



Eggplant

(*Solanum melongena* L.)



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Department of Agriculture, Forestry and Fisheries



Origin and distribution

Eggplant, *Solanum melongena* L., is a popular vegetable crop grown in the subtropics and tropics. It is called brinjal in India and aubergine in Europe. The name "eggplant" derives from the shape of the fruit of some varieties, which are white and shaped similarly to chicken eggs.

Soil and climatic requirements

Eggplant is a warm-season crop and does not tolerate frost. A long growing season of 80 days is required for the transplanted crop. Optimal temperatures for eggplant production are 26 °C days and 20 °C nights.

Plant growth slows and pollination problems occur at temperatures below 17 °C or above 35 °C. Flowering is not affected by day length.

Cooler temperatures can reduce fruit set. Higher temperatures and high humidity levels also reduce yields. Eggplant can tolerate drought and excessive rainfall. It will not tolerate extended periods of saturated soil owing to the build-up of root-rotting pathogens.

Eggplant does well in a variety of soil textures. Previous crop residue must be stubble-disked to improve soil aeration and to adequately bury organic matter for decomposition. Eggplant grows best with a soil pH of 5,5 to 6,5. Eggplant is usually grown in light or sandy loam soils that provide good drainage and favourable soil temperatures. Eggplant will root to a depth of 90 to 120 cm; therefore, sandy loam or silt loam soils free of physical barriers are better for proper plant growth and development.

Uses

This vegetable is quite diverse and more versatile, both in the garden and in the kitchen. Eggplant has chemicals that can cause digestive upset if eaten raw, so is usually cooked. It can be grilled, stuffed, roasted, served in soups and stews and on kebabs, and used in curries and stir-fries.

Human health benefits

Eggplant is nutritious, being low in calories, fat, sodium and is a non-starchy fruit that is cooked as a vegetable. It contains a large volume of water. It is good for balancing diets that are heavy in protein and starches. It is high in fibre and provides additional nutrients such as potassium, magnesium, folic acid, vitamin B6 and A.

Cultivation practices

Soil preparation

Well-drained, sandy loam soils are ideal for eggplant production. Poorly drained soils usually result in reduced functional root area, poor plant growth and low yields.

Site selection can be important if early eggplant production is required. For early production, select sites with a southern to southwestern exposure. Soil with a southern exposure receives more sunlight in the spring and therefore warms up more quickly.

Plan crop rotation so that eggplant is not planted after eggplant or other solanaceous crops such as tomato or pepper.

Good soil preparation is important for optimum eggplant production. If large quantities of plant debris are present, disk land several weeks before transplanting, then plow land, using a mouldboard plough. This will loosen the soil and bury old crop residue. Turn soils at least 20 cm deep.

Adequate soil preparation facilitates the growth and development of an extensive root system. Plants will then have a larger volume of soil from which to draw water and nutrients, reducing the chance of moisture and nutrient stress. Disking soil after turning can cause recompaction. If planting beds need to be made or smoothed prior to transplanting, use a rotary tiller or similar implement and maintain the same wheel patterns throughout subsequent operations.

Eggplant is intolerant of poorly drained soil, so it is usually helpful (especially on heavier soils or in low areas) to transplant eggplant on raised beds.

Planting

Eggplant crops are normally grown from transplants; however, a few growers use direct seeding. Desert growers plant spring transplants on southern-sloping beds that run from east to west. They use brush paper

and wooden stakes to protect the crop from spring frosts. The butcher-type brown paper is held in place with wooden stakes placed every 60 cm along each row. The paper-stake structure is placed at an 80-degree angle to reflect sunlight downwards, warming the soil and young plants. The stakes must hold the paper securely, otherwise wind can cause it to vibrate and tear.

Clear, polyethylene mulch is also used on the spring crop. Some small-scale growers use mulch in combination with brush paper and stakes. Black-plastic mulch increases yields by controlling weeds, conserving moisture and warming the soil.



In-row spacing of eggplant is 30 to 60 cm. The crop can be grown, using a row width depending on the space needed by harvest workers. Growers usually plant 8 rows and skip 2 rows to make roadways for harvest operations. Growers are experimenting with a bed spacing of 45 to 70 cm in an effort to maximise sunlight penetration onto the fruit, improving fruit colour. Some growers remove the lower leaves and flowers and stake the plants in an effort to reduce fruit rot that occurs when the fruit touches the soil.

Fertilisation

The nitrogen (N) requirement for eggplant is approximately 168 to 224 kg/ha. Preplant fertilisers are usually broadcasted. A typical blend is 90 to 134 kg/ha each of phosphorus (P) and potassium (K) and 22 to 45 kg/ha of N. During the growing season, 2,3 to 4,5 kg of N is applied each week for the period of vegetal growth. At early flowering, 7 to 11 kg of N is applied each week. During fruit enlargement, 5 to 7 kg of N is applied each week. The N is water run by most small growers.

Irrigation

Eggplant can be grown with furrow or drip irrigation. A crop of furrow-irrigated eggplant uses approximately 1 850 m³ of water. Some growers use black plastic mulch and drip tape to control weeds, moisture and soil temperature in spring plantings. Critical watering periods are at flowering, fruit set and enlargement. The volume of water applied, depends on the

time of the year and stage of plant growth. Most of the water and nutrient-absorbing roots are in the top 45 cm of the soil. Irrigation should be managed to maintain good soil moisture in this root zone.

