FLORIDA DEPARTMENT OF CITRUS

Florida Citrus Production Projections and Consumption Scenarios 2016-17 Through 2025-26

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MISSION: Maximize consumer demand for Florida citrus products to ensure the sustainability and economic well-being of the Florida citrus grower, the citrus industry and the State of Florida.

Florida Citrus Production Projections and Consumption Scenarios 2016-17 Through 2025-26

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Introduction

In this report production projections and consumption scenarios for Florida round oranges, grapefruit and specialty citrus are provided for the 2016-17 through 2025-26 seasons. The production projections are based on the Florida Agricultural Statistics Service (FASS) commercial citrus tree inventory[1]. The inventory report provides the number of trees and acres, by age, for different varieties of citrus. These data are combined with FASS yield data on boxes of fruit per tree, by age. Future production is projected by applying average yields to projected tree numbers, by age. Both production and consumption in upcoming years will depend on a number of factors difficult to predict. For production, assumptions are made related to acre-loss rates, planting rates, and yields per tree. Consumption scenarios are based on a given production projection and are calculated to provide insight on potential impacts to presumed consumption and on-tree values from a specified production level.

The projections in this report are intended to indicate possible future trends in production and consumption as opposed to actual production or consumption in any given season. The same average yields, by age, are used in estimating production levels in each season to obtain the projection (many factors determine yields in a given season, and this analysis does not attempt to estimate season-specific yields). Yields can vary significantly from year to year. Hence, for each of the upcoming seasons considered, actual yields could be significantly different than the average yields used here,

[1] The authors of this report express their gratitude to the staff of the Florida Agricultural Statistics Service (FASS), a joint unit between the Florida Department of Agriculture and Consumer Services and the National Agricultural Statistics Service, United States Department of Agriculture (NASS) located in Maitland, FL for making the complete Florida commercial citrus tree inventory available for this research.

with the result that the season's production projection in this report may be significantly different than the actual production that occurs. Given this issue, production projections are not provided for the upcoming 2015-16 season. The first forecast for the 2015-16 season will be made in October, 2015, by the USDA, FASS. For oranges only, alternative consumption scenarios were considered.

The citrus industry in Florida, as well as a number of other citrus-growing regions in the world, including Brazil, has been confronted with the citrus disease Huanglongbing (HLB) (also known as citrus greening). This disease eventually hinders infected trees from producing viable fruit, and has had severe economic consequences throughout all sectors of the Florida citrus industry. The disease does not discriminate in terms of citrus variety, region, and tree age. Best estimates are that every commercial block of citrus in Florida suffers from some level of HLB infection. Several research efforts related to HLB are ongoing, some are already available, and grower practices are evolving as more is learned about the disease. The ultimate goal is to develop disease-resistant trees and suppress ACP populations, but it is assumed in this report, that disease resistant trees will not be available over the ten-year projection period evaluated. There are a number of short-term solutions including heat treatment, use of anti-microbial compounds, and broadening the establishment of Citrus Health Management Areas (CHMAs)[2] are on the horizon, and could offer some relief from the deleterious effects of HLB.

The HLB disease, however, has contributed to substantial declines in yields per tree and, consequently, reduced crop production. The 2014-15 orange crop of 96.8 million boxes is substantially smaller than that realized five years ago, and future crop projections remain uncertain under current conditions. The analyses in this report evaluate alternative yield scenarios and replanting rates.

[2] Citrus Health Management Areas (CHMAs) are geographic zones in which growers coordinate their efforts to suppress the Asiatic Citrus Psyllid (ACP), the vector that spreads HLB. CHMAs have shown some success in suppressing psyllid populations.

2014 Commercial Citrus Inventory Overview

The September 2014 *Commercial Citrus Inventory* suggests that Florida's total citrus acreage decreased by 1.8% from 524,640 acres in 2013 to 515,147 acres in 2014 (Table 1). Similarly, the number of citrus trees decreased by 1.3% from 69 million in 2013 to 68.1 million in 2014. Tree density increased from 131.5 trees per acre in 2013 to 132.3 trees per acre in 2014. Acreage and tree inventory data for individual varieties of citrus – round oranges, grapefruit, and specialty citrus – are shown in Tables 2, 3, and 4, respectively. Tree density by tree age group and variety are shown in Figures 1 and 2 for oranges and in Figures 3 and 4 for grapefruit.

The FASS commercial citrus inventory indicates that the population of bearing and nonbearing round-orange trees was 60.5 million trees in 2014 (Table 2). As indicated in Table 5, the orange tree population continues to become relatively mature with nearly 65% of the tree population having an average age of 14 years or older. The orange tree population is likely to continue to mature in upcoming years given recent levels of new plantings.

The total number of bearing and nonbearing grapefruit trees decreased from 5.25 million trees in 2013 to 5.19 million trees in 2014 (Table 3). This decline extends the downward trend in grapefruit tree numbers that began in 1996 with total tree numbers now approximately 1/3 the level that were present at that time. The grapefruit tree population is also relatively mature, as indicated in Table 6, with over 74% of the trees having an average age over 14 years. The age distribution for grapefruit trees by variety is shown in Table 7. Note that over 83% of white grapefruit trees are 14 years of age and older.

