

13. Rouging: Rouging is the activity to identify and eliminate unusual plants. The purpose of rouging is to maintain the genetic purity and variety of quality. Rouging is carried out generally from the vegetative phase to the harvesting phase. The unwanted and o -types plants are removed from the field based on the branching type, capsule size and colour of the seeds. Maximum percentage of o -type permitted is 0.10% for foundation seed production and 0.50% for certified seed production. Rouging is done repeatedly and systematically.

14. Harvesting and threshing: The crop should be harvested when 75 % of pods turn to golden yellow in colour. Threshing should be done with threshers after proper drying.

15. Storage: For safe storage, moisture content of seeds should be 8% or less, which can be achieved by sun drying of threshed seed for approximately one week.

16 Insects and diseases: Mustard aphid, saw fly, painted bug, pea leaf miner and bihar hairy caterpillar are the important insects and Alternaria blight, white rust, downy mildew, powdery mildew and Sclerotinia stem rot are important diseases commonly observed in Assam. The following strategy should be adopted for integrated management of insects and diseases of rapeseed-mustard in Assam.

- Proper cropping pattern to avoid disease and pests.
- Timely sowing.
- Mechanical removal of the crop residue of previous season.
- Seed treatment with Carbendazim 2g per (kg) seed for Sclerotinia rot and Apron 35 SD @ 6g/kg for white rust disease.
- Spray 0.2% Mancozeb to manage white rust, Alternaria blight and downy mildew and 0.1% Carbendazim for Sclerotinia rot and powdery mildew diseases.
- Pluck and destroy aphid-infested twigs thrice initially.
- For the control of mustard aphids at the economic threshold level(ETL), i.e., at least 10% plants having 26-28 aphids/plant, spray 0.025% Oxydematon methyl 25 EC or 0.03% Dimethoate 30 EC.
- If *Coccinella septumpunctata*, *Chrysoperla carnea* and Syrphid fly are seen in the field, then don't spray chemicals.

***Estimated seed requirement of rapeseed-mustard for self-sufficiency in Assam**

Class of seed	Year	
	2023-24	2024-25
Proposed area (Lakh ha)	4.62	6.87
Total certified seed requirement @ 7kg/ha	3.23	4.81
Actual certified seed requirment @ 70% SRR (000 ton)	2.26	3.37
Foundation seed (Ton)	11.32	16.83
Breeder seed (Kg)	56.60	84.15
Total seed (CS+FS) (MT)	2271.3	3386.8

*Considering 70% seed replacement every year

Strategy for self-sufficiency in quality seed of rapeseed-mustard in Assam

Strategies

- Ø Seed rolling plan for next five year should be prepared.
- Ø Ensure adequate and timely availability of breeder / foundation seed/quality seed as per plan.
- Ø Training of farmers registered as seed growers in each district of the state for seed production.
- Ø Incentives to seed growers to encourage quality seed production.
- Ø Maintenance of seed purity and quality through regular monitoring and evaluation.
- Ø State seed certification agency be set up in the state or to be strengthened.
- Ø Adequate arrangement for seed procurement.
- Ø Time bound programme for seed processing, testing and tagging.
- Ø Construction of new processing centers, seed godowns under seed village programme.
- Ø Seed bank to be set up in cluster villages.
- Ø State seed farm in di erent agro-climatic zone of the state be strengthened and utilized properly.
- Ø Seed testing laboratory to be set up in each district of the state
- Ø Seed testing should be to ensure germination before distribution to the farmers.
- Ø Post harvest drying, packaging and labelling of seeds imperative
- Ø Conduct PVS (participatory varietal selection) to identify and disseminate farmer-preferred varieties.
- Ø Introduce agri-clinics and agri-business centres.
- Ø Facilitate rapid spread of quality seeds of improved hybrids/ varieties among farmers through
 - i. Demonstrations in cluster area.
 - ii. Dissemination of information on availability of quality through multimedia seeds to farmers.

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Seed Production Technology of Rapeseed-Mustard

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Seed Production Technology of Rapeseed-Mustard

Seed

Seed is a basic input in agriculture. Strictly speaking seed is an embryo, a living organism embedded in the supporting or the food storage tissue. In seed, the importance is given to the biological existence whereas; in grain the importance is given to the supporting tissue of the economic produce. In broad sense, seed is material which is used for planting or regeneration purpose.

Importance of quality seed

- Ensures genetic and physical purity of the crops gives desired plant population.
- Capacity to with stand the adverse conditions seedlings produced will be more vigorous, fast growing and can resist pest and disease incidence to certain extent.
- Ensures uniform growth and maturity development of root system will be more efficient that aids absorption of nutrients efficiently and result in higher yield.
- It will respond well to added fertilizer and other inputs.
- Good quality seeds of improved varieties ensures at least 10-15 % higher yield.

Major seed quality characters

- Physical quality:** The seed should be uniform in shape, size, colour, weight etc., according to the specification of variety. It should be free from other material/seeds
- Genetic purity:** It should be true to type i.e., the seedling / plant / tree from the seed should resemble its mother in all aspects.
- Physiological quality:** The seed should have high germination ability, high vigour, high longevity / shelf life. And higher field establishment.
- Seed health:** The seed should be free from insect infestation and fungal infection, in or on the seed.

