

Industrial Castor Crop Cultivation in Kharif Season

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Castor oil plant, or castor bean plant (*Ricinus communis*) of the Euphorbiaceae family is one of the world's most useful and economically important plant as its seed contains 30-50% of oil, the highest among cultivated oilseeds. Castor oil has more than 700 industrial uses (eg. hydraulic fluid, artificial leather, rubber, printing ink, soaps, recinol, lubricating and heavy duty automotive greases, telecom engineering plastics, production of nylon 11, nylon 6-10 and medicines, source of fuel for aeroplanes etc.). India is the major producer in the world, castor seed with a production of 17.95 lakh tonnes (lt) during 2021-22 season, against 17.89 lt in 2020-21. (Anon, 2022). Among states, Gujarat is leading with 6.52 lakh ha (13.45 lakh tonnes) under castor followed by Rajasthan 1.77lakh ha (2.76 lakh tonnes), Andhra Pradesh 0.16 lakh ha (0.064 lakh tonnes), and Telangana 0.022 lakh ha (0.037 lakh tonnes). According to government 2nd advance estimates, all India castor production in 2022-23 is at area 8.917 lakh ha, production 18.82 lakh tonnes. [Source: Directorate of Economics and Statistics (DES), 2nd Advance estimates].

Table 1: Recommended varieties/hybrids:

| S.No | Variety/Hybrid | Days to maturity for first picking | Special characters | Mean seed yield (kg/ha) |
|------|----------------|------------------------------------|--|--|
| 1 | DCH-519 | 105-110 Days | Resistance to wilt | 1500-1750 |
| 2 | ICH-66 | 94-97 DAS | Resistance to wilt, root rot and leaf hopper | 1560 (Rainfed) 1450-1750 |
| 3 | PCH-111 | 85-90 DAS | Resistance to wilt | 1400-1500 (Rainfed) 2200-2500 (Irrigated) |

Season and Time of sowing

Castor is mainly raised as *kharif* crop. The time of sowing varies from place to place depending on the onset of rains. Sowing is June 15th to July 15th for

getting higher yields. Early crop suffers from severe incidence of semi-looper. In case of late sown crop, reduce spacing to 60 x 45-60 cm, soak the seed in water for 12 hours followed by shade drying. Apply 25 % more N than recommended dose.

Table 2: Intercropping: some of the profitable intercropping combinations involving castor followed in the Telangana:

| Feasible intercropping systems |
|--------------------------------|
| Castor + groundnut (1:3) |
| Castor + cowpea (1:2) |
| Castor + red gram (1:1 or 1:5) |
| Castor + black gram (1:2) |
| Castor + green gram (1:3) |

Seed treatment

Seed treatment with Thiram or Captan @ 3g/kg seed or Carbendazim 3 g/kg protects plants from seed borne diseases like *Alternaria* leaf blight, seedling blight and wilt. Treating the seed with *Trichoderma viride* @ 10 g/kg seed and soil application of 2.5 kg incubated in 125 kg FYM/ha help in managing wilt.

Nutrient management

Application of 5-7.5 tonnes FYM/ha helps in moisture retention and provides nutrition to the crop. The recommended dose of fertilizer for a crop of 150 to 180 days duration is 60 kg N, 40 kg P₂O₅ and 30 kg K₂O/ha under rainfed conditions.

Nitrogen is normally used in split doses under irrigated condition and also under rainfed conditions

subject to receipt of rains while phosphorus and potash applied ad basal dose.

Table 3: Seed rate and Spacing:

| Season | Variety/Hybrid | Seed rate (kg/ha) | Spacing (cm) |
|---------------------------|----------------|-------------------|--------------------------|
| Rainfed conditions | | | |
| Black Soils | Hybrids | 5.0-6.25 | 90 x 60 (or) 120 x 45 |
| Light textured Soils | Variety | 8.75-10.0 | 90 x 45 |
| | Hybrids | 5.0-6.25 | 90 x 60 (or) 120 x 45 |

Irrigation

Castor is a drought resistant crop and found to thrive well in 400 mm rainfall also. Castor is grown as rainfed crop during *kharif* season. Hence, irrigation will not be given. However, in case of long dry spell during mid/terminal stages, give one or two lifesaving irrigations either from farm ponds or other source.

Make conservation furrows at an interval of 2.4 to 3.6 m interval across the slope for moisture conservation especially in slopy lands.

Harvesting

- Castor which is essentially a branching type in India produces five to six spikes on sequential branches at different intervals.
- The main spike gets ready for harvest within 90 to 100 days followed by other at 30days interval in case of the popular short duration varieties and hybrids .
- Premature harvesting result in low oil content and poor quality of oil. Since the problem of shattering is completely eliminated in the present varieties and hybrid harvesting can be delayed until the capsules are fully dry.
- The harvested spikes are allowed to dry in the sun for about six to eight days before threshing either by beating with sticks in case of limited quantities or by trampling by bullocks or tractor as per the availability when large quantities are to be hulled. Power operated mechanical threshers are available which are easier, faster and more efficient.

