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Frontiers in Floriculture - - South America III

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Brazil has a well-developed rose industry with a capability for producing high quality export roses from December to May. Brazil exports no roses and few other horticultural materials at present. Production of other flower crops except tropicals is beset with many problems. Seed and unrooted cuttings of exotic plants offer strong export potential. Peru, on the other hand, is floriculturally underdeveloped. Neither the know-how nor the backing in research personnel is presently available to make an export industry. Strelitzia, certain high priced seeds and possibly cymbidium orchids are potential export crops. Since cymbidium flowers in June, July and August, Peruvian production might possibly fit in between U.S.-European and Austrialian production on the world markets.

Brazil

Brazil is a very large country, about the size of continental U.S., mostly tropical and low in elevation. There is a climatic island in Southeast Brazil extending 60 miles or more in all directions from Sao Paulo. Elevations around 2500 feet at a latitude around 22°S cause great variations in microclimates. Tropical foliage plants and stock plants are produced in great profusion just out of Campinas by the firm of Alfredo Tilli. Export of unrooted cuttings or canes of dracaenas, philodendrons and many other foliage plants should be a good business. Dracaena marginata grows in profusion throughout the Sao Paulo area. The production of "character" branched plants of this species for landscape use has reached a peak of perfection not seen in any other place.

Sao Paulo, the hoppingest city in Latin America, is also the center of flower marketing in Brazil. An agricultural cooperative of 13,000 members functions mainly in buying supplies for its flower, fruit and vegetable grower members. Growers deliver their best flowers to the fine retail flower shops in Sao Paulo (pop. over 5 million) or ship by rapid transit bus or air to florists in other Brazilian cities. The lower grade and more open flowers are on sale Tuesdays and Fridays in the modern and architecturally-unique free market. Buyers may be anyone from housewives to peddlers and truckers. Most of the flowers go to peddlers, retail florists, and truckers who take them to other cities such as Santos.

Summer (January and February) flower prices are 2 to 3 cents per flower for most kinds. Quality, especially of carnations, is very low. Roses and carnations are bunched 36 per bunch. Roses are graded in four grades according to stem length. Prices in winter and at special holidays are often four times as high. Special holidays are Mother's Day (May), Christmas, Easter, Thanksgiving (carnival time just before Lent), Father's Day (August) and All Saints Day (November 1). There is a 17% sales tax on all transactions of goods and services in Brazil. This is paid by the seller on both wholesale and retail sales. It may be paid twice on flowers that move through retail florists.

Carnations

Most flower growers in Brazil are Japanese who have emigrated within the past 30 years. Roses grow easily in Brazil with fewer problems. Carnation culture is beset with many problems. Part of these problems stem from the fact that the climates presently being used for carnation culture are far too warm and humid for carnations. In no other area is it so clear that an ideal climate for roses is to be avoided for growing carnations.

Number one problem in carnation culture is disease. Every carnation disease runs rampant since the diseases have been propagated with the carnation

cuttings with an assist from the warm, humid climate. The Yamaguchi firm has started the first mother stock plants, raised benches and soil steaming in their location near Atibaia (50 miles north of Sao Paulo). Technical assistance for this program is supplied by a young graduate of a Japanese university, Soichiro Shirakawa. Stock plants are imported from the U.S. and are very expensive after duty and air freight are paid.

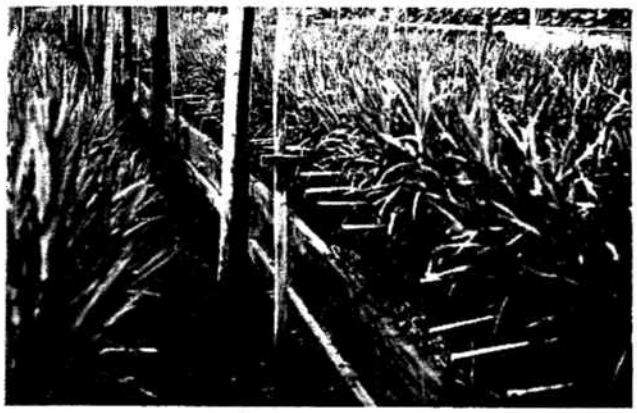

Fig. 1. The first attempt at growing "clean" carnation stock plants at Yamaguchi's. Also first steamed soil in Brazil.

