(ii) SESAME (*Sesamum indicum*)

CLIMATE REQUIREMENT

T_Max°C	T_Min°C	Optimum °C	Rainfall mm	Altitude m MSL
40	20	25 - 35	450 - 500	up to 1600

Tropical crop. It needs fairly high temperature for good growth. Can with stand drought, survive well with winter dew. Short day plant.

CROP IMPROVEMENT

I. SEASON AND VARIETIES

Zone/ District/Season	Sowing Month	Varieties
I. Western Zone (Irrigated)		
Coimbatore, Thiruppur, Erode		
Masipattam	Feb- March	VRI (Sv) 2, TMV 7, VRI 3
Western Zone (Rainfed)		
Coimbatore,Thiruppur, Erode, Dindigul		
Anippattam	June- July	TMV 7
Theni		
Karthigai	Nov- Dec	VRI(Sv) 2, TMV 7
II. Southern Zone (Irrigated)		
Thirunelveli, Karur		
Chithiraipattam	Apr- May	VRI (Sv) 2, TMV 7
Pudukkottai		
Margazhi	Dec- Jan	VRI (Sv) 2, TMV 7, VRI 3
Southern Zone (Rainfed)		
Madurai		
Anipattam	June-July	TMV 7
Virudhunagar, Pudukkottai,		
Adippattam	July-Aug	TMV 7
Karur		
Purattasipattam	Sep- Oct	VRI(Sv) 2, TMV 7
Ramanathapuram, Sivagangai, Thirunelveli, Thoothukudi		
Karthigaipattam	Nov- Dec	VRI(Sv) 2, TMV 7

III. North Eastern Zone (Irrigated)		
Kancheepuram, Cuddalore, Vellore		
Margazhipattam	Dec- Jan	VRI (Sv) 2, TMV 7, VRI 3
Thiruvannamalai		
Masipattam	Feb- March	VRI (Sv) 2, TMV 7, VRI 3
Villupuram		
Chithiraipattam	Apr- May	VRI (Sv) 2, TMV 7
Thiruvallur		
Anipattam	June-July	TMV 7
North Eastern Zone (Rainfed)		
Vellore, Thiruvannamalai		
Anippattam	June-July	TMV 7
Kancheepuram, Cuddalore		
Adippattam	July-Aug	TMV 7
Thiruvallur		
Purattasipattam	Sep- Oct	VRI (Sv) 2, TMV 7
Villupuram		
Karthigaipattam	Nov- Dec	VRI (Sv) 2, TMV 7
IV. North Western Zone (Irrigated)		
Namakkal		
Margazhipattam	Dec- Jan	VRI (Sv) 2, TMV 7, VRI 3
Salem, Perambalur, Ariyalur		
Masipattam	Feb- March	VRI (Sv) 2, TMV 7, VRI 3
North Western Zone (Rainfed)		
Salem,Namakkal, Dharmapuri, Krishnagiri		
Anippattam	June-July	TMV 7
Perambalur, Ariyalur		
Adippattam	July-Aug	TMV 7
V. Delta Zone (Irrigated)		
Thanjavur, Thiruchirapalli		
Masipattam	Feb- March	VRI (Sv) 2, TMV 7, VRI 3
Thiruvarur		
Chithiraipattam	Apr- May	VRI (Sv) 2, TMV 7
Delta Zone (Rainfed)		
Thanjavur, Thiruvarur, Nagapattinam		
Thaippattam	Jan- Feb	TMV 7
Thiruchirapalli		
Purattasipattam	Sep- Oct	VRI (Sv) 2, TMV 7

Suitable Varieties for Irrigated **:** VRI 2, VRI 3, TMV 4, TMV 6, TMV 7
Suitable Varieties for Rainfed :TMV 6, TMV 7
Suitable Varieties for Rice fallow :VRI 1

II Description of sesame varieties

Particulars	VRI(Sv) 2	TMV 7	VRI 3
Year of Release	2005	2009	2017
Year of Notification	SO.599(E)/ 25.04.2006	SO.2137(E)/ 31.08.2010	SO.1379(E)/ 27.03.2018
Parentage	Derivative of VS 9003 X TMV 6	Derivative of SI 250 X ES 22	Derivative of SVPR 1 x TKG 87
Duration (days)	80-85	80-85	75-80
Average Yield (kg/ha)			
Rainfed	650-700	850	-
Irrigated	700-750	920	995 (Margazhipattam) 1055 (Masi pattam)
Oil content %	51.9	50	50
Habit	Profuse branching	Erect, indeterminate, with Profuse	Erect, indeterminate with Profuse branching
Capsules	4 loculed	4 loculed	4 loculed
Seeds	Reddish brown	Brown	white

