

established as soon as possible to build national research programs through convocations at Beltsville, Md., and at other locations around the United States. Thus, it is urgent that we locate all of the research scientists as soon as possible to analyze their current programs, invite them to regional convocations, and to serve on panels on their research specialties to propose solutions and approaches to solve the critical research needs.

The USDA created the National Chair for Florist and Nursery Crops Review to:

- Review: Staff, funding, facilities, and research priorities for federal and state programs.
- Assess: Current research priorities and initiatives proposed by professional societies and user groups.
- Evaluate: Current funding of research by the private sector.
- Analyze: Projected needs and regulations for the international trade of florist and nursery crops.
- Analyze: What is the size/economic force of the florist and nursery (landscape, arborist, and environmentally oriented) industries?
- Develop: What are the potentials to use Capacity Building Grants or other cooperative programs with 1890 institutions to expand research, marketing, and training programs for florist and nursery crops?
- Assist: Identify opportunities for cooperative research agreements with the private sector.
- Represent: Work with cooperating professional groups and user organizations to present the achievements of ARS' research and to aid in technology transfer?

In order to assure the progressive and orderly development of a national research, marketing, and export plan, there is a need to assess and develop strategies to address the opportunities and constraints for this sector of agriculture.

## Steps

- 1) Form coalition of 60 trade and professional organizations relating to F&NA to review proposals and develop an implementation plan.
- 2) Create a Directory of Research Scientists working in F&NA [published by *Grower Talks* (Apr. 1994)].
- 3) Analyze research projects in the CRIS systems.
- 4) Kickoff event was held at the National Arboretum, Washington, D.C., 9 Apr. 1992.
- 5) Convocations (workshops) across the United States. Sites: California, Delaware Valley, Florida, Great Northwest, Hawaii, Illinois, Long Island, Michigan, Minnesota, North Carolina, New York, Ohio, and Oregon.
- 6) Proceedings of the Convocations: Regional convocations—reports; consensus proposals; responsibilities of federal, state, private, and foundation action plan in the lay terms [published

by *Grower Talks* (Apr. 1994)].

7) Action: Continuous throughout the decade [published by the American Floral Endowment (Sept. 1993)].

**Plants for the year 2000.** Our research and marketing programs will be centered around the following activities:

- The National Chair will prepare a public report that assesses the research, marketing, and export responsibilities and opportunities for federal, state, and non-profit organizations.
- The role of government in florist and nursery agriculture as a viable source of economic development will be examined by all interested groups in public workshops and a national agenda will be proposed.
- The critical role of landscape plants in urban life in restoring our environment will be supported thoroughly with expanded research information.
- A national plan must be proposed to permit florist and nursery agriculture to produce plants with the highest consumer acceptance and performance.
- The concepts from the research entitled "Clean Air Machines" will require complex teamwork to understand the interactions of the plant with its environment.
- The potential for U.S. farmers to produce and market florist and nursery agriculture with the principles of sustainability will increase the long-term profitability of family farms.
- The emerging opportunities to increase the export of florist and nursery crops will prosper with the expanded research information.
- The report will be useful in public action to guide the course of florist and nursery agriculture in the United States for the next decade.
- Based on needs assessments, workshops held at Beltsville, Md., and regional meetings across the United States—the green industries will together develop a national research action plan. Opportunities will be provided for scientists and industry personnel to express their opinions as to the main efforts, and the substitute technical approaches.
- Activities to optimize the objectives and miscellaneous related activities. The recommendations from the workshops will be summarized and distributed in science- and lay-oriented initiatives for all to use in a coordinated way to support the expanding research, marketing, and export potentials of florist and nursery agriculture.

The plan for the Chair offers opportunities for hundreds of professionals from all segments of the expanding green industries to help set the future course of research. The plan, published in Sept. 1993 by the American Floral Endowment, charts the specific research needs for the advancement of knowledge, the teams required to deal with the complexities, and promotes cooperation among all users of the information. We do have opportunities for optimism.

