PLANT PROPAGATION IN THIRD WORLD COUNTRIES

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August and September, 1989, my wife and I served as volunteers in Western Samoa. The Peace Corps had requested a practical horticulturist to assist them with two botanic gardens in this country. Volunteers in Overseas Cooperative Assistance (VOCA) contacted me to go there in what they call the "Farmer to Farmer" program.

Western Samoa is an independent Republic about the size of Rhode Island. It is located half way between Hawaii and New Zealand 300 miles south of the equator. There are two major islands; it has a population of 163,000, imports are $38 million and exports are 17 million in U.S. dollars. The per capita income is $616 US and there is a literacy rate of 99%. It is a truly tropical island with a rainfall of over 100 in., most of which comes between October and June.

With the stream bed dry and no piped water in the 11 acre Botanic Garden when we arrived, I turned to my second objective—that of training workers. Even though the Samoans depend on their agriculture, there are no life sciences taught in the schools. The Samoan's have their own language although most understand a little English. Their language has no words for such terms as cambium, xylem, phloem, auxins, or hormones. As the workers are not fluent in English my lectures and all my notes on the black board had to be translated. This required four or five words for each one I spoke and took a lot of time. This sure threw my usual rapid-fire lectures into chaos.

Machetes were the only tool issued to the crews, until I introduced hand pruners. In discussing plant growth and its control I likened the hormones to the traffic officer in the street intersection. He would not let the cars get out of line. If we removed him out of the intersection then the side buds would grow

Fortunately, three weeks before I had tied several 15 ft shoots of poinsettia to the horizontal. All of the 80 nodes had responded with new shoots, and the students could see that instead of just one blossom at the tip, the shoot would have many blossom. With the pruning shears, saw, and loppers we gave the garden a real pruning job.

Our office was located at the Forest Nursery site where seedling trees were grown in plastic bags for reforesting. It had dependable

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water, and a Saran house we could use. When I suggested that we should propagate some plants to be ready when the rains came, I was informed that we could not propagate during the dry summer.

I had been experimenting at our cottage with a "Mickey Mouse Mist System". I had found that water dripped from a height of 5 ft. onto a convex surface would splatter an area about 15 in. across. On the local trash heap between houses I found a quart plastic vodka bottle. With a hot needle I burned a small hole in the bottom. I plugged this with a tapered piece of coconut fiber. By pushing in or pulling out I could control the rate of drip. I found that 8 drops a minute would keep the cuttings moist and the water would last for 6 hours. When I demonstrated this to the workers and showed them the roots on cuttings in 7 to 9 days, you would be surprised at the number of dripping containers that appeared.

When I found that they only got 50% rooting with their cuttings, I made the following suggestions:

1) about two weeks before making their cuttings to girdle the stem at where the basal cut will be made;
2) split or wound the bottom of the cutting;
3) use hormones;
4) in all cases put 3 in. of coarse sand in the hole before placing the cutting.

I understand that where the suggestions have been followed that the rooting response had greatly improved.

There was much interest in budding and grafting, so we began to water stock plants heavily so that we could be sure of an active cambium. Here I might mention that in the Peace Corps you must use A.T. "Appropriate Technology". One cannot use material that is not readily available to the native people. Rubber bands and grafting wax was out. We wrapped the buds and graft unions with toilet paper and either watered daily, or arranged a drip system to keep the buds and graft unions moist at all times. We got surprisingly good results until the local people tore the grafts and bud apart to find out what we were doing. I even grafted *Plumeria,* that has bloomed twice and withstood a disastrous hurricane that swept the island.

Our second experience in a Third World Country was from May 20 to July 20, 1990. North Yemen Arab Republic is 1/3rd the size of California. It is located south of Saudi Arabia, bound on the west by the Red Sea and on the East by the Great Desert. It has high plateaus and mountains to 12,000 ft. It is located 1000 miles north of the equator and has 7.8 million people. Imports a total value of $12 billion US, with exports worth $10 million U.S., mostly agricultural commodities.

The major crop is *Catha edulis*, qat or khat (pronounced gat), a plant whose leaves contain amphetamine (like an "upper"), sold only locally. Per capita income $550 U.S. Literacy is about 20% nationally but just 2% for women. It is amazing that 80% of the country is terraced to catch and hold all of the rain that falls and allow it to get into underground aquifiers. North Yemen is in a serious drought and water tables are dropping fast, about 15 to 20 feet a year.

The soil is mostly a fine clay from calcarious material, alkaline in nature and with water that ranges in pH from 7.4 to 8.5. I was working in the capital, Sana'a, at an elevation of 7,200 ft. The climate was not unlike that of Palm Springs, California, little humidity, and with a nearly constant drying wind.

I held a series of three different lectures and demonstrations of two days each. It was the first time I have lectured to women who were completely veiled. I visited eight government nurseries, seven private nurseries, and seven demonstration farms. All were directly related to deciduous fruit crops. Since 1984 the importation of deciduous fruits has been restricted as the country wishes to become self sufficient in the production of these crops. Rootstocks are either imported or grown from stool beds. With limited water, winds, low humidity, and lack of sawdust, the stool beds dried and plants became sunburned so that rootstock production was less than two plants a foot.

Two government nurseries had crops other than deciduous fruits. One had about 500 rose cuttings planted in plastic bags. Less than 1% rooted. It appeared from the looks of the cuttings that they had not been callused before planting. The other nursery had hardwood cuttings of bouganvillea and quince. These had been stuck in ground beds in a Saran house. The beds were below the walk level so that any surplus water drained onto them. Again, less than 1% had rooted. I was really amazed to find that the budding techniques for chip buds and T-buds were exceptionally good. It was the aftercare that showed lack of understanding of plant requirements

It appears to me that the greatest problem is the literacy situation. I had several of the official bulletins regarding pruning translated, and then with their horticulturists, tried to figure out what I was supposed to do. We could not The drawings in the pamphlet were very artistic, but in no way resembled how plants actually grow. The fruit growers are so scattered that work shops are not practical. The rich owners are not interested and the workers merely follow instructions of the poorly informed owners.

Although the Government Nurseries were supervised by "College Graduates", of the nine supervisors who attended my lecture demonstration sessions, I found all to be really lacking in basic

information of how plants grow and the basic principles of pruning. It appeared to me that the Horticulture section of the Agricultural Ministry lacked strong leadership and drive. Perhaps it was the problem of combining the offices of the two Yemens (as the North and South recombined on May 24, 1990), things were still in a state of transition. Perhaps in a couple of years the situation will get straightened out and a better organization will develop.

One final statement. It surprised me that in the libraries of both countries, copies of *Plant Propagation: Principles and Practices* by Hartmann and Kester, 4th ed., were available.