

Original Research Article

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**Assessment of Performance and Suitability of Different Castor Hybrids
(*Ricinus communis L.*) in Central Dry Zone of Karnataka, India**

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A field experiment was carried out at Zonal Agricultural and Horticultural Research Station, Hiriyur, Karnataka to during *Kharif* 2016-17 to assess the performance and suitability of different Castor hybrids (*Ricinus communis L.*) and to identify good castor hybrid in Central Dry Zone of Karnataka. The treatment comprised of 3 different hybrids and 3 sources of sulphur fertilizers (Single superphosphate, Gypsum and Elemental sulphur) in Randomized Block Design with 3 replications. The results showed that the castor hybrid DCH- 177 with the application of 20 kg sulphur per hectare through gypsum recorded significantly higher seed yield (1388.8 kg/ha) compared to YRCH-1 (1250.9 kg/ha) and HCH-6 (1200.2 kg/ha).

Introduction

Castor (*Ricinus communis L.*) is a non-edible, industrial oilseed crop, which plays an important role in Indian economy.

The crop is well known for its non-edible oil (45-50% oil in seeds), which is completely biodegradable with its tremendous uses. India plays a lead role in the production and productivity of castor in the world with a production of 2.34 million tones seeds while China, producing 0.18 million tones of castor

is the second largest producer (Anonymous, 2015). Cultivation of castor in India has mainly been confined to Gujarat, Andhra Pradesh, Telengana, Rajasthan and Tamil Nadu. Sulphur plays an important role in the formation of amino acids, synthesis of proteins, chlorophyll, oil content and nutritive quality (Jamal *et al.*, 2009).

Sulphur has become one of the major limiting nutrients for oilseed crop production in recent years due to its widespread deficiency (Singh and Singh, 1999). Sulphur deficiency is

responsible for stunted growth of the crop and subsequent reduction in the yield and quality of the crop (Singh, 1991). Use of non-sulphur fertilizers in intensive agricultural activities results soil sulphur deficiency in the country. On an average, oil seed crops including castor absorbs as much sulphur as they absorb phosphorus. Productivity of oil seed crops can be increased by application of sulphur (Tandon, 1995).

Considering this, the present study was undertaken to find out the effect of various sources and doses of sulphur on the performance of Castor under rainfed conditions of Karnataka.

Materials and Methods

Field experiment was conducted for the year (2016-17) during the *Kharif* season at Zonal Agricultural and Horticultural Research Station, Hiriyur, Karnataka to assess the response of Castor to sulphur application and to identify good source of sulphur for higher seed and oil yield under black soil.

The Initial soil nutrient status: pH of 7.9, medium available nitrogen (220 kg/ha), medium available phosphorus (21.4 kg/ha) and potassium (212.4 kg/ha), Zinc (0.20 ppm), Iron (4.56 ppm), Sulphur (2.5 ppm) and Manganese (15.9 ppm).

The experiment consists of 12 treatments, the treatments comprised from two sulphur doses, *i.e.* 0 (control) and 20 kg per hectare supplied through three sources, *i.e.* single superphosphate (SSP), gypsum and elemental sulphur was tested on three castor hybrids *i.e.* DCH- 177, HCH -6 and YRCH-1 to assess their suitability in the Central Dry Zone of Karnataka. The experiment was laid out in Randomized Block Design with three replications with net plot size ($3.6 \times 4.8 \text{ m}^2$) and gross plot size ($5.4 \times 6.0 \text{ m}^2$).

Results and Discussion

Effect of sulphur application yield components and seed yield

Among the treatments, application of sulphur at 20 kg per hectare through gypsum recorded significantly maximum seed yield (1388.8 kg/ha, 1200.2 kg/ha and 1250.9 kg/ha for T4, T8, and T12, respectively) and oil yield of (627.3, 523.0, and 558.1 kg/ha for T4, T8 and T12, respectively) followed by application of sulphur at 20 kg per hectare through single super phosphate resulted in seed yield of (1273.1, 1125.8 and 1195.5 kg/ha for T3, T7 and T11, respectively) and oil yield of (556.7, 464.7 and 496.9 kg/ha for T3, T7 and T11, respectively) over control. This was due to higher number of spikes per plant, highest length of primary spike (cm), more number of capsules per spike higher 100 seeds weight (g) and highest percentage of oil content in the seeds (Table 1).