## Closing the Circle: Exporting Florida Grapefruit to Japan

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Christopher Columbus is generally credited (perhaps apocryphally) with bringing citrus to the New World in his search for a route to the Far East, specifically Japan. Ironically enough, citrus, which started out in Asia, has now come full circle, with massive shipments of citrus products from the United States to Japan and other parts of the Far East, some 500 years after Columbus' unplanned, but fortuitous, discovery of what would turn out to be the finest region in the world for the production of all types of citrus.

Grapefruit, Florida's largest and most successful agricultural export, is a relative newcomer to the citrus industry. Grapefruit appeared in the Caribbean, most probably as a spontaneous mutation on the pomelo. Pomelos had been brought to the Caribbean most probably in the 1640s, from Indonesia by a British sea captain. The first mention of grapefruit in the literature came in 1750 in Barbados and referred to a variety of pomelo known locally as "forbidden fruit." The first time the actual term "grapefruit" was used seems to have been in Jamaica in the early 1800s, when it was noted that the fruit tended to grow in clusters, like grapes.

In 1823, Count Odet Philippe, a relative of Louis XVI and schoolmate of Napoleon, who had spent several years imprisoned in the Caribbean by the British, emigrated to Florida and settled in the area of Tampa, bringing with him the first known grapefruit seeds to be planted in Florida.

For most of the 19th century, grapefruit languished in Florida. In the 1880, however, due to its perceived value as a healthful tonic useful for treating influenza, grapefruit began to be grown commercially and shipped to northern markets such as New York and Philadelphia, where, by 1895, it was selling for as much as \$20 a box. The high price and the continuing demand for the product helped establish grapefruit as an integral part of Florida's citrus industry. Florida grows 50% of all the grapefruit in the world.

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Initially, the grapefruit grown in Florida were white and of the 'Duncan', 'Marsh', 'Triumph', or 'Walters' varieties. Pigmented grapefruit first appeared in Florida in 1907, but was not grown commercially until the 1920s. With the development of the 'Ruby Red' variety in the 1930s, pigmented grapefruit began to achieve commercial popularity and, by the 1970s, was becoming more popular with consumers than the more-prevalent white 'Marsh'.

Facing the loss of the huge U.S. and Canadian fresh grapefruit markets to pigmented varieties, the growers of the white grapefruit were facing potential disaster, as their only option would be to send the fruit to the processing plants for relatively low prices. Fortunately, it was exactly at that time, in the early 1970s, that the Japanese market was opened to allow the quota-free importation of grapefruit. U.S. agricultural interests and the U.S. government had been working for some time to gain access to the closed Japanese market for virtually all produce. For Florida, fresh grapefruit was the first foot in the door.

The Florida Citrus Commission/Dept. of Citrus is a government agency established in 1935 by an act of the Florida legislature as the result of an industry request. The act, called the Florida Citrus Code, states that the Commission/Department was set up to protect and enhance the quality and reputation of Florida citrus fruit and processed citrus products in both domestic and foreign markets. It also acts to "protect the health and welfare and stabilize and protect the citrus industry of the state," which, in turn, helps to promote the general welfare and social and political economy of the state.

The Florida Citrus Commission serves in the capacity of a board of directors for the Dept. of Citrus. The Commission consists of 12 members appointed by the governor of the state and confirmed by the senate for 3-year terms; four members are appointed each year. The members of the Commission must be citrus growers, packers/shippers, or processors who have been active in the industry for at least 5 years immediately preceding the appointment. Seven members of the Commission must be growers or represent grower corporations; three members must represent the processing industry; and two of the Commissioners must be fresh-fruit shippers.