CROP MANAGEMENT

1. FIELD PREPARATION

a) Plough the field with tractor twice or with mould board plough thrice or five times with a country plough.

b) Break the clods in between ploughings and bring the soil to a fine tilth to facilitate quick germination as the seeds are small.

c) Chiselling for soils with hard pan: Chisel the soils having hard pan formation at shallow depth with chisel plough first at 0.5 m interval in one direction and then in the direction perpendicular to the previous one once in three years. Apply 12.5t FYM/composted coir pith besides chiselling.

d) For irrigated gingelly, form beds of size 10 m^2 or 20 m^2 depending upon the availability, inflow of water and slope of the land. Level the beds perfectly without any depressions to prevent water stagnation, which will affect the germination adversely.

e) In rice fallows, field is ploughed once with optimum moisture, seeds are sown immediately and covered with one more ploughing.

2. APPLICATION OF FERTILIZERS

i) Spread FYM or composted coir pith or compost @ 12.5 t/ha evenly on the unploughed field and plough it in.

ii) If the manure is not applied before commencement of ploughing, spread 12.5 t/ha of FYM or compost evenly on the field before the last ploughing and incorporate in the soil.

iii) If soil tests are not available, follow the blanket recommendations.

iv) **Rainfed:** Apply 23:13:13 kg NPK/ha or 17:13:13 kg NPK/ ha + 3 packets of Azospirillum (600 g/ha) and 3 packets (600 g/ha) of Phosphobacteria or 6 packets of Azophos (1200 g/ha).

v) **Irrigated:** Apply 35:23:23 kg NPK/ha or 21:23:23 kg NPK/ha + 3 packets of Azospirillum (600 g/ha) and 3 packets (600 g/ha) of Phosphobacteria or 6 packets of Azophos (1200 g/ha)

Soil : Black alluvium (Adanur series) FN =13.7 T-0.46 SN

Target : 1.00 - 1.25t ha^{-1} FP_2O_5=6.3T-1.79 SP

FK_2O=12.8T-0.47 SK

Initial soil test values (kg ha^{-1})			Yield target – 1.00t ha^{-1}			Yield target – 1.25 t ha^{-1}		
			NPK (kg ha^{-1}) + FYM @ 12.5 t ha^{-1} + *Azospirillum* @ 2 kg ha^{-1} + PSB @ 2 kg ha^{-1}			NPK (kg ha^{-1}) + FYM @ 12.5 t ha^{-1} + *Azospirillum* @ 2 kg ha^{-1} + PSB @ 2 kg ha^{-1}		
SN	**SP**	**SK**	**FN**	**FP_2O_5**	**FK_2O**	**FN**	**FP_2O_5**	**FK_2O**
180	12	180	23	22	13	53**	35**	35**
200	14	200	18*	12*	12*	24	22	26
220	16	220	18*	12*	12*	18*	18	17
240	18	240	18*	12*	12*	18*	15	12*
260	20	260	18*	12*	12*	18*	12*	12*

* Maintenance dose **Maximum dose

Note: FN, FP_2O_5 and K_2O are fertilizer N, P_2O_5 and K_2O in kg ha^{-1}, respectively; T is the yield target in q ha^{-1}; SN, SP and SK respectively are available N,P and K in kg ha^{-1} and ON, OP and OK are the quantities of N, P and K supplied through

organic manure in kg ha^{-1}. Open furrows to a depth of 5 cm and 30 cm apart and place the fertilizer mixture along the furrows and cover to a depth of 3 cm with soil before sowing.

vi) If furrow application is not done, broadcast the fertilizer mixture evenly on the beds before sowing.

vii) Apply TNAU MN mixture @ 7.5 kg/ha as enriched FYM for rainfed sesame and TNAU MN mixture @ 12.5 kg/ha as enriched FYM for irrigated sesame. (Prepare enriched FYM at 1:10 ratio of MN mixture and FYM; mix at friable moisture and incubate for one month in shade)

3. APPLICATION OF AZOSPIRILLUM

a) Treat one hectare of seeds with 600 g of *Azospirillum* and 600 g of Phosphobacteria (or) 600 g of Azophos. Apply 2 kg of *Azospirillum* and 2 kg of Phosphobacteria (or) 2 kg of Azophos with 25 kg of FYM and 25 kg of sand, mix uniformly before sowing as soil application.

b) Liquid formulation Treat one hectare of seeds with 125 ml of *Azospirillum* and 125 ml of Phosphobacteria, shade dry it for 30 minutes before sowing.

4. NUTRITIONAL DISORDERS

a) **Manganese deficiency** : Leaves develop interveinal chlorosis, chlorotic tissue, later develop light brown or husk coloured necrotic lesions. Mix 10 kg $MnSO_4$ /ha with 45 kg of soil and broadcost evely in the beds after sowing.

b) **Zinc deficiency**: Middle leaves develop chlorosis in the interveinal areas and necrosis along the apical leaf margins. Apply 25 kg Zinc sulphate with 45 kg of soil and broadcast evenly in the beds after sowing.

Note: Do not incorporate the micronutrient in the soil.

5. SEED RATE

Adopt a seed rate of 5 kg/ha.

6. SPACING

a) Give a spacing of 30 cm between rows and 30 cm between plants. b) For rice fallows, seeds are broadcasted and thinned to maintain 11 plants / m^2

7. QUALITY OF SEEDS

Select mature, good quality seeds free from pest and fungal damage.

8. SEED TREATMENT

Treat the seed with *Trichoderma* @ 4g/kg. This can be done just before sowing. SUCH SEEDS SHOULD NOT BE TREATED WITH FUNGICIDES or treat the seed with Thiram 4 g or Carbendazim at 2 g /kg of seeds before sowing.

9. SOWING

a) Sow the seeds preferably in lines.

b) Mix the seeds with four times its volume of dry sand and drop the mixture evenly along the furrows in which fertilizers are applied.

c) Sow the seeds to a depth of 3 cm and cover with soil.

d) The optimum time of sowing for VRI (SV) 1 sesame is second fortnight of February to first fortnight of March under summer irrigated conditions.

10. WATER MANAGEMENT

i) Irrigate at sowing and give life irrigation 7 days after sowing depending on the soil and climatic condition and allow excess water to percolate.

ii) Give one pre-flowering irrigation (25 days): One at flowering and one or two at pod setting. An irrigation at flowering period is critical.

NOTE: The critical stage for moisture requirement is the flowering phase i.e, between 35th to 45th days of sowing. During the maturity phase, moisture status should be low. If more water is given during this phase, maturity of seeds is affected and filling up of the capsules will be poor. Therefore, stop irrigation after 65 days of sowing.

11. THINNING

Thin out the seedlings to a spacing of 15 cm between the plants on the 15th day of sowing and 30 cm on 30th day of sowing. This operation is very important for the crop in order to induce basal branches.

12. WEED MANAGEMENT

i. Apply, PE application of Pendimethalin 1.0 litre /ha followed by one hand weeding on 25th DAS

13. HARVESTING

a) Decide when to harvest

i. Observe the crop, considering the average duration of the crop.

ii. Twenty five per cent of the leaves from the bottom are shed and the top leaves loose their colour and turn yellow at maturity.

iii. The colour of the stem turns yellow.

iv. The colour of the capsules turn yellow upto the middle.
v. Harvest before the bottom capsules turn brown.
vi. Examine the 10th capsule from the bottom by opening. If the seeds attained the full color of the variety harvest may be taken up.
vii. If harvest is delayed/ the capsules will dehisce resulting in yield reduction.

b) Harvest

i. Pull out the plants from the bottom.
ii. Stack in the open, one over the other in a circle with the stems pointing out and the top portion pointing inside.
iii. Cover the top with straw, so that humidity and temperature increases.
iv. Cure like this for 3 days, shake the plants. About 75 per cent of the seeds will fall off.
v. Dry the plants for one more day and again shake the plants. All the mature seeds will fall off.
vi. Winnow the seeds and dry in the sun for 3 days. Stir once in 3 hours to give uniform drying.
vii. Collect the seeds and store in gunnies.

