

Oilseed Crops

In Himachal Pradesh, three major oilseeds viz. sesamum, linseed and rapeseed and mustard are grown. Cultivation of oilseed crops in the State is done on an area of about 18,000 hectares. Out of this area, over 60 per cent is occupied by rabi oilseeds.

RAPESEED & MUSTARD

This group constitutes brown *sarson*, *toria* and *raya* crops. These crops occupy an area of over 8.4 thousand hectares, with a total production of 3.6 thousand tones with average yield of 4.3 q/ha.

Out of three crops, sarson occupies the bulk of the area. However, with the introduction of new varieties of *toria* and *raya*, more and more farmers are taking to the cultivation of these crops owing to the advantages enjoyed by them over *sarson*. District-wise distribution of these crops shows that Chamba occupying almost 50% of the area under these crops makes the maximum contribution of the production of these crops. Rapeseed and mustard are raised under rainfed conditions and the mean yields are generally low. However, these can be considerably improved by sowing improved varieties and by following the improved package of practices.

BROWN SARSON

This is by far the most common **Brassicac**s grown in the State. Yellow *sarson* being more susceptible to frost is sown to a very low extent.

Variety

1. **KBS-3** : This is a new high yielding variety. It is resistant to white rust and tolerant to fog. It contains 46% oil and gives an average yield of 10.6 q/ha. Plants are medium tall and maturity time is 150-155 days.
2. **BHS-1**: This variety has been found to exceed all other varieties in grain yield and recommended for cultivation in the State as it yields 25% higher than the local types. It matures in about 150 days and yields about 64% oil.

RAYA

Raya (Brassica juncea) is a common oilseed of this group and is cultivated in low hills both as a pure crop and in mixture with wheat. The crop can be raised well both under rainfed and irrigated conditions. Being more responsive to fertilizers, it gives better returns under irrigated conditions.

Variety

Varuna : It is a medium tall variety maturing in about 5 months. It is prolific pod bearer and fairly resistant to aphids. Both pods and grains of this variety are bold. The grains carry 42-44% oil. It is suitable for cultivation both under monoculture and mixture with wheat.

RCC-4 : The plants are medium tall, solid & with more branches. Seeds are medium in size & dark brown in colour. This variety is suited for sowing with wheat. Its maturity period is 155-160 days, oil is 40% & average yield is 10.5 q/ha.

Soil and climate

The rapeseed and mustard thrive well on light to heavy loam soils. Sarson grows well in light loam while raya can be grown in drier regions too. Raya, however, does well in medium and high rainfall areas.

Time of sowing

Sarson & Raya : Last week of September to end of October.

However, when sown in mixture other crops, the sowing time will depend on sowing date of main crop.

Method of sowing

For pure crop, seed should be sown in rows 30 cm apart by drill or pora. The seed should be placed at 2 to 3 cm depth. In case the moisture in the soil is insufficient, the seed may be mixed with moist soil and kept overnight for soaking.

Seed rate

When sown pure, the seed rate of 6 kg/ha may be used for all rapeseed and mustard crops.

Manuring

Nutrients* (kg/ha)			Fertilizers (kg/ha)			Muriate of Potash
N	P ₂ O ₅	K ₂ O	Urea or	CAN	Single Super phosphate	
60	40	40	130	240	250	65
			Fertilizer (kg/ bigha)			
			Urea or 10	CAN 20	Single Super phosphate 20	Muriate of Potash 5

Method of application

Full amount of phosphorus and potash and half amount of nitrogen should be applied at the time of sowing, while the remaining dose of nitrogen should be top dressed at the pre-flowering stage if adequate moisture is present. For toria crop, the whole of nitrogen should be applied at sowing time otherwise the maturity would be delayed.

Water management

Normally, *Rabi* oilseed crops are raised as mixed cropping with main crops of cereals and the irrigation applied to main crops supports the water requirements of oilseed crops also. If these are grown as a single crop and at the time of sowing soil moisture is not enough, a pre-sowing irrigation is a must. In case there are winter showers once or twice, there is no necessity for irrigation. For *raya* crop, one irrigation at 75% flowering may be given.

Interculture

When the crop is 3 week old, it should be thinned keeping plant to plant distance of 10 to 15 cm. To control weeds, handweeding at 30 and 60 days after sowing may be done or preemergence application of Pendimethalin @ 1.5 kg/ha or isoproturon @ 1.0 kg/ha after 30 days of sowing should be applied in 700-800 L water per hectare.

