

## Brinjal

- Botanical name: *Solanum melongena*
- Family: **Solanaceae**
- Chromosome no. (2n) = **24**
- Origin: **Indo-Burma region**
- Common name: **Egg plant**

### Importance and uses

- Brinjal can be grown in almost all parts of India except higher altitudes, all the year round.
- The brinjal is of much importance in the warm areas of far east, being grown extensively in India, Bangladesh, Pakistan, China and Philippines. It is highly productive and usually finds its place as the poor man's crop.
- In World, unripe fruit is primarily being consumed as a cooked vegetable in various ways. The white brinjal is said to be good for diabetic patients.
- Bitterness in brinjal is due to presence of glycoalkaloids (as solasodine). The discolouration in brinjal fruits is attributed to high polyphenol oxidase activity.

**Origin, taxonomy and botany:** The brinjal, eggplant or aubergine (French name), a normally self-fertilized annual is of uncertain origin. The cultivated brinjal is undoubtedly of Indian origin. Vavilov (1928) was opinion that its centre of origin was in the Indo-Burma region. It belongs to family Solanaceae and known under the botanical name *Solanum melongena* L. There are 3 main botanical varieties under the species *melongena* e.g. *var. esculentum*, *var. serpentine* and *var. depressum*.

### 1. Based on growth habit brinjal can be classified as below:

- i) *Solanum melongena var. esculentum*: Fruit is long, round or egg-shaped and oval.
- ii) *Solanum melongena var. serpentine* known as snake brinjal. Fruit is extra ordinarily long and slender types. Leaves are prickly.
- iii) *Solanum melongena var. depressum*: plant is extensively short and dwarf.

### 2. Classification on the basis of fruit shape:

- i) Long brinjal: Pusa purple long (PPL)
- ii) Round brinjal – Pusa purple round
- iii) Oval brinjal – Pusa kranti.

### 3. Classification on the basis of fruit colour:

Purple brinjal: they have no anthocyanins. Eg: PPL.

Green brinjal: more of chlorophyll. Eg: Arka kusumakar

Brinjal is an annual herbaceous plant. Roots are usually tap but on transplanting its changes as fibrous as is true with tomatoes and peppers. The above ground portion of plant is erect, compact and well branched. The leaves are large, simple, lobed and the underside covered with dense wool-like hairs. Inflorescence is often solitary but sometimes it constitutes a cluster of 2-5 flowers. The flowers are large showy with the corolla purple in colour. The flowers are hermaphrodite and stamens dehisce at the same time the stigma is receptive so that self-pollination is the rule, although there is some cross-pollination by insects. The fruit is pendant and is a fleshy berry borne singly or in clusters. There are 4 types of flowers, depending on the length of styles.

**Flowers in brinjal are of different styles.**

**a.** long style **b.** medium style **c.** short style **d.** pseudo short style.

Brinjal is a self pollinated crop.

Only **long style and medium style flowers** will set fruits. Entire plant surface is covered by 'hairy layer called 'tomentum'.

**Long styled flowers:** they have a big ovary, stigma is swollen, long anthers.

**Medium styled flowers:** it has medium, long style, anthers are of same length, ovary is also medium sized.

**Short styled flowers:** they have rudimentary ovary.

**Pseudo short styled flowers:** ovary is rudimentary. Style should be shorter than the anther. No swelling of anther is observed.

**Climate:** Brinjal is the warm season crop. It is susceptible to severe frost. It requires a long warm season, before fruit maturity. Optimum temperature is 20 to 30°C. Late round varieties are more tolerant to frost than early long varieties. Under very cool seasonal conditions, the ovaries are split leading to the development of abnormal fruits.

**Soil:** Brinjal can be grown on a wide range of soils. The ideal soils should be a deep, fertile and well drained. The pH should be between 5.5 to 6.6 for better growth and development. Light soils are good for a healthy crop but heavy soils are suited for higher yields.

