

A Brief Review on Sesame Crop Production and Insect Pest Management

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SUMMARY

Sesame (*Sesamum indicum* L.) is the oldest indigenous oilseed crop, with longest history of cultivation in India. Sesame seed (contain 50% oil, 25% protein and 15% carbohydrate) is used in baking, candy making and other food industries. The oil is used in cooking, salad oils and margarine (contains about 40% oleic and 40% linoleic acid).

INTRODUCTION

The seed contains 50-60% oil which has excellent stability due to the presence of natural antioxidants such as sesamol, sesamin and sesamol (Brar and Ahuja 1979). The fatty acid composition of sesame oil varies considerably among the different cultivars worldwide (Yermanos et al. 1972, Brar 1982). After oil extraction, the remaining meal contains 35-50% protein, and is rich in tryptophan and methionine. Seeds with hulls are rich in calcium (1.3%) and provide a valuable source of minerals (Johnson et al. 1979). Sesamum, commonly known as til, is one of the important edible oilseeds cultivated in India. Numerous wild relatives occur in Africa and a smaller number in India (Bedigian, Dorothea 2015).

Sesame seed production scenario : In 2020, world production of sesame seeds was 7 million metric tons (6,900,000 long tons; 7,700,000 short tons), led by Sudan, Myanmar, and.

Table-1: Top three states in Area , production and productivity (2020-2021)

Source: <https://www.indiastat.com/>

	I	II	III
Area (in lakh ha)	Madhya Pradesh (4.24)	Uttar Pradesh (3.27)	Rajasthan (3.058)
Production (in lakh tonnes)	Madhya Pradesh (1.95)	West Bengal (1.92)	Rajasthan (1.26)
Productivity (in kg/ha)	Meghalaya (937)	Karnataka (921)	Arunachal Pradesh (900)

Table 2. Nutritional value of dried sesame seed (Per 100 grams)

Energy	573 kcal (2400kJ)
Carbohydrates	23.4 g
Sugar	0.3 g
Dietary fibre	11.8 g
Fats	49.7 g
Saturated	7.0 g
Monosaturated	21.8 g
Polysaturated	21.8 g
Protein	17.7 g
Water	4.7 g
Vit A	9 IU
Vit B1(Thiamine)	0.79 mg
Vit B2 (Riboflavin)	0.25 mg
Vit B3 (Niacin)	4.52 mg
Vit B6	0.79 mg
Vit B9 (Folate)	97 ug
Vit C	0 mg

Vit E	0.25 mg
Minerals	Quantity
Calcium	975mg
Iron	14.6 mg
Magnesium	351 mg
Phosphorus	629 mg
Sodium	11 mg
Zinc	7.8 mg
Potassium	468 mg

Source : USDA National Nutrient Database for Standard Reference Release 28. 1 April 2019. Retrieved 10 March 2022.

Crop Production Of Sesame :

Climatic requirement: Sesame is grown in almost all the states in large or small areas. It can be cultivated up to the latitude of 1600m (India 1200 m). Sesame plant needs fairly high temperature during its life cycle. Normally the optimum temperature required during its life cycle is between 25-35°C. If the temperature is more than 40°C with hot winds the oil content reduces. If the temperature goes beyond 45°C or less than 15°C there is a severe reduction in yield. The pollen become sterile at aberrant temperatures.

Improved varieties: Sesame is highly sensitive to seasonal variation in terms of day length and temperature. Therefore, varieties recommended for commercial cultivation are location and season specific.

- Assam- TKG-21 ,
- Chhatisgarh- Sekhar ,
- Jharkhand- PKDS-11 ,
- Jammu and Kashmir- Brijeshwari

Growing seasons: Sesame is grown in all the crop growing seasons viz, kharif, late kharif, rabi and summer.

Table-3. Crop calendar of sesame in india :

	Sowing				Growing period				Harvesting			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Kharif												
Late kharif												
Rabi												
summer												
Pre kharif												

Source : Sesame technology for maximizing production, AICRP on Sesame and Niger

Soil: Sesamum can be grown on a wide variety of soils provided they are well- drained, but it thrives best on sandy loam with adequate soil moisture. Very sandy, alkaline and acidic soils are not suitable for its cultivation.

Land preparation: One or two ploughings followed by harrowing are recommended for pulverization and fine tilth required for good germination and plant stand.

Seed and sowing: The proper time for planting of sesamum under northern Indian condition last week of June to first week of July. A range of 25-27° temperatures for its proper germination.

Manure and fertilizers: For obtaining higher yields in addition organic manures apply 30 kg nitrogen, 60 kg P₂O₅; and 30 kg K₂O Application of nitrogen and phosphorus increases the number of capsules per plant and number of seeds per capsules.

Irrigation in sesame farming: Sesame is mainly raised as a kharif rainfed crop. Sesame though a fairly drought resistant crop is highly susceptible to moisture stress at seedling stage. Once established, it comes up well with the available soil moisture. During prolonged dry spell, a protective irrigation especially at flowering stage is essential for realizing economical yield (G.S. Tomar et.al. 2011).

Weed control: During Kharif season, the sesamum field is usually heavily infested with weeds. The critical period of crop-weed competition in sesame is 20-30 DAS (Dr. G.S. Tomar et. al 2013).

Harvesting and threshing: Harvest the crop, when leaves and capsules turn yellow and defoliation starts. The capsules at base of the plants mature first and then start maturing upwards. Plants should be harvested as and when they are yellowish-brown. (Rajbir Singh et al 2020).

Insect Pest Of Sesame:

There are many insect pest that has sesame as a host but only few have economic importance. The following chart of pest profile gives us idea about how much period a particular insect cover during the crop growth period.