Similar results were also reported by Srivastava (2007) who observed that application of sulphur at 20 kg per hectare through gypsum produced significantly higher seed yield (2577 kg/ha) in castor compared to no sulphur application (control 2087 kg/ha) under irrigated conditions of Uttar Pradesh. The treatment receiving sulphur at 20 kg per hectare through gypsum recorded significantly the higher yield over the control. In the present study, Control had registered significantly lower seed yield of (1082.2, 1012.5 and 1062.8 kg/ha for T1, T5 and T9, respectively) owing to poor growth and yield components as a result of poor availability of nutrients from soil pool, as external supply was not done.

Assessment of different castor hybrids for their suitability in central dry zone showed that the hybrid DCH-177 with application of sulphur at 20 kg /ha through gypsum recorded

significantly the highest seed and oil yield (1388.8 kg/ha and 627.3, respectively) followed by YRCH-1 (1250.9 kg/ha and 558.1, respectively) and HCH-6 (1200.2 kg/ha and 523.0, respectively) with application of Sulphur at 20 kg per hectare through SSP over

control under rainfed conditions, this was due to sulphur plays an important role in the formation of amino acids, synthesis of proteins, chlorophyll, oil content and nutritive quality, in turn it enhanced the higher spike length and more number of capsules per spike.

Table.1 Effect of different source of sulphur on seed yield (kg/ha), oil yield (kg/ha) and yield attributing characters of castor hybrids

Treatments	Number of spikes /plant	Length of primary spike (cm)	Number of capsules /spike	100 seed weight (g)	Oil content (%)	Seed yield (kg/ha)	Oil yield (kg/ha)
T1	4.30	32.10	40.23	24.60	39.12	1082.2	423.3
T2	5.20	34.50	42.22	25.00	41.90	1163.2	487.3
T3	5.43	35.37	43.52	27.60	43.73	1273.1	556.7
T4	6.17	37.43	45.27	29.90	45.17	1388.9	627.3
T5	3.80	30.60	37.65	24.10	37.20	1012.2	376.5
T6	4.17	32.57	40.67	24.00	39.10	1095.2	428.2
T7	4.70	33.17	41.83	26.10	41.28	1125.8	464.7
T8	5.30	35.33	43.42	27.80	43.58	1200.2	523.0
T9	4.10	31.30	39.03	24.20	38.40	1062.8	408.1
T10	4.77	33.13	41.33	24.20	40.54	1122.0	454.8
T11	5.17	34.05	42.27	26.80	41.57	1195.5	496.9
T12	5.97	36.38	44.20	28.50	44.62	1250.9	558.1
S.Em±	0.96	1.24	1.52	0.93	1.72	32.40	14.25
C.D. @ 5%	NS	2.52	3.82	2.25	4.33	92.52	41.42

Treatment details:

- T1: DCH-177 + NO sulphur (RDF)
- T2: DCH-177 + Elemental sulphur 20 kg/ha
- T3: DCH-177 + SSP 20 kg/ha
- T4: DCH-177 + Gypsum 20 kg/ha
- T5: HCH-6 + NO sulphur (RDF)
- T6: HCH-6 + Elemental sulphur 20 kg/ha
- T7: HCH-6 + SSP 20 kg/ha
- T8: HCH-6 + Gypsum 20 kg/ha
- T9: YRCH -1 + NO sulphur (RDF)
- T10: YRCH-1 + Elemental sulphur 20 kg/ha
- T11: YRCH-1 + SSP 20 kg/ha
- T12: YRCH-1 + Gypsum 20 kg/ha

The lower seed yield under control plots might be due to the fact that soil may not able to meet the nutrients demand of the crop and consequently resulted in poor growth and yield. Similar results were also reported by

Srivastava and Jagdish Kumar (2015) under irrigated conditions of Uttar Pradesh and Anonymous (2012). Similar findings were also made by Jamal *et al.*, (2009) and Ahmad & Rashid (2003) who observed that

application of sulphur it is one of the key macro elements essential for plant growth and its requirement for oilseeds is usually higher than cereals and legumes.

Soil nutrient mining is major threat to modern agriculture as soil fertility is continuously depleting as a result of cultivation of high yielding varieties. Regular sulphur fertilization is needed to avoid further sulphur depletion in the top soil and thus to guarantee high crop productivity in the future. Castor hybrid DCH- 177 with Application of 100% recommended NPK + Sulphur at the rate of 20 kg per hectare as gypsum found to mitigate the adverse effects of sulphur deficiency in castor crops and it could enhances the seed yield more effectively and the same caster hybrid performed well in the central Dry Zone of Karnataka.

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