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Most of Australia's 7557 t of fresh asparagus is exported. We eat about 800 g of fresh spears per person per year.

Export of asparagus from the Ord River

By John Bonnardeaux, Research Officer and Chris Robinson, Technical Officer, Kununurra

Fresh asparagus is presently supplied to Australian markets from August to March from temperate regions. For the remainder of the year, there is no significant production of fresh spears in Australia.

Recent research in Taiwan, Zambia and Zimbabwe has indicated quality asparagus can be grown in tropical and subtropical regions. The harvest period can be manipulated by withholding irrigation water and cutting ferns to make spears grow out-of-season.

Markets

Most of Australia's fresh asparagus is exported (see Figure 1) because we consume, on average, only 0.8 kg per person per year of fresh asparagus. This is a small amount when compared with Australian per capita consumption of 1.2 kg cucumbers, 2.8 kg celery, 8.6 kg carrots, and 21 kg tomatoes.

Nevertheless, asparagus growers produced 7557 t of spears in 1991. The general trends show an increase in the consumption of fresh asparagus, a decline in percentage of asparagus produced for processing and an increase in exports (see Figure 1). Victoria produces the most asparagus in Australia, with 1050 ha under production; Western Australia has only 60 ha (see Table). Prices of asparagus range from $1.20 to $4.00 per kilogram during the main supply period from September to December, through $6.00 to $10.00, and up to $13.00 to $17.00 per kilogram in the May to August off-season.

Japan imports 90 per cent of Australia's export asparagus. Figure 2 shows the difference in prices between Tokyo and Brisbane markets.

Department of Agriculture studies show that both markets pay high prices in July and August, the most favourable period for asparagus production in subtropical and tropical areas of northern Australia, such as the Ord River Irrigation Area. Other Australian markets also traded in low volumes of asparagus at high prices during July and August.

Australia also produces little asparagus in May and June, the period of maximum imports of fresh asparagus, and buyers pay higher than average prices for locally grown asparagus.

The Department's study concluded that asparagus growers in Australia's tropical and subtropical areas could:

- replace imports during May and June; and
- supply the Australian and export markets during July and August, when temperate areas cease production.

<table>
<thead>
<tr>
<th>Year</th>
<th>Fresh</th>
<th>Processing</th>
<th>Export</th>
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</thead>
<tbody>
<tr>
<td>1988</td>
<td>18.4</td>
<td>36.8</td>
<td>44.7</td>
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<td>1989</td>
<td>22.0</td>
<td>39.1</td>
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<tr>
<td>1991</td>
<td>29.5</td>
<td>17.9</td>
<td>61.5</td>
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</table>
Practical aspects of production

Spear quality
Asparagus growers need good management skills for regular production of export quality spears 22 to 25 cm long, because, often, when the spear is just reaching 20 cm, hot weather causes its bracts to open, resulting in a `blown' spear. In many instances growers must harvest twice a day. The percentage of blown spears is higher on sandy soils than on clay soils.

In a temperate environment, growers usually wait three years after planting the crowns to allow enough carbohydrates to accumulate before they start cutting spears. However, the growth pattern in the Or River Irrigation Area is very different. Under tropical conditions, the ferns remain evergreen, and the development and growth of new buds and storage roots is continuous. This is a major advantage over growing asparagus in temperate environments; growers in the tropics can harvest spears one year after seeding.

Tropical growers can also follow the `mother fern' cultural practice, which allows continuous spear production year-round. This is common practice in Taiwan, where most of the world's asparagus is processed. Under the `mother fern' cultural practice, only a few ferns are left on each plant at harvest. These ferns grow and supply photosynthates for the plant throughout the harvest, but in high temperatures, these stalks die after two or three months. To allow for this, growers must maintain a staggered turn-over of ferns of different ages to ensure a high level of photosynthetic efficiency.

These findings, and the strong interest in asparagus culture of experienced growers in the Or River Irrigation Area, prompted the Department of Agriculture to establish trials in 1987 to closely examine the productivity of asparagus plants in the irrigation area. Results were encouraging enough for one grower to start the first commercial production of asparagus in July 1992 to supply the local market and for export to other States. The introduction of asparagus has increased the stability of the Or River Irrigation Area as a horticultural region.

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Spear thickness varies. Some buyers prefer small diameter (5 mm) spears, others 25 mm spears. Spaghetti spears — thin, bundled spears — are popular on the Melbourne market. In Australia, jumbo spears (25 mm) can be as much as 40 per cent cheaper than the thinner, 8 to 12 mm spears. This could be because there are fewer jumbo spears per bunch, or the buyer’s perception that large spears are older and tougher.

**Harvest periods**

In temperate regions, asparagus is first harvested three years after seeding and harvest lasts 20 to 40 days, with two to three days between cuts.

The first harvest in the tropics starts one year after seeding and lasts 7 to 10 days; growers harvest every day and sometimes twice a day. Asparagus spears can grow up to 5 cm per day. In the second year in the tropics, harvest can last 15 to 20 days. In the fourth year, spears are cut during a two-month period.

**Yields**

Asparagus yields depend on the variety, the density of planting and the age of the crowns.

 Marketable spear yields in Bundaberg, Queensland, which has the same latitude as Carnarvon, are relatively low (1.5 to 6.9 t/ha). That industry survives on its ability to produce asparagus either early (August) or late (April to May) in the season. Single rows of two-year-old asparagus plantings of the Californian line UC 157 F1, in the Ord River Irrigation Area yield 1.6 t/ha, while double density (double row of asparagus on the same bed) plantings of four-year-old crowns of UC 157 F1, in Katherine, Northern Territory, have produced 8.6 t/ha. World experience has shown that Californian lines perform better in warm climates whereas New Jersey lines such as Jersey Giant are more suitable to cooler areas.

Although it is possible to harvest twice a year in the tropics, it is not a recommended practice because each harvest produces half the normal yield. A better alternative is to divide the production area in two, each harvested only once a year during a fixed period of the year.

**Post-harvest handling**

In the warm conditions of the Ord River Irrigation Area spears must be cooled in water below 5°C for 12 to 15 minutes within one hour of being harvested to maintain quality. As much quality is lost in one hour at 27°C as in 14 hours at 2°C.

Quality is lost through increased toughness, decreased ascorbic acid and sugar content, accumulation of free ammonia, undesirable growth, and bending, wilting and yellowing.

Quality is best when spears are sorted and packed quickly in a cool environment to prevent spears warming up. Individual spears, cooled at 1°C, can warm up to 27°C in less than 15 minutes.

The optimum storage temperature for asparagus spears is 1.5°C.

**Pests**

The cluster caterpillar, Spodoptera litura, and white ants on sandy soils are the major pests affecting asparagus in tropical areas of Australia.

Cluster caterpillar is well controlled by natural predators and occasionally chemical sprays.

White ants, which feed inside the stems, are more difficult to control. Growers should avoid sandy soils in white ant infested areas.