The Florida Dept. of Citrus (FDOC) carries out the Commission's policy and acts as the Commission's staff by conducting a wide variety of programs involving industry regulation; scientific, market, and economic research; advertising; merchandising; public and industry relations; and consumer promotions. More than 80% of the FDOC annual budget is spent on advertising and promotion activities for Florida citrus in the United States, Canada, Europe, and Asia. The remainder of the monies derived from the excise tax is spent for administration and scientific, economic, and market research. The FDOC used its marketing and

research departments to assist the growers and shippers in penetrating the newly opened Japanese market.

### Pest control and quarantine problems

The 1973–74 season marked the beginning of full-scale shipment of grapefruit to Japan. It also marked the discovery by Japanese plant quarantine officials of strange, tiny worms in a late-season grapefruit shipment. They were identified to be Caribbean fruit fly (*Anastrepha suspensa* Loew) larvae. This unfortunate incident triggered a halt to all fresh citrus shipments to Japan and a number of quarantine measures to ensure that all shipments of Florida citrus are free of pests that may threaten Japan's huge citrus industry, the fifth largest in the world (Florida Agricultural Statistics Service, 1991).

### Quarantine treatments

As a result of the Caribbean fruit fly discovery, the first quarantine treatment to be instituted was fumigation prior to shipment with ethylene dibromide (EDB). At first, in-truck fumigation was used, but, due to increased demand for grapefruit, the Florida Dept. of Agriculture and Consumer Services, working hand-in-hand with the Florida Citrus Packers and other citrus organizations, established two in-chamber fumigation stations. The first was built in Fort Pierce with 16 chambers and the other was a 12-chamber station built outside the city limits of Winter Haven. Each fumigation chamber (900 ft<sup>3</sup>) accommodated a semi-trailer load of ≈1100 cartons of grapefruit. Fumigation was conducted according to procedure and dosage prescribed the USDA Plant Protection and Quarantine Manual (USDA, 1976). At the height of the shipping season, fumigation was carried out 24 h/day. In 1977, the U.S. Environmental Protection Agency issued a Rebuttable Presumption Against Registration and Continued Registration of Pesticide Products containing EDB (U.S. EPA, 1977). The document detailed the health hazards that may develop as a result of the various uses of EDB, including commodity fumigation. It was not until Nov. 1987 that the use of EDB on fresh fruits and vegetables was completely banned, and the citrus industry, as well as others, were left without a safe and effective quarantine treatment. Meanwhile, a team of scientists at the USDA Horticultural Research Laboratory in Orlando was working on practical methods to improve grapefruit tolerance to low-temperature storage. If grapefruit could tolerate the low temperatures prescribed for eradication of tropical fruit flies, cold treatment would be used for quarantine purposes as a substitute for EDB. The efforts of Hatton and Cubbedge (1982, 1983) were successful in developing a conditioning treatment by which chilling injury to grapefruit was substantially reduced by storing fruit at 33 to

36°F for 10 to 22 days (USDA, 1976). However, at the first commercial application of cold treatment in 1982, a load of 150,000 cartons of early season grapefruit subjected to cold treatment was lost to chilling injury and decay. Further shipments of late-season grapefruit were damaged in Spring 1984. It was not until a field study was conducted in 1986 that recommendations were advanced to assure successful implementation of cold treatment (Ismail et al., 1986) that the Florida citrus industry was able to ship >12 million cartons of grapefruit during the 1988–89 season (Florida Dept. of Agriculture and Consumer Services, 1991).

Today, Florida citrus is being shipped to Japan in increasing volumes under strict quarantine requirements. These requirements are being met primarily by cold treatment and a Caribbean fruit fly-free zone protocol. Under this protocol, grapefruit production areas are monitored extensively for the fly. Approved areas must be free of preferred fly host, such as guava, Surinam cherry, and loquat. If the area is proved to be fly-free, grapefruit can be shipped without quarantine treatment. However, if flies are detected, bait sprays containing malathion must be applied to eradicate the infestation.