**Varieties:** Brinjal varieties are grouped on the basis of colour and shape of fruit.

**Long fruit varieties:** ex. **Pusa purple long:** evolved as a selection from mixed batia.

**Pusa purple cluster long:** is an early maturing variety.

**Long green varieties:** arka kusumakar, arka shirish, Krishna nagar green long.

**Round purple:** ex: **Pusa purple round:** is resistant to fruit borer and little leaf of brinjal. Selection-6, suphala, arka navaneet, krihsna nagar purple round, pant ritu raj, vijaya hybrid, shyamala.

**Round green:** banarasi gaint, round striped.

**Roundish white:** some varieties under this group have purplish tinge with white stripes. Ex: Manjeri, Vaisali.

**Oval or Oblong fruited varieties:** Junagad oblong, Bhagyamati, H4., Pusa anmol (**Pusa anmol** is a hybrid variety between **pusa purple long and hyderpur**).

**Cluster fruited varieties:** fruits born in cluster. Ex: pusa purple cluster, arka kusumakar, **Bhagyamathi (APAU variety)**.

Spiny varieties: H-4, Manjeri

**Hybrids:**

Pusa Anmol: Pusa purple long X Hyderpur

Arka Navaneet: IIHR22-1 X Supreme

**Time of sowing:** In plains crop is grown in three seasons, summer crop is sown during February - March and *rabi* crop is October to November. In hills, seed is sown in April-May and the seedlings transplanted in May-June.

**Seed rate:** Seed rate varies from 350 to 500 g per hectare.

### **Nursery bed preparation:**

- Seeds are sown in the area of 250 m<sup>2</sup>. A raised bed prepared by well decomposed FYM is mixed @ 4kg FYM per m<sup>2</sup> of nursery bed. A fertilizer dose of 0.5 kg N, P, K per bed is also mixed in the soil.
- Seeds are treated with fungicides (Thiram or Bavistin @ 2g/kg) and 40% formalin solution at 500ml/m<sup>2</sup> area of nursery bed sterilisation.
- During summer and rainy season, there is very heavy incidence of damping off. To protect seeds and seedlings, the beds should be treated with 10% formaldehyde. After fumigation the beds are covered with polythene for 24 hours.
- Seeds are sown 4 to 5 days after removal of polythene sheets. In line sowing 7.5cm distance is kept between the rows. The beds are covered with straw or polythene till the seeds germinate.
- Seedlings are protected against wind, exposure to sun and excess rainfall. Fungicides are sprayed weekly to avoid of damping off. Nursery can also be grown in poly house. Hardening is done by withholding water 4-5 days before uprooting seedlings.
- Adding 4,000ppm sodium chloride or spraying of 2,000ppm CCC is effective for hardening of seedlings.

### **Transplanting:**

- Seedlings are of 8 to 10 cm height with 2 to 3 true leaves are ready for transplanting. Seedlings should be hardened before lifting for transplanting.
- The summer crop may be transplanted on ridges and furrow system for effective use of water. Hardening of seedlings is achieved by withholding water for 4 to 6 days before transplanting.
- Light irrigation should be given on due day of nursery pulling. Seedlings are pulled without any injury to the root. At the time of transplanting soil around the seedlings is pressed firmly.
- Distance of transplanting depends on soil fertility, climatic conditions and varieties. Long fruited varieties are transplanted at a spacing of 60 cm x 60 cm. Round fruited varieties at 75 cm x 75 cm.

### **Manuring:**

- Brinjal occupies the land nearly 6 to 8 months, about 25 to 30 tons of well decomposed FYM is incorporated in the soil before transplanting in one hectare.
- NPK @ 100, 80, 60 kg per ha is generally applied, ½ of nitrogen, full quantities of P and K is applied at the time of transplanting while the remaining quantity of nitrogen may be applied either twice or thrice depending upon soil conditions at 30 days, 45 days after transplanting.

### **Irrigation:**

- Brinjal is a **shallow rooted** crop it needs frequent irrigation. The crop is irrigated at 3 to 4 day interval during summer season 12 to 15 days during winter season. However during rainy spells irrigation is not needed. Brinjal is generally irrigated by furrow system of irrigation.
- Drip irrigation is recommended to improve water use efficiency and also to reduce weed growth.

