

THE FUTURE OF THE FLORIDA GRAPEFRUIT INDUSTRY

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Abstract. The Florida grapefruit industry will confront many production and marketing challenges during the next decade. Critical to many current decisions are expectations of future market and economic conditions. This paper examines market trends and discusses projected demand and supply for grapefruit products and their implications for the Florida grapefruit industry.

The Florida grapefruit industry will confront many production and marketing challenges during the next decade. Critical to many current decisions are expectations of future market and economic conditions.

Florida dominates grapefruit production, usually accounting for 75% of annual U.S. production. Texas, prior to 1983-84, usually produced about 14% of the U.S. supply with California-Arizona producing 11%. Florida's grapefruit production has averaged 44.5 million 85-pound boxes per year during the past five seasons with total U.S. production averaging 61.6 million boxes each season. Florida is the major domestic supplier of both fresh and processed grapefruit. During the last five seasons, Florida's fresh utilization represented approximately two-thirds of total U.S. fresh supplies and over four-fifths of processed grapefruit supplies.

This paper examines market trends, provides projected demand and supply trends for grapefruit and grapefruit products, and discusses implications for the Florida citrus industry. The paper focuses on the weak demand for grapefruit products and expanding grapefruit production.

Trends in Grapefruit Demand

There have been dramatic shifts in the demand for fresh and processed citrus since 1940 which have resulted from the introduction of new products in the marketplace. Fresh consumption has fallen while processed consumption has increased. Today, citrus juice dominates the U.S. juice market. However, in recent years grapefruit juice sales have weakened. Grapefruit juice represented 10.5% of 1978 juice sales, compared to only 6.2% in 1983.

The general shift from fresh to processed consumption has implications for Florida grapefruit. Per capita consumption of many of the traditional fresh fruits has remained fairly stable in the past 20 years as competition in the produce section of the grocery store has increased. Per capita consumption of fresh grapefruit moderated somewhat during this period. Domestic fresh grapefruit shipments from Florida have been generally declining since

the 1975-76 season and fresh grapefruit exports have not increased since the 1978-79 season (Fig. 1). Today, there is a wide variety of fruits, many of which are imported, available on a year-round basis to the U.S. consumer. It is not realistic to expect increases in per capita consumption of fresh grapefruit. In fact, there could be a slight decline in per capita consumption given the competitive situation in the produce section. The trends in consumer demand have important implications for the viability of Florida's grapefruit industry.

The demand for citrus, like most products, is a function of the price of the product, population, consumer income, the prices of substitutes, and tastes and preferences of consumers. However, these factors impact differently on various citrus products. While the forecast values of most of these factors should have a positive impact on demand for grapefruit juice, the magnitude of the impacts combine to produce a relatively weak long-term demand outlook for grapefruit juice, particularly canned single strength grapefruit juice (CSSGJ). In the short-run, however, expected strength in export demand for fresh grapefruit will likely keep upward pressure on fresh fruit prices and result in an extremely tight juice supply situation. Given low inventory levels, the balancing of supply and demand will put upward pressure on FOB and retail prices. However, continuation of favorable grapefruit prices in future seasons will be dependent, in part, on how quickly Florida's production increases to the higher levels realized in the past and how fast the Texas industry recovers.

Grapefruit Juice Demand

Retail grapefruit juice sales increased during the period from 1973-74 through 1977-78 and remained relatively high in 1978-79 (Fig. 2). Retail sales declined significantly in 1979-80 as the retail price increased. The increase in nominal or current prices was in excess of price increases on other food items. Real prices remained high in 1980-81, and sales continued to decline. Real prices began to decline in 1981-82, and sales basically stabilized.