The 2014 tree inventory indicates that the acreage of specialty citrus (tangelos and tangerines) decreased by 6.1%, from 2013 to 2014.

Methodology and Assumptions

The production forecasts discussed in this report are based on projecting the tree numbers in each of the 24 tree-age categories for the upcoming ten seasons, by variety. Projections are reported for oranges, grapefruit, and specialty citrus. These projections are based on separate estimates for early and midseason oranges, late oranges, white seedless grapefruit (including a small amount of seedy grapefruit), red and pink seedless grapefruit, tangelos, and tangerines. Assumed annual acreage loss and planting rates are used to project citrus tree numbers from year to year, and average yields per tree by tree age are applied to the projected tree numbers to obtain production projections.

Orange production projections are made using the same methodology that has been used by the Florida Department of Citrus for the past 40+ years. Strategic supply assumptions made in applying these models in the present analysis are discussed in the next three sections. In the base version of the model, it is assumed that demand is held constant at 0% growth rate. Alternative consumption scenarios are provided with a modest 1% annual growth rate in consumption in orange juice. The analysis did not include alternative consumption scenarios for grapefruit.

Yield Assumptions

The production estimates were made by multiplying the projected number of trees in each age category by the yield or number of boxes per tree for that age category and summing the results across age categories. Estimated yields from the 2014-15 season are used to establish a baseline level of production. The widespread adoption of higher per acre tree densities along with the use of irrigation (either microspinkler or drip) suggests that most trees planted after the freezes of the 1980s exhibit a yield profile that flattens out around the 13-15 age range. Historical per tree yields for oranges and grapefruit reported by FASS are shown in Tables 11 and 12, respectively. Average tree yields by tree age by variety are given in Figures 5 and 6 for oranges and in Figures 7 and 8 for grapefruit.

Three alternative yield assumptions are considered. Under the "increasing yield" scenario, yields are assumed to increase by two percent across all tree age categories for five years beginning in the 2017-18 season and then remain constant beginning in the 2022-23 season after reaching a level of 10 percent above 2014-15 yields. Under the "decreasing yield" scenario, a similar yield profile is used except yields are decreased by two percent per year until 2022-23 which the yield decline has reached 10 percent, and then remain constant thereafter.

In the third yield scenario, statistical techniques were employed to extrapolate the downward trend, expressed in terms of per tree yields, beginning in the 2010-11 season. The "extrapolated yields" scenario attempts to capture the effect of the downward trend in in yields that, in part, have resulted from the continued spread of HLB. The "extrapolated yields" scenario serves to highlight the impact of HLB on long-term viability in the absence of adequate mitigation strategies.

Planting Assumptions

Production projections are dependent upon assumed future acreage-planting rates. Planting levels by variety, based on the commercial citrus inventories, are shown in Table 9. Significant declines in planting levels have occurred in recent years with the destruction of nursery trees exposed to citrus canker, re-establishment of the nursery industry in screen houses, and the risk of planting in an HLB environment. In other studies, citrus prices have been important factors in projecting planting levels, but recently the risk of losing new plantings to HLB appears to have become a primary factor underlying many grower planting decisions. Three planting scenarios are considered in this report. The first scenario assumes the planting level will be half (50%) the replacement level (the number of trees lost). This assumption roughly corresponds to the average planting level in recent years. The second and third scenarios assume planting levels are higher at 100% and 125% of the replacement level, respectively. It is assumed nurseries will be able to supply the trees required, although the current number of nursery trees in inventory may not be sufficient to accommodate

some of the high-planting scenarios in the immediate upcoming years. These scenarios, thus, require that nurseries respond relatively quickly to grower demand for trees.

Production Projections and Consumption Scenarios

Given the different assumptions on magnitudes of planting and yields, nine different scenarios for projecting future production can be defined. These scenarios are summarized in Table 13. The worst-case scenario can be defined as one with low planting and declining yields (upper-left) and a best case scenario can defined as one with high planting and increasing yields (lower-right). The remaining scenarios represent a range of in-between possibilities.

The orange and grapefruit production projections are shown in Tables 14 and 15, respectively. The table footnotes describe the assumptions. The scenario with declining yields and low plantings (far left column) is the scenario that is most representative of the current situation. As seen, if re-plantings remain at half the replacement, as they have been, total production is on a steady declining trend. Although increasing the planting rate to 100% replacement dampens the decline, the downward trend remains. Only when the planting rate exceeds the loss rate is production growth realized. Moreover, given the time lapse for new trees to become productive, if the planting rate were to become 125% of replacement, production still declines even in the near-term. Projections for specialty citrus, under the assumption of constant yields and 100% planting levels, are shown in Table 16. The projections for specialty citrus are similar to those for oranges and grapefruit.

Given the recent downward trend in per tree and per acre fruit yields for both oranges and grapefruit, a separate production projection was analyzed. This scenario is called "extrapolated yields". In Figure 11, both observed and projected orange yields (aggregated across varieties) are shown. The dashed line in the figure separates observed data from projections. Statistical techniques were employed in an attempt to extrapolate recent per tree yields which are being adversely affected

by HLB. Under this analysis, the implicit assumption is that no remedy for HLB will be found in the next ten years. The results for extrapolated yields for oranges are shown in Table 17 and for grapefruit in Table 18.

