Practical-18

Seed Production Technology of Cucurbits

EXERCISE

18.1 Raising crop of cucurbits for quality seed production.

18.2 Method of seed extraction in cucurbits and maintaining seed standards.

Exercise 18.1: Raising crop of cucurbits for quality seed production.

OBJECTIVE:

- Quality seed production of cucurbitaceous vegetables.

Delivery schedule: 01 period.

Student's expectations/learning objective:

- To demonstrate the growing of cucurbits for seed production.
- Additional production procedures to be followed to maintain the identity of a variety.

Pre-learning required: Agronomic practices for raising the cucurbitaceous vegetables.

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

Introduction

The seed production is taken up for a particular variety(ies) which is/are recommended for cultivation in a specific region(s) and has demand among the farmers. Therefore, the basic requirement of seed production is availability of improved varieties/hybrids. The variety should be notified for certified seed production however, any variety can be multiplied for Truthfully Labeled Seed (TFL). Procure nucleus/ breeder/ foundation seed from source approved by a seed certification agency.

Procedure/methodology:

1. **Isolation requirements:** The cucurbits are cross pollinated in nature and in general, bear monoecious flowers. The honeybees are major pollinator and thus, an isolation distance is required between different

varieties and species of cucurbits to separate the fields to maintain purity of the seed. The isolation distance is as under:

Certified seed : 400 m

Foundation seed : 800 m

Breeder seed : 1000 m

It is further important to mention that different species of cucurbits have the ability to cross with each other *e.g. Cucumis* species (muskmelon, long melon and snap melon), *Cucurbita* species, and cucumber with its wild relative *Cucumis hardwickii.*

2. **Season of seed production:** Seed crop must be grown in such a season that remain dry at seed maturity and seed extraction. Rainy season is suitable over summer season for raising seed crop as monsoon rains recede by the time seed crop mature.

3. **Soil conditions and preparation of field:** Cucurbits prefer well-drained soils such as loamy sands. The land should be free of volunteer plants. The soil of selected fields should be well aerated. Prepare the field to a good tilth by one deep ploughing, two to three harrowings followed by leveling.

4. **Agronomic practices:** Follow the cultivation practices similar to that of green crop production of different cucurbits.

S. No	Crop	Time of planting	Spacing (cm)	Seed rate (kg/ha)
1	Cucumber	Jan-Feb June-July	120-150 × 100-120	4-5
2	Bitter gourd	Jan-Feb June July	100-150 × 100-120	5-6
3	Bottle gourd	Jan-Feb June July	300 × 100	6-8
4	Ridge/Sponge gourd	Jan-Feb June- July	100 × 50	4-5
5	Watermelon	Jan-Feb April-may	200 × 150	5-6
6	Muskmelon	Jan-march April-may	200 × 100-150	4-5
7	Pumpkin	Jan-Feb June-July	200 × 100-150	6-8

5. **Training of vines:** During monsoon season, cucurbits such as cucumber, bitter gourd, ridge gourd, sponge gourd and bottle gourd are allowed to grow on a pandal or bowers made of bamboos and sticks to harness better yield. Staking help to avoid direct contact of fruits with wet soil which otherwise cause fruit rotting. The growth and development of hanging fruits is better than those lying on the ground surface.

6. **Rouging:** Seed crop is required to be monitored at various stages of its growth for removal of off-type plants. Any variation in the specific characters in any of the plants of the variety grown for seed are rouged out. The most critical stages to carry out rouging are as under:
   - Before flowering to remove off-type plants to avoid natural cross-pollination.
   - Fruit set and fruit development stages.

7. **Field inspections:** A minimum of three inspections should be made, the first before flowering, the second during flowering and fruiting stage and the third at the mature fruit stage prior to harvesting.

