

Boronia megastigma



Boronia megastigma is a member of the family Rutaceae of which 60-70 species are known. They are mostly endemic to Australia. *B. megastigma* has several horticultural forms known in the nursery trade including Lutea and Heaven scent. Many nurseries have selected floriferous seedlings and propagated these clonally. Ease of rooting often determines the success of a clone in the nursery trade.

Natural stands in Western Australia have been harvested for many years for the florist trade in the eastern states. Some flowers have also been harvested for solvent extraction to obtain the highly prized essential oils. The majority of world production for this use now takes place in Tasmania.

In New Zealand, boronia is becoming popular as a cut flower with *B. megastigma*, *B. heterophylla* and clones like Just Margaret being grown. Interest in use for essential oil extraction began in New Zealand in 1984 and a small industry is now established in Nelson.

B. megastigma is a fickle plant, as many home gardeners have found to their distress, and losses in early commercial plantings were high because of root rot diseases caused by phytophthora and fusarium.

People interested in establishing essential oil production units must consider a number of factors including the plant material and planting, harvesting and extraction requirements, and marketing.

Plant material and crop management

The small Nelson industry was established with two types of material: plants from seed harvested from the wild in Western Australia, and clonal material from a nursery in the North Island.

Seed is notoriously difficult to germinate and, because of the very oily seed coat, it may remain in the soil for a number of years without growing. Seedling diversity is immense with plant form, flower colour, time of flowering, ease of harvesting, oil content and chemical composition all being very different. Each type may require harvesting at different times and each may give different qualities and quantities of product. However, seedling plantings have enabled selection work for superior types to occur and the concrete or oil produced has given a balance of perfume and composition.

Clonally-produced plants mean that flowering, and hence harvest, is in a concentrated period. Because there are numerous clones available in New Zealand, before planting a specific clone, it should be analysed to check for suitable oil content, chemical composition, ease of harvest and other agronomic features.

Plants for field establishment should be small and not root-bound. If left too long in their pots, roots fail to spread when planted into the field and although tops may grow well in the first year, the plants are top heavy and appear more prone to disease.

Ideally planting is done into friable well cultivated soil in spring when plants will benefit from the flush of growth. Seedlings planted from 5 cm tubes in spring should reach 25-30 cm high and across by the following spring when flowers can be harvested.

Spacing varies but blocks planted at 1.2 x 0.75 m (11 000 per hectare) are comfortable to work in and at three years old have filled the available space. All planting is done by hand directly into the soil or through black polythene or weed matting. Rooting is very shallow and cultivation is damaging and allows entry of pathogens. Where no artificial mulches are used, a layer of bark chips is recommended to maintain moisture, stop weeds and cool the root zone of the soil.

Fertiliser is required but no research as to best formulations or quantities has been done. Light dressings, approximately four to six weekly, of a compound fertiliser such as Nitrophoska blue plus (12:5:14 plus) appears satisfactory. As flowering occurs on new growth, heavy yields require adequate extension growth so applications immediately after flowering and pruning are ideal.

The majority of weeding is done by hand but chemicals such as preeglon, paraquat and diquat are safe desiccants. Some other herbicides have been evaluated but care must be taken to avoid any contaminants that may get into the flowers. Pruning is carried out in the year of planting to ensure a well branched, stable shrub. This mainly involves removing excessive branching in the middle of the plants.

After manual harvesting, plants should be pruned to clear excessive growth from the centre of the shrubs to facilitate ease of harvest in the subsequent season. Allowing light into the centres also allows new growth and flower buds to develop.

Spraying is essential to contain the leaf hopping insect, psyllid, which is the major pest problem. This minute insect causes the plant to take on a rusty appearance, followed by honeydew and then sooty mould on bushes. Heavy infestations eat away the developing flower buds and can severely reduce yields. Pesticide residues can be highly concentrated in the oil extraction process so it is essential that only approved chemicals are used.

Harvesting and extraction

In New Zealand at present all harvesting for oil extraction is done by hand with a picking comb. This comb is raked gently through the bushes when flowers are mature in September/October in Nelson and the removed flowers are

collected in buckets and bagged. Care is required to remove only flowers as leaf and stalk material have different chemical components to the flowers. Early morning harvesting is best because the flowers become sticky as they warm up and are then much more difficult to remove from the bushes. Picked flowers are stored in plastic bags or drums in a chiller at approximately 5°C as soon as possible after harvest. Heating occurs quickly in the flower bulk and this must be avoided. Research has shown that flowers can be stored at this temperature for up to 12 days without deterioration. The current method of extraction involves using hexane of food product grade. This is a highly inflammable petroleum product with special handling requirements. A unit to process the flowers is necessary and this can involve glass or stainless steel vessels to steep the flowers in the hexane solvent, a steam source to evaporate the solvent, collection vessels, separators and smaller scale laboratory equipment to prepare the extracted materials to accepted standards.

Steeping flowers in hexane removes oils and waxes collectively known as concrete. This is a deep brownish green solid with a strong woody aroma. On dilution, this takes on the characteristic boronia perfume. The concrete can be washed into separate oil (absolute) and wax fractions but, at present, New Zealand sales are in the concrete form. Boronia concrete and absolute are highly prized and used mainly in food flavour enhancement, particularly in fruit products. A small amount is used in the perfumery trade.

Marketing

One small company operating out of Nelson province is the sole producer and exporter from New Zealand, with all the product being sold to Tasmania. Marketing of any essential oil from New Zealand must be coordinated. This country has a very short history of involvement in essential oil markets so is virtually unknown. Opportunities will be lost unless all producers of a product unite to set quality standards and prices. New Zealand can produce unique, high quality oils but coordination and cooperation are essential if the industry is to develop into a viable one in the world marketplace.

Further reading

Smale, P.E. 1991: Investigation into the production of oil from the flowers of *Boronia megastigma* Nees. *Horticulture in New Zealand* 2(1): 24-25.

Davies, N.W.; Menary, R.C. 1983/84: Volatile constituents of *Boronia megastigma* flowers. *Perfumer and Flavorist* 8 December 1983/January 1984: 3-8.

Guenther, E. 1949: The essential oils. Vol.111. D. Van Nostrand Co Inc. 364 p.

Contacts

Noel Porter
Crop & Food Research
Private Bag 4704, Christchurch
Tel. 03 325 6400
Fax 03 325 2074
Email portern@crop.cri.nz