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Pre-Cooling Technology for Vegetables

Freshly harvested vegetables that are rapidly cooled and packed prior to marketing have prolonged shelf life. Many farmers therefore use room cooling to pre-cool their vegetables, and thus achieve good temperature management. However, room cooling usually takes between 4-20 hours, and farmers with large harvests but limited cooling capacity will have to cool the harvest in batches, thus facing delays in their cooling and packing processes. In contrast, the pre-cooling process can be sped up by the use of the vacuum cooling and forced-air techniques.

With the vacuum cooling technology, the harvested vegetables are subjected to very low atmospheric pressures in a vacuum chamber. This accelerates the evaporation of water from the produce, and results in a quick reduction in the surface temperature of 5 °C in about 30 min. Vacuum cooler are thus particularly suited to farms having large harvests of leafy vegetables, where the short cooling times not only allow large

amount of the leafy vegetables to be processed quickly, but also allow the vegetables to remain fresh by reducing the respiration rate of vegetable in low temperature. This will ensure high quality vegetables for packing.

With the forced-air cooling technology, cold air is forced through the harvested vegetables to rapidly reduce their temperatures. The time required for such cooling is between 30 min to 2-3 hours, depending on the amount of vegetable. The limitation is that a prolonged cooling time will cause leafy vegetable to dehydrate. Forced-air cooler is therefore more suitable for cooling fruited and rooted vegetables.

Pre-cooled vegetables have longer shelf life as compared to non pre-cooled vegetables. According to experiments conducted by the Post Harvest Technology Division of AVA, the shelf life of Xiao Bai Cai pre-cooled by vacuum cooler can be extended to 15 days, as compared to 6 days when no pre-cooling treatment is used. Such pre-cooling will be useful in reducing yellowing and spoilage in vegetables that do not reach the consumer within 6 days.

In order to encourage the farming vegetable industry, including the farming sector, to implement the cold chain and adopt rapid cooling of vegetable, AVA and SPRING Singapore has jointly developed the Technical Reference (TR24: a cold chain management standard for the

vegetable supply chain) and is currently conducting pilot trials to implement this standard in different sectors of the industry. The various supply chain players were also being trained on the TR24 including the application of pre-coolers.

A demonstration workshop had been conducted for local farmers and members of the Singapore Fruits and Vegetables Importers and Exporters' Association. Among the twenty-six participants from the farming and supply chain industry, some had expressed interest in the procurement of pre-coolers for their farms. At present, two vegetable farms and one bean sprout farm are equipped with vacuum coolers.

Workshop for Cooperation in Development of Test Guidelines and DUS Test

A Workshop on Cooperation in Development of Test Guidelines and DUS Test, arising from the First East Asia Plant Variety Protection Forum, was conducted by a delegation of 8 technical experts from the Ministry of Agriculture, Fisheries and Forestry of Japan (MAFF). The Workshop was for AVA officers and officers from the Intellectual Property Office of Singapore, and was held at the Horticulture Service Centre, located at AVA's Sembawang Research Station.

Such tests are used for the documentation of new varieties of plants, which must meet the criteria of distinctness, uniformity

and stability (DUS), under rules established by the UPOV (International Union for the Protection of New Varieties of Plants).

The participants were taught methods for conducting DUS examinations and on-site inspections, the formulation of DUS test guide-lines, photo-documentation and the preparation of reports for new plant varieties applying for protection. Practical sessions with the *Dendrobium* orchid and the vegetable Cai Xin, including sharing and question and answer sessions, were used to reinforced the knowledge gained from the training.



Fig: Participants of the DUS workshop.

E-books for Sale

The E-books “The Singapore Plant Health Guide” and the Chinese version of the “Guide to Vegetable Growing” are still available for sale at \$5 each. Purchases may be made from the Plant Health Laboratory (Animal and Plant Health Centre, Agri-Food and Veterinary Authority, 6 Perahu Road, Singapore 718827; Tel: 63165148 / 63165168; Fax: 63161090; Email: AVA_Planthealth@ava.gov.sg).

Pest Interceptions Recorded in 2010

Pests/Diseases	Species	Intercepting Country
In aquarium plants		
<i>Bemisia tabaci</i>	<i>Hygrophila salicifolia</i> <i>Hygrophila angustifolia</i> <i>Hygrophila angustifolia</i> <i>Anubias barteri</i> <i>Nomaphila siamensis</i>	France and United Kingdom
<i>Hirschmaniella</i> sp.	<i>Vallisneria spiralis</i> <i>Vallisneria gigantes</i> <i>Cryptocoryne</i>	France
In orchid flowers		
<i>Thrips palmi</i>	<i>Dendrobium</i> sp. <i>Aranthera</i> sp. <i>Alpinia</i> sp.	USA
Comb footed spider <i>Coleosoma floridanum</i> Snails, Slugs, Springtails	No orchid species mentioned	Australia
In cut foliages		
Diseases of <i>Phomopsis</i> sp. (blight)	<i>Chrysalidocarpus</i> sp.	USA
Snails	<i>Monstera</i> sp.	USA
In seeds		
<i>Pyraloidea</i> (moth)	<i>Phaseolus</i> sp.	USA
In wood packaging material		
<i>Sinoxylon</i> sp.	-	Germany
<i>Bethylid</i> wasps, red flour beetle, lesser auger beetle (exotic), tube thrips, darkling beetles, conifer auger beetles, drywood termites, booklice	-	Australia
<i>Coleoptera: Bostrichidae</i>	-	Canada

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The aim of this bulletin is to disseminate horticulture and plant health information to plant growers, exporters and importers in Singapore. If you have any suggestions, comments or enquiries, please contact us at :

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