Indian Farming 76 (11): 07-09; November 2026

Canola production for home consumption and crop diversification

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Canola, a member of the Brassicaceae family, is renowned for its oil-rich seeds and nutritious leaves. Originally developed from rapeseed, canola has been bred to have low levels of erucic acid (<2%) and glucosinolates (<30 micro moles per gram defatted meal), making its oil a heart-healthy choice. Canola is characterised by its bright yellow flowers and adaptability to various climates, making it suitable for cultivation in diverse regions. Canola oil is low in saturated fat and high in monounsaturated fats, providing a healthy alternative to other cooking oils. Canola oil also provides alpha-linolenic acid (an omega-3 fatty acid) which contributes towards a composed nutritional fat profile. Additionally, canola leaves are rich in vitamin A, C and K, as well as essential minerals like calcium and iron.

Keywords: Agronomic practices, *Gobhi sarson*, Plant protection

IN the quest for self-sufficiency and sustainable agriculture, canola has emerged as an excellent choice for home cultivation, offering both personal and environmental benefits. Originally developed from rapeseed (*sarson*), canola stands out for its low levels of erucic acid (<2%) and high nutritional value, making its oil a heart-healthy alternative to more saturated fats. Edible oils that are high in erucic acid are undesirable due to their association with arterial thickening and subsequent heart problems. Similarly, non-canola varieties of rapeseed, when processed into defatted meal for animal feed, can negatively impact livestock health by reducing appetite, affecting reproductive capabilities, and disrupting thyroid function, which can lead to thyroid-related health issues. Canola varieties address these concerns by eliminating the long-chain erucic acid from their oil, which enhances its safety for human consumption. This modification results in a substantial increase in monounsaturated fatty acids (MUFA), such as oleic acid, which rises from 18–20% to approximately 60–67%, making canola oil a healthier option. Additionally, the defatted meal from canola varieties is particularly well-suited for animal feed, as it does not carry the negative effects seen with non-canola varieties. Beyond its nutritional advantages, growing canola at home provides economic benefits by reducing grocery bills and potentially generating additional income through the sale of surplus produce.

Integrating canola into crop rotations further promotes agricultural sustainability by improving soil structure and reducing insect and disease attack, which lessens the need for chemical pesticides. As part of a diversified cropping strategy, canola not only supports soil health and reduces economic risks, but also contributes to a more resilient and self-reliant farming system. Beyond these direct nutritional and economic benefits, the inclusion of canola under diversified cropping systems could play a significant role in enhancing the sustainability and resilience of agricultural production systems. Crop diversification with inclusion of canola with cereals and other crops can help enhance resource-use efficiency, interrupt insect-pest infestation and disease cycles, and improve soil health. For those embarking on home cultivation, canola's adaptability to various climates and soil types, coupled with its relatively straight forward cultivation requirements makes it a practical and rewarding addition to any garden. Therefore, canola not

Table 1. Canola type varieties and hybrids of *raya* and *gobhi sarson*

Variety	Duration (days)	Average yield (q/ha)	Oil content (%)
RCH 1	152	23.0	39.4
RLC 3	145	18.3	41.5
PGSH 1707	162	22.0	41.0
GSC 7	154	22.3	40.5
GSC 6	145	15.3	39.1

only enriches the diet and supports financial stability, but also fosters a more sustainable and resilient approach to home gardening.

Agronomic practices for successful cultivation of canola

***Preparatory tillage*:** To achieve optimal germination, a well-prepared seedbed is essential. In irrigated regions, the process typically involves two to four ploughing, each followed by planking to ensure soil consolidation. For rainfed areas, one or two ploughing, each accompanied by planking, are generally adequate.

***Seed rate and sowing method*:** For rapeseed-mustard grown as a sole crop, a seed rate of 3.75 kg/ha is used. When soil moisture is limited, it is advisable to mix the seed with moist soil and allow it to sit overnight before sowing. This technique increases the seed's bulk, promoting more uniform distribution across the field. The optimal sowing depth for the seeds is between 4 and 5 cm.