Thanks to the development of cold treatment and the fly-free zone protocols, shipments of grapefruit to Japan became regularized, and the Japanese trade began to think of Florida grapefruit as a stable commodity and not just as an exotic novelty fruit.

The rapid growth of the Japanese market in the late 1970s and early 1980s stabilized at around 6 million cartons per year. The major importers believed that this was the maximum size of the market and that there would be little growth beyond this level. The industry, through the efforts of the Florida Dept. of Citrus, believed that the Japanese market had just barely been tapped and that there was still considerable room for growth.

In 1980, a local Japanese firm was hired the FDOC to provide promotional services and to interface with the trade. This was effectively the start of Florida's marketing activities in Japan. Due to the small budgets available for international marketing programs, however, only minimal advertising and promotional activities were undertaken. Programs were limited primarily to the Tokyo and Osaka areas.

The FDOC discovered that there was relatively little knowledge or expertise in Japan concerning the marketing of imported products. Japan, at that time, was just beginning to allow access to its domestic market and, as a result, there were virtually no guidelines as to how a generic commodity such as grapefruit should be marketed.

Prior to the 1980s, Florida grapefruit had merely been offered to Japanese importers through Florida ports. Once the letters of credit had cleared and the fruit was on board ship, it was the problem of the importer, not the packer or grower. With a 6-

million-carton market for increasingly hard-to-sell white grapefruit, however, Florida could not take Japan for granted or rely solely on the Japanese importers to build the market.

Through their normal channels of distribution, the major Japanese trading companies, the Sogo Shosha, could move a set amount of fruit, but were unwilling to take the risk of increasing their imports beyond what they knew they could sell profitably. If the market was to expand, it would be up to the Florida citrus industry to take the lead and show the importers that the demand was there.

The FDOC began a small advertising campaign in the early 1980s using print media and TV commercials to educate consumers as to the availability and origin of Florida grapefruit. More important, using its contracted representative, the department began to develop extensive contacts throughout the multilevel Japanese produce distribution network to help promote Florida grapefruit.

A unique feature of the Japanese distribution system is the tendency for each level to deal only with the very next level in the product flow chart; i.e., importers tend to know and deal with the large wholesalers, wholesalers deal with brokers, brokers deal with jobbers, jobbers deal with retailers, etc. Prior to the FDOC marketing efforts, no one in Japan was tracing the entire grapefruit distribution network all the way to the consumer.

The FDOC is charged with consumer-oriented marketing and does not get involved in sales or pricing. The primary task was to work with the Japanese to build awareness of Florida grapefruit and encourage retailers to stock the product. To do so, FDOC representatives spent several years meeting personally with key players in the distribution system, acting as a conduit of information and providing linkages among the different levels.

The FDOC representatives were not concerned with pricing of the product and took no role in negotiations between exporters and importers. Over time, therefore, they came to be accepted by all levels of the trade as neutral parties interested only in helping move the maximum amount of fruit. As such, they were able to review and analyze problems involved in the distribution, handling, and merchandising of fresh grapefruit. The FDOC found that Japanese consumers liked the taste and juiciness of Florida grapefruit and preferred it to grapefruit from other sources.

The major constraints to increasing sales of Florida grapefruit in Japan, once quotas were lifted, always has been distribution and availability. Wherever Florida grapefruit is made available to Japanese consumers, they buy and consume it at the same rate. There are virtually no regional differences in consumption patterns or pricing.

Having recognized this, the FDOC began pressing the importers and major wholesalers to consider expanding their marketing efforts beyond the relatively well-developed regions of Kanto and Kansai. These groups, however, are primarily sales-

oriented rather than marketing-oriented, and tend to deal with the regular customers directly down the distribution line. To encourage their expansion, attention had to be focused on building demand in the retail sector. The retailers had to be convinced that consumers would buy the product.

