These results are due to the reason that, hybrids performed better in wider spacing because there is lesser competition between the plants when compared to closer spacing, which produces more number of spikes and exhibits higher effective primary spike length in castor (Rana *et al.*, 2006).

It is concluded that, castor hybrid YRCH 1 growing with a spacing of 120 x 120 cm were found suitable under irrigated condition during *Rabi* season in Tamil Nadu.

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