Table 4: Castor pests and Diseases Management

| Name of Insect/ Disease | Symptoms | Favorable climatic conditions | Chemical / Biological control |
|-------------------------|---|-------------------------------|---|
| Semilooper | The caterpillar feeds sparingly at initial and feeds voraciously during later stages leaving only mid rib and veins i.e. *Defoliated leaves. *In severe cases only mid rib and veins of the leaves. | August to January | <ul style="list-style-type: none"> ➤ Collection and destruction of the infested material from the field. ➤ Plucking of leaves harbouring egg masses / gregarious larvae and destroying. ➤ Setting up of pheromone traps @ 4-8/acre ➤ Application of <i>Azadirachtin</i> 1500 ppm i.e. neem oil 5 ml/L for management of early instars larvae. |
| Tobacco caterpillar | In early stages, the caterpillars are gregarious and scrape the chlorophyll content of leaf lamina giving it a papery white appearance. Later they become voracious feeders | During September to January | <ul style="list-style-type: none"> ➤ Natural enemies (<i>Snellenius maculipennis</i>) acts as larval parasite whose cocoons may be seen attached to the ventral aspect of the posterior end of the host caterpillar. Avoid chemical |

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| | making irregular holes on the leaves and finally leaving only veins and petioles and cause complete defoliation or skeletonised leaves. | | spray when 1-2 larval parasitoids are observed per plant. ➤ Spray of Acephate 1.5 g/L or Thiodicarb 1.5g/L of water(if <25% defoliation) ➤ Spray Profenophos @ 2ml/ L or Flubendamide 0.2ml/L or Spinosad 0.3ml/L of water (if >25% defoliation). |
| Shoot and capsule Borer | Initially the larvae bores into the tender shoots and later it enters into capsule and causes holes. Damaged capsules webbed together. Peduncle and capsules showing galleries made of larval silk and frass. | September to February | ➤ Collection and destruction the shoots and capsules infested by capsule borer. ➤ Spraying should be commenced from the time of formation of inflorescence and again after 20 days. ➤ Spray Profenofos @ 2ml/L or Novaluraon @ 1ml/L of water, if at least 10% capsules are damaged. |
| Leafhopper | Leaf margins become yellow. Curling of leaf edges and leaves turn red or brown. Under severe infestation hopper burn symptoms are also noticed. | Peak infestation is during November to January | ➤ When 10% of leaves in a plant show curling, spray Profenophos 2 ml/L of water. ➤ Under severe infested conditions spray Acetamirpide @ 0.2g/L or Clothionidin 0.1g/L of water. ➤ Atleast two sprays required at 15 days intervals based on severity. |
| Seedling blight - <i>Phytophthora parasitica</i> | The disease appears circular, dull green patch on both the surface of the cotyledon leaves. It later spreads and causes rotting. In mature plants, the infection initially appears on the young leaves and spreads to petiole and stem causing black discoloration and severe defoliation. | Continuous rainy weather. Low temperature (20-25°C). Low lying and ill drained soils. | ➤ Remove and destroy infected plant residues. ➤ Avoid low-lying and ill drained fields for sowing. ➤ Treat the seeds with Thiram or Captan at 3g/kg. ➤ Drenching with metalaxyl @ 2.5 to 3 g/L or Copper oxy chloride 3g/Lof water. |
| Wilt – | When seedlings are attacked cotyledonary leaves turn to dull green colour, wither and die subsequently. ➤ In matures plants the leaves becomes yellow and brittle, droop and drop off leaving behind only top leaves. Diseased | Monocropping of castor in same field. Infected seed | ➤ Crop rotation with non host plants ➤ Seed treatment with thiram @ 3g/ kg or carbendiazim @ 2g/ kg seed. ➤ Seed treatment with biocontrol agent <i>Trichoderma viride</i> @10g /kg. ➤ Soil application of <i>T. viride</i> @2kg of talc formulation mixed in 100kg farm yard manure and incubate it for 15 days and apply to the soil before ploughing. ➤ Drenching with Copper Oxy Chloride @ 3 g/L of water. |

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| | <p>plants are sickly in appearance.</p> <p>➤ Cut opened stems will show discolouration of the vascular bundles and presence of white mycelium on infected portion.</p> | | |
| Gray Mold | <p>Symptoms can be seen on all plant parts, being prominent on spike. Infected flowers rot and are covered by characteristic gray or ash coloured growth of the fungus. Subsequently the disease spreads upward infecting all flowers and capsules which are covered by the fungus. This is followed by development of cottony white growth which later converts into gray colour due to sporulation. Yellowish drops of liquid exude from these portions. Infected spikes become sterile without capsules. Infected capsules rot and shed off.</p> | <p>Continuous rains, Night temperatures below 22°C and high relative humidity favours the disease spread</p> | <p>➤ Adjust sowing time in such a way that crop maturation occurs during dry season</p> <p>➤ Adopt wider spacing (90 x 60cm)</p> <p>➤ Remove diseased spikes and destroy them</p> <p>➤ Grow varieties with non-spiny capsules and less compact inflorescence.</p> <p>➤ Seed treatment with carbendazim @2g/kg</p> <p>➤ Spray Carbendazim@ 1g/L or Propiconazole @ 1ml/L or thiophenate methyl @ 1g./L before onset of cyclonic weather based on weather forecast and another spray after cyclonic rains.</p> <p>➤ Application of 20kg urea and 10kg of muriate of potash after removal of diseased panicles may be useful for the growth of panicles that subsequently develop.</p> |

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