With the advent of the Target Export Assistance (TEA) program in the mid-1980s, significant U.S. government funding became available for promoting agricultural products such as Florida citrus in selected international markets. Starting in 1986, the FDOC was able to begin effective TV and print advertising campaigns to help build consumer awareness and to offer major merchandising support to retailers in exchange for expanded promotional activities for Florida grapefruit.

Advertising and public relation activities were used to educate consumers about the availability of Florida grapefruit and its unique characteristics and quality, as well as informing them as to the different modes of preparation and consumption. Because grapefruit was relatively new and exotic in Japan, consumers had to be taught how to eat it. Television commercials showed grapefruit being cut in half, or peeled, or wedged, with emphasis on the sweet taste and juiciness. These features are the hallmark of Florida citrus, and the primary difference between Florida grapefruit and fruit from competitors from California, Israel, South America, and other areas.

To keep and build Japan as a market for white grapefruit, all the fruit shown in any type of advertising was white, as opposed to pink or red. Likewise, when referring to Florida grapefruit in Japan, pigmentation was never mentioned.

Television commercials ran in the peak seasons each year, which, for Florida grapefruit, is early spring in Japan. Through each season, however, promotional activities were done in retail outlets where consumers were coming in direct contact with the product. Merchandising in Japan, as opposed to the United States, still relies heavily on in-store demonstrations, which can include large displays with highly visible point-of-sale (POS) materials such as banners, posters, videotapes, etc.

One of the keys to Florida's success in consumer promotions, however, has been in-store sampling of grapefruit. In Japan, politeness and levels of formality are of crucial importance in the daily interaction of individuals. Retailing in Japan is renowned for its attention to the customer and the high degree of service that store personnel offer. The phrase "*Okyakusama wa Kamisama desu*," (the customer is god) is the operative guideline for retailers across the country. Customers, therefore, are offered samples of product to taste by merchandising personnel with appropriate bows and formal language. For their part, having been offered something in a polite and deferential fashion, the shopper is almost duty-bound to accept and try it. Having tried the sample, the shopper is thereby obligated in polite society to

purchase at least one of the items being sampled.

Japanese consumers are among the toughest in the world when it comes to demanding quality and perfection in the purchases. Produce presentations in Japan are superb displays of first-class vegetables. Japanese shoppers, like those in the United States, shop primarily with their eyes. Given the less-than-perfect external appearances of Florida grapefruit, it is crucial that consumers in new market areas be afforded an opportunity to taste the product. Taste, rather than appearance, is the primary selling point for Florida grapefruit and, as such, it must be emphasized in merchandising and promotional activities.

With the expanded marketing budgets provided by the TEA and its successor Market Promotion Program (MPP) through the USDA, Florida has been able in the past 5 years to double its annual shipments of fresh grapefruit to Japan. To some extent, this increase was aided by the increase in the value of the yen against the dollar, but, for the most part, it was a direct result of greatly expanded marketing efforts by the FDOC.

In addition to increased carton shipments, the value of those shipments have increased to an even greater extent. From a starting point of less than \$20 million in the mid-1970s, the value of Florida's fresh grapefruit exports to Japan has risen to more than \$70 million in the early 1990s.

Japan is now the largest and most-important single market for Florida grapefruit outside the United States. In volume and value, shipments to Japan exceed the combined shipments of all of Florida's other international markets.

Even with annual shipments in the 12 million carton range, there is still room for considerable growth in the Japanese market. While the major metropolitan areas of central Japan are well-developed and can be considered mature markets for Florida grapefruit, only two-thirds of the population of Japan has access to the product. The remaining third of the market lies in the southern and western regions, particularly the islands of Shikoku and Kyushu.

Florida's long-term marketing strategy is to continue its programs of advertising, public relations, and merchandising activities aimed at building consumer demand for Florida grapefruit until the product is regularly available in every area of Japan. The FDOC conservatively estimates that a mature market will account regularly for around 18 million cartons annually, even if there is no major increase in per-capita consumption.

