Protected Cropping for Specialty Melons (*Cucumis melo* L.): Primary evaluations in North Queensland

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A research and development project led by horticulturist Dr Elio Jovicich from the Queensland Department of Agriculture, Fisheries and Forestry (DAFF) is exploring the benefits of using protective cropping systems on high-value melons grown in the Australian Tropics.

Rockmelons and honeydews are the two melon fruit types most commonly consumed in Australia. As a response to markets demanding greater diversity of this commodity, several melon growers in Queensland have started to experiment with growing a greater variety of fruit types. In supermarkets, it is now possible to find *piel de sapo* (the Spanish name which translates to ‘toad skin’) and small canary melons; two fruit types of the *Indorus* group and popular in Mediterranean countries. Other fruit types such as *galia* (*Reticulatus* group), *charantais* (*Reticulatus* group) and *hami* (*Inodorus* group) are generally absent in Australian markets. Galia melons have been evaluated in field crops in North Queensland but yield and quality were reduced by variable climate conditions (such as rainfalls during the typically dry season), foliar diseases, and decaying fruits in contact with soil.

Many warm regions of the world grow some of these specialty melon types using protective cropping systems. Protective cropping systems involve growing plants under a frame structure covered with a film or screen material. The protective structures (for example walk-in tunnels, greenhouses, or net houses) aim to create environments that are closer to the optimum for maximum plant growth and production.

‘Protective cropping could be an effective system for growing specialty melons in the Dry Tropics of North Queensland,’ Dr Jovicich said. ‘The growing system could reduce outdoor risks for production loss, improve fruit quality, increase yield per square metre, allow for off-season production, and supply niche markets in a segment of the larger melon market in Australia. These systems can also be suitable for increasing the use of biological control practices and rely less on the use of pesticides.’

‘Many farmers in the warm regions of Australia may relate protective cropping to costly high-tech glasshouses with full environmental control. However there are low-cost and effective systems available for warm environments that can moderate extremes of our variable climatic conditions and lead to high yields.’

‘When selecting a protective structure design for warm environments, it is critical to consider the height of the roof and allow for adequate passive ventilation to remove hot air. Acceptable air exchange rates can be achieved through roof vents or retractable roof systems, as well as including a large screened area around the whole structure.’

However Dr Jovicich said protective cropping was not only about the structure covering the crop. ‘The yield benefits achieved from the improved environment are also the result of using performing cultivars and specific management of plant architecture and fertigation that are appropriate for warm climatic conditions.’

‘We evaluated melon production under existent low-cost protective structures in commercial farms in Giru and Harvey Range, in North Queensland. The aim of these trials was to gain local knowledge on potential yields and fruit quality as well as on pests and diseases that may
be present when melon crops are protected from rain, wind, extreme solar radiation and extreme temperatures.’

On 25 July 2013 in Giru, seven cultivars of fruit types; galia, hami, charentais, small canary, and rockmelon; were transplanted under a high polyethylene-covered tunnel. Plants were grown at a density of 2.8 plants/m² in containers filled with volcanic rock and irrigated with a complete nutrient solution. Pruning and trellising was done to a single vertical stem, keeping lateral shoots on the main stem after the seventh leaf node. After bearing small fruit, lateral shoots were cut off after their second or third leaf node. To facilitate natural pollination by insects, a screen window in the tunnel was left partially opened. On 20 November 2013, the cultivars had combined marketable yields that ranged from 2.8 to 8.2 fruits/m² and from 3.1 to 7.8 kg/m². Total soluble solids levels in fruit ranged from six to 13. Cultivars Tempo (galia), Tikal (canary) and Sultan (charentais) had fruit yields that were up to 2.6 times greater than yields commonly achieved with field-grown rockmelon crops (compared to rockmelon yields of 27.5 t/ha or 1,800 30-litre-trays from an outdoor crop established with 13,330 plants/ha). All fruit under the protected cover was marketable and very consistent in size and quality.

Dr Jovicich believes that sugar levels in fruits and marketable yields can be increased in some cultivars with changes in fertigation management. ‘Some fruit types that detach from the peduncle when reaching the mature ripening stage may also require a fruit support system.’