Number two problem in Brazilian carnation growing is high temperature in summer (December to March). This is also the rainy season so cover is needed to keep the plants dry. Polyethylene cover is used but no UV resistant film is available. New covers may last only four months and maximum width poly available is only 2 meters. I saw no sandwiched polyethylene construction. Sash bar spacing seems to be a standard one-half meter and tack strips are used on all bars. Bars commonly are approximately 1" x 2" wood. The common construction uses new polyethylene covers at the beginning of December with sides and ends open in summer, closed in winter to retain heat. Maximum air flow is needed in summer to cool the separate houses. Daytime air temperatures in the main carnation growing areas often exceed 30°C, and of course in poorly ventilated houses this temperature often rises much higher. Best temperatures for plants are in the open or in uncovered houses. The best young plants were seen growing without cover, but rain on the plants may cause more rust and alternaria blight. The problem of keeping the temperature as low as possible in the established areas then boils down to devising construction that allows maximum air flow with shelter from the rains. Evaporative pad and fan cooling is unsatisfactory since humidity is near saturation much of the summer and keeping construction tight enough for efficient cooling would probably not be possible.

An alternative to the outsider is to find a better microclimate for carnations in this Sao Paulo region. The present flower growing climates were selected because they are warmer in winter. If cooler summer temperatures were the main factor in selection, these occur on the tops of mountains where there is better air circulation and more summer showers. Some heating would be needed in winter (June-July), but quality of the flowers would probably be so much higher the first growers in these areas would enjoy a sellers market. Good roses and gladiolus are common in Brazilian markets. Quality carnations in summer are just not available.

Roses

The strange paradox in flower growing in Brazil is that the roses are the best in all of South America. The climates presently used for growing flowers are too warm and moist in summer for carnations, but they are ideal for rose culture in the open ground. Each day I visited what I thought was the best rose grower in Brazil, only to visit a better one the following day. Rose culture without heat is so simple in Brazil that some detail of cultural methods being used are included.

Roses are propagated in pretty much the standard way used in California and Oregon. A little over a year is required for rooting the understock, budding and developing the young plant to the stage for producing flowers. The top of the understock is removed shortly before young plants are transplanted to their rows or beds for flowering. One grower stated that he preferred transplanting when the bud had just started growth (about 1" or less). Soft pinching for about five months develops strong and very beautiful plants. Cutting the flowers from this time on is in hardwood - often below all five-leaflet eyes. Cutting except on new bottom breaks, was most similar to our knuckle cutting. In open ground in this fine climate, bottom breaks occur freely and regularly to renew the bushes. Four-year-old bushes were producing long stemmed flowers with large flower heads. No one agreed on how long a rose plant could be cut before replanting. I suspect this can be indefinite, depending upon drainage and how well plants are cut.

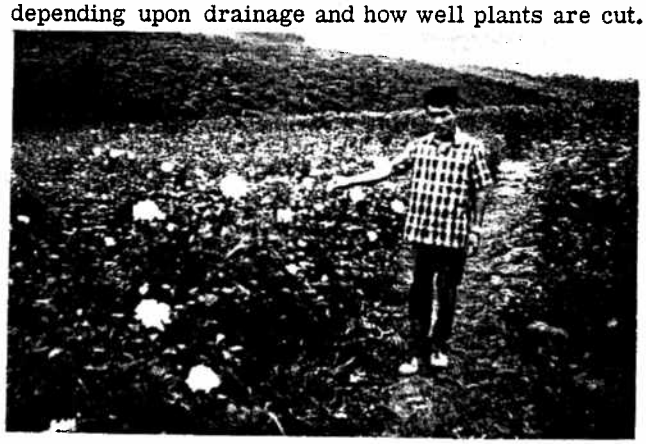

Fig. 2. Sochiro Shirakawa beside young rose plants developed to the stage where flower harvest is started.

The understock used was unknown, but resembles odorata. Some indica major was also being used. These are probably the same rose, but the latter from Italy in recent years has much more disease, or at least appears weaker.

The two best rose growers in Brazil that I visited were Sr. Takeshi Kiyohasi and Sr. Nakinori Mori. Both growers are in the area north of Sao Paulo.

Kiyohasi is a successful farmer growing glads, grapes, roses (about 10 acres) and pineapple. Mori grows mainly roses, about 20 to 25 acres with some in the open and some under polyethylene cover. Both propagate their own plants and Sr. Mori has extensive variety trials. Both have excellent irrigation systems.