These results give a highly pessimistic outlook for the Florida citrus industry with orange output declining to 27 million boxes by 2025-26 and grapefruit production at just under 4.5 million boxes in that same season. Production at these levels would have severe ramifications for industry. These results point to the urgent need to find resolution(s) to HLB.

Scenarios for U.S. presumed consumption of orange juice and grapefruit juice, as well as on-tree values, are shown in Tables 19 and 20, respectively. The assumption of the model are outlined in each table accordingly. The status quo production projection of declining yields and low planting is shown under flat (unchanging) market conditions (scenario 1). The "ideal situation" for the citrus industry is depicted in scenario 3, which is defined as increasing yields and high replanting rates. As prices for both fresh and processed citrus products have not responded to smaller crops, future price assumptions are for little increase in FOB and grower prices.

Conclusions

The 2014 Florida Citrus Tree inventory[3] provided the baseline for the projections in this report. Based on this report's production projections, Florida orange, grapefruit, and specialty production is expected to be moderately declining over the next ten years under constant yields and recent rates of tree loss and new plantings. On-tree prices are expected to remain relatively constant over the forecast period as prices for both oranges and grapefruit have risen little over the past two seasons in the face of declining crops.

[3] The FDOC would like to thank the Florida Agricultural Statistics Service (FASS) for access to the required data essential to conducting the long-run projections of this study.

As such, the long-run outlook of the Florida citrus industry continues to be in a precarious state. The persistent trend of tree mortality rates exceeding tree planting rates sets a downward course for production levels. Declining per tree yields, realized in recent years, further depress production and adversely affect grower profitability. In the long-run, the industry risks losing relevance and economic impact without sufficient reinvestment. Long-run sustainability, relevance, and impact can be realized with reduced tree mortality, improved per tree yields, new tree plantings, and modest market growth.

Reduced mortality involves sustained efforts to control the psyllid; the application of current/future research to maintain tree health & HLB resistance. As new measures become available to mitigate the impact of HLB, there is promise of better fruit yields. Increased plantings will be influenced by stable on-tree prices high enough to attract investment and an expectation that trees will survive to generate returns over time. Market growth will depend on effective marketing programs by the FDOC and the brands to maintain and grow the market for Florida citrus.

TABLES

Table 1. Florida citrus acreage and tree numbers by commercial inventory.

Year of Inventory	Number of Acres	Percent Change from Previous Acre Inventory	Number of Trees	Percent Change from Previous Tree Inventory	Tree Density
	- thousands -	- % -	- millions -	- % -	- trees/acre -
1970	941.5	1.1	76.7	3.1	81.5
1972	878.0	-6.7	72.1	-6.0	82.1
1974	864.1	-1.6	71.3	-1.1	82.5
1976	852.4	-1.4	70.5	-1.1	82.7
1978	831.2	-2.5	69.1	-2.0	83.1
1980	845.3	1.7	70.7	2.3	83.6
1982	847.9	8.5	71.6	1.3	84.4
1984	761.4	-10.2	66.0	-7.8	86.7
1986	624.5	-18.0	57.5	-12.9	92.1
1988	697.9	11.8	69.3	20.5	99.3
1990	732.8	5.0	78.9	13.9	107.7
1992	791.3	8.0	92.0	16.6	116.3
1994	853.7	7.9	103.7	12.7	121.5
1996	857.7	0.5	107.1	3.2	124.9
1998	845.3	-1.4	107.1	NC	126.7
2000	832.3	-1.5	106.7	-0.4	128.2
2002	797.3	-4.2	103.2	-3.3	129.4
2004	748.6	-6.1	97.9	-5.1	130.8
2006	621.4	-17.0	81.9	-16.4	131.8
2008	576.6	-7.2	75.4	-8.0	130.7
2009	568.8	-1.3	74.1	-1.7	130.3
2010	554.0	-2.6	72.2	-2.6	130.3
2011	541.3	-2.3	70.6	-2.1	130.5
2012	531.5	-1.8	69.6	-1.5	130.9
2013	524.6	-1.3	69.0	-0.9	131.5
2014	515.1	-1.8	68.1	-1.3	132.3

SOURCE: Florida Agricultural Statistics Service, *Commercial Citrus Inventory*, various issues.

Table 2. Florida round-orange acreage and tree numbers by commercial inventory.

