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Study Mission To Korea On Post-harvest Handling Of Vegetables

A study trip jointly organized by the Post Harvest & Horticulture Branches, AVA, the Singapore Fruit and Vegetable Importers and Exporters Association (SFVIEA), and hosted by Korean Food Research Institute (KFRI) was made to the Republic of Korea, 28 June to 2 July 2004 to learn post-harvest techniques for handling fruits and vegetables there. Sixteen members of Association and 2 AVA staff participated (Fig 1). The mission stemmed from the visit by Dr. Kim Byeong-Sam from KFRI to AVA in February 2004 under the ASEAN-ROK Vegetable Post-Harvest Technology Programme. His lectures sparked the interest of the vegetable farmers here who expressed desire to visit KFRI, vegetable farms, post-harvest and pre-cooling facilities and packaging houses in Korea.

The mission would also open opportunities for the vegetable traders and farmers to meet up with their Korean counterparts to network and exchange post harvest know-how. The group also had opportunity to dialogue with the traders and farmers to explore the possibility of trading and exchange experience.

During the study tour, visits were made to:

- forced air cooling facility in KFRI, Seongnam,

- vacuum cooling facilities in Noghyup Seongnam Agricultural Distribution Center.
- processing fresh cut vegetables, Singingwon Co., Daegwallyeong Horticulture Agricultural Co-operative
- Wholesale and Auction Center in Seoul

The study mission saw the importance of proper handling to maintain the freshness and quality and removal of field heat as a critical factor that determined the shelf life of the vegetables at retail.

At KFRI they observed that pre-cooling was achieved by “pulling” cold air through stacked vegetables. Such forced cooling can bring down the temperature 1-10 times faster than room cooling, depending on the air-conditioner capacity, air flow speed and the amount of vegetables. Vacuum cooling is another pre-cooling method but may be less economical to implement as the capital outlay is 10 times higher than forced air cooling.

The delegates also learnt that high standards of sanitation and hygiene must strictly be adhered to when processing fresh-cut vegetables to



Fig 1: Singapore Delegates at the Korean Food Research Institute (KFRI)

ensure food safety and maintain quality for the vegetables.

Overall, Singapore members felt that the objective of this study mission was well achieved. The participants had opportunity to see the latest technology in pre-cooling, processing of fresh cut vegetables, farming and harvesting of tomatoes and lettuces, as well as the auction, wholesale and retail marketing practices there.

AVA would look into the possibility of organizing missions to China or Australia in future improve the post-harvest handling practices here, thereby enhancing value for consumers in Singapore.

CITES Update : Trade In Agarwood & Ramin Timber

The 13th Meeting of CITES Conference of the Parties, held in Bangkok, Thailand, 2-14 Oct, 2004 had agreed to uplist all *Aquilaria spp.* and *Gyrinops spp.* to CITES Appendix II. In addition all parts, derivatives and manufactured products of ramin timber, *Gonystylus spp.* had been moved to Appendix II from Appendix III. This amendment comes into effect 12 Jan 2005.

All agarwood and ramin timber traders have been notified to declare their existing stocks to Plant Regulatory Branch, AVA by 31 December 2004. They are to obtain CITES export permit from the country of origin and a CITES import permit from AVA in 2005 for the import for these products. The “country of origin certificate” for the import of ramin timber will no longer be accepted. A CITES import permit will cost \$60. For further information please contact Ms. Ong Ai Khim at 67519843

Khaya Base And Root Rot

Base and root rot of the khaya trees or African mahogany, *Khaya senegalensis*, was observed in Singapore since late 1980, the first reported tree being at Loyang Avenue. Subsequently, infected Khaya trees were found in various locations in Singapore. The tree is an introduced tree species by the National Parks Board and widely planted as roadside shade trees.

Diseased trees show progressive decline over the years, becoming partially defoliated (Fig. 2).



Fig. 2: Khaya tree defoliated by the disease

With each new growth, the leaves become smaller and lighter green in colour. Bark at the tree collar cracked. Beneath the cracked bark were brown discoloured wood tissues that signified wood rot and decay. Roots below the soil line when exposed revealed a network of thin black lines in the decayed wood (Fig. 3). Such trees eventually die and had to be removed. Nearby Khaya trees too succumbed to the disease as it slowly spread along the tree rows.

There had been no known disease reported on *K. senegalensis*. Fungal mycelia isolated from diseased wood



Fig. 3: Mycelial network on infected wood sent to CABI Bioscience Centre, UK were identified as “a probable Basidiomycetes” as no confirmatory taxonomic characters such as fruit bodies were found. In 2003, NParks tree health inspectors stumbled upon black crusty formations of fruit bodies (Fig. 4) hidden among grasses and buried roots of an infected Khaya tree along Henderson Road, an area with the highest incidence of Khaya root rot. More fruit bodies were later found from stumps and roots of fell infected trees. Tar patches were also noted on diseased collars and roots .

Laboratory examination made at the Plant Health Laboratories, AVA on the tar patches showed brown elliptical spores. The fruit bodies were sent for identification. The “unknown” can now be confirmed as *Ustulina zonata* by its characteristic carbonaceous fruit bodies and spores (ascospores), the likely primary cause of the Khaya root rot disease observed. The fungi belong to the Class, Ascomycetes instead of Basidiomycetes as first thought.

This is the first report of *Ustulina zonata* on *Khaya senegalensis* in Singapore. *U. zonata* is known to cause sudden death of many trees and shrubs. The hosts include economic crops of tea, citrus, coconut, coffee, oil palm, rubber, tobacco, cocoa, oak and maple trees. In May 2004, black fruit bodies were observed at the base of *Khaya grandifolia*, another Khaya tree species. The Plant Health Laboratories, AVA has initiated

inoculation tests with *U. zonata* cultures on khaya saplings to prove pathogenicity. This would be followed with the development of control measures and strategies to curb the disease rampage through the garden city.



Fig. 4: Carbonaceous fruitbody hidden among grass and roots

Organic Fungicides

Here are 2 organic recipes that can be used as preventative measures for some plant fungal diseases.

Baking Soda Spray

1 quart of water
1 teaspoon of baking soda
1 squirt of liquid, non-detergent soap

Spray leaves thoroughly, including undersides and stems. Repeat regularly during rainy seasons. This is an effective mixture to prevent black spots, rusts and powdery mildews on roses.

Sulfur Dust

Sulfur has been used as a natural fungicide since olden times. It is usually purchased as a powder. Finely-ground sulfur can be used as a dust or a spray and double as insecticide to control spider mites. However, sulfur may burn tender foliage and shoots at temperatures above 32°C. Sulfur may also cause an unpleasant taste if used on vegetables shortly before harvest for consumption.



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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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