Harvesting

The crop is ready for harvest when the pods turn yellow. Sarson is harvested in March and raya in April depending upon the location.

GOBHI SARSON

Gobhi Sarson (*Brassica napus*) is recent introduction in Himachal Pradesh. It is photo and thermo-sensitive and makes little growth upto the middle of February, but in the end of this month, plants make a quick growth as the weather warms up. It has good yield potential, wide adaptability and possesses high oil content of good quality.

Variety

Neelam (HPN-3) : This is a new variety recommended for timely and late sowing under irrigated and rainfed conditions as pure crop. It contains 42.8% oil . It is resistant to yellow rust but susceptible to blight. Its cake is of very good quality which has international standards. Its average yield is 15-16 q/ha.

Sheetal (HPN-1): A new Brassica cultivar named as Gobhi Sarson is suitable for irrigated as well as unirrigated conditions in all parts of H.P. This can be successfully grown after paddy, maize and other *Kharif* crops. Its leaves are thick, smooth and sweet in taste and thus serve as a quality pot herb saag. The initial growth is slow, plants remain in vegetative phase till February, as such the crop escapes frost injury. Plants are stout and do not lodge easily. It takes about 170 days for maturity. On an average, it yields 18 q/ha. The seeds possess 41 per cent oil of good quality.

Sowing time : Mid October-end October

Seed rate : 6 kg/ha

Manuring

Nutrients (kg/ha)			Fertilizers (kg/ha)			Muriate of Potash
N	P ₂ O ₅	K ₂ O	Urea or	CAN	Single Super phosphate	
120	60	40	260	480	375	65
			Fertilizer (kg/ bigha)			
			Urea or 20	CAN 40	Single Super phosphate 30	Muriate of Potash 5

Spacing : Line to line 30 cm
 Plant to plant 10 cm

Growing of toria and gobhi sarson in alternate rows at 22.5 cm spacing is remunerative.

Weed control

1. Two hand weedings at 40 and 70 days after sowing give effective control.
2. Weeds can also be controlled by pre-emergence application of pendimethalin @ 1.5 kg ai/ha (Stomp 30 EC) or Isoproturon 1.0 kg/ha of the 30-35 days of sowing in 700-800 litres of water/ha.

TORIA

This is a short duration variety of *Brassica campestris* and is suitable for taken an extra crop between the two main cereal crops of maize and wheat. This crop is suitable for cultivation in the foot and mid-hills of the State upto an altitude of 1000 m asl. It is sown after the harvest of maize crop from mid to late September and vacates the field in about 15 weeks allowing the sowing of early maturing wheat and potato crops.

Variety

DK-1 : This is a quick flowering and early maturing variety that vacates fields earlier for sowing wheat. Its comparative yield is lower than varieties like ITS'A but is preferred for sowing in the State on account of its earliness.

Bhawani : Plants are dwarf, profusely branched, long siliquae, seeds shining brown in colour, test weight (3-3.5 g/1000 seeds). It matures in 70-80 days and due to short duration, it escapes from aphid attack. Its average yield is 7-8 q/ha.

Soil and climate

Toria grows well in loam soil, however, it does well in medium and high rainfall areas.

Time of sowing

Toria should be sown before 20th September. Late sowing of the crop results in reduced yield.

Method of sowing

For pure crop, seed should be sown in rows 30 cm apart by drill or kera. The seed should be placed at 2-3 cm depth. In case the moisture in the soil is insufficient, the seed may be mixed with moist soil and kept overnight for soaking.

Seed rate

The see rate is 10-15 kg/ha.

Manuring

Nutrients (kg/ha)			Fertilizers (kg/ha)			Muriate of Potash
N	P ₂ O ₅	K ₂ O	Urea or	CAN	Super phosphate	
60	40	40	130	240	250	65
			Fertilizer (kg/bigha)			
			Urea or 10	Can 20	Super phosphate 20	Muriate of Potash 5

Method of application

Full amount of the recommended doses of fertilizers should be applied at the time of sowing. Otherwise the maturity of the crop would be delayed and consequently the wheat sowing is delayed.

Interculture

When the crop is 3 week old, it should be thinned keeping plant distance of 10-15 cm. 1-2 hoeings may be required to check weed infestation.