8. **Maturity of fruits:** The maturity of different cucurbits for seed extraction can be adjudged from change in fruit colour on the vines. The stage at which different cucurbits should be harvested are as under:
   - Cucumber and summer squash: green to pale yellow or golden yellow
   - Bitter gourd and snake gourd: Fruit turn to bright yellow.
   - Bottle gourd: Fruit colour fade to straw green or pale yellow.
   - Pumpkin: Fruit redden and seeds inside the shell break readily from pulp.
   - Muskmelon: Full slip stage.
   - Watermelon: Fruits are ready to harvest at edible maturity, fruit colour change from green/white to pale yellow at under side of the fruit.
   - Luffa: Complete drying/fruit turn to grey colour.

EXERCISE:

1. Grow cucumbers for seed production by following all essential cultural practices and principles of quality seed production.

Exercise 18.2: Methods of seed extraction in cucurbits and maintaining seed standards

Objective:

- Seed extraction of cucurbitaceous vegetables.

Delivery schedule: 01 period.

Student's expectations/learning objective:

- To demonstrate the methods of seed extraction of different cucurbits.
- Post-harvest handling.

Pre-learning required: Cultivation technology for raising different cucurbits.

Handouts/material/equipment's & tools required: Paper sheet and pen to note down the instructions, mature fruits of cucurbits, bucket, water *etc.*

Seed Extraction Methods: There are two method of seed extraction which are used to extract the seed in cucurbits.

1. **Dry method:**
   - Harvest the mature fruits.
   - Dry the fruits in the sun.
   - Cut one side of the fruit and shake it.
   - The seeds come out from the fruit.
   - Collect the seed and dry for few days.
   - This method is applicable in snake gourd, sponge gourd and ridge gourd.

2. **Wet method:** The seeds of different cucurbits are extracted as under:

   a) **Mechanical Extraction:**
      - In this method, the fruits are cut into pieces and macerated by machine.
      - The pulp is removed by washing under running water and seeds are separated out from pulp.
      - This method is quick, less expensive and seeds retain good luster but require good amount of water.

- This method is applicable in bottle gourd, watermelon, round melon and ash gourd.

Immature stage

Mature cucumber fruit

Extraction of seed

b) Natural Fermentation:

- Cut the fruits of cucurbits into two halves.
- Scoop out the seeds along with placental material.
- Keep this material in plastic or steel vessel for 48 hours at room temperature and stir it 2-3 times.
- Then, wash the seed thoroughly with water.
- The main drawback of this method is discolouration and poor luster of seed.
- Fermentation is usually avoided for seed extraction in almost all cucurbits because the seeds get discolored and also germination potential of the seeds is reduced.

c) Chemical Extraction:

- Cut the fruits of cucurbits into two halves.
- Scoop out the seeds along with placental material.
- Keep this material in plastic or steel vessel and add 25-30 ml. of HCl or 8-10 ml. of commercial H_2SO_4 @ 5 kg of pulp and mix some quantity of water in it.
- Stir the pulp to enhance the separation of seed and keep it for 30 minutes.
- The pulp floats and seeds settle down.
- Then, wash the seeds thoroughly with clean water.
- This is quick method but quantity of acid and time must be given due care otherwise seed viability get reduced.

Seed Yield:

S. No.	Crop	Average seed yield(kg/ha)
1	Cucumber/pumpkin	400-500
2	Bitter gourd	250-300
3	Bottle gourd	300-400
4	Ridge/sponge gourd	200-250
5	Water melon	200-300
6	Musk melon	150-200

Seed standards

S. No.	Factors	Standards for each class	
		Foundation	Certified
1	Pure seed (min) %	98	98
2	Inert matter (min) %	2	2
3	Other crop seeds (max)	5/kg	10/kg
4	Total weed seeds (max)	none	none
5	Objectionable weed seeds (max)	none	none
6	Germination % (min)	60	60
7	Moisture % (max)	7	7
8	Moisture % for vapour proof containers (max)	6	6

EXERCISE:

1. Collect some mature fruits of cucumber and extract the seed by following fermentation method.