

# Wasabi or Japanese horse radish - *Wasabi japonica*



Wasabi stems are used to prepare a pungent condiment that is considered essential in some Japanese foods, particularly raw fish and some noodle dishes.

## Growing environment

Wasabi is a member of the crucifer or mustard family and a native perennial of Japan and Sakhalin Island north of Japan. It occurs naturally in wet places alongside mountain streams, and requires specific conditions of light and water to thrive. In Japan, the highest quality wasabi stems are grown on tree-shaded, terraced, gravel beds covered by a thin layer of cool, clean, running water from mountain streams, or on artificially shaded, moulded, gravel ridges formed in river beds. Wasabi is also grown in soil to produce leaves for processing.

## Agronomy

Wasabi plants grow poorly in full sun in New Zealand and shading is required. Japanese recommendations of using 50% shade cloth were inadequate in the Waikato and a further 30% shade cloth was required during summer. The structures to support shade cloth and the engineering requirements involved fall outside the scope of this broadsheet.

Wasabi is grown in natural hydroponic conditions where planting material is planted in porous gravel either covered by or adjacent to running water. The water must be clean, cold (10-14°C) and oxygenated. Wasabi will not grow in

low oxygen or stagnant water. In Japan, a water flow rate of 180 R/ha is recommended. Water is also the source of plant nutrients although in Japan growers are known to augment natural levels with fertilisers. Sites for wasabi production need to be free from possible flood damage.

In Japan, wasabi planted on the gravel bed system, covered with a thin layer of water, is established at 25 cm spacings using 12 cm PVC rings to prevent the small plants from being washed away. This system requires expensive construction of the gently sloped beds and it is unlikely to be widely used in New Zealand. The wasabi planting system more suited to New Zealand conditions is the construction of gravel ridges 25 cm high and 1 m apart with flowing water in the furrows.

Wasabi plants are established 20-30 cm apart at the water's edge on both sides of the gravel ridge. This system is being used commercially.

Wasabi is a very new crop in New Zealand and crop production systems are still evolving although they are based on Japanese systems. A production cycle takes from 18 months to two years to produce export size stems.

Wasabi plants can be established from either offshoot cuttings taken from a previous crop, seedlings grown from seed, or tissue-cultured plantlets. New crops are usually

usually only established twice in succession from offshoot cuttings to reduce the accumulation of diseases. In Japan, crops established from cuttings are rotated with crops established from seed.

Wasabi seed is obtained by cross pollination. It cannot tolerate desiccation and must be stored moist from harvest. Winter cold or cold treatments break seed dormancy in nursery beds in winter. In Japan, these seedlings are planted out in production beds in the following autumn.

Micropropagation is now being used to produce elite, high health planting material and this system of propagation has been commercialised in Japan.

There are numerous wasabi cultivars in Japan but, currently, planting material in New Zealand is in short supply. Preliminary research has shown that Daruma- style cultivars with minimal offshoot branching give superior export quality stems compared with cultivars such as Midori, which produce many offshoots.

Plants in tissue culture are allowed free entry into New Zealand with a health certificate but seed and plants require an import permit. Enquiries about the requirements to import wasabi stock should be directed to MAF Quality Management, Lynfield Plant Protection Centre, Box 41, Auckland.

After planting, the crop is grown for 18-24 months until the stems are a harvestable size. In our trials, the wasabi obtained its nutrients from natural levels in spring water but, in Japan, slow release NPK fertiliser may be added to the water and sulfur sprayed onto the crop to enhance the flavour.

Diseases and pests are a major consideration in wasabi production and a current difficulty is that there are no registered pesticides for use on the crop. As a member of the crucifer family, wasabi suffers from the same disease and pest spectrum as brassicas. Aphids are potentially serious pests because of their ability to transmit viruses. Wasabi can also be seriously affected by tobacco, turnip and cucumber mosaic viruses. Root aphids have also been found on wasabi roots and, while the pest is not widespread, it is likely to be difficult to control.

At harvest, wasabi plants are broken up by hand to extract the exportable stems. In trials after 18 months growth, plants had an average of two stems/plant greater than 50 g with the longest stem being around 15-20 cm. For export, the stems should be green and have little discolouration from *Phoma* infection. The leaf stalks are trimmed to one-third the length of the stem. Stems that are too small to export are normally processed. In Japan, all plant material, including small offshoots and leaves, is processed.

## Yield

One trial in the Waikato gave a yield of 3 t/ha of stems larger than 50 g with a total crop yield of 17 t/ha. This trial used the cultivar Midori, which gives high offshoot production.

An improved cultivar and improved disease control could improve export stem production markedly.

## The market

Fresh wasabi stems are very highly priced in Japan, and in 1991 the average wholesale price on the Tokyo market was more than \$100/kg. These high prices have meant that wasabi preparations have been adulterated or substituted with products such as European horse radish. The demand for wasabi has also been significantly increased by the growing popularity of Japanese cuisine outside Japan. Test marketing of New Zealand-grown wasabi in Japan has shown that New Zealand produce is acceptable to the Japanese market. A number of companies are beginning commercial wasabi production with considerable Japanese interest in producing wasabi in New Zealand. A wasabi product group has been established under the New Zealand Horticulture Export Authority to set quality standards and coordinate marketing. Further information can be obtained from: The Wasabi Product Group, C/- NZ Horticulture Export Authority, Box 1417, Wellington.

## Future issues

Crop & Food Research has an active research programme on wasabi with research expected to continue on planting systems, crop management, disease and pest control, and micropropagation. Wasabi is a very new crop in New Zealand but research results to date, the abundance of natural resources required to grow the crop, and the buoyant international market indicate a bright future.

## Further reading

Chadwick, C. I.; Lumpkin, T. A.; Elberson, L. R. 1993: The botany, uses and production of *Wasabi japonica* (MIQ) Matsum. *Economic botany*.

Douglas, J. A.; Follett, J. M. 1992: Initial research on the production of water-grown wasabi in the Waikato. *Proceedings of the Agronomy Society of NZ*.

Follett, J. M. 1986: Production of four traditional Japanese vegetables in Japan. Ruakura Agriculture Centre Special Publication ISBN 0-477-03082-3.

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