Pollination

Eggplant is self-fertile as its flower contains both male and female parts. Flowers are usually formed on opposite leaves. Flowering is considered day neutral. Eggplant is not well suited for greenhouse production because it will not set fruit in extremely high or low temperatures. Fruit abscission can result if day temperatures exceed 35 °C. If night temperatures drop below 16 °C, pollen deformity increases and less fruit is produced. Flowering and fruit setting begin 6 to 8 weeks after transplanting. Market size fruit is ready approximately 3 weeks after flowering.

Weed control

Eggplant is slow to become established and cannot compete with aggressive weeds. Weeds also harbour damaging insects and diseases.

Weeds are controlled either by physical methods or chemical control. Physical methods, such as hand weeding, cultivation and mulching, are quite frequently used on small vegetable farms. Only shallow cultivation is necessary. Mulching with black plastic mulch effectively controls weeds and reduces labour needs. Natural organic mulches, such as rice straw, will conserve moisture and add organic matter to the soil.

Chemical weed control is especially popular in places where labour is expensive. Suitable herbicides include Lasso and Sencor (metribuzin).

Pest and disease control

Herbicides, insecticides and fungicides should always be used in compliance with the label instructions.

INSECTS

Many insect pests are attracted to eggplant. Spider mites (*Tetranychus* spp.), green peach aphids (*Myzus persicae*), lygus (*Lygus* spp.), flea beetles (Chrysomelidae) and wireworms (Elateridae) can be destructive to eggplant. Spider mites are especially harmful and should be treated as temperatures become warmer. Flea beetles are usually a problem only in young plants. Fields should be closely monitored during the flowering period as lygus will feed on flowers and cause flower drop. Root-knot nematodes (*Meloidogyne* spp.) can cause plants to wilt and leaves to yellow.

DISEASES

Leaf spot and fruit rots caused by *Phomopsis vexans* are characterised by circular, brownish spots on fruit and leaves. Fruit rot may appear during postharvest transport even when symptoms are not evident at the time of harvest.

Control measures:

- Crop rotation with any other crop rather than solanaceous crop.
- The field should be cleaned as soon as the disease is detected in the field, i.e. the diseased fruit should be plucked and burnt.

Early blight caused by *Alternaria solani* can result in dieback known as collar rot in seedlings. Foliage can be affected at all growth stages, and fruit can drop owing to infection. This fungus is favoured at temperatures between 16 and 32 °C. Stressed plants are more susceptible than healthy plants.

Control measures:

- Observing proper field sanitation
- Using certified disease-free seed
- Own seed should be water/heat treated

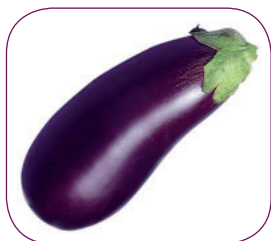
Anthrachnose fruit rot from *Colletotrichum melongenae* causes sunken spots and lesions on the fruit surface. This fungus is favoured by temperatures between 13 and 35 °C with optimum growth at 27 °C and humidity at 93% or higher.

Control measures:

- Using resistant varieties, if available
- Using certified disease-free seeds
- Crop rotation
- Destroying infected crop residue.

Wilt caused by *Verticillium albo-atrum* affects the vascular system of a plant and results in stunted plant growth, yellow discolouration and eventually defoliation of the lower foliage and plant death. This fungus is favoured in temperatures between 13 and 30 °C. Currently, there are no eggplant varieties available that are resistant to these soil-borne fungi.

Tobacco ring spot virus (TRSV) is characterised by yellowing foliage and plants dying off. Crop rotation can help to lessen the effects of this disease. The dagger nematode (*Xiphinema* spp.) is a known vector of



TRSV. Postharvest losses of fruit can be caused by *Alternaria* spp. (black mould rot), *Botrytis* spp. (grey mould rot), *Rhizopus* spp. (hairy rot) and *Phomopsis* rots.

Harvesting and handling

Harvest of eggplant usually starts 75 to 90 days after transplanting or 15 to 35 days after flowering expansion (anthesis). Fruit is harvested when it reaches market size, and the skin is glossy, but before seeds begin to enlarge significantly and mature. Varieties with elongated fruit take more time to ripen. Overmature eggplants become pithy and bitter. Fruit should be removed often to encourage continued fruit set. At market maturity, the fruit stem hardens and a sharp knife is needed to cut fruit from plants. The length of stem left on the plant can vary from 2,5 to 5,0 cm for American varieties and 2,5 to 7,5 cm for Asian varieties. Harvesting is done by cutting the stem rather than by pulling the fruit.

The fruit is dumped in a water bath for washing and cooling prior to packing. Fruit should be handled and packed carefully to avoid skin abrasions and puncturing. Some types of eggplant have skin that can be damaged easily. Careful harvesting and handling practices should be followed to avoid bruising and compression injuries. The fruit is packed by 18s and 24s into fibreboard containers.

Some growers cut plants to 45 cm, allowing them to grow out again for autumn harvest. This practice depends on current market prices and plant vigour.

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Further information can be obtained from

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