Harvesting

The crop is ready for harvest when the pods turn yellow . Toria is harvested in December, depending upon the location.

Plant Protection

Sign of Attack/ Symptom	Control
Aphids : Plant lice become innumerable and cover growing shoots, inflorescence and pods from mid February till harvest. They suck sap as a result of it the plants remain stunted, flowers dry up and seeds do not develop.	Spray 750 ml Cypermethrin 10 EC (ripcord) or 750ml Methyl demeton 25 EC (metasystox) or 750 ml Dimethoate 30 EC (Rogor) or 1.5 L Formothion 25 EC (athio) or 200-250 ml Phosphamidon(100 dimecron) in 750 L water/ha and when, on an average, 50 aphids or 4 mm aphid infestation level per central shoot is noticed. Caution : 1. Do not use treated leaves/shoots for <i>saag</i> . 2. Use only 1.250 L Malathion 50 EC (malathion/cythion) in 1250 L water on crop meant for <i>saag</i> but do not pluck leaves for 7 days after spraying. 3. When the crop is blooming & spraying is essential, spray the insecticide in the evening to avoid mortality of pollinators and advise local bee-keepers to close down bee-hives for the following day.
Leaf miner : The maggots feed by making silvery white mines in leaves. The damage is mainly done during February March.	Spray the seed crop with 750 ml cypermethrin 10 EC (ripcord) or 750 ml methyl demeton 25 EC (metasystox) or 750 ml diamethoate 30 EC Rogor or 200-250 ml phosphamidon 100 dimecron in 750 L water /ha.
Painted bug : Nymphs and adults suck sap from the foliage and pods resulting in poor yield.	Spray crop with 750 ml Monocrotophos 36 SL (nuvacon/monocil) or 750 ml Methyl demeton 25 EC (metasystox) in 750 water/ha.
Mustard sawfly : Larvae attack the young crop by biting holes into leaves and may eat the entire foliage in case of heavy attack.	Spray the young crop with 500 ml Malathion/Cythion 50 EC in 500 L water/ha.
Cabbage caterpillar : Some-times becomes serious pest. The caterpillars feed on the foliage and developing pods. Young caterpillars feed gregariously while the advanced instars of larvae	Spray crop with 1.125 L Endosulfan 35 EC (Thiodan/ Endocel/ Hildan) or 1.5 L Quinalphos 25 EC (Ekalux) or 1.250 L Fenitrothion 50 EC (Accothion/ Sumithion) in 750 L water /ha. Caution : Regular watch is necessary to pick up infested

become solitary.	leaves as soon as noticed on foliage and destroy them.
(ii) Diseases: Blight : Round, dark brown spots appear on leaves and pods. The plants become weak and give low yield.	<ol style="list-style-type: none"> 1. Treat seed with Indofil M-45 or Captan @ 3 g/ kg seed. 2. Spray the crop twice with Indofil M-45/ Dithane M-45 (0.2%) at fortnightly intervals.
White rust : Scattered white pustules of different sizes appear on leaves and stems which coalesce to form bigger patches. Later, these burst exposing the white mass of spores. Stems and floral parts get hypertrophied.	<ol style="list-style-type: none"> 1. Spray with copper oxychloride/Blitox (0.25%) at 10-15 day interval. Two sprays are sufficient. 2. Healthy and disease free seed should be sown.
Downy mildew : Purplishbrown spots are produced on the underside of the leaves. These may remain small or enlarge considerably on the upper side, the lesions appear tan to yellow. Later a typical mildewed appearance becomes manifest usually on the lower side of the leaf.	Sanitation and crop rotation help in reducing primary infection.

LINSEED

Linseed is an important oilseed crop of Himachal Pradesh. However, its cultivation is concentrated in the Palam area of Kangra and Mandi districts, accounting for almost the whole area and production in the State. With an average area of 3.7 thousand hectares, the crop contributes 1.3 thousand tonnes of grain (1997-98) in the State.