Sales of CSSGJ declined as a result of loss of purchasing consumers as well as reduction in the quantity purchased

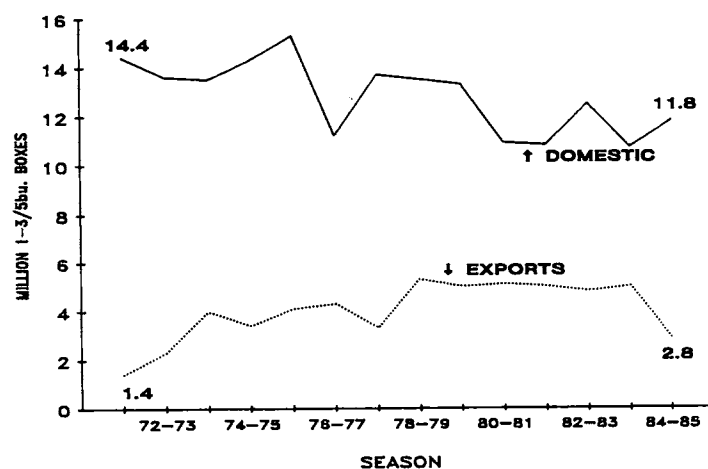


Fig. 1. Fresh grapefruit shipments.

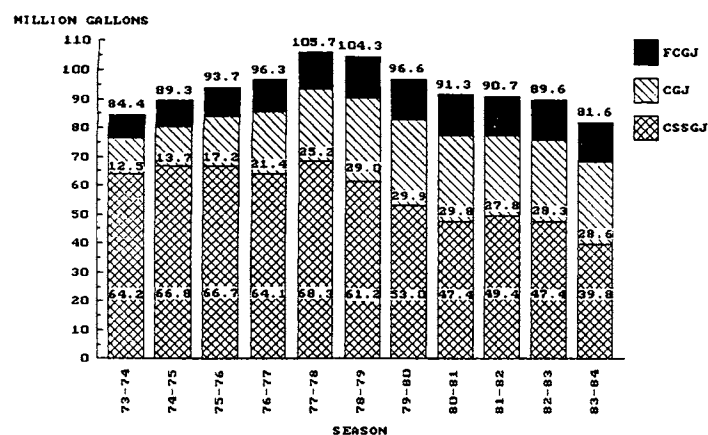


Fig. 2. Nielsen grapefruit juice sales.

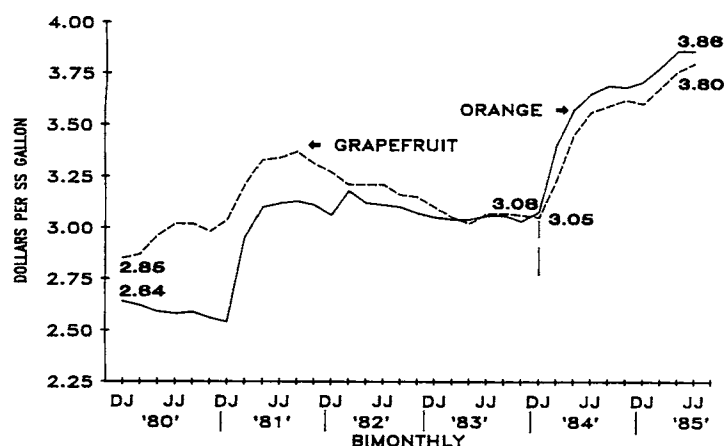


Fig. 3. Nielsen prices, orange and grapefruit juice.

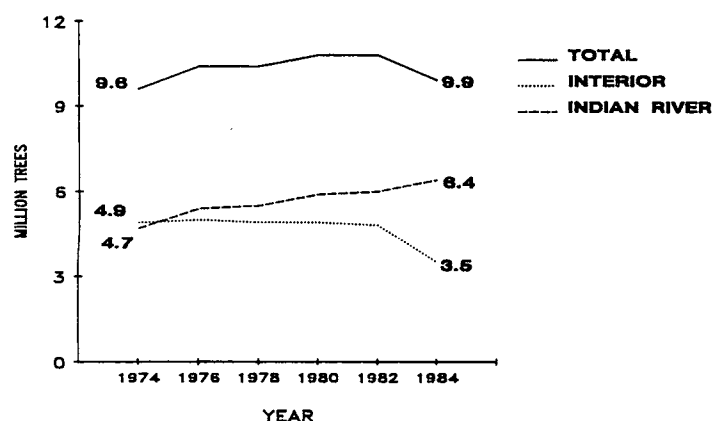


Fig. 4. Florida grapefruit tree inventory by marketing district.

by each individual buyer. The market for frozen concentrated grapefruit juice (FCGJ) and chilled grapefruit juice (CGJ) remained relatively strong.

