

DON GUSTAFSON VISITS SOUTH AFRICA



Don Gustafson

The avocado industry was privileged to receive Don Gustafson for three weeks during June and July. He brought with him a wealth of knowledge and experience.

Don is the recipient of many awards, viz "Award of Honor" from the California Avocado Society for outstanding and meritorious service to the avocado industry. He received "Man of the Year" award from Calavo Growers and again "Man of the Year" from the Avocado Growers Bargaining Council in recognition for his outstanding contributions to the avocado industry. In 1977 he received the "Award of Recognition" from the San Diego County Farm Managers' Association. Indeed Don's middle name should be "Mr. Avocado".

He visited all the important production areas, addressed big meetings and in a typical fashion, talked to scores of farmers. He made many friends. After completing his visit he submitted the following views and food for thought to SAAGA and the growers. Don writes as follows:

INTRODUCTION

This report is my evaluation of the South African avocado industry. The information herein was obtained during my personal visit to your country during the period of June 25 to July 13, 1980. Areas visited were:

1. Pretoria
2. Nelspruit
3. Letaba
4. Tzaneen
5. Levubu
6. Louis Trichardt

The evaluation of the avocado industry will include observations made and impressions received after visiting the orchards, nurseries, research stations, packing sheds and in talking with many growers.

There were many facets of the South African avocado industry that were impressive. The progress the industry has made since my last visit in 1974 was quite noticeable. The industry leaders, the research personnel and the growers are to be commended for their contributions to the advancement of their industry.

VARIETIES

Varieties to be used should be: Hass, Fuerte, and possibly, Edranol. Hass appears to be the best variety for the following reasons: 1) good to excellent yield. 2) a good shipping fruit, and 3) good market acceptability. Fuerte is likewise a good fruit, but the yield is not as great as Hass, nor is it as good a shipping fruit because of its thin skin and green colour. Skin blemishes are more noticeable and results in downgrading and less acceptance by the trade.

Varietal testing should be continued, as a long term, ongoing project. There can always be a better variety.

SOILS

Heavy clay-loam and clay soils are a major factor in contributing to the high incidence of

root rot. Very little can be done to modify the soil to make it more suitable, or less disease prone. Extensive tile drainage to remove excess sub-surface water could reduce the amount of water that accumulates during the rainfall season. If this can be accomplished, the risk of root rot infection could be reduced.

On a trip to Australia, a unique method to help drain heavy soils where grape (wine) vineyards were planted was observed. The field was tile drained in the usual way, but instead of permitting the soil to drain by gravity only, a pumping device was built into the tile drainage system. The pump was on a timer, permitting the unit to automatically suck out the water from the tile drains. In this manner, excess water did not accumulate in the root zone of the vines. The excess water was discharged into a canal or water channel alongside the field and returned to a sump, or small reservoir, to be reused. This technique should be explored. If this is done, the recycled water should be treated with chlorine to remove any disease organism.

NURSERY PRACTICES

The sterile techniques of growing avocado nursery trees as practiced by Hall and Sons, Westfalia Estates and Mr. Bertie le Roux, will surely reduce the risk of introducing root rot disease into the orchards. The other nurserymen we visited, that had a philosophy of planting avocado seeds and growing the trees under natural conditions (no sterile technique) could be inviting serious infection into orchards. Their theory that growing seed and subjecting them to all types of climatic, physical and pathological adversities sounds good, but experience in California has been disastrous for the nurseryman and the grower who purchases the trees from nurserymen who did not practice sterile techniques.

In California, growing nursery avocado trees is a sterile technique. Seed is heat treated in a hot water bath for 30 minutes at 120°F. Container soil is treated with methyl bromide prior to planting the seed. The first stage of growing a nursery tree is done in a greenhouse. The container used (3 inches diameter and 8 inches long) is smaller than the standard container (7 inches diameter and 18 inches in depth). The seedling is grown for 6—8 weeks in an atmosphere of 55°F —85°F, at 80% humidity. This forces the seedling to grow rapidly, making tip grafting (cleft graft) possible at an earlier date.

Workers entering the greenhouses step into a dry powdered Bordeaux (Copper sulphate) foot bath. The benches, ground, cement walkways and other areas of the greenhouse are fumigated with a chemical such as Vapam.

At the final growing grounds the small grafted nursery trees are transplanted into the larger plastic containers. The growing area is enclosed by a fence, with only one gate for personnel and vehicles to pass in and out of the growing grounds. A cement trough, filled with a water-chlorox solution, is at the gate entrance. All vehicles must pass through the disinfectant to clean the tires and wheels before entering the compound.

The ground, growing beds, and other equipment within the fence are fumigated. A Bordeaux foot bath is located outside the gate for all foot traffic into the compound. The avocado variety, *Persea indica*, is planted in and around the nursery grounds. *P. indica* is very sensitive to attack by the avocado root rot disease fungus, *Phytophthora cinnamomi*, and is a good indicator plant to detect quickly the presence of the fungus.

Trucks delivering trees to growers have the beds powdered with Bordeaux.

If root rot is to be prevented in orchards, the first step is to produce a nursery tree as clean and as healthy as possible. Nurseries that are using growing methods that produce clean nursery stock should continue to operate in this manner. Nurseries not using sterile techniques should be encouraged to use the sterile technique of growing avocado trees.

There are about 900 plants of all types that are hosts, or are susceptible to *P. cinnamomi*. Many of these plants are found in South Africa, so, it is imperative that precautions be taken to produce clean and healthy trees.

DISEASE

There is no question that avocado root rot disease is the most serious problem South African avocado growers face.

The avocado root rot disease report by Dr. George Zentmyer in the South African Avocado Growers' Research Report, Vol. 3, 1979, covers the problem in detail.

There is one item, however, that should be mentioned. To assist growers in determining whether or not *P. cinnamomi* fungus is present, a private laboratory should be established. All trees showing typical above ground root rot symptoms should be checked for the presence of the fungus on the roots. Not all trees evidencing root rot symptoms are infected with the fungus. There are many causes of root problems, and the true answers to these problems can only be obtained by laboratory tests on soil, roots and other plant tissue.

In addition to the disease detection services, the laboratory should do leaf analysis, soil analysis and other chemical tests. See discussion on fertilization.

A most logical way to set up the laboratory would be for SAAGA to have the laboratory as part of their organization. This would be a real service to the members, as well as a "selling point" to enlist more members.

IRRIGATION

Irrigation is the most important cultural operation in the production of avocados. The dry-farm method of growing avocados by some South African growers should be re-considered. Regardless of how much rainfall occurs during the summer months, there should be some supplemental irrigation applied during the balance of the year. Because of the nature of the soils, a moisture measuring device, such as a tensiometer, should be used. Tensiometers placed at 12", 24", and 36" depths would provide a good guide for a supplemental irrigation programme.

Trees need moisture all year round. Less water is required during the winter time when the tree is semi-dormant and the weather is cooler.

Another practice related to irrigation of avocados is the cultivation of the orchard soil. Conflicting reports by growers visited on cultivation and non-cultivation were confusing. Some claimed good results from cultivation, while other growers reported excellent results from non-cultivation. A research project should be undertaken to evaluate the practice of cultivation in avocado orchards.

Improved irrigation practices will result in better utilization of fertilizer present in the soil, as well as, prevent stress to the trees. The first two feet of the soil must remain moist since 80%—90% of the avocado trees' roots are in that area. If these roots dry out trees will suffer and fruit yield (number of fruit and size) will be reduced.

There are numerous methods of irrigation that could be used. They are: 1) sprinkler, 2) drip, 3) micro-jet, and 4) mini-spray. The system selected will depend upon the terrain, work force, availability of equipment, water supply, water source and method of conveyance to orchard and growers' preference.

