



**FACULTY OF AGRICULTURAL SCIENCES  
AND ALLIED INDUSTRIES**

## SEED PRODUCTION IN SOLANACEOUS VEGETABLES

First the seeds are raised in nursery and the seedlings are used for transplanting..

### **Nursery bed preparation and management**

Nursery bed should be in other field and not under shade. Apply farm yard manure to the nursery area and incorporate well before formation of raised nursery beds. The bed size of 1m breadth, 2m length and 30cm height will be ideal for nursery. The soil should be porous and loose for easy penetration of roots. The lines are drawn at 10cm apart. Seeds are sown sparsely at 1cm depth and covered with river sand. Water with rose can be irrigated initially and later. Seeds germinate within 8 days. Drench the beds with fytolan (copper oxy chloride) @ 5 g/lit of water once in 7 days to prevent damping off disease. Apply 2Kg of DAP 10 days prior to pulling out of seedlings. Spray Rogar or Metasystax @ 1ml/lit of water, if sucking pests are noticed.

Seedlings are transplanted to main field at the age of 35-40, 25-30 and 30-35 days respectively in Chillies, Tomato and Brinjal. Fruits are harvested when fruit colour changes from green to red in chillies and tomato and to yellow colour in brinjal.

### **Hybrid Seed Production**

In vegetable crops, hybrid seeds are produced by adopting emasculation and dusting method.

## **TOMATO**

### **Steps involved in hybrid seed production programme**

#### **1. Inbred line development**

The genotypes which are to be utilized for heterosis breeding programme should be uniform for economic traits.

#### **2. Combining ability**

At least one parent should have high general combining ability for producing

heterotic hybrid. The following are the good general combiners on the basis of various economic traits.

1. EC-129599 x Chico Grande
2. Chico grande x Balkan
3. Ec 129599 x Pusa Gawar
4. balkan x ussr 1056, Pusa 120 x PR -A 5 . Pusa 120 - Pusa guwvra, 130041-PR4
6. Red jacket x Meeruti
7. Pusa rubi x Best of all
8. Pusa 120 x Chico grande .

The cost of seed is very high due to hand pollination

### **Hand pollination**

Buds emasculated 12-14 hr before the opening of flowers of male parents they are bagged at bud stage and are picked up in the after noon. The pollen is collected in dry petridishes as stamens are hygroscopic. The receptivity of stigma and anther dehiscence is 24-36 hr before the opening of flowers. Pollination is generally done in the morning hours between 7.00 am to 1.00 pm . The cost of hybrid seed can be reduced by the use of male sterile line. Four types of male sterility have been found in tomato.

1. Sterile pollens
2. Stamen less flower
3. Positional sterility
4. Functional male sterility

Tomato is predominantly self pollinated crop and parental lines are maintained by continuous selfing. Hybrid seeds of COTh 1 was produced by hand emasculatation and pollination .

### **Crossing technique**

1. Raise the crop of pollen and ovule parents during optimum season
2. Select one or two well developed buds of ovule parent which will open next day
3. Emasculate the flower buds in the evening by removing the anther cone using the clean and pointed forceps or head pin
4. Cover the emasculated flowers with butter paper cover of constant size of 10x5 cm
5. Cover the flower bud to be used as pollen parent
6. Use covers of different colours for pollen and ovule parent
7. Collect the pollen 7am -10am

8. Dust the collected pollen on the receptive stigma of emasculated flower
9. Cover the crossed flower and allow for 7 days to set fruit and remove the cover after ensuring fruit set
10. Harvest fully matured fruits and extract seeds
11. Grade the seeds after treating with Captan or Thiram 2g/kg in 150 gauge polythene aluminium bags

### Field standards

A. General requirements Contaminants	Minimum distance (M) Foundation Certified
Field of other varieties including commercial hybrid of the same variety	200 100
Between parental lines	- 5

## Specific requirements

Factor	Maximum permitted (%)	
	Foundation	Certified
Off types in seed parent	0.010	0.050
Off types in pollinator	0.010	0.050
Fertile segregant (pollen shedding cymes) in seed parent	0.050	0.100
Plants affected by seed borne disease	0.100	0.500

## SEED EXTRACTION TECHNIQUES IN TOMATO

### Fruit Grading

Based on fruit size and shape true to type fruits are selected for seed extraction and large to medium sized fruits alone to be used for extraction of higher seed recovery in tomato, chilli, brinjal. In tomato seeds are extracted from fully ripened (reddish) fruits by different methods. They are

#### (I) Fermentation method

The fruits are pulped by trampling under foot or using a pulper and collect the pulp in plastic container or cement tank. The pulp is allowed to ferment overnight. The next day seeds get separated from the pulp. The floating fraction is removed and discarded and the sinkers (Due to bacterial degradation the seed is fermented and settle down in the bottom of the container) are collected, washed well and dried in the shade and then in sun between 8 -12 Noon and 2-5 pm.

#### (II) Hydrochloric acid method

The fruits are pulped by trampling under foot or by using a pulper and collect the pulp in a plastic container or cement tank. Add commercial hydrochloric acid @ 10ml Kg<sup>-1</sup> of pulp and keep it for 20-25min with occasional stirring. The seeds get separated from the pulp and sink to the bottom. The floaters can be removed by discarding. The seeds are collected, washed well with water 3-4 times and dried in shade. The advantages of this method are the seeds are attractive in colour, recovery is very high, remove the external seed borne pathogens and do not clog each other while drying. Seed quality is also very high. Seed recovery is 0.8-1.0 %. The cost of seed extraction is Rs.20/kg.