Year of Inventory	Number of Acres	Percent Change from Previous Acre Inventory	Number of Trees	Percent Change from Previous Tree Inventory	Tree Density
	- thousands -	- % -	- millions -	- % -	- trees/acre -
1970	715.8	0.3	57.8	2.1	80.7
1972	659.4	-7.9	53.7	-7.0	81.4
1974	642.4	-2.6	52.5	-2.3	81.7
1976	628.6	-2.1	51.6	-1.8	82.1
1978	616.0	-2.0	50.8	-1.5	82.5
1980	627.2	1.8	52.0	2.2	82.9
1982	636.9	1.5	53.5	2.9	84.0
1984	574.0	-9.9	49.9	-6.8	86.9
1986	466.3	-18.8	43.5	-12.9	93.3
1988	536.7	15.1	54.5	25.5	101.5
1990	564.8	5.2	62.6	14.9	110.8
1992	608.6	7.8	72.8	16.3	119.6
1994	653.4	7.4	81.6	12.1	124.9
1996	656.6	0.5	84.2	3.1	128.2
1998	658.4	0.3	85.4	1.5	129.8
2000	665.5	1.1	87.2	2.1	131.0
2002	648.8	-2.5	85.8	-1.7	132.2
2004	622.8	-4.0	83.0	-3.2	132.2
2006	529.2	-15.0	70.9	-14.6	133.9
2008[a]	496.5	-11.3	65.8	-7.2	132.5
2009[a]	492.5	-0.8	65.0	-1.2	132.0
2010[a]	483.4	-1.8	63.8	-1.9	131.9
2011[a]	473.4	-2.1	62.5	-2.0	132.2
2012[a]	464.9	-1.7	61.6	-1.4	132.6
2013[a]	459.3	-1.2	61.2	-0.8	133.2
2014[a]	452.4	-1.5	60.5	-1.0	133.8

[a] Includes Temples oranges; in prior years, Temple oranges included with specialty citrus.
SOURCE: Florida Agricultural Statistics Service, *Commercial Citrus Inventory,* various issues.

Table 3. Florida grapefruit acreage and tree numbers by commercial inventory.

Year of Inventory	Number of Acres	Percent Change from Previous Acre Inventory	Number of Trees	Percent Change from Previous Tree Inventory	Tree Density
	- thousand -	- % -	- million -	- % -	- trees/acre -
1970	124.1	3.5	8.92	4.9	71.9
1972	124.1	NC	9.01	0.9	72.6
1974	130.3	5.0	9.65	7.0	74.1
1976	137.9	5.8	10.40	7.8	75.4
1978	136.3	-1.2	10.41	1.3	76.4
1980	139.9	2.6	10.77	3.4	77.0
1982	139.9	NC	10.83	0.6	77.4
1984	134.7	-3.7	10.58	-2.3	78.5
1986	117.8	-12.5	9.62	-9.1	81.7
1988	119.6	1.5	10.08	4.7	84.3
1990	125.3	4.8	11.19	11.0	89.3
1992	135.2	7.9	13.12	17.2	97.0
1994	146.9	8.7	15.00	14.3	102.1
1996	144.4	-1.7	15.12	0.8	104.7
1998	132.8	-8.0	14.08	-6.9	106.0
2000	118.1	-2.6	12.67	-2.3	107.2
2002	105.5	-10.7	11.33	-10.6	107.4
2004	89.0	-15.6	9.75	-14.0	109.5
2006	63.4	-28.8	6.97	-28.5	109.9
2008	56.9	-10.3	6.24	-10.5	109.7
2009	53.9	-5.3	5.86	-6.1	108.8
2010	50.2	-6.9	5.45	-7.1	108.5
2011	49.0	-2.4	5.35	-1.8	109.2
2012	48.2	-1.6	5.27	-1.4	109.4
2013	47.7	-1.1	5.25	-0.4	110.2
2014	45.9	-3.6	5.19	-1.2	113.0

SOURCE: Florida Agricultural Statistics Service, *Commercial Citrus Inventory*, various issues.

Table 4. Florida specialty citrus[a] acreage and tree numbers by commercial inventory.

Year of Inventory	Number of Acres	Percent Change from Previous Acre Inventory	Number of Trees	Percent Change from Previous Tree Inventory	Tree Density
	- acres -	- % -	- million -	- % -	- trees/acre -
1974	74,446	-3.4	7.0	-2.1	93.84
1976	67,485	-9.4	6.2	-10.9	92.24
1978	62,723	-7.1	5.8	-7.1	92.23
1980	60,360	-3.8	5.6	-3.9	92.07
1982	55,163	-8.6	5.1	-8.8	91.88
1984	34,619	-37.2	3.2	-37.7	91.17
1986	30,155	-12.9	2.9	-7.7	96.60
1988	30,284	0.4	3.0	4.1	100.09
1990	33,347	10.1	3.7	21.1	110.04
1992	37,507	12.5	4.6	24.0	121.36
1994	45,768	22.0	5.9	30.4	129.69
1996	50,950	11.3	7.0	17.1	136.40
1998	48,556	-4.7	6.7	-3.1	138.70
2000	45,355	-6.6	6.3	-6.4	139.00
2002	39,844	-12.2	5.6	-11.0	140.80
2004	33,547	-15.8	4.8	-15.0	142.14
2006	26,098	-22.2	3.7	-22.5	141.59
2008	22,920	-12.2	3.2	-12.3	141.37
2006[b]	23,556		3.4		144.42
2008[b]	20,780	-11.8	3.0	-11.9	144.24
2009[b]	20,233	-2.6	2.9	-3.0	143.64
2010[b]	18,340	-9.4	2.6	-9.8	143.00
2011[b]	17,510	-4.5	2.5	-4.3	143.40
2012[b]	16,725	-4.5	2.4	-4.1	144.05
2013[b]	16,093	-3.8	2.3	-3.1	144.50
2014[b]	15,108	-6.1	2.2	-5.5	145.50

[a] Temple oranges, tangelos and tangerines; fallglo tangerines not included prior to 1996.
[b] Excludes Temple oranges; beginning in 2008, Temple oranges included with round oranges. 2006 and 2008 restated to reflect the removal of Temple oranges from this classification.
SOURCE: Florida Agricultural Statistics Service, *Commercial Citrus Inventory*, various issues.