The story of Florida grapefruit in Japan is a remarkable tale of hard-won success brought about by a combination of well-planned marketing and a smoothly operating partnership between the Florida citrus industry and Japanese trade. The circle, which began centuries ago with the movement of citrus from its home in Asia, through Europe and the Americas, has completed its loop with the integration of Florida citrus in Japan and other thriving new economies in Asia.

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# 1989–90 Vegetable Production in Mexico for Export to the United States

J.F. Gomez

**T**he North American Free Trade Agreement (NAFTA) between the United States, Canada, and Mexico will open opportunities for a new economic relationship with our international trading partner to the south. Understanding Mexico's vegetable exports is important for estimating the economic impact of NAFTA on the U.S. vegetable industry. For example, growers are concerned that the agreement will lead to major production shifts into Mexico, particularly in vegetables and other crops. On the other hand, U.S. fruit growers in the Northwest believe Mexico can become a major market for U.S.-grown apples, pears, and other deciduous fruit (Waterfield, 1991). Waterfield (1992) reported that, in 1992, for the first time, fruits, vegetables, and horticultural items ranked as the number one U.S. food export. The increase was in part due to escalating sales to Mexico, where overall trade is up 13.6% from 1989 (Blum, 1991). It is difficult to get reliable data on Mexican vegetable production and movement, which could answer the concerns of growers/shippers with respect to NAFTA. I present here an overview and perspective of vegetable production in Mexico.

In the 1989–90 season, Mexico farmed ≈20 million ha, of which 3.5%, or 700,000 ha, were dedicated to vegetables, including 246,000 ha for export (CNP, 1990). National vegetable production was 8 million t, of which only 1.5 million t was exported to the United States. Potentially, 100 different vegetables, some of which are major crops in the United States, can be produced in Mexico for export to the United States (Table 1).

In the past 10 years, imports of labor-intensive crops have risen; for example, muskmelon production has expanded 76%, while onion production has increased 128%. This rise is primarily due to higher consumer demand for these products. Consequently, some U.S. growers produce vegetables in Mexico to provide product throughout the year. However, some vegetable production has shifted from the United States into Mexico for various other reasons.

Growers may be attempting to lower produc-

tion costs in those vegetables that are labor-intensive. However, data show that this may not be the case. For example, to produce 1 kg of muskmelon in Guaymas, Sonora, costs \$0.31, while the cost is \$0.53 in Est. Gonzalez, Tamaulipas; in the Imperial Valley of California, the cost is about \$0.30 (Gomez et al., 1992). Other reasons include growers' searching for new production land that has available water for irrigation or perhaps fewer disease problems.

Roughly 72% of the vegetables produced in Mexico for export to the United States were grown in three states: Sinaloa, Sonora, and Baja California (Table 2). This is because Sinaloa and Sonora have the largest area of arable land for agricultural production in Mexico, and their proximity to California results in lower transportation costs. However, with NAFTA, there is more opportunity for expansion of vegetable production in the other Mexican states, particularly Michoacan, Jalisco, and Colima, because of their availability of land

Table 1. *Vegetables produced in Mexico and exported to the United States, 1989–90 season (CNP, 1990).*

Crop	Quantity (1000 t)
Tomato	338
Cucumber	192
Muskmelon	172
Onion	132
Pepper	117
Watermelon	109
Squash	99
Grape	38
Mango	35
Cabbage	21
Okra	18
Broccoli	17
Eggplant	14
Sweet corn	12
Cowpea	11
Others	104

Table 2. *Mexican state vegetable exports to the United States, 1989–90 season (CNP, 1990).*

State	Quantity (1000 t)
Sinaloa	674
Sonora	201
Baja California	162
Tamaulipas	98
Michoacan	76
Jalisco	47
Guerrero	30
Colima	27
Nayarit	21
Guanajuato	20
Veracruz	17
Others	66

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