Sr. Kiyohasi plants single rows on the contour and flood irrigates. His soil is well drained, rather sandy and sloping. Rows are spaced about 1 meter apart and the plants set near the ridge of the narrow contoured terraces. Sr. Mori has level ground with highly organic soil. His watering is all overhead with plastic pipe and risers and rainbird-type sprinklers. Even in his greenhouses he uses overhead irrigation. Both growers use lots of organic matter in soil preparation and practice clean cultivation - no soil cover crops. Tractors and tillers made in Brazil are used freely although they are expensive by our terms. Neither grower, nor any other growers visited in Brazil, have refrigeration for cooling the flowers.

Rose grades by length are as follows:

70 cm or more - Extra A
50 to 70 cm - Extra
40 to 50 cm - Special
40 cm and below - Superior

There were plenty of the top two grades being cut when I visited early in February, a time of highest temperatures.

Fig. 3. Newly planted roses on the contour for flood irrigation.

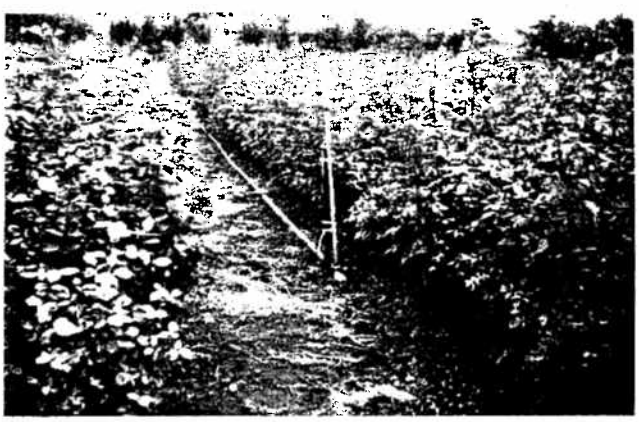

Fig. 4. Sprinkler irrigation through plastic pipe; height of rose plants about 6 feet.

Varieties

Sr. Mori has a small planting of many varieties near his grading building. This was the only place in South America that I was able to see a large group of modern varieties. Tropicana (Super Star) is grown widely in Brazil. It is a popular color but is susceptible to mildew. Happiness is a major red variety. It grows well in the open and is most resistant to bugs and worms. The best white is Pascali. Golden Scepter is grown widely for yellow though Dries Verschuren may take its place. Both grow very well in the open, but yellow varieties are most susceptible to depredations from chewing insects. Blue Moon is grown for orchid and Tiffany is widely grown for a light pink bicolor. Baccara and Queen Elizabeth are also grown widely here as in other countries of South America. Mori's observations are that some varieties require cover while others like Happiness are just as good in the open. Cover increases stem length in varieties inclined to be short and reduces disease problems except for powdery mildew. Very little spraying for disease control on roses seems to be needed in this section of Brazil.

In every market and with almost every rose grower a difference was recognized between varieties in their ability to take water. Roses were handled out of water quite a lot but were filled with water before marketing. The moist climates seem to be helpful in this respect. Some rose varieties are not grown because they take water with difficulty. Roses are not cut especially tight in Brazil.

Peru

Peru, on the west hump of South America, has climates all the way from desert to temperate in the higher elevations to tropical on the east slope. Lima, the main city, is located on a dry coastal plain at the foot of dry mountain slopes. While some mist occurs regularly, it never really rains. The Lima area is covered with clouds most of the time. There is irrigation water and the rocky fields around Lima probably produce the best crops of corn and cotton of any area in South America. Temperatures from day to day and from month to month are remarkably uniform in this coastal plain, but microclimates that are cooler and that have more temperature spread are found within a few miles of the city. Much cooler climates in the mountains are less accessible to the airport and the city.

Lima has one of the most modern airports in South America with many flights to both the U.S. and Europe. There are direct flights to New York (10+ hours) and to Miami (6-1/2 hours). There seems to be no shortage of air space out of Lima at the present time.

My contact and guide in Peru was former CSU graduate Miguel Holle who is now Professor of Horticulture at the Agricultural University (La Molina) in Lima. This university has one researcher working on ornamental plants who is presently organizing a course of study in floriculture. Opportunities are great for a special kind of tropical floriculture and research in this area, and to my knowledge, there is no one else in South America doing work of this

nature at the present time. The University (La Molina) was founded in 1902 and levelled by an earthquake in 1940. The new campus has been assisted by a combination of funds from AID, Rockefeller Foundation and the Danish government.

There are many problems in this particular university and with agricultural research in Peru that I suspect are more or less common to other South American countries. One of the major stumbling blocks in research is that there is a federal department that has little or no liaison with the university people. They often have the same functions and goals but due to lack of qualified personnel and because of red tape little is accomplished.