Table 5. Age distribution of Florida round-orange trees by year of inventory.

Year of Inventory	Tree Age						Total Trees	Bearing Trees
	≤2	3-5	6-8	9-13	14-23	≥24		
	- - - - - - - - - - - - - - - - - - % -						- - - - thousand - - - -	
1970	9.1	20.6	17.6	14.8	13.4	24.4	57,801.5	49,404.2
1972	5.5	11.1	20.2	22.0	14.1	27.0	53,731.1	49,786.5
1974	4.0	5.9	16.9	27.8	16.9	28.4	52,521.7	49,466.9
1976	4.0	4.8	7.5	29.7	24.1	29.8	51,595.3	48,373.8
1978	5.2	4.5	4.7	23.4	31.5	30.6	50,843.2	47,454.5
1980	7.2	4.7	3.8	13.0	39.1	32.2	51,977.8	47,366.3
1982	12.0	5.1	3.7	7.2	40.2	31.8	53,504.7	46,078.5
1984	17.5	7.1	4.5	5.8	35.2	29.9	49,884.7	39,777.7
1986	20.0	12.4	6.1	7.1	28.7	25.7	43,461.4	32,708.0
1988	30.7	13.9	7.8	5.7	17.7	24.1	54,536.6	35,537.3
1990	35.1	14.3	10.7	6.7	10.0	23.3	62,613.4	40,666.0
1992	31.9	23.4	9.9	8.4	6.7	19.7	72,826.3	49,577.1
1994	24.4	24.6	16.7	11.0	6.5	16.9	81,614.4	61,707.7
1996	10.5	26.9	24.0	14.7	8.2	15.7	84,155.4	75,286.6
1998	8.0	15.5	26.7	23.0	11.5	15.3	85,430.6	78,586.5
2000	9.7	7.2	21.4	33.7	13.6	14.4	87,200.1	78,721.0
2002	9.5	8.6	9.3	37.0	22.5	13.1	85,751.1	77,595.9
2004	9.1	9.4	8.1	29.0	32.4	12.0	82,987.5	75,391.7
2006	6.9	9.4	10.1	17.1	44.9	11.5	70,849.4	65,954.4
2008[a]	6.1	8.2	10.1	13.3	49.7	12.5	65,775.3	61,740.6
2009[a]	6.6	7.6	9.3	14.7	48.8	13.1	64,992.7	60,752.9
2010[a]	6.6	6.7	9.7	14.6	48.6	13.8	63,776.7	59,560.8
2011[a]	7.0	6.5	8.0	16.2	46.3	16.0	62,528.9	58,160.4
2012[a]	6.8	7.1	7.4	15.5	42.9	20.2	61,640.1	57,460.4
2013[a]	6.6	7.5	6.6	15.2	40.9	23.2	61,167.0	57,146.1
2014[a]	7.7	8.1	6.2	13.5	36.7	27.9	60,545.5	55,891.7

[a] Temple oranges were included in the round orange category beginning in 2008.
SOURCE: Florida Agricultural Statistics Service, *Commercial Citrus Inventory*, various issues.

Table 6. Age distribution of Florida grapefruit trees by year of inventory.

Year of Inventory	Tree Age						Total Trees	Bearing Trees
	≤2	3-5	6-8	9-13	14-23	≥24		
	- - - - - - - - - - - - - - - - - - % - - - - - - - - - - - - - - - - - -						- - - - - thousand - - - - -	
1970	15.1	21.7	4.2	3.9	14.1	41.1	8,925.4	6,746.5
1972	6.9	21.9	14.0	5.5	10.6	41.1	9,012.7	8,032.1
1974	11.5	8.2	25.1	7.6	8.1	39.4	9,647.2	8,362.6
1976	13.9	7.9	13.3	20.8	6.8	37.2	10,398.1	8,598.9
1978	8.5	13.8	6.8	28.9	7.1	34.9	10,412.5	8,969.7
1980	8.9	10.5	10.7	21.6	15.8	32.5	10,768.7	9,586.2
1982	7.5	7.4	12.8	12.6	29.1	30.6	10,833.2	9,753.9
1984	11.4	6.7	7.5	15.7	32.1	26.7	10,582.9	9,192.8
1986	9.7	7.8	7.9	17.0	35.7	22.0	9,624.0	8,367.7
1988	11.0	9.7	6.5	13.8	38.3	20.7	10,081.2	8,654.7
1990	21.8	6.2	8.0	9.1	31.4	23.5	11,193.2	8,748.5
1992	27.2	14.0	5.5	8.6	19.1	25.6	13,119.2	9,556.9
1994	23.3	21.3	7.6	8.3	16.0	23.5	15,004.0	11,514.1
1996	9.8	25.3	17.8	8.2	15.3	23.6	15,116.9	13,632.8
1998	4.3	16.7	24.6	13.8	14.8	25.8	14,079.1	13,469.6
2000	3.7	6.2	22.7	27.2	13.6	26.7	12,668.6	12,204.1
2002	4.1	4.7	9.7	38.3	16.7	26.5	11,329.2	10,869.7
2004	8.0	4.0	4.9	32.1	27.0	24.1	9,748.3	8,967.9
2006	6.1	5.9	3.8	18.5	41.8	23.8	6,971.4	6,543.2
2008	4.0	6.9	4.3	7.7	50.8	26.2	6,241.0	5,989.7
2009	3.9	6.3	4.8	6.4	49.8	28.8	5,861.0	5,633.8
2010	4.5	5.5	5.5	5.7	50.1	28.8	5,445.9	5,201.0
2011	5.9	4.4	5.4	6.2	48.3	29.8	5,349.6	5,036.4
2012	6.4	4.2	5.7	6.3	44.9	32.5	5,272.3	4,934.6
2013	6.8	5.4	5.0	6.5	40.3	36.1	5,251.20	4,896.10
2014	7.3	6.3	4.4	7.6	31.5	42.9	5,118.00	4,744.00

SOURCE: Florida Agricultural Statistics Service, *Commercial Citrus Inventory*, various issues.

Table 7. Age distribution of Florida grapefruit trees by variety, 2014 inventory.

District/Variety	Tree Age						Total Trees
	≤2	3-5	6-8	9-13	14-23	≥24	
	- - - - - - - - - - - - - - - - - - %[a] - - - - - - - - - - - - - - - -						- thousand -
White Seedless[b]	1.6	2.4	2.6	9.9	30.6	53.0	1,509
Red & Pink Seedless	6.7	6.5	4.9	8.7	24.9	48.4	4,000
TOTAL	5.4	5.8	5.0	9.2	28.3	46.3	5,509

[a]Percentages may not total 100 due to rounding.
[b]Includes seedy grapefruit.
SOURCE: Florida Agricultural Statistics Service, *2014 Commercial Citrus Inventory.*

Table 8. Age distribution of Florida specialty citrus trees by variety, 2014 inventory.

Variety	Tree Age						Total Trees
	≤2	3-5	6-8	9-13	14-23	≥24	
	- % -						- thousand -
Tangelos	2.9	2.2	2.7	10.9	34.3	47.7	478.6
Tangerines	3.8	3.6	3.8	6.8	49.7	32.2	1,719.4
TOTAL	3.6	3.3	3.5	7.7	46.4	35.5	2,198.0

SOURCE: Florida Agricultural Statistics Service, *2014 Commercial Citrus Inventory.*

Table 9. Annual citrus plantings by variety[a]

Variety[c]	Annual Plantings 1000 Trees					
	2009	2010	2011	2012	2013	2014[e]
ORANGES						
Early & Midseason[b]	523.5	409.3	514.7	321.2	581.4	581.9
Late	474.5	451.2	499.4	422.1	499.0	500
Unidentified[d]	242	209.7	188.1	232.4	445.1	-
TOTAL	1,239.0	1,405.3	1,202.2	975.7	1,525.5	1081.9
GRAPEFRUIT						
White Seedless[e]	1.7	1.0	1.9	2.3	0.2	1.2
Red & Pink Seedless	92.2	107.6	40	99.8	55.3	56.3
Unidentified	13.3	13.3	10.3	15.7	27.7	-
TOTAL	107.2	124.4	52.2	117.8	83.2	57.5
SPECIALTY						
Tangelos	1.8	0.2	2.4	5.1	3.7	4.7
Tangerines	16.3	14.1	16.5	18.6	16.1	18.3
TOTAL	18.1	14.3	18.9	23.7	19.8	23.0

[a] Based on various *Commercial Citrus Inventories*.
[b] Includes Temples
[c] Orange and grapefruit trees and acres listed as "unidentified" by the USDA/FASS will later be classified into one of the other categories.
[d] Includes seedy.
[e] The data source was used for 2014 that did not include any trees categorized as "unidentified".

Table 10. Historical citrus tree- and acreage-loss rates by variety[a]

Variety	00-02	02-04	04-06	06-08	08-09	09-10	10-11	11-12	12-13	13-14
	Annual Tree Loss Rate (%)[c]									
ORANGES[d]	3.8	4.3	9.3	5.6	3.5	3.8	3.3	3.3	3.8	2.1
GRAPEFRUIT[e]										
Indian River	5.8	9.5	17.2	5.7	6.5	10.1	3.1	2.2	1.0	4.9
Interior	9.4	10.8	16.6	8.5	8.2	5.7	6.7	5.1	6.8	-0.7[g]
SPECIALTY[f]										
Tangelos	8.3	8.2	16.2	8.8	2.2	10.9	6.6	5.5	4.5	6.1
Tangerines	6.6	9.6	10.8	6.5	3.6	10.9	4.7	5.3	3.2	5.3
	Annual Acre Loss Rate (%)[b]									
ORANGES[d]	4.2	4.8	9.7	5.2	3.1	3.7	3.5	3.6	1.3	1.5
GRAPEFRUIT[e]										
Indian River	6.1	10.2	17.4	5.3	5.7	9.5	3.0	2.2	.6	4.8
Interior	8.8	11.7	16.2	8.9	7.7	5.7	6.7	5.1	2.5	0.2
SPECIALTY[f]										
Tangelos	9.2	10.3	15.3	8.4	2.3	10.4	7.4	5.7	4.5	7.2
Tangerines	6.7	9.8	10.6	6.4	3.1	10.5	4.9	5.9	3.5	5.7

