

Preparation of Stecklings of Root Vegetables and their Planting for Seed Production

EXERCISE

17.1 Preparation of stecklings by raising mother roots of carrot, radish and turnip

17.2 Planting of stecklings for seed production of root vegetables

Exercise 17.1: Preparation of stecklings by raising mother roots of carrot, radish and turnip

OBJECTIVE:

- Preparation of root stecklings for quality seed production of root vegetables

Delivery schedule: 01 period

Student's expectations/learning objective:

- The importance of stecklings in seed production of root vegetables
- To demonstrate the growing of root crops and to prepare stecklings from their roots

Pre-learning required: Introduction to seed production of root vegetables

Handouts/material/equipment's & tools required: Paper sheet and pen to note down the instructions, roots of radish or carrot or turnip or beet root, knife, digging hoe *etc.*

Introduction:

Root vegetable crops are cross pollinated in nature and therefore, seed production has to be taken up very carefully. Carrot, radish and turnip belong to two groups namely Asiatic and European. The Asiatic types produce seed under plain conditions whereas European types can produce seeds only in the hills as their roots need low temperature (around 10°C) for 4-8 weeks to transform into reproductive phase.

Procedure/methodology:

Step I: Raising of mother roots for preparation of stecklings

1. Selection of a variety

2. **Time of Sowing:** For seed production purpose, adjust sowing time in such a way that roots must get ready by the onset of winters for receiving chilling stimulus particularly in European types. In hills, autumn sowing preferably may be done in early October.

3. **Production technology:** Follow the production technology as follows to raise the roots for the preparation of stecklings.

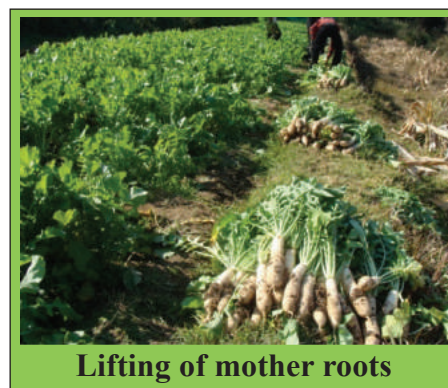
Agronomic practices	Carrot	Radish	Turnip	Beet root
Seed rate (kg/ha)	6-7	10-12	4-5	8-9
Spacing (row to row × plant to plant)	30 cm × 5 cm			45-60 cm × 10 cm
Farmyard manure (t/ha)	10			
N: P ₂ O ₅ : K ₂ O (kg/ha)	50-90: 40-80: 40-80 Full dose of farmyard manure, phosphorus, potassium and half dose of N should be applied at the time of transplanting. Remaining nitrogen should be top dressed in two equal installments at an interval of one month each.			
Weed management	Pre-emergence application of Propazine @ 1.12 kg/ha has to be done. Earthing up is also essential for better growth and development of roots.			
Critical stages of irrigation	Initiation of root and root development stage			

4. Methods of seed production

a) **Root to seed method:** This method is most effective for the quality seed production as only true-to-type roots are selected for the seed production. The stecklings are prepared after uprooting the roots which simultaneously confirm the varietal characteristics, especially the underground economic part (root).

b) **Seed to seed method:** In this method, seed is sown in the field and plants are not uprooted. This may result in mixture of seed if any off-type plant is left in the field.

5. **Selection of roots:** Uproot the plant when the roots have attained proper size (60-70 days after sowing) depending upon the variety. Spring radishes are ready for uprooting with in 30-40 days of



sowing. After harvesting, examine each root critically for foliage and root characteristics namely, size, shape, colour, texture, sponginess *etc.* Reject roots having off-type foliage, roots not conforming to varietal characteristic, diseased, malformed, forked *etc.*

6. **Preparation of stecklings from selected roots:** After selection, hold the top/foliage of roots in your hand just near the shoulder of the root and cut the foliage which remains out of your fist. Cut $\frac{1}{3}^{\text{rd}}$ of lower root portion in Asiatic types where as whole roots are used in European varieties.



Stecklings ready for planting

Exercise 17.2: Planting of stecklings for quality seed production of root vegetables

OBJECTIVE

- Quality seed production in root vegetables by planting stecklings

Student's expectations/learning objective:

- To demonstrate the planting of stecklings for seed production of root vegetables
- Acquaintance with the additional practices to be followed for the quality seed production of root vegetables

Pre-learning required: Isolation distance, rouging and inspections to maintain the purity and identity of a particular variety

Handouts/material/equipment's & tools required: Paper sheet and pen to note down the instructions, stecklings and the other inputs to raise the seed crop

Procedure/methodology:

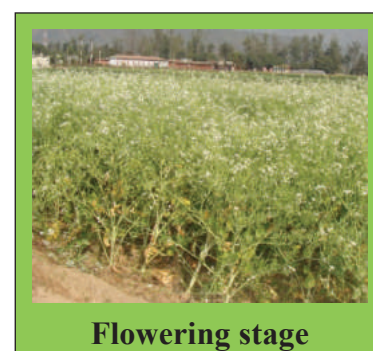
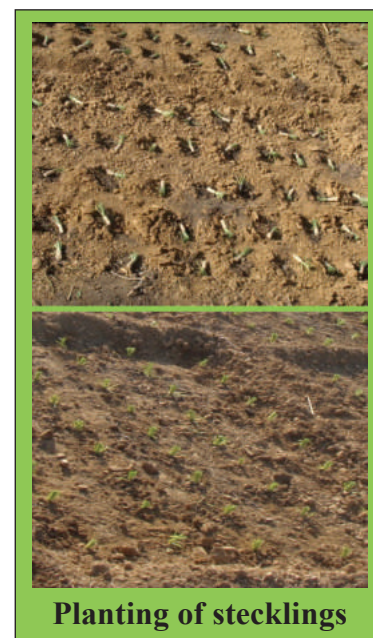
1. **Isolation requirements:** Maintain at least 1600 meters of isolation distance between two varieties of radish for production of foundation seed and that of 1000 meter for certified seed. In carrot, maintain isolation distance of 1000 m and 800 m between two varieties for production of foundation and certified seed, respectively.
2. **Step II: Planting of stecklings:**
 - Prepare the field to fine tilth by one deep ploughing followed by 2-3 harrowing and then level it. Make plots of convenient size by providing irrigation and drainage channels.

- Add 200-250 q/ha of well rotten farmyard manure at the time of preparation of land.
 - Prepare small pits according to the size of the steckling at a spacing of 60 cm × 45 cm in Asiatic type and 45 cm × 45 cm in European type radishes. In carrot, the spacing is 45 cm × 45 cm and 45 cm × 30 cm in the respective group.
 - Also, apply 35kg nitrogen, 50kg phosphorous and 50kg potassium per hectare as basal dose. Mix the fertilizers thoroughly so that the roots do not come in direct contact with fertilizers.
 - Plant the stecklings carefully so that top foliage remain above ground level.
 - Irrigate the field immediately after planting the stecklings.
 - After one month of planting of stecklings one weeding and earthing up should be done along with top dressing of nitrogen @ 35 kg /ha.
 - Irrigate the crop at 8-10 days interval depending upon the weather conditions.
3. **Rouging and field inspections:** Off type plants and early bolters should be uprooted (rouged) from the field. Normally, three rougings are done at following crop growth stages:
- Before maturity of roots for off type foliage.
 - At the time of steckling preparation.
 - At flowering stage to remove early and late bolters.

4. **Harvesting and threshing:**

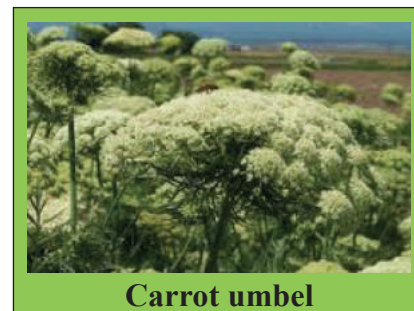
Radish

- Harvest the crop when 75% of the siliquas have attained maturity.
- Keep the crop in a heap for curing for 2-3 days for uniform seed maturity.
- Dry the crop by spreading it in the open sun for 5-7 days.
- Thresh the siliquas by trampling or beating with sticks.
- After threshing, winnowing is done to remove the chaff.
- The seed is graded through sieves and dried to 6 per cent moisture level before storage.



Carrot

- Carrot plant bear compound umbels. It is the king umbel (primary umbel) or umbel of the first order that flower first. Secondary, tertiary and other orders of umbels flower at an interval of 8-12 days from each-other.
- The best time of harvest is when the secondary umbels (heads) are fully ripe and tertiary heads begin to turn brown.
- Seed is commonly harvested manually in 2-3 pickings.
- After drying, heads are threshed and seed cleaning is done.
- After cleaning the seed is rubbed by hand to remove the bristles on the surface and is graded through sieves.
- Before storage, the seed moisture content should be 8%.



5. Seed Yield

Radish

- Asiatic types : 9-12 q/ha,
 - European types : 4-5 q/ha
- 1000 seed weight is about 10g.
- Carrot : 5-6 q/ha

a. Specific requirements

Factors	Minimum permitted limits (%)	
	Foundation	Certified
*Roots not confirming the varietal characteristics (including for seed)	0.10	0.20
**Off Types (Plants)	0.10	0.20
Plants infected by seed borne diseases	0.10	0.50

* Maximum permitted at second inspection at mother root production stage.

** Maximum permitted after flowering and at seed production stage.

- Seed borne diseases to be considered are Black rot and Black leg

Seed Standards

Factors	Standards for each class			
	Radish		Carrot	
	Foundation	Certified	Foundation	Certified
Pure seed (minimum) %	98	98	95	95
Inert matter (maximum) %	2	2	5	5
Other crop seed (maximum) Numbers/kg	5	10	5	10
Total weed seeds (maximum) Numbers/kg	10	20	5	10
Germination (minimum) %	70	70	60	60
Moisture (maximum) %	6	6	8	8
For vapour proof containers (maximum) %	5	5	7	7

EXERCISE:

1. List the steps to raise the seed crop of radish by planting root stecklings and then follow these steps to produce the quality seed of carrot.