There is an old guard not highly educated and mostly before 1940. The standard belief among these "administrators" is that everyone should know a little about everything. The young group were educated in the 50's and 60's. Most of them have their Ph.D.'s or are completing them at U.S. land grant universities. They realize the importance of specialization but have little to say as yet in the planning of research programs. Space and facilities for agricultural research are improving but operational budgets are almost nil. The university system in Peru has been fragmented too much politically. The legislator from each province wants to establish an agricultural university even though there are no funds or people to staff it. There are some 15 agricultural universities in Peru when three or four should be enough to cover the climate differences.

Cost of Land and Capital

Land costs are high if with good water rights; almost nothing if without water. In some housing developments the land costs up to $5 per square meter. Agricultural land can be bought, if the owner needs money, for $.75 to $1 per square meter, or around $4000 per acre. Most Peruvians and other Latins use land as a hedge against the ever-present threat of inflation, hence land for purchase is never plentiful. Interest rates on short-term money in Lima are 12 to 15%, and 1% per month is common in most South American countries on long term (120 months) loans.

Marketing in Peru

Flower marketing in Lima is rather typical of other South American cities. The producer sells his best flowers to retail flower shops at premium prices. What are not sold to retail florists move through the open wholesale market to peddlers and to people who make a business of funeral arrangements. These wreaths and sprays are made up and displayed for sale. It is the custom to pick up funeral flowers personally or to send taxis for them. It is also the custom to send flowers to the family of the bride. The big flower demand periods are Mother's Day and All Saints Day. Flowers are used freely in Lima, partly because of the peddlers who have regular routes in the middle class sections of the city. Typical of these are bicycle carts who make regular calls on a group of clients in a given section. This moves many flowers and the peddler must know the flowers to get highest quality and to have satisfied customers.

The commercial flower crops grown in the Lima plain at present include roses, chrysanthemums, strelitzia and some other tropical flowers, and miscellaneous annuals such as marguerites, statice, etc. A few small-flowered carnations of the Nice type were also grown but are inferior to most other flowers available.

Fig. 5. Lima wholesale flower market with flower peddler in foreground.

Roses

One of the best potential crops for export in this area are roses; there are around 25 acres of roses grown near Catholic University. Others are grown in the area as well. The plants observed were old and overgrown (8 feet tall). Some propagation is being done for replanting. Flower stems were short as cutting had been too high and not enough pruning had been done. Growth was healthy and no cover was needed. Japanese growers in another section grow better roses than the Peruvians. Principal problems on roses are a small grey scale that will kill the plants if left unsprayed, powdery mildew and rust. There was no mention of the two-spotted mite as a problem.

Rose prices in the wholesale market vary from around a 3-cent low in summer to as high as 20 cents per flower during periods of high demand. Good roses were seen in the wholesale market in Lima in late January along with good gladiolus and various tropical flowers. Chrysanthemums were rather poor and infected with petal blights.

There are two rose understocks used in Peru but by far the best is called Chileano, or Chileno. This is a vigorous rose with pink flowers and about seven petals. It may be R. odorata that was brought from Chile years ago. It is not R. canina. I could not learn of a rose understock called Chileno in Santiago. The second understock used has much larger leaves and a darker five-petalled flower and is susceptible to mildew. Ingeniero Medina of the university has developed an interesting method for propagating roses and many other woody ornamentals by a combination of mound layerage and budding. He has found that it works easily on many species and that it facilitates comparisons of either understocks or clones.

The understock is well established for one or two years then cut back and soil mounded around it. The resulting new sprouts are budded at the proper stage.

About the time the buds knit, the young shoots can be removed with some roots (on roses) and planted out in rows, or they can be left on the understock and removed for transplanting at a more favorable time. No containers are used and understocks can be used indefinitely. Ing. Medina uses this method on Eucalyptus and about 100 other species, many of them difficult to propagate by any other method.

Fig. 6. An excellent planting of 3-year-old strelitzia in beds.

