

HAWAIIAN ORNAMENTAL INDUSTRIES

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Prior to the Second World War, the ornamental industries of Hawaii were limited to the local trade. The standard cut flowers — roses, carnations and gladioli — regularly graced our flower shops. Some chrysanthemums were grown but were insignificant because control of flowering was still unknown. Flowers such as asters, gerberas, marguerite daisy and zinnias were also available. Relatively few anthuriums, orchids, heliconias and other tropical ornamentals were seen. Landscape nurseries were few in number.

From around 1941, interest in tropical ornamentals expanded rapidly, both among hobbyists and commercial growers. The exposure of many of these ornamentals to servicemen stationed here, and the improvements in air transportation provided the initial impetus for the expansion of the export of ornamentals to continental United States.

In 1951, the University of Hawaii and the Floral Association of Hawaii co-sponsored the First Floral Clinic. Some mainland experts were invited including O. Ben Haley, Manager of Denver Wholesale Florists; Edward Goepner of Podesta Baldocchi, San Francisco; James Sykora, Manager of Amling Co., Chicago; and John Dudley, President of the Society of American Florists. Many problems and possible solutions were discussed. The general conclusion reached was that the ornamental industries of Hawaii showed great promise for growth but that there were numerous problems which needed to be resolved.

Eighteen years later, in 1969, an industry-wide agricultural planning conference was held to prepare the State Agricultural Development Plan. The development of the plan was mandated by the 1968 State Legislature for the purpose of determining what the future holds for agriculture in the State of Hawaii. Ornamental horticulture was one of 14 enterprise or commodity groupings. The planning committee on ornamental horticulture was comprised of 13 industry representatives and three University personnel. It was noted that the ornamental horticulture industries were rapidly evolving from backyard operations to large-scale enterprises and that new technology was replacing the older practices. The committee expressed considerable optimism for the continued growth of the ornamental industries. The factors cited which favor this expression were:

1. Hawaii has the highest per capita consumption of ornamental plants and flowers in the United States. With the projected increase in population, including tourists, the total value of the ornamental industries is expected to increase proportionately.
2. The exotic nature of Hawaii's products such as anthuriums, orchids and other tropical flowers has created a demand for these products on the mainland market. With improvements in jet transport, Hawaiian floral and plant products can be placed on the mainland market in a matter of hours.
3. Ornamentals are intensive crops yielding high returns per unit area; consequently, the competition for large parcels of land is not as intense as with other agricultural crops.
4. Urban development, resort development, highway construction, and the national interest in the beautification of man's environment place the ornamental industries in a favorable position for substantial growth.

VALUE OF ORNAMENTAL INDUSTRIES

The census figures for 1949 placed the wholesale value of ornamentals at \$1,274,000. The value rose to \$1,958,000 in 1959, and to \$4,022,000 in 1969. The value for 1971 was \$4,484,000. The actual value would probably be much higher than the census figures indicate because many part-time or backyard operations are involved. The annual growth recorded has been about 10 percent. Another interesting statistic is the relatively high percentage of export sales. In 1971, over half of the total sales of ornamentals comprised out-of-state shipments.

ANTHURIUM

With the foregoing as an introduction to the ornamental industries of Hawaii, let us now look into the components or commodity groupings.

Anthuriums, the most important cut flower crop of Hawaii, have experienced a phenomenal growth within the past 10 years. In 1959, the value was \$216,000. In the early sixties, large-scale operations were initiated. In 10 years, the value had risen to \$1,019,000, which represented an average growth of 20% per year for the ten-year period. During the last couple of years, growth has leveled off to about 10% per year. In 1969, anthuriums represented about 60% of out-of-state shipment sales.

At the present time, there are approximately 200 farms and about 230 acres in cultivation. About 90% of anthuriums are grown on the island of Hawaii.

Anthuriums cannot tolerate full sunlight and, therefore, shading is required. Generally about 75% shade is provided

through various means. Anthuriums can be grown under trees, tree fern fronds, lath or saran.

Anthurium andraeanum is native of Colombia. It was first introduced into Hawaii from England in 1889. During the late 1930's, interest in anthuriums began to mount, and today, Hawaii has developed into the major anthurium production center of the world.

Anthuriums are propagated from suckers or cuttings. Because a single lead produces about six leaves per year, which means six nodes or six potential growths per year, vegetative multiplication is slow. Mist propagation of two- to three-leaf terminal cuttings is effective. Successful meristem or tissue culture should be a boon in increasing new cultivars, but unfortunately this mode of propagation is still in the experimental stage.

For the production of new cultivars, sexual propagation is necessary. Pollination is effected by grasping the pollen-laden spadix with fingers and then rubbing the pollen onto the stigmas of other flowers. Six months are required from pollination to fruit maturity. After separating the pulp, the seed is planted on finely shredded tree-fern fiber. In six months, the seedlings are transplanted into flats and six months later are moved into individual pots or in ground beds. Some seedlings will begin to flower in 15 months from seedage, but usually two years must be allowed for the entire progeny to flower.

