

# Farmnote

## Growing eggplant

By John Burt, Development Officer, South Perth

Eggplant or eggfruit (*Solanum melongena*) belongs to the Solanaceae family, which includes crops such as tomatoes, potatoes and capsicums. Commercial eggplant varieties originated from a white skinned variety in India. Overseas names for eggplant include aubergine in Europe and brinjal in India.

Eggplant is available from Western Australian growers throughout the year, mainly from Carnarvon from May to December and the Perth area from January to May. All produce is sold on the domestic market and there are no exports. Total throughput at Market City, Canning Vale, Perth in 1998/1999 was 934 t, although this does not represent total production in Western Australia.

Eggplant needs more warmth than most vegetables and slightly more warmth than tomatoes. It grows as a small bush up to 1.5 m high. It is a short-lived perennial, but is treated as an annual in commercial production. Fruit is glossy, normally purple, with firm white flesh and small seeds. Fruit size is usually 8 to 20 cm long. There is a dark green, spiny, calyx (sepals) on top of the fruit.

Eggplant has moderate nutritional value and the flavour is bland. It can be boiled, grilled, baked or fried and used in a number of dishes such as moussaka, parmigiana and ratatouille.

### Climate

Eggplant is damaged by frost and low temperatures. To produce high yields of good quality fruit, it needs five months of warm to hot weather, with temperatures varying between 21 to 30°C. Cold weather will retard crops and reduce yields. Strong winds will damage branches and scar the fruit. In Perth, eggplant may be protected with cloches, in a similar manner to capsicums.

### Soils

Eggplant is deep rooting, so lighter textured, free draining soils are better than soils with high clay content. Lighter soils warm up quickly in spring and are more suitable for early plantings. A soil pH of 6 to 7 (by the water system of measurement) is optimum. On acidic soils, add lime to raise the soil pH.

### Varieties

There are many varieties of eggplant with varying shapes and colours, which include purple, white, yellow, green, pink and red varieties. The eggplant with most demand

is dark purple and globular in shape, such as the Black Bell variety. A good 'tear-drop' variety is Epic and miniature purple varieties include Little Fingers and Baby Fingers.

### Seedlings

Seedlings are usually six to ten weeks old, with five to seven leaves, and are 10 to 15 cm high when they are transplanted into the field. In Perth, they may need to be grown in a greenhouse in winter for early spring planting. Most varieties are hybrids. It is preferable that seedlings are ordered from specialist nurserymen in cell-packs.

### Planting

Crops are planted in Carnarvon from January to April and July to mid August.

Crops in the Perth metropolitan area are usually planted from September to December. Early crops can also be planted in Perth from late July to September and raised in cloches. These provide higher air and soil temperatures, and hasten crop growth, reduce pest problems and give protection from wind, heavy rain and sand blasting.

Cloches have wire hoops at 1.2 m apart, which are inserted about 30 cm into the soil and are about 50 cm high. A line of wire on top of the hoops helps to support the plastic. The plastic is 1.5 m wide and is tucked into the soil. The plastic should be raised on one side on warm days on every third or fourth hoop. In late September, the plastic may be removed and the grower then waters by sprinklers or continues with trickle irrigation.

Eggplant is not commonly grown in the south-west of Western Australia and would need to be planted from October to November in these areas.

Transplant when the soil temperature is at least 20°C. Black plastic mulch may be used in Perth to raise soil temperatures, especially for early crops. Plantings in a north-south direction will give maximum sunlight to both sides of the plants.

Plant spacing will depend on the vigour of the plants which varies with the variety, the district and the time of planting.

In Carnarvon, single rows are planted at 1.5 m and the distance between plants is 1 m. In the Perth metropolitan

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area, crops are usually single rows set at 1.0 to 1.2 m apart with 45 to 60 cm between plants.

For home gardens, eggplant scions are often grafted in summer, on to rootstocks of plants in the Solanaceae family (*Solanum* sp.). The varieties are grown as standards and the plants may produce from September to June in Perth for a number of years.

## General

Pruning of flowers and branches is unnecessary, although pruning of branches can be carried out after the first year to produce another crop. However, yields will be less than new plantings.