Varieties:

1. **Surbhi (KI-1)** : This is high yielding variety resistant to lodging, rust, powdery mildew and drought. It matures within 165-170 days and contains 44% oil. Its average yield is 9-10 q/ha.
2. **Nagarkot (KL-31)** : This is a new variety, resistant to rust, drought and powdery mildew. It contains 44% oil and gives an average grain yield of 14-15 q/ha and fibre yield of 10-12 q/ha.
3. **Jeevan (DPL-21)** : It is a dual purpose variety released for commercial cultivation. It is a tall variety with average total and technical height of 90 and 75 cm respectively. The seed is brown coloured, medium in size and flowers are blue coloured. The variety matures in 175-180 days. It is resistant to wilt, rust and powdery mildew and yields 10 q of seed and 9 q of fibre per ha.
4. **Janaki (KL-43)** : It is a tall variety with an average total and technical height of 90 and 70 cm respectively. It is a blue flowered, having medium sized brown seeds. The variety is resistant to rust, wilt and powdery mildew. It matures in 175-180 days and contains about 43% oil. It is more suited for prepared bed conditions and yield is about 10 q/ha, and also performs satisfactorily under *uttera* system giving about 6 q/ha of seed yield. It has an yield superiority of 15% over variety Himalini.
5. **Himalini** : The seed is medium and seed colour is brown. The plant is medium in height, erect in growth habit and bears white flowers. It is resistant to wilt, free from rust and moderately susceptible to powdery mildew. It matures in 180 days and yields about 40% oil. The average yield is 10 q/ha.

6. **Him Alsi-I (KL-187)** : It is a new variety suitable for cultivation in the linseed growing areas of H.P. which can be grown both under prepared seed bed & utera system of cultivation. It is a semi-spreading type in early stage of growth. It has snow white, medium sized, funnel shaped flowers. It has bold, shining brown seeds. The variety has better oil content (41.5%). It has resistance to rust, wilt & blight diseases. It has yield potential of 8-10 q/ha.

7. **Him Alsi-2 (DPL-17)** : It is a new dual purpose variety suitable for cultivation in rainfed conditions in the linseed growing areas of Zone I & II under prepared seed bed conditions. The plant is medium sized with cup shaped white flowers with bold brown seeds. The oils content is 40.5%. It matures in 188 days & resistant to rust & wilt & moderately resistant to powdery mildew. The average grain yield is 11.0 q/ha & that of fibre is 6-7 q/ha.

Soil

A well drained loam to clay soil is considered best for linseed cultivation. This crop does well in fields where paddy crop has been brown. Proper seed bed is prepared by giving 2-3 ploughings to remove weeds. The land is then planked.

Preparatory tillage

Prepare the land with two ploughings with desi plough.

Sowing time

First fortnight of October is the optimum time for linseed sowing.

Method of Sowing

The seed should be sown in rows 23 cm apart, at a depth of 4-5 cm by kera.

Seed Rate

40 kg seed/ha for prepared seed bed and in case of direct seeded linseed in standing rice, the seed rate should be 75 kg/ha .

Manuring

Nutrients (kg/ha)			Fertilizers (kg/ha)			Muriate of Potash
N	P ₂ O ₅	K ₂ O	Urea or	CAN	Single Super phosphate	
50	40	20	110	200	250	35
			Fertilizer (kg/bigha)			
			Urea or	CAN	Super phosphate	Muriate of Potash
			9	16	20	2.8

Method of Application

The whole quantity of phosphorus, potash and half dose of nitrogen should be applied at the time of sowing while the remaining half dose of nitrogen should be applied as top dressing after 3-4 weeks of sowing. In case of *utera* cultivation, only 60 kg N /ha should be applied and out of this, half dose should be applied after germination and the remaining half should be top dressed at pre-flowering stage.

Water Management

One irrigation at flowering and another irrigation at podding may be given.

Interculture

First hand weeding should be done 30 days after sowing or spray isoproturon @ 1.25 kg/ha at 30-35 days after sowing.

Harvesting

The crop is ready for harvest in April-May

Plant protection

(i) **Insect-pests** : There are no serious insect-pests attacking linseed crop

(ii) **Diseases**

Symptom	Control
Rust : Pink coloured lesions appear on the surface of leaves, stems and capsules.	1. Grow resistant varieties like Jeewan, Janaki and Himalini. 2. Spray Dithane Z-78/ Indofil M-45 @ 2.5 g/L water.
Wilt : Young seedlings die when attacked. Mature plants turn yellow and wilt.	Grow resistant varieties like Jeewan, Janaki and Himalini.
Powdery mildew : A greyish white powdery growth appears on the leaves and stems causing ultimate defoliation of the plant.	In areas where the disease appears in severe form, spray the crop with Sulphex (0.25%).