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PLANT BREEDING AND GENETICS PANEL SUMMARY

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Summary

M. L. Arpaia: Avocado breeding program. The goals of the avocado improvement program are to produce varieties that can produce optimal prices, easier tree management and higher fruit quality to the consumer. This is achieved through searching for dwarfing varieties and rootstocks and new selections with increased tolerance to pests, diseases and environmental stress. We also need to identify varieties, which will "store" on the tree, will have minimum alternate bearing, uniform ripening, and better postharvest storage.

R. Knight: Genetic diversity of avocado germplasm. The archeological evidence shows that Indians in Mexico collected and used avocado over 9,000 years ago. Genetic diversity is very abundant in avocado in comparison with other crops such as lychee and mango because the locations of origin have great ecological diversity. The Guatemalan and Mexican races have higher cold tolerance than West Indian materials. Dr. A. Ben Ya'acov believes that West Indian avocado originates from the Pacific coast of Costa Rica. The diversity of avocado germplasm has tremendous impact on the development of the avocado industry worldwide.

A. Barrientos-Priego: Germplasm conservation. Avocado germplasm is present in all regions of Mexico and South America. However with rapid growth in developing countries and the rapid destruction of the rain forest, there is urgency for the collection and preservation of avocado germplasm.

M. Zilberstaine: Avocado breeding program in Israel. Over 6000 seedlings of avocado were screened by Dr. A. Ben Ya'acov for better tolerance to salinity in Israel. Six to seven rootstocks were selected for different regions throughout Israel depending on the level of salinity, *Phytophthora*, and soil type. Most orchards use seedling West Indian rootstocks due to high salinity of the irrigation water. Rootstock selection plays a major role in tree productivity in Israel.

R. Litz: Somatic hybridization and genetic engineering of avocado. Somatic embryogenesis is used to regenerate avocado plants. Somatic embryogenesis involves four steps: induction, maintenance, maturation, and recovery. So far, six avocado cultivars have been generated through embryogenesis. Somatic hybridization is used to introduce useful characteristics from related *Persea* species into commercial avocado rootstocks. Pathogensis-related protein, anti-fungal protein gene, glucanase and chitinase genes have been introduced into avocados through genetic transformation that can give higher resistance to *Phytophthora* root rot.

Questions and answers

Q. Which rootstocks appear to reduce alternate bearing?
A. (M. L. Arpaia) 'Duke 7' has the lowest alternate bearing tendency in a trial at South Coast Research and Extension Center.

Q. The size and vigor of the current avocado varieties are a big impediment to increase per acre productivity. When can we expect a successful dwarfing 'Hass' type avocado tree?
A. (M. L. Arpaia) Dwarfing of avocado can be achieved through the use of selected dwarfing rootstocks. It probably will take another 10 years before dwarfing rootstocks become available.

Q. What is the current status of nuclear treatment of avocado to increase fruit shelf-life? Is this good or bad for growers?
A. (M. L. Arpaia) Irradiation is only a quick fix for the problem. We should look into other aspects of handling to increase the shelf life of avocado.

Q. How soon would Dr. M. Clegg's work could be implemented to help produce a genetically manipulated California avocado?
A. (R. Litz) Dr. Clegg is not directly involved in genetic engineering of avocado. However, progress has been made in other laboratories for cloning different genes.

Q. Is there an indication that somatic hybrids may be graft incompatible if hybrid parents were used?
A. (R. Litz) Experience in citrus showed that there can be graft incompatibility. Potentially avocado could have the same problem.

Q. I understand that tissue culture of avocado has been difficult. As a result of your work, can you say that the difficulty has been overcome and it can now be used successfully by tissue culture laboratories in different parts of the world?
Do you feel that the procedure of somatic embryogenesis is 'ripe' for commercial implementation?
A. (R. Litz) Potentially somatic embryogenesis can be used by commercial laboratory to produce rootstocks.

Q. Have you thought about the nutritional value of the fruit your are genetically engineering?
A. (R. Litz) No, we only work with rootstock transformation at this moment. However, transformation of scion variety should be feasible in the future.

Q. Is there a way to select for the somatic hybrids before they are grown into embryos and into plants?
A. (R. Litz) The successful rate of somatic hybridization is 1/10,000. An antibiotic resistance gene can be used as a selection marker.

Q. West Indian rootstocks are salt tolerant and potentially dwarfing. Do you think this industry can afford to continue its rootstock research without looking at this race?
A. (Group) NO.