**Inter culture:**

- Generally, manual weeding is done to remove weeds. Shallow cultivation is followed to put down the weed growth.
- Mulching in brinjal with black polythene film reduces weed growth, increases crop growth, early bearing and total yield.
- Weeds can be controlled by applying herbicides like fluchloralin @1-1.5 kg a.i. / ha.

**Harvesting:**

- Fruits are harvested when they attain good size and when the surface is bright and glossy appearance.
- If the fruit is too immature we press the fruit the pressed portion springs back.

**Yield:**

In case of open pollinated variety 200 to 500 q per ha. Hybrids 300 to 700 q per ha.

**Chilli and Capsicum****Botanical name**

**Chilli :** *Capsicum annum*

**Capsicum:** *Capsicum annum*

**Family :** Solanaceae

**Chromosome no. (2n) :** 24

**Origin:**

**Chilli from Peru**

**Capsicum from South America**

**Importance and nutritive value:**

- Green chillies are rich in proteins 2.9 g per 100 g. Ca, Mg, P, K, Cu and S. vitamins like Thiamine, Riboflavin and Vitamin C.
- Chillies are the major ingredients in curry powder. In powdered form it is mixed in red or cayenne pepper.
- Pungency of chillies is due to **capsaicin**. The pigment (colour) in chillies is due to **capsanthin** also contains many other oleoresins.

**Botany and floral biology:** Genus capsicum 20 wild species have been reported at only few are cultivated.

- *Capsicum annum* (sweet pepper and chilli): it has blue anthers, milky white corolla.
- *C. baccatum*: it has yellow or brown spots on corolla. Its cultivation is restricted to South America.
- *C. frutescens*: tobacco pepper. It has blue anthers. Milky yellowish white corolla.

**Chilli Varieties :**

- **Andhra Jyothi or G5 (G2 x Bihar variety):** released from Lam Guntur. Fruits are short and called as Gundu types.
- **Bhagya laxmi (G4):** selection from thohian chillies grown largely for green chillies.
- **Sindhuri:** Tall growing and less pungent variety suit for green chillies
- **Baskar/ CA-235:** released from Lam, Guntur. It is a cross between G4 x yellow anther mutant.
- **Prakash (LCA 206):** developed from RARS, Lam Guntur.
- **Hissar sakthi:** multiple resistant variety developed at hissar.

- **N. P. 46A:** Medium, early prolific and pungent variety of IARI (**N.P. means New Pusa**)
- **Arka lohita:** highly pungent variety released from IIHR, Bangalore.

#### **Hybrids:**

- Pusa Jwala- Pusa Red X N.P 46 A
- Pusa sadabahar- Pusa jwala X IC 31339
- Punjab lal- Perennial X long red
- Kiran (x235) -G4 X anther mutant

#### **Bell pepper Varieties:**

- **Arka basant:** released from IIHR, Bangalore. It was improved from the variety Soroksari, suitable for both kharif and rabi.
- **Arka gourav:** pureline selection from golden caliwonder released from IIHR, Bangalore. Fruits are 3 to 4 lobed. Good for kharif and rabi.
- **Arka mohini:** selection from variety known as Taitan. Fruits are 3 to 4 lobed becomes red on ripening. Suitable for both kharif and rabi season.
- **California wonder:** an introduction from US. Fruits are 3 to 4 lobed.
- **Yolo wonder:** plant is dwarf and as medium flesh thickness.
- **Pusa deepthi:** released from Katrain. Suitable for both **kharif and rabi**.

#### **Climate:**

- Chilli is grown in both tropical and sub-tropical areas. It can grow up to 2000 MSL altitude. For vegetative growth, it requires warm humid climate.
- For fruit maturity, it requires warm dry weather. It requires a well distributed annual rainfall of about 800-1200 mm. Heavy rainfall leads to poor fruit set and high humidity leads to fruit rot.
- The crops continue to develop at high temperature but root development is retarded at a temperature of 30°C. Fruit development is adversely retarded at 38°C.
- Average night temperature favours high capsaicin content. Day length of 9 to 10 hours light stimulate plant growth. In general capsicum is grown at low temperature conditions than chillies.