Classes of seed

Class	Characteristics	General standards
Nucleus seed	<div><div>Ø</div>Produced from basic nucleus stock.</div> <div><div>Ø</div>Produced by the original breeder/Institute /State Agriculture University (SAU).</div> <div><div>Ø</div>Small scale multiplication</div> <div><div>Ø</div>Pedigree certificate issued by Breeder.</div>	Genetical purity : 100% Physical purity: 100% Min. Germination :100% Max. Inert matter : 0%
Breeder seed	<div><div>Ø</div>Progeny of nucleus seed.</div> <div><div>Ø</div>Multiplied in large area as per indent of (DOAC),MoA&FW under supervision of plant breeder / institute / SAUs'.</div> <div><div>Ø</div>Golden yellow colour certificate is issued.</div>	Genetical purity : 100% Physical purity: 100% Min. Germination :100% Max. Inert matter : 0%

Foundation seed	<div><div>Ø</div>Progeny of breeder seed.</div> <div><div>Ø</div>Produced by recognized seed Producing agencies in public and private sectors under the supervision of certification agencies.</div> <div><div>Ø</div>Large scale multiplication.</div> <div><div>Ø</div>White colour certificate is issued.</div>	Genetical purity : 97-98% Physical purity :- >95% Min. Germination : >85% Max. Inert matter : 2%
Certified seed	<div><div>Ø</div>Progeny of foundation seed. Produced by registered seed growers under the supervision of seed certification agencies.</div> <div><div>Ø</div>Meant for distribution to the farmers for commercial cultivation.</div> <div><div>Ø</div>Azur blue colour certificate is issued large scale multiplication.</div>	Genetical purity : 98% Physical purity : >98% Min. Germination : 70-85% Max. Inert matter : 2%
Truthful level seed	<div><div>Ø</div>It is the category of seed produced by cultivators, private seed companies and is sold under truthful labels.</div> <div><div>Ø</div>But field standard and seed standard should maintain as per seed act and certified seed stage. Under the seed act, the seed producer and seed seller are responsible for the seed.</div>	Genetical purity :-98% Physical purity: >98% Min. Germination :70-85% Max. Inert matter : 2%

Seed Standards for rapeseed-mustard

Factor	Maximum permitted (%)*	
	Foundation	Certified
Pure seed (minimum)	97.0%	97.0%
Inert matter (maximum)	3.0%	3.0%
Other crop seeds (maximum)	10/kg	20/kg
Other distinguishable varieties (maximum)	0.10% (by number)	0.50% (by number)
Total weed seeds (maximum)	10/kg	20/kg
*Objectionable weed seeds (maximum)	5/kg	10/kg
Germination (minimum)	85%	85%
Moisture (maximum)	8.0%	8.0%
For vapour-proof containers (maximum)		
Mustard	5.0%	5.0%
Rapeseed	7.0%	7.0%

Scientific recommendations for quality seed production of rapeseed-mustard

1. Selection of suitable varieties: The DRMR-150-35, NRCHB-101 and PM-28 of Indian mustard and TS-38 of toria are the suitable varieties for Assam. The crossing systems of different rapeseed-mustard crops are as

follows:

Crops	Species	Crossing system
Rapeseed	<i>B. rapa</i> (Toria)	largely cross pollinating
	<i>B. rapa</i> (Brown sarson)	largely cross pollinating
	<i>B. rapa</i> (Yellow sarson)	largely self pollinating (5-16% CP)
	<i>B. napus</i> (Gobhi sarson)	largely self pollinating (5-16% CP)
Mustard	<i>B. juncea</i>	largely self pollinating (7-18% CP)
	<i>B. carinata</i>	largely self pollinating (8-26% CP)

2. Selection of land: Well drained, leveled, and light to medium textured sandy loam-to-loam soils with pH 7.

3. Land preparation: In Irrigated condition, first ploughing with soil turning plough followed by 3 to 4 harrowing or ploughing with planking after every ploughing. Pulverize the soil before sowing. In rainfed condition, disc harrowing after every effective shower in monsoon followed by planking to conserve soil moisture and avoid clod formation. Pulverize the soil by cultivator before sowing.

4. Optimum sowing time: In Assam, the sowing time stretches up to mid November for mustard and Up to last November for toria. Sow the crop when the maximum day time temperature is about 30°C.

5. Seed Rate: 4-5 kg/ha for mustard and 6-7 kg/ha for toria in irrigated condition. Keep 25% higher seed rate in rainfed condition.

6. Seed treatment: For white rust and downy mildew diseases use 6 g Metalaxyl (Apron 35 SD) and for Sclerotinia rot, use 2 g Carbendazim/ kg seed.

7. Sowing method and spacing: Irrigated: 30X10 cm (33 plants/ meter²) and rainfed: 45X15 cm (15 plants/ meter²). Therefore, line sowing by seed-cum-fertilizer drill is useful.

8. Isolation distance: The recommended isolation distance for toria and mustard from other crops of same family for different classes of seed is as follows.

Crops	Foundation seed (Meter)	Certified Seed (Meter)
Toria	200	100
Mustard	200	50

9. Fertilizer management: Under irrigated condition, use 60 kg Nitrogen, 40 kg Phosphorous, 40 kg Potash and 20 kg Sulphur per hectare. Under rainfed conditions, use 40 kg Nitrogen, 35 kg Phosphorus, 15 kg Potash and 20 kg Sulphur per hectare. Use Borax @ 10 kg/ha.

10. Thinning: To keep an optimum plant population per unit area and uniform plant growth, thinning operation by removing the extra plants should be done 15 to 20 days after sowing to maintain 10-15 cm plant to plant and 30 cm row to row distance.

11. Intercultural operation: Intercultural operation should be done 25-30 days after sowing.

12. Irrigation: Apply first irrigation in rapeseed-mustard at bud initiation stage (35-40 DAS) and second at the silquae formation stage (60-70 DAS).