The important commercial cultivars are Ozaki, Kaumana, Kozohara and Nitta. Some of the University releases are Marian Seefurth, Anuenue and Manoa Mist.

ORCHIDS

Hawaii is well known as a center for orchid hybridization, and many fine hybrids have found their way into international markets. The following sales were generated in 1970: *Vanda* 'Miss Joaquim' — \$565,000; cattleyas — \$52,800; dendrobiums — \$60,800; and cymbidiums — \$116,000.

Flowers of *Vanda* 'Miss Joaquim' are used primarily for leis. About 50 acres are presently in production. It is easy to propagate from cuttings. Increase in plantings can be easily accomplished, since considerable acreage is in production.

In the Volcāno region on the island of Hawaii, cymbidium production is increasing. Plants grow well, and flowers are produced a couple of months ahead of the normal flowering time in California. Meristem culture has made possible the commercial cropping of superior clones from the standpoint of productivity, seasonality and quality. Practically all of the flowers produced in Hawaii are marketed on the mainland.

Dendrobium orchids are beginning to receive increased attention. Flowers come in assorted colors and shapes. The flower sprays have a long vase life. Plants are productive, and flowers are easy to pack and ship. The successful meristem culture technique developed for dendrobiums in Dr. Sagawa's laboratory makes possible the rapid increase of superior clones for commercial cropping.

The dendrobium industry is still in its infancy, emerging from hobby or backyard status to commercial enterprises. There are signs of increased activity to explore the export market.

The University of Hawaii has been evaluating dendrobium clones as well as producing new clones through breeding in order to promote the development of the industry. It has mericloned and released *Dendrobium* 'Jaquelyn Thomas' (0580), D. 'Neo Hawaii' (Y972), and D. 'Lady Hay', and recently released a tetraploid seedling strain of D. 'Jaquelyn Thomas' (UH44).

FLOWERS AND FOLIAGES

Hawaii grows the standard cut flowers — roses, carnations, chrysanthemums and gladioli — for the local market. Because these are well known to all ornamental horticulturists, I will not delve into these except to mention that in Hawaii carnations are grown primarily for their flower heads for use in leis, rather than for cut stems.

A new potential export crop for Hawaii is ornamental proteas. Experiments initiated in 1963 and expanded by Dr. Parvin at our Kula Research Station on Maui have revealed their desirable qualities as cut flowers. These proteas are exotic, have a long vase life, and flower ahead of those produced in California. *Leucospermum cordifolium*, the Pincushion Protea, appears to be most promising, but others like *Protea nerifolium*, the Pink Mink, and the White Mink, and *Protea grandiceps*, the Princess Protea, also have exciting possibilities.

Heliconias, gingers and ti leaves provide livelihood for some of our growers. Also, potted flowering plants such as chrysanthemums, poinsettias, bougainvilleas and azaleas are produced for local sales.

FOLIAGE PLANTS

Foliage plants appear to offer tremendous potentials for our export market. New and expanded developments are in evidence. Expansion of plantings for stock material, construction of greenhouses to produce certified plants, improvement in mass propagation, and development of artificial soil mixes have been receiving appropriate attention. The ti, *Cordyline terminalis*, both normal size and dwarf, dracaenas, dieffenbachias and dwarf bras-

saia are but a few of the many tropical ornamentals which can be exploited.

LANDSCAPING AND TURF

Turf and landscape services are integral parts of the ornamental industries, but their actual monetary value is difficult to assess. Both of these areas are expanding rapidly, for they are closely related to urban and resort developments, and improvements of parks and recreation facilities. Also, they are in complete consonance with our national efforts to enhance our environment.

CONCLUSION

The ornamental industries of Hawaii are now undergoing rapid evolution and expansion. They are evolving from essentially hobby, backyard and family operations to large-scale commercial enterprises, and are beginning to attract young men and new capital. The recent announcements of the establishment of the Kohala Nurseries and Orchids Pacifica at Kohala on the island of Hawaii are positive signs of the viability of ornamental horticulture. We can certainly look forward with optimism to the growth of the ornamental industries, and hope that the 1989 goal of 76-million-dollar ornamental industries set in the State Agricultural Plan will become a reality.

BOB WARNER: Thank you very much, Dr. Kamemoto; that was excellent. I am going to call next on another Oahu-born Hawaiian. He got his Bachelors and Masters degrees in plant physiology at the University of Hawaii. He grew up with the macadamia industry at the Royal Macadamia Hawaiian Nut Company and worked later at the C. Brewers Hawaiian Orchards. In recent years he has been with the College of Tropical Agriculture, working with nutrition and pollination of macadamia as well as on mechanical harvesting of guavas. He is a resourceful and enthusiastic horticulturist and is going to speak on "Hawaii — Land of Exotic Fruits." Gordon Shigeura. Gordon: