

Line Sowing of Mustard and Toria to Achieve Higher Yield in Odisha

In India, mustard is cultivated in 6.34 m ha with a total production of 7.82 million tons and productivity of 1,234 kg/ha. Comparatively in Odisha, the area is about 0.145 m ha with a production of 0.06 million tons and productivity of 424 kg/ha (2013-14) only. Mustard and toria are prominent crops for sustainable intensification of rice-based cropping system in the state.



Land Preparation

Traditionally mustard/toria, being small seeded crop, is grown in well prepared fields with conventional tillage. To achieve well pulverized soil, 2-3 ploughing followed by leveling is needed. Weeds and plant residue should be removed. However, to get benefit of residual soil moisture and advancing sowing after harvest of previous crops (largely rice and maize), zero tillage (ZT) may be preferred in mustard/toria. To achieve this, harvest the rice crop at proper time, avoid long sun drying in situ and vacate the field within 2-3 days by stacking the harvested produce near threshing area or in one corner of the field for drying and threshing.

Sowing

Line sowing using seed drill helps to maintain uniform plant population, seeding depth and germination, lesser seed rate, proper fertilizer placement and better intercultural operations.



Uniform germination and healthy mustard in conventional tillage.

Good quality seed-cum-fertilizer drill with vertical metering system fitted in seed and fertilizer boxes is appropriate for sowing under conventional tillage (CT). Whereas, zero-till-seed-cum-fertilizer drill fitted with fluted roller seed metering system can be used both under ZT and CT. Seed is mixed

with phosphatic (DAP/NPK) fertilizer and put in seed box while sowing through ZT-drill.

Sowing should be done in adequate soil moisture. Avoid dry sowing followed by irrigation as it results in poor emergence and increased weed infestation.

Time of Sowing

- Mid-October to mid-November

Seed rate

- Mustard: 2.5 to 3 kg/acre
- Hybrid mustard: 1 to 1.5 kg/acre
- Toria: 1.5 to 2 kg/acre

Seed Treatment

- Treat the seed with Thiram 2.5 g or Bavistin 2 g/kg
- **Spacing:** 30 cm for mustard and hybrid mustard; 20-25 cm for toria (row-to-row)
- **Seeding depth:** 2-2.5 cm

Variety

- Mustard: JD 6, Pusa Bold, Pusa Jaikisan, B9
- Hybrid mustard: Bayer 5111, Mahyco Bold
- Toria: M 27, Anuradha, Parbati



Mixing of seed with DAP or NPK fertilizer



Sowing of toria using seed drill in ZT

Nutrient Management

Phosphorus are the most important nutrients for Mustard.

- Mustard (kg/ha): N:P₂O₅:K₂O = 80:40:40
- Hybrid mustard (kg/ha): N: P₂O₅:K₂O = 100:50:50
- Toria (kg/ha): N:P₂O₅:K₂O = 60: 30: 30
- **Mustard:** Use 30-35 kg DAP/acre as basal with seed drill and 50-55 kg Urea and 25 kg MoP/acre before first irrigation.
- **Hybrid mustard:** Use 35-40 kg DAP/acre as basal with seed drill and 60 kg Urea and 35 kg MoP/acre before first irrigation.
- **Toria:** Use 20-25 kg DAP/acre as basal with seed drill and 35-40 kg Urea and 20 kg MoP/acre before first irrigation.

Sulphur promotes oil synthesis and it is an important constituent of seed protein. It plays an important role to increase oil content and quality of oil and yield. Broadcast fertilizer S (Gromor) @ 10 kg/acre as basal before sowing.

Irrigation

It depends on availability of soil moisture and critical growth stages.

Mustard: Apply three irrigations at following critical growth stages:

- Branching: 25-30 DAS
- Peak flowering: 40-50 DAS
- Silique formation: 60-65 DAS

Toria: Apply two irrigations

- Branching: 25-30 DAS
- Silique formation: 40-50 DAS
- Any effective rainfall during the season may save irrigation.

Weed Control and Intercultural Operation

Field should be weed free to ensure better crop growth. Apply pendimethalin as pre-emergence @ 1kg ai/ha (1.25 lit/acre product) 1-2 DAS or Quinalofop-ethyl as post emergence @ 37.5 g a.i./ha (400 ml/acre product) at 20-25 DAS in 200 lit water/acre.

Under ZT, apply pre-seeding non-selective herbicide glyphosate @1000 ml/acre product (90 ml/15 lit tank and 12 tanks/acre) to control existing weeds, if any.

Thinning

It is an important intercultural operation. Seed rate of 4-5 kg/ha produces about 80-90 plants/m² and this plant population must be reduced to 25-30 plants/m² for mustard and 40-50 plants/m²

for toria to get maximum yield. To achieve this, thinning is done at 20-25 DAS before fertilizer application. One hand weeding along with thinning helps to control weeds, if any.

Insect-Pest and Disease Control

Based on SAU recommendation, opt for following plant protection measure:

Apply methyl-demeton or dimithoate @ 400 ml or midachlorpid @ 50 ml/acre for aphids, alternate spray of Trizophos or Quinalphos @ 400 ml/acre for saw fly, endosulfan or quinalphos @ 400 ml/acre for leaf webber and Cuman L or blitox-50 @ 0.2% at 14 days interval for leaf spot. Use spray volume of 150-200 lit/acre.



Uniform germination and healthy toria in ZT.

Harvesting

Harvesting should be done when plants turn yellowish or brownish, most of the leaves either shed or turn yellow but most of the silique except that basal few remain yellowish-green with considerable moisture. Harvesting should be done in the morning to avoid shattering of seeds.

Immediately after harvesting crop should be stocked in threshing floor for 2-3 days and spread over the floor in sun for drying and threshing. After threshing seed should be cleaned and dried again to reduce moisture content to 7% before storing.

Approximate Cost of Cultivation Per Acre

Operation	Cost (in Rs)	
	Mustard	Toria
Land preparation (CT)	1,000	1,000
Land preparation (ZT)	-	-
Line sowing with seed drill	600	600
Cost of seed	300 (Rs.100/kg)	100 (Rs.50/kg)
Herbicide (CT)	500	500
Herbicide (ZT)	800	800
Pesticide	500	500
Thinning	1,000	1,000
Fertilizer	1,600	1,100
Irrigation*	1,500	1,000
Harvesting	600	600
Threshing	600	600
Total cost (CT)	8,200	7,000
Total cost (ZT)	7,500	6,300