#### **Soil:**

- Chilli can be grown on a wide variety of soils provided. They are well drained, well aerated and rich in organic manure.
- In ill drained soils plants shed their leaves and turn sick. Cannot tolerate water logging conditions.
- Sandy loam soil with adequate irrigation and manuring can support better crop of chilli. Black soils also preferable to grow chillies as rainfed crop.
- Strongly acid soils and alkaline soils are not suitable. Chilli can be grown in saline soils. Seed germination and plant vigour affected by salinity. Ideal pH 6 to 7.

#### **Time of sowing:**

- Chilli seeds are sown in nursery beds during May-July. Sowing is little early in the north east India.
- In south states where rainfed cultivation is in vogue chillies can be in May-June and September to October. In hills it is sown during March to April.

**Seed rate:**

- **1 to 2 kg** seed is required to raise seedlings for hectare. Chilli seed bed are sometimes made in the dimensions of 3 x 3 m, it can accommodate 6000 seedlings and requires about 50 g of seed.
- However, generally nursery of chilli is prepared by following method. Selected area is ploughed to a fine tilth.
- Nursery bed should be prepared to a size of 6 m length 1 m width with a 15 cm raised. Raised beds are preferred than flat beds because on flat beds root development is poor and incidence of damping off is more.
- Well decomposed FYM @ 20 to 25 kg per bed is mixed thoroughly in seed beds in one month advance.
- Seeds are treated with fungicides like Captan 2 to 3 g per litre used to prevent seed borne diseases. Seeds are sown preferably 5 cm lines. Paddy straw used for mulching. Mulching is removed as soon as seeds start germination. Phytolon 0.25 g per litre solution is used to drench the nursery beds at fortnightly intervals against damping off.

**Transplanting:**

- Seedlings ready for transplanting 35 to 45 days. Short thick stem seedlings are preferred for better establishment.
- In older seedling topping has to be done one week prior to transplant. Early seedlings are transplanted singly different spacing 30 x 30 cm, 45 x 30 cm, 45 x 45 and even 30 x 20 were tried in chillies.

**Manuring:**

- It needs good fertile soils supplied humus. Excess nitrogen lead to increase the vegetative growth and delays maturity.
- 10 to 15 tones of well decomposed FYM need to be applied in the last ploughing. Besides that 120 kg N, 60 kg P, 50 kg K per ha is to be applied.
- Entire quantity of FYM, Phosphorus, potassium and half of nitrogen is to be applied at the time of field preparation. Remaining half nitrogen is to be given as top dressing in two equal splits at one month interval of transplanting.

**Irrigation:**

- First irrigation is given just after transplanting for better establishment in the soil. Second irrigation is given 10 days after transplanting.
- During this time gap filling can be taken up. After wards irrigation is given as per the requirement.
- Generally 8 to 9 irrigations have given depending on rainfall, soil type, humidity and temperature. Method of irrigation adopted is ridges and furrows.

**Interculture:**

- Chilli is a slow growing crop cannot compete with aggressive weeds hand weeding or hoeing or application of herbicides need to be done in order to ensure weed free conditions.
- Frequent shallow conditions are under taken to facilitate soil aeration and proper root development. However deep cultivation should be avoided because, it damages roots. Herbicides like Alachlor 2.5 kg per ha can be used on chillies.

**Harvesting:**

- Flowering begins 40 to 60 days after transplanting depending upon variety climate, nutritional status of plant.
- Fruits starts ripening about 3 months after transplanting and picking may go on for 2 to 3 months.
- Commercial chilli variety yield 2-2.5 tonnes per ha. dry pods. and 7.5 to 10 tonnes per ha in normal conditions.
- Green chillies can be stored for about 40 days at 0°C and 95 to 98 % RH. Dried chillies can be kept for a month in dry places well protected from insect pests.