Retail orange and grapefruit juice prices have increased significantly since the December 1983 freeze (Fig. 3). The January 1985 freeze led to even higher retail prices. Retail prices are currently at record high levels. The most recent prices are up 5.4% for orange juice and 6.7% for grapefruit juice from the levels of one year ago.

Orange juice prices have exceeded grapefruit juice prices since Dec. 1984/Jan. 1985, reversing the price re-

lationship observed in previous years when orange juice was priced below grapefruit juice. The lower relative grapefruit juice price in 1985 has contributed to the strengthening of the grapefruit juice market. However, anticipated lower orange juice prices resulting from increased supplies in conjunction with the relatively tight supply/demand situation for grapefruit juice are expected to erode the current strength observed in the grapefruit juice market. Thus, in spite of the current strength, anticipated demand conditions suggest that the grapefruit market may return to the relatively weak situation observed in recent years and remain in this situation until the consumer base is expanded.

Grapefruit Supply

Of equal importance to decisions in the industry are projections of production. Projections of grapefruit production were developed for the next ten-year period. Estimated production trends are based on the commercial tree inventory by age and historical yields as well as assumed future tree planting and loss rates.

The 1985 update of the 1984 commercial inventory by the USDA shows the first decline in the number of grapefruit trees since the commercial inventory program was initiated (Fig. 4). Florida's grapefruit tree inventory declined from 10.8 million trees in 1982 to 9.6 million trees as of June 1984, an 11.1% decline. The increase in tree inventory from 1974 to 1982 resulted from increased plantings in the Indian River. The commercial inventory remained relatively stable in the Interior between 1974 and 1982 at 4.8 to 5.0 million trees. The inventory declined significantly in the Interior between 1982 and 1984. Losses in the Interior were partially offset by increased Indian River plantings which have continuously increased since 1974.

Seedy grapefruit trees compose 9% of Florida's commercial inventory with white seedless trees representing 47.4% and pink seedless trees accounting for 43.6% of the commercial inventory. As of 1984, just over 26% of Florida's total grapefruit trees and nearly 47% of the pink seedless trees were less than ten years of age. Nearly one-third (31%) of the grapefruit trees planted in the Indian River were less than ten years of age as of 1984. Indian River plantings account for 62% of the white seedless trees, 78% of the pink seedless, and 8% of the seedy grapefruit trees in the State. Overall, 64% of the total grapefruit tree inventory is planted in the Indian River with 36% planted in the Interior.

Grapefruit yields observed during the ten seasons from 1973-74 through 1982-83 by variety and production/marketing district were incorporated into the production estimates. The production estimates include the assumption that tree losses observed between 1974 and 1982 will be observed over the next decade. In order to test the sensitivity of the production estimates to planting rates, production estimates were based on the average planting rates observed during the 1979-1983 period as well as rates double and half of the average observed during this period.

Based on the average planting rate assumption, the long-run grapefruit production trend is expected to increase over the next decade from an estimated 47 million 1 3/5-bushel boxes in 1986-87 up to 73 million boxes in 1995-96 (Fig. 5). Production is expected to return to the

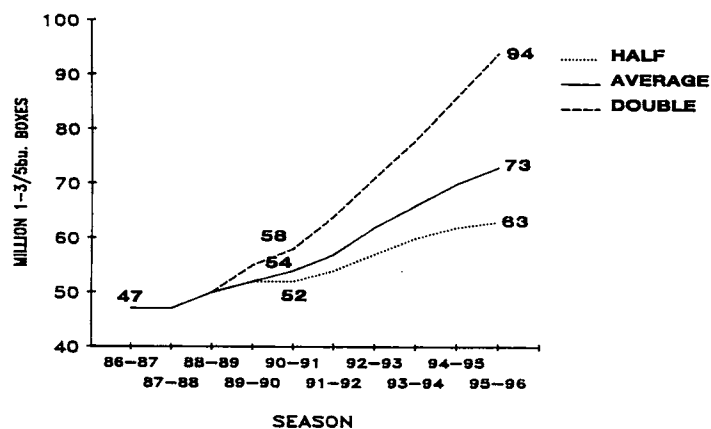


Fig. 5. Florida grapefruit estimates with various tree planting assumptions, 1986-87 through 1995-96.

record level observed in 1979-80 by the 1990-91 season. Divergence between the production estimates based on various planting assumptions becomes apparent by the 1989-90 season. If planting continues at half the rate observed during 1979 through 1983, production is projected to reach 63 million boxes by 1995-96. If the planting rate is doubled during the next 10 years, grapefruit production is forecast to be 94 million boxes by 1995-96.