Leaf Webber: *Antigastra catalaunalis* D. (Crambidae: Lepidoptera):

The adult moth has wingspan of 19–22 mm. Larva become full grown in about 10 days in summer, but it takes 33 days period in winter season (G.S. Dhaliwal et al 2020). Measures about 20 mm (larval period – 11-16 days). Pupates in leaf fold itself in white silken cocoon (emergence 5-7 days).

The larvae feed on snapdragons (*Antirrhinum* species), common toadflax (*Linaria vulgaris*), trumpetbush (*Tecoma* species), Scrophulariaceae and Pedaliaceae species. Young caterpillars feed on leaves. They also bore into the shoots, flower buds and pods.

Jassids : *Orosius albicinctus* (Cicadellidae : Hemiptera):

Adult is wedge shaped, which walk diagonally. Adult insert eggs in leaf tissue near midvein. Short life cycle with high reproductive capacity makes it successful sucking pest in sesame. Nymph and adults suck the sap of tender parts of the plants. Infestation of the pest lead to curling of leaf edges, leaves turn red or brown and then dries up and drop.

Sesame gall fly: *Asphondylia sesami* (Cecidomyiidae : diptera):

Adult midge about 4 – 5 mm long and pale orange in colour (Fig 5). Legs slender, yellowish – brown. Forewings transparent, dusky and covered by numerous small grayish hairs. The total life cycle is completed in 23-27 days (Baskaran, et. al. 1997). The irritation caused by feeding of larvae results in drops of flower buds and formation of gall like buds, which do not develop in to seeds capsules.

Spinx caterpillar : *Acherontia styx* (Sphingidae: lepidoptera):

The moth is very large, brownish with a characteristic skull-like marking on the thorax and violet and yellow bands on abdomen. It pupates in an earthen chamber in the soil. The pupal stage lasts for 2-3 weeks in summer and about 7 months in winter. Three generations /year. The larvae feeds voraciously on leaves and defoliate the plants. The insect is capable of inflicting heavy damage at times but generally it is not very serious pest in India. However, it draws out attention because of its peculiar character. (G.S. Dhaliwal et al 2020).

Bihar hairy caterpillar : *Spilosoma obliqua* (Erebidae : lepidoptera):

The caterpillar has a black head, tufts of black hairs behind this, and similar tufts of yellow hairs on the remaining portion. It is polyphagous and feeds on at least 126 species of plant including pulses, cereals, vegetables, oilseeds, mulberry, turmeric, fibre crops such as jute, roselle, ramie and sunn hemp and non-cultivated plants and weeds.

Ecological engineering for pest management

Ecological engineering for pest management has recently emerged as a paradigm for considering pest management approaches that rely on the use of cultural techniques to effect habitat manipulation and to enhance biological control.

Table 4. list of natural enemies in sesame ecosystem. (Source in reference list)

Natural enemies	Host
<i>Cremastus flavoorbitalis</i> (Ichneumonidae: Hymenoptera)	Leaf webber
<i>Bracon hebetor</i> (Braconidae: Hymenoptera)	Leaf webber larva, Sesame gall fly maggot
<i>Brumus suturalis</i> (Coccinellidae: Coleoptera)	Leaf hopper
<i>Eurytoma sp</i> (Eurytomidae: Hymenoptera)	Sesame gall fly maggot
<i>Trichogramma sp.</i> (Trichogrammatidae: Hymenoptera)	Eggs of stynx caterpillar
<i>Protapanteles obliquae</i> (Brachonidae: Hymenoptera)	Larva of bihar hairy caterpillar
<i>Aphelinus asychis</i> (Aphelinidae: Hymenoptera)	Nymph and adult of sesame aphids

Table .5 . List of Approved insecticides for insect pest of sesame (As on 01/02/2023,DPPQS)

Insect pest	Chemical name of insecticide	Dosage
Leaf hopper <i>Orosius albicinctus</i>	Oxydemeton-methyl 25% EC	2.5 ml/lit
	Quinalphos 25% EC	4 ml/lit
Leaf webber <i>Antigastra catalaunalis</i>	Quinalphos 25% EC	4 ml/lit
Sesame gall fly <i>Asphondylia sesami</i>	Dimethoate 30% EC	1.5 ml/lit
	Quinolphos 25% EC	1.5ml/lit
	Imidacloprid 17.8% SL	0.3ml/lit
Spinx caterpillar, <i>Acherontia styx</i>	Quinalphos 25% EC	1.5ml/lit
	Chlorpyrifos 20 EC	2ml/lit
Bihar hairy caterpillar <i>Spilosoma obliqua</i>	Quinalphos 25% EC	1.5ml/lit
	Chlorpyrifos 20 EC	1.5ml/lit
	Trizophos 40 EC	0.8ml/lit
Aphid, <i>Aphis gossypii</i>	Malathion 50EC	1.25 ml /l
	Dimethoate 30 EC	2.0 ml/l
	Tolfenpyrad 15EC	2ml/lit

CONCLUSION

Sesame is widely grown and has a mellow flavor and high nutritional value, making it very popular in the diet. Sesame seeds are rich in protein and lipids and have many health benefits. A number of in vitro and in vivo studies and clinical trials have found sesame seeds to be rich in lignan-like active ingredients. They have antioxidant, cholesterol reduction, blood lipid regulation, liver and kidney protection, cardiovascular system protection, anti-inflammatory, anti-tumor, and other effects, which have great benefits to human health. In addition, the aqueous extract of sesame has been shown to be safe for animals. As an important medicinal and edible homologous food, sesame is used in various aspects of daily life such as food, feed, and cosmetics.

REFERENCES

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