***Fertiliser application*:** Apply 225 kg urea (46% N) and 187.5 kg single super phosphate (SSP) (16% P_2O_5) per hectare. For potassium (K) deficient soils, apply 15 kg of K_2O (equivalent to 25 kg of muriate of potash) per hectare. If urea is used as a nitrogen (N) source, it should be applied just prior to pre-sowing irrigation (*rauni*). It is recommended to use SSP as it contains both sulfur (S) and P. If SSP is unavailable, apply 200 kg of gypsum or 32.5 kg of bentonite-S per hectare at sowing, particularly in S-deficient soils, along with 65 kg of DAP and 87.5 kg/ha urea to provide the necessary P and N.

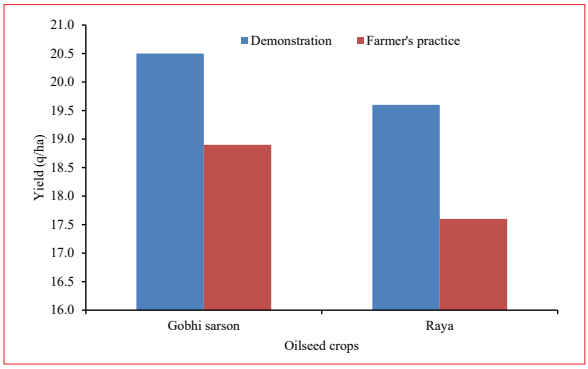
For *raya* and *gobhi sarson*, drill half of the N and the full dose of P and K before sowing or transplanting, with the remaining half of the N applied at the first irrigation. For soils deficient in zinc (Zn), apply 25 kg/ha of zinc sulfate heptahydrate (21%) to check Zn deficiency.

***Weed control and irrigation practices*:** Effective weed control involves one or two hoeings, preferably using an improved wheel hand hoe. The first hoeing should be performed 3–4 weeks after sowing, with a second hoeing, if necessary, conducted 3 weeks after the first. Alternatively, apply 875 mL/ha pendimethalin 38.7 CS in *raya* and *gobhi sarson* within two days of sowing using 500 L of water per hectare.

Irrigation practices vary by crop. *Raya* and *gobhi sarson* should be irrigated 3–4 weeks post-sowing to encourage deeper root development