Based on the average planting rate, grapefruit production in the Interior is projected to increase gradually over the next decade, from 22 to 25 million boxes. Production in the Indian River is expected to nearly double in the next decade from 25 to 48 million boxes (Table 1), based on the average planting rate. By 1995-96, Indian River production is expected to be twice that of the Interior.

Pink seedless grapefruit will become a more important part of the grapefruit crop. Production of pink seedless

Table 1. Florida grapefruit production estimates by marketing district, 1986-87 through 1995-96.

Season	Interior	Indian River	Total
million boxes			
1986-87	22	25	47
1987-88	21	26	47
1988-89	22	28	50
1989-90	22	30	52
1990-91	22	32	54
1991-92	23	34	57
1992-93	24	38	62
1993-94	24	42	66
1994-95	25	45	70
1995-96	25	48	73

Table 2. Florida grapefruit production estimates by variety, 1986-87 through 1995-96.

Season	Seedy	White Seedless	Pink Seedless	Total
million boxes				
1986-87	5	26	16	47
1987-88	4	27	16	47
1988-89	5	27	18	50
1989-90	4	28	20	52
1990-91	4	28	22	54
1991-92	4	28	25	57
1992-93	4	30	28	62
1993-94	4	30	32	66
1994-95	4	30	36	70
1995-96	4	30	39	73

fruit is projected to increase from 16 million boxes in 1986-87 to 39 million boxes by 1995-96 (Table 2). White seedless production is anticipated to increase moderately from 26 million boxes in 1986-87 to 30 million boxes by 1995-96. Projected 1995-96 production of white seedless grapefruit is expected to be two million boxes less than the record 1979-80 production. Within the next decade pink seedless production is estimated to be 2.5 times larger than the record 15.8 million boxes produced in 1979-80. These projections assume that the average planting rates observed in 1979-83 will continue in the next decade.

The production estimates reveal several significant trends in grapefruit production is expected to increase by nearly two-thirds (66%) from the USDA Oct. estimate of 44 million boxes for the 1985-86 season. Second, the Indian River will account for nearly 90% of the anticipated production increase, nearly doubling production during the next decade to account for nearly two-thirds of Florida's grapefruit. Third, pink seedless grapefruit production will increase at a much faster rate (+144%) than white seedless (+20%) in the next decade. Pink seedless represents 36% of the USDA estimated 1985-86 grapefruit crop. By 1995-96, pink seedless is projected to account for 53% of grapefruit production.

Supply-Demand Situation

Comparing the production estimates with the long-run demand estimates suggests that production increases will likely exceed demand growth. Assuming that grapefruit juice prices moderate back to 1982-83 levels in real terms, and remain level through 1995, the domestic grapefruit juice market is expected to expand at an annualized rate of 0.9% during the next decade. Grapefruit production is expected to increase from the current season level of 44 million boxes to 73 million boxes by 1995-96, an increase of 29 million boxes. The extent to which an imbalance develops will be dependent upon changes in domestic and foreign fresh fruit demand and export demand for grapefruit juice as well as the extent of the overall U.S. supply change. Retail demand models for fresh grapefruit were not estimated due to inadequate retail-level data. However, increased supplies projected for Florida and the potential return of Texas to the market suggest increased competitive pressure in the fresh grapefruit market during the next decade.

The Texas grapefruit industry was severely frozen in 1983, and as a consequence, the industry is still basically out of the market. However, the Texas industry is expected to recover. Acreage devoted to grapefruit production may not return to the prefreeze level. Indications are that the marginal production areas will not be rehabilitated. Expectations are that some of the areas will be shifted into orange production. While specific forecasts for Texas are not available, many believe that Texas grapefruit production may not attain levels observed prior to the freeze.