Use a trellis to keep the fruit off the ground, to reduce wind damage and to make picking and spraying easier. Place 1.5 m long stakes 50 cm apart, across the planting rows and wire the stakes together at the top so they cannot spread. Allow 4 to 5 m between the pairs of stakes and a strainer post at either end of the row. Place a 2 mm wire along each side of the row at 30 to 40 cm high, supported at the stakes by ties or nails. Branches should be trained up through the space between the wires.

## Weed control

There are no residual herbicides registered for weed control on eggplant, so use black plastic mulch and shallow inter-row cultivation until the plants are big enough to smother the weeds.

The active ingredient glyphosate (various brands, including Roundup®) is registered as a contact herbicide to kill existing weeds that may appear in the path areas. Use a shielded sprayer, so the herbicide is not sprayed on the eggplant.

## Irrigation

Eggplant need uniform soil moisture conditions for high production. Dry periods may cause shedding of flowers and young fruits.

Water used for irrigation should preferably contain less than 1000 ppm of total dissolved salts, or have an electrical conductivity (EC) reading of less than 1.8 millisiemens per centimetre (180 ms/m).

On sandy soils in Perth, irrigate crops twice daily when conditions are hot. In warmer months, apply half of the water between 7 to 9 a.m., and half between 2 to 3 p.m. In cooler months, apply all of the water daily between 7 to 10 a.m.

Irrigation should be applied to replace 120 per cent of evaporation and at a similar rate to tomatoes. Refer to Farmnote No. 66/95, 'Watering requirements of vegetables grown on sandy soils' (Agdex 250/560) to calculate the water needs of a crop grown on a sandy soil.

An increasing area of eggplant is being watered by trickle irrigation in Perth. When combined with black plastic mulch, this results in less weeds and a saving in water. It is also useful for eggplant under cloches. However, trickle irrigation may result in more mites on the plants compared with the use of sprinklers. An evaporation replacement factor of 60 to 90 per cent is suggested for trickle irrigation of eggplant in Perth. Growers may also

plant on black or reflective plastic mulch, without cloches, and water by sprinkler irrigation from planting onwards.

At Carnarvon, when using trickle irrigation and black or reflective polythene mulch, irrigate at 25 per cent daily evaporation replacement rate during early growth and at 40 to 50 per cent daily evaporation replacement rate from flowering onwards. Tensiometers can be used for irrigation scheduling. Apply irrigation when the soil tension is 30 to 35 centibars. A crop planted in April and picked in November will require 4000 to 6000 kL/ha of water.

## Fertilisers

A high level of nutrients will be needed throughout the long growing season.

It is recommended that nutrient analyses are made of the soil and irrigation water before planting, plus one to two analyses of the youngest mature leaves after planting. This will enable some adjustments to the fertiliser program and provide information on nutrients that are deficient or toxic. Some of the suggested nutrients in the programs in this publication may be deleted or reduced, if it is obvious that they are sufficiently high in the irrigation water and soil, including sources from compost or from fertilisers from previous cropping.

Do not apply excess fertilisers, because nitrogen, phosphorus and potassium are easily washed through sandy soils by rainfall and irrigation. This may lead to groundwater pollution in rivers and estuaries.

The use of compost at up to 50 cubic metres per hectare is beneficial in the rotation, or before planting. This will supply organic matter, add nutrients and help to retain moisture in the soil.

The fertiliser program before planting for the sandy soils of the Swan Coastal Plain from Eneabba to Busselton is outlined in Table 1. Double superphosphate is preferred to single superphosphate as it has less cadmium, which is a toxic, heavy metal.

**Table 1. Fertilisers before planting**

Fertiliser	Rate (kg/ha)
Double superphosphate	Up to 500 kg/ha (based on soil analysis)
Magnesium sulphate	50
Manganese sulphate	20
Copper sulphate	18
Zinc sulphate	18
Iron sulphate	18
Borax	18
Sodium molybdate	2

## Fertilisers after planting

Commencing three days after planting, apply ammonium nitrate weekly at 55 to 70 kg/ha, or urea at 40 to 50 kg/ha, plus muriate of potash at 50 to 60 kg/ha. Where salt is a problem in the soil or water, 6 kg sulphate of potash may be substituted for every 5 kg muriate of potash.