[a]Losses due to all factors.
[b]Based on the bearing trees reported in *Citrus October Forecast, Maturity Test Results and Fruit Size*, Florida Agricultural Statistics Service, October 11, 2012.
[c]Based on various *Commercial Citrus Inventories*.
[d]One loss rate for round oranges (early and midseason and late oranges) was estimated due to the unidentified (by variety) young round-orange trees.
[e]One loss rate for seedless grapefruit was estimated due to the unidentified (by variety) young grapefruit trees.
[f]Loss rates based on bearing trees or acres due to unidentified nonbearing specialty citrus.
[g]A small increase in tree numbers were reported for 2014..

Table 11. Average orange yields by age.

Season	Early and Midseason Oranges						Late Oranges					
	3-5	6-8	9-13	14-23	24+	wt avg[a]	3-5	6-8	9-13	14-23	24+	wt avg[a]
	1-3/5 bushel boxes per tree											
1993-94	1.4	3.2	3.8	4.5	5.2	4.1	1.0	2.0	2.7	3.5	4.0	3.1
1994-95	1.2	3.1	4.1	4.6	5.2	4.2	1.4	2.7	2.5	3.6	4.2	3.3
1995-96	1.3	2.9	3.8	4.1	4.9	3.8	1.2	2.0	2.5	3.2	4.0	2.9
1996-97	1.3	2.8	3.7	5.1	5.3	4.4	1.1	2.3	2.5	3.3	4.2	3.0
1997-98	1.3	2.7	3.8	4.8	5.3	4.2	1.1	2.2	2.6	3.8	4.9	3.4
1998-99	0.8	1.9	2.9	3.8	4.2	3.3	0.8	1.5	1.9	2.2	3.2	2.1
1999-00	0.9	2.1	3.4	4.7	5.2	4.0	0.9	1.7	2.4	3.1	4.5	2.9
2000-01	1.0	2.0	3.2	4.2	4.6	3.6	0.9	1.7	2.3	2.7	3.7	2.6
2001-02	1.4	1.8	3.0	4.2	5.2	3.7	0.9	1.7	2.4	2.8	4.5	2.7
2002-03	0.7	1.8	2.7	3.8	4.3	3.3	1.0	1.6	1.9	2.6	4.0	2.5
2003-04	1.8	1.9	3.2	4.1	5.3	3.7	1.7	2.1	2.5	3.0	5.1	3.0
2004-05	1.2	1.7	2.2	2.9	2.8	2.5	1.1	1.2	1.7	2.0	2.1	1.8
2005-06	1.8	1.8	2.0	2.8	3.7	2.7	0.8	1.8	1.8	2.1	3.0	2.1
2006-07	1.1	1.8	1.8	2.5	3.6	2.4	0.6	1.5	1.5	1.9	2.7	1.8
2007-08	0.8	1.9	2.5	3.4	4.8	3.1	0.7	2.1	2.5	2.5	4.1	2.6
2008-09	1.2	1.8	2.9	3.5	4.7	3.2	0.9	1.8	2.3	2.3	3.4	2.3
2009-10	1.0	1.8	2.1	2.8	4.0	2.7	1.0	1.4	2.0	1.9	2.9	1.9
2010-11	0.8	1.6	2.1	3.0	4.2	2.8	0.5	1.2	2.1	2.2	3.1	2.1
2011-12	0.7	1.8	2.7	3.1	4.2	3.0	0.9	1.4	1.9	2.3	3.0	2.2
2012-13	0.9	1.5	2.2	2.6	4.1	2.7	0.5	1.4	1.8	2.1	2.9	2.1
2013-14	0.7	0.9	1.7	2.2	3.2	2.2	0.5	0.8	1.4	1.6	2.2	1.6
2014-15[b]	0.7	1.3	1.9	2.0	2.2	2.0	0.4	0.9	1.6	1.7	1.8	1.6

[a] Weighted average based on 2013-14 tree distribution. [b]Estimated based upon 2014-15 crop.

SOURCE: Florida Agricultural Statistics Service.

Table 12. Average grapefruit yields by age.