In tropical and subtropical areas where rainfall is high, but occurring over a short period of time, (two to five months), while the balance of the year remains dry, there is a need for supplemental irrigation.

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 cannot be assumed the tree is infected with the fungus disease.

The best tool to use as a guide to a proper fertilization programme 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 and boron. Laboratories, where growers could obtain soil, water and leaf analysis and root rot determinations, should be set up. This could be on a private or public basis, or through SAAGA. SAAGA could finance a laboratory for use by growers, who may or may not have to pay a small fee for an analysis. Through these analyses the problems of the industry could be monitored.

FRUIT HANDLING

South Africa is unique among the main avocado producing countries regarding markets. You have the longest distance from producing areas to markets of any other country. Exceptional fruit handling techniques and the best transportation are required. The best production methods have to be used to produce top quality fruit. Harvesting, packing and transportation of the fruit to the harbour, and subsequently to Europe, must employ the best techniques and equipment possible if the fruit is to arrive in good shape.

Wrapping fruit with a special tissue paper, treating fruit with a fine coat of wax, and maintaining proper storage and transporting temperatures and humidity are methods used by various countries depending upon the distance from their markets.

In the early days of the California avocado industry, packers experimented with tissue paper wraps, waxing, etc. Results were that no real improvement was noticed for the extra time and effort required. Also, the market farthest away from the producing area was only three to four days by refrigerated truck. The industry has not used any wraps or wax since those early days.

South Africa's situation is different. With the almost four weeks for the fruit to reach market, some experimental work should be carried out on fruit wraps which could prolong the shelf life of the fruit.

WEED CONTROL

Weed control in avocado orchards is necessary. Weeds should be removed by hand from under the tree and well beyond the drip line of the tree. At least a 10 feet diameter

circle should be cleared.

Weeds between the tree rows can be mowed, disked under, or sprayed with herbicides or oil. Heavy growth of weeds compete with the trees for water and fertilizer.

RE-PLANTING IN OLD AVOCADO SOILS

Re-planting avocado trees in old avocado orchard soils requires soil fumigation prior to planting new trees. Observations in a few orchards where a new avocado orchard was planted after old avocado trees were removed suggests the need for soil fumigation. In one large orchard visited, a comparison could be made between two newly planted areas, side by side. One was planted after an old grove was removed. The other, an avocado orchard planted after eucalyptus trees were cut out for lumber. This latter piece of soil was cleared of all eucalyptus trees prior to planting avocados. In the old avocado orchard area, the new orchard was planted without any fumigation.

The tree growth between the two orchards was striking. In the old avocado soil the trees were much smaller than in the virgin soil.

Experience with other varieties of fruit trees, like citrus in California, there is a definite retardation of tree growth in a new planting of trees that followed the same variety with no soil fumigation. From the few cases observed in South Africa, it would be prudent to set up some comparative trials to determine if soil fumigation prior to replanting in old avocado soils is beneficial, what materials are the best, and which method of application is most effective.

RESEARCH

The amount and type of research being conducted by personnel at the Citrus and Subtropical Fruit Research Institute, Westfalia Estates and the University of Pretoria was especially impressive. More avocado research is being conducted in South Africa, at the present time, than in most avocado producing countries. This is commendable. The fungicidal work on avocado root rot is the best and most extensive anywhere. Other research projects on post-harvest fruit diseases, varieties, soil fumigation for replanting, irrigation, soils, orchard thinning, etc., adequately covers all the required information to grow and produce good avocado yields. Research should be continued at the present high level.

SOUTH AFRICAN AVOCADO GROWERS' ASSOCIATION

The avocado industry leaders are to be commended for beginning SAAGA, and making it work. Growers' organizations are important to guide the industry. Governmental agencies, research stations and such organizations are established to assist growers solve industry problems. However, it is the responsibility of the growers to identify industry problems and find ways to solve them. This is the value of a group such as SAAGA. Everything should be done to encourage all growers to join and to participate in the development of their organization and further their industry.

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