

COMMENTS ON THE SOUTH AFRICAN AVOCADO INDUSTRY



DON GUSTAFSON

Farm Advisor, Cooperative Extension, University of California

INTRODUCTION

This report summarizes my observations of the South African avocado industry, made during a 34 day visit from July 14 to August 17, 1983. This was a follow-up to my visit from June 25 to July 13, 1980. The progress made in the development of the avocado industry during the past three years has been most impressive. The two most important things observed were: 1) the dramatic response of root rot disease infected trees to injections with Aliette, and 2) the fine progress of the South African Avocado Growers Association in its service to grower members and for providing the leadership on industry needs. The month-long program, as organized and executed by Mr Burelli (director) provided an excellent exposure to all growing areas and all aspects of the avocado industry. Areas visited were: 1) Louis Trichardt, 2) Levubu, 3) Nelspruit, 4) Natal (Eshowe, Richmond), 5) Letaba, and 6) Tzaneen.

VARIETIES

Varietal testing should be an ongoing program. New varieties should be introduced and planted in all growing areas in order to find a better yielding tree and a better quality fruit.

The Hass variety is one of the most acceptable market fruit because of its thick skin and dark colour. It ships well and skin blemishes and discolouration are less noticeable, making it more attractive to the shipper, wholesaler and retailer. The small sized Hass fruit is a problem observed in many orchards that were visited. This is probably due to inadequate irrigation and fertilization practices.

Fuerte is still an excellent quality fruit and well accepted in the market.

The Edranol is an attractive fruit and should be readily accepted in local markets. Three new varieties developed by Dr Bob Bergh, University of California, Riverside would be worthy of trial. They are: 1) Gwen, 2) Esther and 3) Whitsell. Growers should be alert as they work their orchards for any unusual production of good quality fruit on individual branches. Many new varieties have been found where bud sports, or chimeras, occurred on branches of a standard variety tree.

Another facet of varietal testing is the development of a technique to duplicate trees, called "copy trees." There is no point in developing new scion varieties without using the same rootstock that made that particular variety desirable. Rootstocks are grown from seed, and every seedling is genetically different. This difference affects the scion in many ways — tree growth, fruit quality, fruit yield, resistance to diseases and insect attack, etc. Israeli plant scientists have been working on the "copy tree" technique for a number of years and are the leaders in this method of reproducing trees.

ROOTSTOCKS

Rootstock variety testing should be on the same level as scion variety testing. Rootstock varieties tolerant to *Phytophthora cinnamomi*, such as Duke 7, G6, and G755, must be planted in all areas, in all soils and under dry farm and irrigated conditions.

Etiolated rootstocks, considered clones, should be looked at very carefully. Recent research in Israel indicates genetic material is transmitted from the rootstock to scion. When the etiolation technique is used, the transfer of genetic material can take place from the nurse stock (a seedling) to the scion during the short period (a few months) it is on the root stock (nurse stock). This could explain why there are variations in Duke 7 rootstock trees, or any other rootstock used, when planted in the field.

Much work is needed on this problem of growing true clonal trees. It is recommended that research be funded, or funds be made available to a PhD candidate in horticulture to pursue this study.

SOILS

Heavy clay-loam and clay soils are a major factor, along with water accumulation, in contributing to a high incidence of root rot. Tile drainage can help alleviate this situation by removing excess sub-surface water. Very little else can be done to modify the soil to make it less disease prone.

Soil pH should be given increased attention, especially where avocados are concerned. Soil pH's in the orchards visited in all four growing areas were quite acid, between pH 4.0-5.5. Liming the soils must continue in order to bring the soil pH up to the 6.0-6.5 level. Very little work in soil pH manipulation has been done with avocados because in most growing areas of California the soil pH's range from 6.0-8.0. In San Diego County, the pH in soils where avocados are grown is in the 6.0-6.8 range.

In the North Carolina peach study, it was shown that soil pH's below 5.6 resulted in poor tree growth, low fruit yield and small fruit size. Further field research on the relationship

between soil pH and avocado production is strongly recommended.

Methods to introduce lime in sufficient quantity to raise the pH should be tried. Vertical mulching is one method to try. This type of mulching can include quantities of lime at the time the organic matter is blown in, or packed into, the holes bored into the soil around the tree. The holes should be augured to a depth of two to three feet.

NURSERY PRACTICES

The sterile technique in growing avocado nursery trees, as observed at Westfalia Estate, HL Hall and Sons, Geoffrey Twycross, Bertie le Roux and other smaller individual nurseries, should be continued to help reduce the risk of introducing root rot disease into orchards. Every precaution should be taken to prevent the spread of this serious disease. It is especially important in the heavy clay type soils where avocados are planted in South Africa, coupled with the heavy rainfall that occurs in normal years during the summer heat.

The sterile technique should include: 1) heat treated seed, 2) sterilize soil with methyl bromide, 3) Bordeaux (copper sulphate) foot baths used at entrances to greenhouses, and growing field areas, 4) disinfectant troughs for trucks and other vehicular equipment to drive through when entering growing grounds, and 5) all soil, benches and cement walks fumigated with an effective fumigant

DISEASES

Avocado Root Rot

"There is no question that avocado root rot disease is the most serious problem South African avocado growers face". This is a quote from the 1981 SA Avocado Yearbook, but the situation is much different in 1983 since Dr Joe Darvas, of Westfalia Estate, developed the injection technique using the relatively new material, Aliette. My observations of infected trees throughout the Industry where injections have been used has shown a fantastic response to treatment. Joe's work will be of great benefit not only to South African growers, but avocado growers world-wide. The recent discovery of root rot in Israel makes the occurrence of this disease in all avocado producing areas complete. There is no commercial avocado producing country free of this deadly disease. Dr Darvas should be given unlimited support to further his important research on root rot control.

SUNBLOTCH

The number of sunblotch trees and suspected diseased trees observed in orchards were too high for an industry that is attempting to grow and increase its production. A survey of the industry should be done to determine what percentage of the orchard trees are infected with the sunblotch viroid. Symptoms to look for are: on fruit yellow, depressed streaks on neck of fruit, or/and yellow, depressed spots on any portion of fruit; on twigs / branches yellow, depressed streaks; on leaves distorted, abnormal

shaped leaves, with portions of leaf a yellow color; on trunk coarse, checked bark, resembling a crocodile skin, extending up the trunk and into the lower scaffold branches and newer, smaller branches.

Every effort should be made to eliminate the bud or scion wood and roots-lock seed sources within the Industry. An educational program should begin to acquaint nurserymen and growers with this disease and how it is transmitted. With the rapid testing for sunblotch technique available, as developed by Dr Da Graca, the infected source trees could be eliminated from the industry.

IRRIGATION

Irrigation is the most important cultural practice in the commercial growing of avocados. The avocado is an exacting plant. It cannot stand drought. In South Africa, during normal rainfall years sufficient water is stored in the soil to supply the tree with moisture for a number of months during the wintertime.

However, the drought of the last two to three years makes it necessary to apply water through an irrigation system, providing a source of water is available. The dry farm method of growing avocados should be re-considered in light of the present drought condition. Even if normal rainfall returns, supplemental irrigation should be seriously considered.

Methods and types of irrigation systems that could be used with avocados are: 1) sprinkler, 2) drip, 3) micro-jet and 4) mini-sprinkler. All systems should be placed under the tree foliage, not above the trees. Over-head sprinkler system is very inefficient because wetting pattern is inconsistent, water distribution is poor, equipment maintenance is difficult and water is wasted. In areas where rainfall is high, but occurs over a two to five months period, with the balance of the year remaining dry, supplemental irrigation is definitely required and will prove beneficial to the growth and production of the trees. Improved irrigation practices will result in better utilization of fertilizer available in the soil.

A good guide to determine when and how much to irrigate under the supplemental irrigation program is the use of moisture measuring devices, called tensiometers. These instruments are usually installed in pairs at depths of 30 cm (12 inches), 60 cm (24 inches) and sometimes 90 cm (36 inches). Placement of instruments are usually under the drip-line of the tree where the most active roots are located and the side of the tree that dries out first.

Hass trees appear to require more water and fertilizer than the other commercial varieties. Fertilization of Hass trees in California is usually up to twice the amount that is applied to Fuertes. Irrigation water amount likewise is doubled to satisfy the increased demand by trees. Increasing the fertilizer, especially nitrogen, and water could help to overcome the small fruit size problem.

FERTILIZATION

The most noticeable nutrient deficiency observed in the different growing areas visited

was zinc. The typical symptoms were present: small terminal leaves, short internodal growth at branch tips, round fruit, mottled leaves, and general weak growth.

In talking with growers, many mentioned that the problem with their trees was root rot. Further questioning of growers indicated that no laboratory tests had been done on the roots of sick looking trees. They just assumed that it was root rot. In California, there have been experiences where growers were told their trees had root rot, but no lab tests were done. When I was called in to evaluate such a situation, it was found that zinc deficiency was the problem, not root rot. A laboratory test on the roots of an affected tree is always done to determine the presence, or absence of the fungus. If a sick tree is not tested for root rot, it should not be assumed the tree is infected with the fungus disease.