CROP PROTECTION

A. Pest management

Economic threshold level for important pests

Pest	ETL
Shoot & capsule borer	10 larvae/ m^2 in the vegetative stage and 2 larvae / m^2 in the reproductive stage

Pest Management strategies

Shoot & capsule borer, *Antigastra catalaunalis*	**Spray any one of the following** Neem seed kernels extract 5% Neem oil 2% Spray Quinalphos 25 EC 2000 ml / ha
Pod borer, *Elasmolomus (= Aphanus) sordidus* **Gall fly,** *Asphondylia ricini* **Whitefly,** *Bemisia tabaci*, *A. dispersus*	**Spray any one of the following neem based insecticide** NSKE 5% Neem oil 2%

Leafhopper, *Emposca devastans*	**Spray any one of the following** NSKE 5% Neem oil 2% Methyl demeton 25 EC 1200 ml / ha Quinalphos 25 EC 2000 ml / ha
Storage pests *Tribolium castaneum* *Corcyra cephalonica*	Mix one kg of activated clay with 100 kg of seeds after adequate drying of seeds

DISEASE MANAGEMENT

Disease	Recommendations
Powdery mildew: *Erysiphe cichoracearum*	Apply Sulphur dust @ 25 kg/ha or spray 0.2% wettable Sulphur
Alternaria blight: *Alternaria sesami*	Spray Mancozeb @ 1000 g/ha
Cercospora leaf spot: *Cercospora sesami*	Spray Mancozeb @ 1000 g/ha
Root rot: *Macrophomina phaseolina* *(Rhizoctonia bataticola)*	• Soil application of *P. fluorescens* or *T. asperellum* @ 2.5 kg / ha with 50 kg of well decomposed FYM or sand at 30 days after sowing. • Spot drench with Carbendazim @ 1 g/ l
Phyllody: Phytoplasma (Vector: *Orosius albicinctus*)	• Remove and destroy infected plants. • To control vector, spray NSKE @ 5% or Neem oil @ 2% or Methyl demeton 25 EC @ 1200 ml/ha or Quinalphos 25 EC @ 2000 ml / ha or Dimethoate 30 EC 500 ml/ha combined with intercropping of Sesamum + Redgram (6 : 1)

SESAME - VARIETAL SEED PRODUCTION

Land requirement

- Land should be free of volunteer plants. The previous crop should not be the same variety or other varieties of the same crop. It can be the same variety if it is certified as per the procedures of certification agency.

Isolation

- For certified quality seed production, leave a distance of 200 m all around the field from the same and other varieties of the crop.

Pre- sowing seed treatment

Pellet the seeds with neem leaf powder @ 760 g + 120 g Azotobacter + 120 g phosphobacteria for 1 kg seed to enhance the productivity.

Fertilizer

- Apply NPK @ 50:25:25 kg / ha and Manganese sulphate @ 5 kg / ha as basal application.

Foliar application

- Spray 1 % DAP at the time of first flowering and 10 days after the first spray.

Harvest

- Harvest the crop when 75 - 80 % of the pods started yellowing and bottom 1 or 2 pods have dehisced. At this stage, the pod moisture content will be 50 - 60 % and seed moisture content will be 25 - 30 % and the seeds will be chocolate brown colour.
- Stake the plants in inverted position and cure them for 3 - 4 days.

Threshing

- Beat the staked plants with pliable bamboo stick for removal of seeds.

Seed grading

- Grade the seeds with 4 / 64” round perforated sieve.

Drying

- Dry the seeds to 7- 8 % moisture content.

Pre-storage seed treatment

- Treat the seeds with Carbendazim @ 2 g / kg along with Carbaryl 200 mg / kg of seed.
- Treat seeds with Halogen mixture ($CaOCl_2$ + $CaCO_3$ + *arappu* (*Albizzia amara)* leaf powder mixed in the ratio of 5:4:1 @ 3 g / kg as eco-friendly treatment.

Storage

- Store the seeds in gunny or cloth bags for short term storage (8 - 9 months) with a seed moisture content of 8 - 9 %.
- Store the seeds in polylined gunny bag for medium term storage (12 - 15 months) with a seed moisture content of 6 - 7 %.
- Store the seeds in 700 gauge polythene bag for long term storage (more than 15 months) with seed moisture content less than 5 %.