



# Farmnote

## Growing witlof chicory Reviewed July 07

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Chicory (*Cichorium intybus*), belongs to the Asteraceae family and is closely related to endive (*Cichorium endive*) and dandelion. Chicory leaves are traditionally used as a vegetable, or its roots may be roasted and used as an additive in coffee manufacturing.

In recent years, radicchio (red or Italian chicory) has been the main type of chicory that has been used as a leafy vegetable. Although this is bitter, it gives a vivid red colour as a garnish and for salads.

In the past 90 years, the production of chicons or witlof ('white leaf') has become a major industry in Belgium, Holland and France. In these countries, chicon shoots are forced from the roots of chicory by blanching and used in salads in winter when few other salad-vegetables are available. They are served raw, chopped in salads, or lightly boiled/steamed with a hot meal. They contain good levels of vitamin C and the flavour is slightly bitter.

Witlof can be produced in Australia throughout the year, but we differ from Europe as many other salad crops are available in winter. However, few consumers are familiar with witlof, although supplies are now available from hydroponic growers in Victoria.

It is not currently grown in Western Australia, but the crop has been successfully grown at Medina Research Station and it could prove to be a suitable crop for producers in the southern areas of the State.

Witlof is an expensive vegetable to grow as it is a two-stage crop. Firstly, seed is direct-sown in the field to produce parsnip-type roots. These are then dug up and re-grown under special conditions to produce a single chicon from each root.

### Stage one - field production

Mid-summer to autumn is the time to grow the root stage of the crops for three to five months. The roots may then be forced over three to five weeks from autumn to winter. However, roots can be stored for up to 12 months at -1°C to 0°C. By this means, and the use of the correct environment in stage two, chicons may be produced throughout the year. In the southern areas of Western Australia, plants seeded later than June may run to seed before digging.

Light, free draining soils cultivated to 30 cm deep encourage straight root formation. A pH range by the water system of measurement of 5.6 to 7.6 is suitable.

Hybrid white chicon varieties are usually grown. Red varieties derived from radicchio are also marketed. These are smaller, sweeter and lower yielding than the white varieties.

Sow seed with a precision seeder into a well-prepared seedbed, at a depth of 1-2 cm, with rows 25 cm apart and 20 cm between plants. Thinning may be needed to give a spacing of 200,000 plants per hectare.

Avoid excessive use of nitrogen, which leads to top growth to the detriment of the roots. A suggested fertiliser program is outlined in Table 1.

| <b>Table 1. Suggested fertiliser program for field growth of witlof chicory on sandy soil</b> |  |           |                              |
|---|--|-----------|------------------------------|
| Fertiliser  | Kilograms/hectare<br>(unless otherwise stated) | Frequency | Timing of application        |
| Conditioned poultry manure*   | 25 cubic metres/hectare                        | Once      | 7 to 10 days before planting |
| Superphosphate, double  | 350**  | Once      | 1 to 7 days before planting  |
| Borax   | 10   | Once      | 1 to 7 days before planting  |
| Sulphate of potash  | 75   | Weekly    | Begin 3 weeks after sowing   |
| Agran   | 60   | Weekly    | Begin 3 weeks after sowing   |
| Magnesium sulphate  | 50   | Once      | When crop is half grown      |
| * Conditioned poultry manure should not breed flies.  |  |           |                              |
| ** If soil test for phosphorus is high, this figure could be reduced                          |  |           |                              |

There are no herbicides registered for use in chicory. Hand weeding may be necessary in the early stages, but as the crop develops it competes well with weeds.

The fungus *Sclerotinia* is the main disease likely to affect chicory in the field. It causes the roots and chicons to rot and is likely to infest land that has previously carried susceptible crops such as lettuce, cauliflowers and potatoes. Close spacing increases the risk of *Sclerotinia* because it reduces air circulation.

Roots should weigh about 100-150 g at 20 weeks and a diameter of 3-6 cm. They can be dug by hand-fork or with a converted potato harvester after mowing off the tops.

### **Stage two - chicon forcing**

After storage, the roots are 'topped and tailed' so they are all the same length in the growing trays. Leave 2 to 3 cm of growth on the crown, as the chicon shoot must re-grow from here in the forcing stage.

Before forcing, the roots are stored at about 14°C for three to four weeks. Relative humidity of 90-95 per cent should be maintained to prevent the roots

from drying out.

There are two recommended methods of forcing:

**Soil-media system.** Roots are stacked vertically in a frame in a temperature controlled dark room with soil filling the spaces between them, but not covering the crowns. The air temperature should be 10°C at first, increasing to about 20°C as the chicons reach marketable size.

Summer forcing is not practical in Western Australia unless temperatures and light are closely controlled in the forcing house. Water the plants every two to three days, at a rate to keep the soil damp but not soggy. High humidities should be maintained.

Soil temperatures should be 3-4°C higher than air temperatures. Root yields varied between 30 t and 60 t/ha, depending on variety, using the soil media system at Medina Research Station. Chicon yields were generally around 15 t/ha.

**Hydroponic forcing.** This is now the standard forcing method in Europe and produces the cleanest and best quality witlof. The trimmed roots are placed into large wooden boxes, lined with polythene. These are stacked on top of each other and kept in the dark. Media is not used around the roots. Only witlof varieties bred for hydroponic production should be used, as older varieties will produce open, loose chicons. The air temperatures are maintained at 16 to 18°C, with a nutrient solution recirculating constantly at 16 to 20°C and EC of 2.0 to 2.3 mS/cm. A level of 2 to 5 cm nutrient solution is maintained in each tray before it overflows into the lower trays

Chicons are ready for cutting in four weeks and weigh 100 to 400 g. They can be broken from the roots and their bases trimmed with a knife. If cutting is delayed, outside leaves will begin to rot. These can be removed readily, but this reduces the weight and size of the final product.

Chicons are graded according to length and firmness. Loose, open heads do not present well for market and they will not pack readily. Blanched chicons turn green and bitter if exposed to light. To prevent this, pack in 5 kg boxes between blue or green paper, which reduces light. Red witlof is sold in plastic-wrapped punnets. Store chicons at 2 to 3°C and 95 per cent relative humidity if necessary for two to four weeks.

### **Acknowledgements**

Mike Kowald (deceased) wrote the original Farmnote.



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