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Integrated Crop Management Practices in Castor Cultivation

*Alok Ranjan

M.Sc. Scholar, Department of Entomology, Bihar Agricultural University,
Sabour, Bhagalpur, Bihar, India

*Corresponding Author's email: alokranjannwd123@gmail.com

Castor (*Ricinus communis* L.) is an important non-edible oilseed crop widely grown under rainfed conditions in Bihar (Baintha, 2025). Among grown oilseeds, castor seeds have the highest oil content (40–55%). Castor oil has substantial industrial and medicinal importance, being widely used in the manufacture of lubricants, greases and paints, as well as in various therapeutic applications (Ramajaneyulu *et al.*, 2017). Approximately 90% of the world's castor oil needs are fulfilled by India, which leads the world in castor production. In 2012–13, castor was produced on 1.3 m ha of land in India, yielding 2.2 m t and 1653 kg/ha of productivity. The main states that produce castor are Gujarat, Rajasthan, and Andhra Pradesh. Also, it is grown on a small scale in Madhya Pradesh, Tamil Nadu, Orissa, Maharashtra, and Karnataka. The crop is primarily cultivated in rainfed circumstances in other states, however it is grown under irrigation in Gujarat & Rajasthan. As a warm-season crop, it needs low humidity & moderately high temperatures (20–27 C) during the growth season. Clear, warm, sunny days are ideal for its growth.



Figure 1: Castor Field

Soils

Castor can be cultivated on almost all types of well-drained soils. But it is generally grown on red sandy loams in peninsular India and on light alluvial soils in the North-Western states.

Seed bed preparation

For ensuring proper tilth and good seed bed preparation, summer tillage or offseason tillage is recommended. It is good to plough the soil immediately after the receipt of pre-monsoon showers and 2-3 harrowings with blade harrow is required after rains. Ridges and furrows method of sowing was found to be ideal.

Cropping Season

During kharif, castor can be sown from June to last week of July and during rabi, sowing can be done under irrigated conditions from September to last week of October. Crop duration varies from 120 to 240 days.

Seed rate and spacing

In case of hybrids, use 5 kg/ha seed and 5-7 kg/ha seed for varieties. Spacing for -

- Rainfed crop : 90x60 cm or 90x90 cm.
- Irrigated crop : 120x60 cm or 120x90 cm.

Seed treatment

Seed should be treated with thiram or captan @ 3 g/kg seed or carbendazim 2g/kg to protect from seed borne diseases like seedling blight and wilt.

Fertilizer management

Apply fertilizers based on soil test values for adequate and balanced nutrition. Incorporate 5 t/ha of well decomposed FYM/ compost 2-3 weeks prior to sowing.

In general 40-60, 15-60, 15-30 kg NPK/ha is recommended for rainfed crop and 80-120, 30-60, 30 kg NPK/ha respectively, for irrigated crop along with 20 kg Sulphur for higher seed and oil yield. For rainfed castor, application of basal dose of 20 kg N, followed by top dressing with 20 kg N/ha each at 35-40 DAS and 65-70 DAS depending on moisture availability. Whereas under irrigated conditions, top dressing with five splits are to be given.

In soils deficient in Zinc and Iron, apply 10 kg zinc sulphate and 30kg ferrous sulphate/ha.

Intercropping systems

Castor is usually raised either as a sole crop or mixed crop in kharif. The remunerative castor based intercropping systems are: Castor + pigeonpea (1:1), castor + cowpea (1:2), castor + urdbean (1:2), castor + mungbean (1:2), castor + clusterbean (1:1), castor + groundnut (1:5), castor + turmeric/ginger (1:5) and castor + chillies (1:8).



Figure 2: Intercropping with Turmeric

Weeding and interculture

Castor is very sensitive to weed competition. Inter cultivation with blade harrow 2-3 times commencing from 25 days after sowing followed by 2 or 3 hand weedings at intervals of 15-20 days effectively checks weed growth. Pre-plant incorporation of herbicides such as fluchloralin @ 21/ha; pre-emergence application of alachlor @ 2.5 l/ha or pendimethalin @ 3.3 l/ha mixed in 600 l of water to be applied to soil under assured soil moisture conditions.

Irrigation

Castor gives good response to irrigation due to its perennial nature. In case of prolonged dry spells, one protective irrigation either at primary spike development or secondary spike initiation /development will greatly benefit the crop and improves the yield. For rabi and summer crops one irrigation is required immediately after sowing to facilitate uniform germination. Based on the soil type and crop growth, irrigation can be given at 10-15 days interval.

Management of insect pests

The major insect pests are red hairy caterpillar, castor semilooper, Spodoptera, capsule borer and sucking pests such as leafhopper, thrips and whitefly.

- Hand pick and destroy gregarious stages of Spodoptera and hairy caterpillars along with damaged leaves.
- Releasing of egg parasitoid, Trichogramma chilonis in August and September months helps in controlling semilooper.
- Spray insecticides when the defoliation exceeds 25% or leaf margins show yellowing and drying due to leafhopper or at least 10% capsule damage due to capsule borer.
- Spray chlorpyrifos 2.5 ml/l or monocrotophos 1.6 ml/l or acephate 1 g/l or profenofos 1 ml/l of water for controlling defoliators and capsule borer.
- Spray dimethoate 1.7 ml/l or monocrotophos 1.6 ml/l of water for controlling sucking pests.

Management of diseases

The major diseases affecting castor are seedling blight, wilt, root rot and grey mold.

- Seed treatment with thiram/captan @3 g/kg or carbendazim 2g/kg seed or Trichoderma viride 10g/kg for control of seed borne diseases.

- Soil application of *T. viride* (2.5 kg mixed in 125 kg FYM/ha).
- Grow Jwala, Haritha, DCS 107, GCH-4, GCH-7, DCH-177 and DCH 519 which can tolerate wilt.
- Crop rotation with millets and Inter cropping with redgram 1:1 ratio.
- Go for prophylactic spray with carbendazim 1 g/ depending upon weather forecast followed by another spray after disease appearance for controlling grey mold. In case of severe infestation removal of damaged spikes followed by application of 10 kg N/ha will help in initiating new branches and spikes.

Harvesting

On an average, castor produces 4-5 sequential order spikes over a span of 180-240 days one each at intervals of 30 days. The first spike is ready for harvest within 90-120 days after planting. The subsequent pickings can be taken up at intervals of 30 days. Capsules are sometimes shelled by rubbing on a corrugated rubbing board, but this is a time-consuming operation. Power operated mechanical threshers are also available for the purpose. Cleaned seed can be stored in jute (gunny) bags under ordinary conditions.

Yield

- 10-15 g/ha (Rainfed)
- 20-35 q/ha (Irrigated)



Figure 3: Spraying of Insecticide & Fungicide



Figure 4: Castor Plants