#### (III) Alkali method

Seed are also extracted by alkali method and citric acid method but are injurious to seed storage.

#### **(IV) Mechanical extraction**

Tomato seeds are also extracted by using tomato seed extractor or pulper for large scale seed extraction. The seed extraction consists of two units operated by electric motor, one is fruit pulper or crusher and second one is seed and pulp separator. The whole unit is made up of stainless steel. Here extraction is immediate seed recovery is high and pulp/juice can be further used for making by product like jam, jelly etc., The cost of seed extraction is Rs.7.5/kg.

Vegetable seed production is completely different from vegetable production where the fully matured reproductive part is not the economic produce. The reproductive part in younger stages are consumed as vegetables in most cases.

Vegetables broadly can be classified as solanaceous vegetables (Tomato, Brinjal and Chillies) malvaceous vegetables (Bhendi), cucurbitaceous vegetables (Snakegourd, Ribbedgourd, Bittergourd, Ashgourd, Pumpkin and Bottlegourd) and cruciferous vegetables (Carrot, Cabbage, Knolkhol, Cauliflower) based on the family origin. The leafy vegetables are Amaranthus, Lettuce, Spinach and Fenugreek where vegetative part is used for consumption.

## **SEED PRODUCTION IN CUCURBITACEOUS VEGETABLES**

### **Floral biology**

Cucurbits are highly cross pollinated and female and male flowers are borne in the same plant at different places and in different proportions. Seasonal variations will influence the proportion of female and male flowers in most of the cucurbits.

### **Method of seed production**

The seeds of varieties are produced by open pollination raised under isolation.

### **Stages of seed multiplication**

Breeder seed ---> Foundation seed ---> Certified seed

### **Land requirement**

Sandy loam or soils rich in organic matter with good drainage is preferable. The land should be free of volunteer plants and wild varieties of cucurbits.

### **Seed standards (Bittergourd, Snakegourd, Ribbedgourd, Ashgourd and Pumpkin)**

<b>Factors</b>	<b>FS</b>		<b>CS</b>
Physical purity (%)		98	98
Inert matter (%)	2	2	
Other crop seed (%)	0	0	
Weed Seed (%)	0	0	
Germination (%)	60	60	
Moisture content (%)			
a. Open storage	10	10	

### **Physiological Maturity (PM)**

It is the stage at which the seed attains its maximum dry weight and marked with highest viability, vigour and germination potential (Harrington, 1972). The SMC at PM at PM varied in different crops like wheat (33-40; 43-50%), maize (30-45 %, barely (42- 48%), oats (36-45 %), regegrass (38-44%), timothy grass (32-38 % soybean 44-60 %), pea (54-62 %), early pigeon pea (37-41%) and mungbean 19-25, 25-40%).

### **Harvestable Maturity (HM)**

Seed maturation began at the end of seed development and continue unto harvest (Abdul - Baki and Baker, 1973).The change that occurred in the seeds was mainly dehydration without accumulation of reserves, mainly dependent on atmospheric dry conditions. Moisture content at this stage is about  $20 \pm 5\%$

Many workers suggested maturity indices used to mark PM and HM in various crops, the Seed Moisture Content as one of them through varies with location to location, environmental conditions and also varietal differences results (Khattar and Singh, 1995).



## **Threshing**

Time of harvest and methods both have to be arranged so as to give the best chance that the resulting seed will have good viability and vigour. Time of harvest has to be adjusted to ensure that the seed is sufficiently mature, usually indicated by Seed Moisture Content and appearance of plants. If harvest is too early, the seeds may become shrivelled on drying and although viability may be satisfactory at the start, it can deteriorate in store, processing losses are also liable to be high. On the other hand, if harvest is delayed too long (over maturity), some seeds may be shed and the remainder be so dry that is liable to be damaged during threshing and processing. Safe moisture content at which to begin harvest varies with the crop; wheat crop can normally be harvested when moisture content is below 20 % while tetraploid rye grass can be harvested at 40 % or below. The moisture content below 10 % for wheat and 35 % for ryegrass can pose problems with shedding or other losses.

There are two main ways in which a seed crop can be harvested. First the plants may be cut allowed to dry in the field before threshing or secondly the seeds may be removed immediately from the plants (Combine threshing) and taken from the field for further processing. The crops which ripen uniformly are particularly suited to this method. A seed crop is always preferred to cut when the Seed Moisture Content is higher than desirable for safe storage (6-14%). It is important to completely thresh the seed while avoiding mechanical damage that results in decreased germination and seed vigour.

## IMPORTANT QUESTIONS:

1. Write down the seed production technology in following crops:
  - a) Rice
  - b) Maize
  - c) Bajra
  - d) Groundnut
  - e) pulses
  - f) Tomato
  - g) Brinjal
  - h) Potato
  - i) Bhindi
2. What care should be taken during foundation and certified seed production of crops?
3. Explain the hybrid seed production technology of maize crop.
4. Briefly explain three line system of hybrid seed production in rice.
5. Define staggered planting with example.