



Chinese water chestnuts for the fresh market

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There has been interest in establishing water chestnuts as a new crop in Western Australia since 1990, but there are problems with the development of this crop as it needs a specialised growing system and the market potential is uncertain.

Description

The Chinese water chestnut (*Eleocharis dulcis*) is a sedge (Cyperaceae family) which grows in water. The plant is rush-like with upright tubular stems 1 to 1.5 metres tall. It produces numerous mahogany brown corms which resemble gladioli. These are sweet and crisp with a white flesh and nutty taste.

The Chinese water chestnut may be mistaken for the European (*Trapa natans*) and Chinese (*Trapa bicornis*) types of water chestnut which have dense floating leaves and produce a horn-shaped nut. These are not economically important and can become weeds. To avoid confusion, the Chinese water chestnut is often referred to by its Cantonese name of 'Matai' which means 'horses hoof'. The variety grown in Western Australia is 'Hon Matai', which is the main commercial variety in the United States.

Uses

Water chestnuts are an essential ingredient in certain Chinese dishes such as 'dim sims', soups, desserts, puddings and stir-fried mixtures, but can also be used raw and in drinks. Until 1993, this delicacy was only available in cans in Western Australia. During canning, the medicinal tonic or antibiotic called 'puchine' is destroyed, but fresh corms remain crisp and retain 'puchine' after cooking. For this reason, Chinese people regard fresh water chestnuts as superior to the canned product. The flavour has been described as a blend between apple, chestnut and coconut. Water chestnuts are high in sugars (2.5 per cent) and also contain about 18 per cent starch, 4.7 per cent protein and less than 1 per cent fibre.

Problems with growing the crop

Chinese water chestnuts are a potential small crop for specialised markets for growers in warm temperate regions. However, they can only be grown in limited areas where the specific water requirements can be provided. Chinese water chestnuts need to be

completely submerged with a controlled level of water for most of the life of the crop (similar to paddy rice) and it is preferable to drain the water for harvesting. The purchase of tanks or the construction of dams is expensive, but a suitable channel can be made with a 50 by 4 metre plastic liner. The cost of planting material is also high at present (80 cents per corm) and it is necessary to bulk up supplies of planting material before commercial crops can be marketed.

A major problem with the crop is that the corms have poor presentation for marketing. As many as 100 corms may be produced from each planted corm, but these may be too small (under 25 cm in diameter) and attract low prices. Prices for some consignments have been as low as \$3 to \$5/kilogram in Perth, but good quality produce has returned up to \$10/kilogram. It is estimated that a return of over \$8/kilogram is needed to return a profit, because of the specialist needs of this crop.

Hydroponics

Water chestnuts may also be grown in hydroponics using buckets and a suitable media such as pernite plus vermiculite. The buckets can be kept topped up with old nutrient solution from other crops.

Climate, soils and water supplies

A total of more than 210 frost-free days are needed to produce a crop. Due to lower air and water temperatures, areas in the South West of Western Australia may be less suitable for producing good quality corms than areas between Perth and Geraldton. Slightly acidic to neutral soils (pH 5.9–7.3 by the water system of measurement) are preferred. The depth of coarse sand in the dam or tank should be 20 to 25 cm.

The pH of the water should be 6.9 to 7.3 (water system of measurement) and lime may be added if the water is too acidic. The crop is reported to have a good tolerance to slightly saline water.

Planting

Corms are planted 10 cm deep in soil and spaced at 75 cm apart (17,800 corms/hectare). Corms will sprout at a soil temperature above 13°C. The paddy is periodically flooded and drained until the plants are 20 cm high. At this stage, a water level of 5 to 15 cm is

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maintained above the soil. Water chestnuts can also be established from transplants which are raised in a nursery. These should be planted 5 cm deep and 7 cm apart in trays in winter or spring when there is no danger of frost. They are kept moist but are not submerged with water. They are transplanted into the tanks or dams when they are 20 cm high.

Fertiliser

When the dam has been drained, fertilise with organic manure at 10 t/ha before planting and incorporate into the soil. Apply a mixed NPK fertiliser eight to ten weeks after planting and in January. Do not over-fertilise, especially with nitrogen as most of the nutrients are retained in the water and, unlike vegetables grown in soil, nutrients are not leached.

It is recommended that one to two nutrient analyses are made during the growing season of the youngest mature leaves. 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 water and soil.

Pests

Water chestnuts are generally free of pests, but they have sometimes been damaged by wood-ducks, geese, weevils and water rats.

Harvesting

In Western Australia, drain the area 30 days before harvesting from mid April to mid May. The leaves naturally turn brown from May to June and should be removed if the corms are not immediately harvested. The corms can be left in the ground and harvested from May to September. Corms can also be kept at 1 to 4°C for up to six months in cool storage.

Harvesting is difficult unless the soil is drained and the crop is mechanically harvested using a modified gladioli corm harvester. Wash the corms after harvest, and brush when they are dry. Pack in 250 g punnets with cellophane wrappers. The preferred size for market is 30 to 45 mm diameter. A good yield is 2 kg per plant per year. In China, yields of 17 to 34 t/ha are reported.

Reject corms may be fed to marron in adjoining ponds.

Exports

Fresh water chestnuts are exported from Taiwan to Hong Kong from mid December to February. It may be possible to export water chestnuts to Hong Kong and Japan from Western Australia where corms may be marketed in the 'off-season' from June to December.