



English spinach

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Spinach is a generic term for certain vegetables which are grown, cooked and consumed for the high content of minerals and vitamins in their leaves. The term spinach may refer to plants from five different families, including English or common spinach (*Spinacia oleracea*), silverbeet or Swiss chard (*Beta vulgaris*), French spinach or orach (*Atriplex hortensis*), New Zealand spinach (*Tetragonia expansa*), Chinese spinach (*Amaranthus gangeticus*), water spinach (*Ipomoea aquatica*) and Indian spinach (*Basella rubra*).

English spinach and silverbeet belong to the family *Chenopodiaceae*. In Western Australia, the term spinach normally refers to English spinach. This is less vigorous and smaller in leaf than silverbeet. It is also softer and has a green rather than a white midrib. English spinach has a lower tolerance to heat than silverbeet.

Spinach is a minor crop in Western Australia but demand has increased in recent years. However, there has been competition with spinach due to the increase in consumption of Asian vegetables. Spinach is more popular in the eastern States, where it is widely used in pre-packs.

Spinach and silverbeet are listed jointly by the Australian Bureau of Statistics. In 1993-94, the area grown in Western Australia by 37 growers was 17.4 hectares and the production was 380 tonnes. However, rural statistics are known to be highly inaccurate for small vegetable crops and actual production was probably much higher than the listed figures.

Spinach is a useful source of vitamins A, B and C and calcium. It also contains levels of oxalate and should not be eaten by people who suffer from kidney stones.

Silverbeet production is discussed in a separate Farmnote. The remainder of this Farmnote refers to the production of English spinach.

Climate

In Perth, the best quality spinach is produced from May to October, but with selected varieties, spinach is marketed all year. In summer, some spinach varieties quickly produce flower stalks, and a variety with good bolting tolerance (for example, Polka) should be chosen for summer production.

Spinach is fairly resistant to frosts. High temperatures cause yellowing of the older leaves.

Soil

Spinach can be grown on a wide range of soils, providing they are well-drained. It grows well on the soils of the Swan Coastal Plain. It is very sensitive to acid conditions. To correct this, add lime where the soils have a pH of less than 6.0 (water system of measurement).

To avoid diseases, rotate crops if possible to give an interval of more than four years between spinach crops on the same ground.

Varieties

Hybrid varieties are used extensively. Polka and LV5 are most suitable for November to March production, but may be grown all year. Chacha is a winter variety, whilst Bolero is suitable in spring and autumn.

Planting

Plantings from March to August will produce the best quality spinach, but planting may be conducted all year.

Spinach is never transplanted. It is sown directly, every one to two weeks, into a well-prepared bed. Sow the seeds 1 to 2 cm deep in rows 30 to 45 cm apart, with 5 cm between plants.

The sowing rate is approximately 11 kg/ha. Seeds may also be broadcast. It is not economic to thin spinach. However, too high a density may increase problems with leaf diseases. Spinach which is harvested for pre-packs may be planted more densely.

Irrigation

Spinach must be kept well-watered, but the crop will not tolerate wet conditions.

Spinach has a higher salt tolerance than most other vegetables and can be grown with water of an electrical conductivity (salinity) level as high as 270 to 635 milliesiemens per metre.

Weed control

There are no herbicides registered for use on spinach. Weed control is by hand. Application of metham sodium soil fumigant at 500 L/ha two weeks before planting will help to control some weeds.

Another technique is to water a well-prepared seedbed before planting and spray the emerged weeds with a contact herbicide consisting of a paraquat/diquat mixture (Spray.Seed® or Triqua®).

Fertilisers

Spinach has a high demand for nutrients. Apply the following rates of magnesium and trace elements (per hectare) every 18 months:

Magnesium	50 kg magnesium sulphate
Manganese	20 kg manganese sulphate
Boron	18 kg borax
Iron	18 kg ferrous sulphate
Copper	18 kg copper sulphate
Zinc	18 kg zinc sulphate
Molybdeunm	2 kg sodium molybdate

Apply double superphosphate at 300 to 500 kg/ha before planting. Spinach does not have a high demand for phosphorus and levels of double superphosphate may be reduced if a soil test shows that phosphorus levels are high.

Spinach has a high demand for nitrogen and potassium. Commencing three weeks after sowing, apply urea at 80 kg/ha plus muriate of potash at 100 kg/ha at weekly intervals until one week before harvest.

On alkaline soils, extra applications of manganese sulphate at 15 kg/ha may be needed if the leaves show a mottled yellowing which is caused by manganese deficiency.

Diseases and pests

Spinach is not seriously affected by diseases or insect pests. However, it is susceptible to attack by **root knot nematode** and **sugar beet nematode**. Soils known to be infested should be treated with fenamiphos (Nemacur®) before planting.

Spinach may also be attacked by **aphids**, **grubs**, **snails** and **weevils**. Endosulfan (Endosulfan® or Thiodan®) is registered for the control of aphids. Methomyl (Lannate®, Kipsin® or Nudrin®) is registered for the control of grubs.

Fusarium root rot disease may be a problem in summer, resulting in wilting and dying of plants. A good rotation will help to control this disease.

Harvesting

Spinach is sold on the quality of its appearance. Any problems with leaf yellowing caused by poor fertilising, cosmetic blemishes caused by weather conditions, or pest and disease attack will lower the appearance of the crop and decrease the market price.

The plants are harvested at the 8- to 12-leaf stage in one pass, usually 30 to 50 days after planting. If marketed for pre-packs, they may be picked after only four weeks from planting in winter. They are pulled from the bed, including the roots, and washed and tied into bunches of 10 plants, weighing 500 to 1000 g. Yields may range up to 4000 bunches per hectare.

Marketing

Spinach may be packaged into approximately 20 bunches per 36 L plastic container. Produce should not be sprinkled with water in summer as this may cause the leaves to stick together. If required, store in coolrooms at 0°C with relative humidity of 90 to 95 per cent for 10 to 14 days. For distant markets, spinach may be packed in sleeves and top-iced.

Most spinach is sold on local markets. Statistics show exports of 3 tonnes of spinach and silverbeet to South East Asia, mainly to Hong Kong in 1995-96.

Hydroponics

There has been some success with growing spinach in a hydroponic lettuce-type Nutrient Film Technique system. One of the advantages of this system is that spinach is marketed with no sand in the leaves. However, there have been problems with providing sufficient aeration to the roots. The nutrient solution must also be replaced more regularly than with other hydroponic crops.

Further reading

- **Horticulture Australia** (1995) 'Silverbeet and Spinach' by John Sutherland, pp 270 - -274.

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