Ammonium nitrate or urea and potassium fertilisers may be spread in a solid form, or nitrogen or potassium sulphate may be dissolved in water and applied by fertigation through the trickle irrigation system or sprinklers.

Alluvial soils in the Carnarvon vegetable growing area contain adequate phosphorus, potassium and many other nutrients and only nitrogenous fertilisers may be needed. Starting three weeks after transplanting, apply 35 kg/ha of urea or 50 kg/ha of ammonium nitrate every two weeks, which may be injected into the trickle irrigation system. For good yields and to maintain soil structure, addition of pelleted organic manures at 2 to 3 t/ha is beneficial.

## Pests

Grubs (fruit), two spider mites (leaves) and root knot nematode (roots) are damaging pests on eggplant and need to be controlled. Aphids and crusader bugs may also be a problem.

The active ingredient propargite (Omite®) is registered for the control of mites, which cause yellowing and spots on the leaves. The use of the active ingredient metham sodium (various brands, including Metham®) as a soil fumigant two weeks before planting should help to control nematodes and some other soil diseases and weeds. Root-knot nematode is seen as swellings on the roots. The active ingredients imidacloprid (Confidor®) and dimethoate (various brands, including Rogor®) are registered for the control of aphids.

Grubs may include *Heliothis armigera* and the eggplant caterpillar (*Sceliodes cordalis*). The eggplant caterpillar is difficult to control as the larvae bore holes in the fruit under the calyx and may also damage stems.

## Diseases

Diseases are less serious than pests on eggplant. Verticillium wilt is the most serious disease. The symptoms are wilting and early death of plants, whilst the conducting tissues of roots and lower stems are discoloured. Control this disease by long rotation with crops other than tomatoes, capsicums or potatoes.

Alternaria leaf spot rarely requires treatment. Several virus and mycoplasma diseases can cause some damage but are not normally a problem. Other diseases may be caused by *Sclerotinia*, *Phytophthora* and *Rhizopus* species.

## Harvesting

Eggplant is mainly self-pollinated, but is also partly cross-pollinated by wild bees.

Fruit should be ready for harvesting 63 to 90 days from transplanting and about 30 days after flowering. Fruit is edible from one-third grown to full maturity, but is usually picked at two-thirds full size. Eggplant will crop for up to 18 weeks with marketable yields of 20 to 80 t/ha.

Eggplant is an irritating crop to pick for some people and has small spines on the leaves and on the protective calyx covering on top of the fruits. It may also cause sneezing. Fruit stems are thick, tough and spiny and should be cut with secateurs or a sharp knife, leaving the fleshy calyx and a short piece of stem attached to the fruit. Handle carefully to avoid puncturing other fruits. Place in a cool store if immediate packing is not possible.

Pick fruit early in the morning and do not expose to the sun. Pick fruits when they have reached the glossy, firm, deep purple stage and when the small seeds are white and tender. Fruit is over-mature if the seeds are brown and the skin is dull and crinkled. There should be no surface blemishes or sun-scorch. Do not allow fruit to become over-mature, as fruit becomes fibrous with a wrinkled stem.

The best sizes are 10 to 15 cm long and 8 to 9 cm diameter for the globular types. Miniature gourmet varieties are picked at the finger to 'hot-dog' size and at 7 to 10 cm long.

After harvesting, carefully wipe the fruit to give a clear, bright appearance. Grade eggplant before packing. Pack eggplant in 36 L crates with about 25 to 45 fruit per crate or in cartons.

Store at 7 to 10°C, with 90 per cent relative humidity. A surface scald may appear on the fruit at temperatures below 7°C. Eggplant do not store well, even at optimum temperatures and should not be retained in cool storage for more than a week. Do not store with ethylene-producing crops such as apples, bananas, rock melons or tomatoes.

## Acknowledgments

Harry Gratte wrote the previous Farmnote on eggplant.