‘The promising results in these first evaluations justify examination of a greater number of genetic materials and soil production systems, in addition to the development of economic feasibility studies and further adaptive research to refine crop recommendations for farmers that may consider using protective cropping systems for growing specialty melons.’

For additional information you can contact Elio Jovicich by emailing elio.jovicich@daff.qld.gov.au or phoning 13 25 23.

This work was conducted as a project component in: Developing protected cropping systems for production of high-value vegetables in the South Pacific Islands (Fiji and Samoa) and Australia, under the overall project Pacific Agribusiness Research for Development Initiative (PARDI) and with funding sources from the Australian Centre for International Agricultural Research (ACIAR) and DAFF. Special thanks to Denise and Bill Jensen and the Stanley family for allowing the conduction of trials and test crops in their properties, and to Rijk Zwaan, Lefroy Valley, and Clause Pacific for supplying seed material.

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A research project led by horticulturist Dr Elio Jovicich from the Queensland Department of Agriculture, Fisheries and Forestry (DAFF) is exploring the benefits of using protective cropping systems for high-value vegetables such as melons.

Rockmelons and honeydews are the two melon fruit types most commonly consumed in Australia. Recently, several melon growers in Queensland have started to grow a greater variety of fruit types, such as piel de sapo (the Spanish name which translates to ‘toad skin’) and small canary melons; both fruit types which are popular in Mediterranean countries. Other fruit types such as galia (Reticulatus group), charentais (Reticulatus group), and hami (Inodorus group) are generally absent in Australian markets and their yield and quality is variable when crops are grown outdoors.

Overseas, it is common practice to grow some of these specialty melon types using protective cropping systems. These systems involve growing plants under a frame structure covered with a film or screen material, and include structures such as walk-in tunnels, greenhouses, or net houses.

‘Protective cropping could be an effective system for growing specialty melons in the Dry Tropics of North Queensland, Dr Jovicich said. ‘The growing system could reduce outdoor risks for production loss, improve fruit quality, increase yield per square metre, allow for off-season production and supply niche markets in a segment of the larger melon market in Australia. These systems can also be suitable for increasing the use of biological control practices and rely less on the use of pesticides.’

‘The yield benefits achieved from the improved environment are also the result of using performing cultivars and specific plant growing systems that are appropriate for warm climatic conditions.’

Recent trials of the project involved evaluating melon production under low-cost protective structures in commercial farms in Giru and Hervey Range, in North Queensland. The aim was to gain local knowledge on potential yields and fruit quality as well as on pests and diseases that may be present when melon crops are protected from rain, wind, and extreme solar radiation and temperatures.

On 25 July 2013 in Giru, seven cultivars of fruit types galia, hami, charentais, small canary, and rockmelon, were transplanted under a high polyethylene-covered tunnel. Plants were grown in soilless media at a density of 2.8 plants/m² and were irrigated with a complete nutrient solution. Plants were pruned and trellised vertically to a main single stem, keeping short lateral shoots where fruit set. On 20 November 2013, the cultivars had combined marketable yields that ranged from 2.8 to 8.2 fruits/m² and from 3.1 to 7.8 kg/m². Cultivars Tempo (galia), Tikal (canary) and Sultan (charentais) had fruit yields that were up to 2.6 times greater than yields commonly achieved with field-grown rockmelon crops (if compared to yields of 27.5 t/ha from an outdoor rockmelon crop established with 13,330 plants/ha). All fruit under the protected cover were marketable and very consistent in size and quality.
Dr Jovicich said these initial results were very promising and growers that visited the trials were very interested in the production system. ‘We aim to develop economic feasibility studies and conduct further evaluations that include a larger range of cultivars and the use of soil production systems. We also plan to develop adaptive research to refine crop recommendations for farmers that may consider using protective cropping systems for growing specialty melons.

For additional information please contact Elio Jovicich by emailing elio.jovicich@daff.qld.gov.au or phoning 13 25 23.

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Vertical trellis of melon plants in a melon cultivar trial in Giru, Queensland.

Excellent quality of charentais (left) and galia (right) melon cultivars that reached 7.8 kg/m² under protected cropping in North Queensland.

Consistent fruit size and high quality of small canary melons (left) and galia melons (right) grown with protective cropping in North Queensland.