Given the static nature of fresh grapefruit markets in recent years, it is probable that larger crops in Florida and Texas will result in downward price pressure. The expectation for a weak domestic grapefruit juice market over the next decade emphasizes the need for continued development efforts of both domestic and export markets.

Implications

The grapefruit supply/demand projections suggest that a potential imbalance will exist in the decade ahead, with Florida having record-level crops to market. Significant shifts in production by variety and marketing district are also anticipated. Both white and pink seedless production are forecast to increase, with pink seedless accounting for a major portion of the production increase.

Given U.S. consumer preference for pink grapefruit, an increase volume of pink grapefruit is expected to enter fresh market channels and reduce the white seedless market share. This shift would mean an increase in the volume of white grapefruit available for processing unless the export market for white grapefruit is expanded.

The expected larger volume of pink grapefruit in Florida in combination with a recovery of the grapefruit industry in Texas could reduce returns on grapefruit substantially from current levels. The expected production trends suggest the need for increased emphasis on fresh market development and expansion with continued efforts to insure acceptability of Florida fruit in the export market.

In addition to increased competitive pressure in the fresh fruit market, increased production is likely to impact even more dramatically on the processed product prices and returns. The demand estimates suggest only modest growth in the U.S. market for grapefruit juice over the next decade. Sales are not expected to return to the historic high levels observed during 1977-78 and 1978-79 even if prices moderate to 1982-83 levels in real terms. The expected increase in grapefruit juice sales in the U.S. market is not forecast to absorb the potential supply increases. Liberalization of the grapefruit juice quota in Japan could

allow expansion of the market in the years ahead. Markets are, however, not developed overnight. The expected larger crops in the future suggests a need for increased attention to development and expansion of additional markets as well as attention to expansion of the domestic market.

Demand expansion is only part of the equation. Informed planting decisions will perhaps keep supply in line with expected increases in the market. The modest increases expected in grapefruit juice demand and the fresh grapefruit market situation suggest a need for only modest supply increases if prices are to be maintained. If growers continue recent planting trends, production will probably increase faster than demand unless markets, particularly export markets, can be expanded.

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SUBMERSION OF FLORIDA GRAPEFRUIT IN HEATED WATER TO KILL STAGES OF CARIBBEAN FRUIT FLY, *ANASTREPHA SUSPENS*A

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Abstract. Florida grapefruit, (*Citrus paradisi* Macf. *cus.* Florigold Golden and Marsh), infested with laboratory-reared Caribbean fruit fly, *Anastrepha suspensa* (Loew), eggs (3 days old) and larvae (1-2 days old and mature) was submerged in water (120° F, 10-30 minutes to kill eggs; 120° F, 10-40 minutes to kill eggs and 1 to 2-day old larvae; and 120° F, 10-30 minutes, 130° F, 10-40 minutes, and 135° F, 10-30 minutes to kill all stages from eggs to mature larvae). None of the treatments produced probit 9 security. Noninfested grapefruit submerged in water at 120° F for 20 minutes

exhibited severe scalding and pitting of the epidermis and produced off-flavors compared with control grapefruit submerged for 40 minutes in water at 80° F. Based on the results, submersion of Florida grapefruit in water at 120° F or warmer for 20 min or longer is not recommended as a quarantine treatment to kill stages of *A. suspensa* in Florida grapefruit.

Grapefruit (*Citrus paradisi*) grown in Florida is susceptible to infestation by Caribbean fruit fly (*Anastrepha suspensa*) and must be treated to prevent spread of the fly to Texas, Arizona, California, Hawaii, and Japan. The approved postharvest treatments for disinfecting grapefruit are cold temperature storage (3) and methyl bromide fumigation (4). Herein, I report on submersion of grapefruit in hot water to kill *A. suspensa* eggs and larvae.

Materials and Methods

Florida grapefruit cultivars, 'Florigold Golden' and 'Marsh', were used in all tests conducted from Nov. 1984 to June 1985. Fruit was exposed in an outdoor cage to thousands of gravid, female Caribbean fruit flies which

This paper reports the results of research only. Mention of a trade name in this paper does not constitute a recommendation for use by the U.S. Department of Agriculture.