The best tool to use as a guide to a proper fertilization program is leaf analysis. Leaf analysis is done on spring flush leaves, taken in the fall, when the leaves are approximately five to seven months old. Nutrients to analyze for are: nitrogen, phosphorus, potassium, zinc, iron, copper, calcium, magnesium, and boron. Laboratories, where growers could obtain soil, water and leaf analysis and root rot determinations are available.

WEED CONTROL

Controlling weeds in an avocado orchard is important. Reducing competition for water and nutrients is necessary, especially during the drought cycle. Roundup, if available, is the best all-around weedicide. Gramaxone (Paraquat) is also a good contact herbicide. Princep (Simazine) is one of the better pre-emergence weed killers. Use of these chemicals, as with all types of chemicals, should be done strictly according to the labels recommendations and directions.

RESEARCH

SAAGA'S Research Committee is to be commended for the excellent guidance it has given to the avocado industry's research program. It was my privilege to have been invited to attend the August 12, 1983, meeting, held at the University of Pretoria. The members are key leaders from the avocado industry, universities, governmental research stations and the transportation and snipping industries. Under the leadership of Dr Jan Kotzé, the members meet regularly to discuss industry problems and what research is needed to solve the problems.

Committee members are dedicated, enthusiastic and with great expertise in their specific field of work. It appears to be a very active and effective committee. Research should be supported at a very high level. Suggested research projects are:

1. Methods to raise soil pH from the 4.0-5.5 range to 6.0-6.8 levels.
2. Continue Dr Joe Darvas excellent experimental work of Aliette injections.
3. Orchard thinning and pruning.
4. Post-harvest handling of avocados.

- a. Temperature — transportation and storage
 - b. Harvesting methods.
 - c. Fruit diseases.
 - d. Fruit quality.
5. Home (domestic) market development.
 6. Selling of ripe fruit versus hard, green fruit.
 7. Grey pulp
 - a. What causes it?
 - b. How is it corrected?
 8. "Clonal" Rootstocks.
 - a. Determine why there is a variation in tree growth and root rot resistance among so-called "clonal" rootstock trees.
 - b. Determine what genetic material is transmitted from seedling rootstock (nurse stock) to Duke 7, G6, and G755 scions which are being etiolated.
 - c. Research at all levels should be intensified on this project. If possible, assign a PhD candidate this problem for his thesis.
 9. Irrigation.
 - a. Supplemental irrigation methods.
 - b. Systems and engineering design.
 - c. Water use by individual trees under different soil and climatic conditions (wind, heat, etc.)
 - d. Water schedules.
 10. Fertilization.
 - a. Zinc deficiency appears to be the main problem. More work on soil application of zinc materials is needed. Could be one of the contributing factors to small sized fruit in the Hass variety.
 - b. Calcium and magnesium are low in the soils. The relationship between calcium-magnesium and fruit yields and fruit quality should be explored.
 - c. Leaf analysis should be encouraged on an annual basis.
 - d. Nitrogen fertilizer amounts should be doubled on the Hass variety.

SOUTH AFRICAN AVOCADO GROWERS' ASSOCIATION

South African avocado growers are to be complimented on the way they have organized into a very vital and effective group to advance their avocado industry.

During the three years since my last visit (June July 1980), the growth in membership,

the research projects supported by SAAGA, and the total confidence the grower-members have in SAAGA to solve their industry's problems is most impressive. The management team and the Board of Directors make an excellent working team. Mr Nino Burelli, Director of SAAGA, has obviously instilled a sense of cooperation among growers and a real "esprit de corps" that has moved the industry ahead.

The growers are to be commended for beginning SAAGA, then following up this initial action with good support. If an industry is to succeed, it must have a strong backing of its members. The organization should control each aspect of the industry — research, extension, production, harvesting, packing, distribution of fruit, advertising, promotion, marketing and to a certain extent, influence retailing through education.

The hiring of an extension type field officer, Mr Colin Partridge, will prove highly beneficial to SAAGA members. To be effective he must receive a tremendous amount of support and cooperation from growers. In this way, he will have a better chance of helping you solve your problems and be able to contribute to the further development of SAAGA and the South African avocado industry.

SAAGA's program of research, extension and service should be so active and productive that growers cannot afford not to be a member and participate in the excellent organization.