Table 2. Plant protection measures against insect-pests and diseases

Pests	Symptoms	Control measures
Insect-pests		
Painted bug (*Bagrada hilaris*)	The nymphs and adults of the painted bug feed on the foliage and siliquae, causing them to dry up.	Applying the first irrigation 3–4 weeks after sowing can substantially reduce the painted bug population.
Mustard sawfly (*Athalia lugens proxima*)	The larvae of the mustard sawfly attack young plants by creating holes in the leaves, which can lead to extensive defoliation if the infestation is severe.	Spray the crop with 625 mL of Ekalux 25 EC (Quinalphos) diluted in 150–160 L of water per hectare.
Mustard aphid (*Lipaphis erysimi*)	The aphids cover the inflorescence and siliquae, sucking substantial amounts of sap, which results in stunted plants and undeveloped seeds.	Actara 25 WG (Thimethoxam) @ 100 g, Metasystox 25 EC (Oxydemiton methyl) @ 1,000 mL, Rogor 30 EC (Dimethoate) 1,000 mL, Dursban/Coroban 20 EC (chlorpyriphos) @ 1,500 mL/ha/200–310 L of water.
Leaf miner (*Chromatomyia horticola*)	The larvae of the leaf miner cause damage by creating mines in the leaves.	Rogor 30 EC (Dimethoate) @ 1,000 mL/ha or use 32.5 kg of Furadan 3 G (Carbofuran) per hectare followed by light irrigation.
Hairy caterpillar (*Spilosoma obliqua*) and Cabbage caterpillar (*Pieris brassicae*)	These caterpillars feed on leaves, young shoots, and green siliquae. Young caterpillars feed gregariously, while older ones migrate between fields.	Hand-picking and destroying infested leaves.
Diseases		
Alternaria blight *(Alternaria brassicae)*	Appearance of brown to blackish spots with concentric rings on leaves, siliquae, and stems. In severe cases, the upper parts of the stem and siliquae may wither, and the seeds within them may become shriveled.	Remove and destroy diseased plant debris from previous crops to reduce the disease's prevalence.
Downy mildew *(Peronospora brassicae)*	Manifests as small light green lesions on the undersides of leaves, which later expand into greyish, dry, and easily torn areas. The disease affects all aerial parts of the plant, with severe impacts on foliage and seed-bearing structures, and causes notable deformity in the stems.	Destroying diseased plant debris from prior crops to reduce the likelihood of infection.
White rust (*Albugo candida*)	White rust presents as prominent white creamy-yellow pustules on the underside of leaves, leading to swelling of affected areas. Flowers may become malformed, sterile, and club-shaped. All parts of the plant are susceptible, except the roots	Remove and destroy any diseased debris from previous crops. Additionally, apply a spray of 625 g Ridomil Gold (containing metalaxyl 4% + mancozeb 64%) dissolved in 250 L of water/ha at 60 and 80 days after sowing (repeat application after 20 days, if necessary).



Seed yield of *gobhi sarson* and *raya* in demonstration conducted in south-western Punjab

and enhance the uptake of applied fertilisers. For *raya*, a second irrigation may be necessary during the flowering stage, particularly if frost threatens the crop; this irrigation might need to be applied earlier. In case of *gobhi sarson*, the second irrigation should be applied to timely sown crops at the end of December or the beginning of January, with a third and final irrigation scheduled for the second fortnight of February. No further irrigation should be provided thereafter, as excessive water can lead to lodging of the crop.

***Harvesting and threshing*:** The optimal time for harvesting rapeseed and mustard crops is when the siliquae (seed pods) turn yellow, signaling that the seeds have matured. *Gobhi sarson* mature in the first fortnight of April. Due to the tendency of *gobhi sarson* to shatter its grains, it is crucial to harvest it at the precise moment to minimise loss. After harvesting, the crop should be stacked and allowed to rest for 7–10 days before threshing to ensure optimal processing.

Results of the front-line demonstrations

Two hundred seventeen frontline demonstrations (FLDs) on canola *gobhi sarson* (GSC 7) and *raya* (RLC 3) were conducted during *rabi* 2022-23. These demonstrations were conducted in nine different villages of Bathinda district in south-western Punjab. The results of these demonstrations showed higher average yield in demonstration plots of *gobhi sarson* and *raya* with an average of ~8.47% and 11.36% increase in yield compared to farmer's practice in *gobhi sarson* and *raya*, respectively.

SUMMARY

Canola varieties address the concerns related to human health by eliminating the long-chain erucic acid from their oil, which enhances its safety for human consumption. By adopting canola varieties and recommended agronomic practices, farmers can enhance crop yields and benefit human health. In addition, integrating canola into crop rotations further promotes agricultural sustainability by improving soil structure and reducing insect and disease attack, which lessens the need for chemical pesticides.

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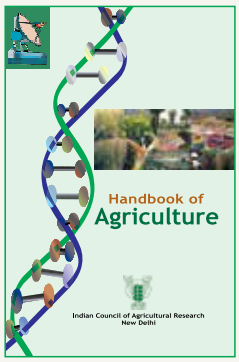

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TECHNICAL SPECIFICATIONS

Size : Royal Octavo (16 cm x 24 cm) • No. of pages : i-xii + 1618 • Price : Rs 1500 • Postage : Rs 100
ISBN No. : 978-81-7164-096-6

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