Strelitzia

While no strelitzia is exported at present, Ing. Medina thinks this is a distinct possibility. In fact, production would have to be built up over a period of several years in order to have flowers for export. Strelitzia stems, each of which produces five to eight birds, now bring an average of around 25 cents each on the Lima market. Medina estimates that an established planting (three years old and older) should produce 80,000 stems per acre. While relatively heavy for shipping by air, the strelitzia is a natural package as it can be harvested before the flowers emerge. Several years of research (unfortunately not published) by Medina have dealt with pollination, seed production and production of young planting stock. He has found that specific cross pollination techniques give about 100% set of seed. Maximum seed germination comes about 140 days after the seed is ripe, then drops off rapidly. Medina soaks seed 48 hours before planting to get more uniform germination. He has also found that with the help of crude greenhouses he can grow seedlings in one year to the approximate 1-foot height desirable for transplanting to the field. If grown in the field the time to attain this height is two years.

Chrysanthemums

The latitude is such in Lima (12°S) that chrysanthemums are always reproductive. No lighting is used by commercial growers so the plants and planting stock are always in a stage of budding or developing the flower buds. New plants are obtained by pulling apart the old clumps that have just been harvested. Two crops of flowers are sometimes cut from one planting, with stem length usually a maximum of 12". Petal blight is common on the flowers. Sulfur spray or dust is used freely. Varieties are unknown, mostly white and yellow standards, possibly of Japanese origin. Chrysanthemums and almost every other flower crop are grown in rows in open fields.

Fig. 7. Chrysanthemums flower the year around in fields near Lima. Ancient ruins on hill in background.

Recent and Good

PETAL BLACKENING OF 'BACCARA' ROSES. Zieslin, N. and A. H. Halevy. J. Amer. Soc. Hort. Sci. 94 (6): 629-631. 1969. The causes for blackening of 'Baccara' rose petals and the differences between normal (red) and black flowers were investigated. Black flowers are frequent in field-grown plants and dark red ones in those grown in unheated greenhouses during winter. Two anthocyanins were isolated and identified: cyanidin 3,5-diglucoside (cyanin) and pelargonidin 3,5-diglucoside. The two pigments were found in both red and black petals. The content of both anthocyanin pigments as well as that of tanins, was several times higher in black flowers than in normal flowers. High polyphenolase activity was found in black petals, while no activity could be detected in normal red flowers. The blackening phenomenon is attributed to an increase in anthocyanin content at low temperatures, and to the accumulation of oxidation products of polyphenols. W.D.H.

CARBON DIOXIDE SUPPRESSION OF ETHYLENE-INDUCED SLEEPINESS OF CARNATION BLOOMS. M. Uota, U.S. Dept. of Agric., Fresno, Calif. J. Amer. Soc. Hort. Sci. 94 (6):598-601. 1969. Sleepiness of carnation blooms can be induced by relatively low concentrations of ethylene at 20°C. The threshold concentration is about 125 ppb ethylene or .125 ppm, but varies slightly with age of the flower. Carnation flowers produce ethylene and consequently older flowers are subjected to more ethylene than younger flowers and suffer more sleepiness, as shown in experiments where exposure to ethylene was delayed. In contrast to freshly harvested blooms, such flowers were more susceptible to ethylene injury. At the same time the blooms receiving delayed ethylene applications were older and therefore more susceptible to any causal factor bringing about senescence.

Carbon dioxide in the atmosphere with ethylene decreased or prevented sleepiness. The protective effect of CO_2 against ethylene damage increased as the concentration of CO_2 was raised. These results provide further evidence for the Burgs' concept of

the biological activity of ethylene, which contends that, as CO_2 pressure is increased, more metal receptor sites for ethylene are tied up and hence the effects of ethylene are diminished.

However, unpublished results of the writer show that in addition to decreasing the effect of externally applied ethylene, CO_2 in the concentrations used in these experiments also inhibits the biological synthesis of ethylene. Even when no ethylene was added to the atmosphere, relatively high CO_2 pressures were effective in maintaining the quality of blooms. When relatively low concentrations of ethylene are present in the micro-environment of the blooms, CO_2 would suppress further increase in the ethylene concentration and would therefore prolong the life of the blooms. Whether or not blooms are placed in water before exposure to ethylene did not affect their susceptibility to sleepiness.

These results are based on activity at 20°C or 68°F. Results would probably not be the same at lower temperatures since ethylene synthesis and cellular activity would be different.

Concentrations of ethylene that can cause sleepiness are sometimes found in shipping containers and at airports at which blooms are handled. (See CFGA Bulletin 225.) Temperatures at which ethylene is biologically active are often present during shipment. Consequently, atmospheres with relatively high partial pressures of CO_2 should materially improve the arrival condition of carnation blooms. With 10% CO_2, the blooms were not damaged by 250 ppb ethylene, and 20% CO_2 provided protection against 500 ppb ethylene. W.D.H.

Your editor,

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