Season	White Grapefruit						Colored Grapefruit					
	3-5	6-8	9-13	14-23	24+	wt avg[a]	3-5	6-8	9-13	14-23	24+	wt avg[a]
	1-3/5 bushel boxes per tree											
1992-93	2.3	3.9	7.5	7.1	7.0	6.9	2.5	4.9	5.6	5.7	6.4	5.6
1993-94	2.2	3.6	4.4	6.6	6.7	6.2	2.3	3.7	4.6	4.6	5.4	4.6
1994-95	3.2	2.5	5.2	7.1	6.4	6.4	2.0	3.5	4.9	5.3	5.1	4.9
1995-96	2.0	4.3	3.5	6.3	5.7	5.7	2.7	3.5	5.1	4.0	5.4	4.3
1996-97	2.3	4.8	3.3	6.7	6.3	6.1	1.6	3.8	4.8	5.7	5.6	5.2
1997-98	1.7	4.2	5.2	8.0	5.3	6.6	2.3	2.8	4.2	5.4	5.2	4.9
1998-99	1.5	3.1	4.2	4.8	5.0	4.7	1.7	3.2	3.5	4.7	4.8	4.4
1999-00	1.3	3.1	4.6	5.2	6.3	5.3	1.4	2.9	4.2	5.3	5.7	4.9
2000-01	2.2	2.9	3.8	7.1	5.4	6.0	1.8	3.3	3.6	4.7	4.9	4.4
2001-02	1.3	3.3	3.6	7.0	5.8	6.0	2.0	2.3	3.9	4.7	5.2	4.5
2002-03	1.9	3.0	3.2	4.8	5.3	4.7	1.6	1.8	3.0	4.0	4.8	3.9
2003-04	2.5	3.5	3.5	4.4	6.9	5.1	2.9	3.5	3.6	4.6	6.0	4.8
2004-05	1.0	0.8	1.1	1.4	1.3	1.3	0.8	2.0	2.2	1.9	1.5	1.7
2005-06	1.9	2.5	3.0	2.3	3.8	2.9	0.3	1.2	2.9	3.1	3.8	3.0
2006-07	0.3	2.9	4.0	4.2	5.9	4.6	1.0	2.7	3.4	4.2	5.9	4.3
2007-08	1.6	4.1	3.2	4.5	6.3	4.9	1.6	2.9	3.2	4.0	6.3	4.4
2008-09	1.1	2.3	2.8	3.8	5.1	4.0	1.4	1.3	2.8	3.7	5.2	3.8
2009-10	0.9	1.9	3.3	3.7	5.4	4.1	1.3	3.0	2.8	3.6	5.3	3.8
2010-11	1.6	2.6	2.0	3.7	5.5	4.1	1.8	1.4	3.4	3.5	5.0	3.9
2011-12	1.3	2.6	3.1	3.1	5.5	3.9	1.4	2.2	2.9	4.0	4.4	3.8
2012-13	2.6	2.8	2.0	3.6	4.9	4.0	1.7	1.6	2.6	3.6	4.7	3.7
2013-14	1.0	1.9	1.5	3.5	3.5	3.3	1.3	1.7	2.4	3	4.3	3.3
2014-15	0.8	1.3	2.0	2.5	2.9	2.7	1.0	1.6	2.3	3	3.2	2.8

[a] Weighted average based on 2011-12 tree distribution.

SOURCE: Florida Agricultural Statistics Service, *Commercial Citrus Inventory*, various issues.

Table 13. Florida orange production projections, actual for 20014-15 and FDOC estimates for 2016-17 through 2025-26.[a]

Season	Declining Yields			Constant Yields			Increasing Yields		
	Low Planting[b]	Middle Planting[c]	High Planting[d]	Low Planting[b]	Middle Planting[c]	High Planting[d]	Low Planting[b]	Middle Planting[c]	High Planting[d]
	thousand boxes								
2014-15	96,700								
	A forecast for the 2015-16 season will be made in October 2015 by the USDA, Florida Agricultural Statistics Service.								
2016-17	94,394	94,394	94,394	96,321	96,321	96,321	98,247	98,247	98,247
2017-18	92,105	92,105	92,105	95,943	95,943	95,943	99,780	99,780	99,780
2018-19	89,567	89,802	89,919	95,284	95,534	95,659	101,001	101,266	101,398
2019-20	87,003	87,617	87,925	94,568	95,236	95,571	102,133	102,855	103,216
2020-21	84,289	85,402	85,962	93,654	94,891	95,513	103,019	104,380	105,065
2021-22	83,411	85,152	86,029	92,678	94,613	95,588	101,946	104,074	105,147
2022-23	82,313	84,895	86,287	91,458	94,327	95,874	100,604	103,760	105,462
2023-24	81,218	84,710	86,629	90,242	94,122	96,255	99,266	103,534	105,880
2024-25	80,047	84,539	87,033	88,941	93,933	96,704	97,836	103,326	106,374
2025-26	78,908	84,471	87,576	87,676	93,857	97,307	96,444	103,243	107,038

[a] Assumes yields are average from 2009-10 through 2011-12.
[b] 50% of replacement planting level (roughly average planting level in recent years).
[c] 100% of replacement planting level.
[d] 125% of replacement planting level.

Table 14. Florida grapefruit production projections, actual 2014-15 and FDOC estimates for 2016-17 through 2025-26.[a]

Season	Decreasing Yield			Flat Yield			Increasing Yield		
	Low Planting[b]	Middle Planting[c]	High Planting[d]	Low Planting[b]	Middle Planting[c]	High Planting[d]	Low Planting[b]	Middle Planting[c]	High Planting[d]
	thousand boxes								
2014-15	12,950								
	A forecast for the 2015-16 season will be made in October 2015 by the USDA, Florida Agricultural Statistics Service.								
2016-17	12,351	12,351	12,351	12,603	12,603	12,603	12,855	12,855	12,855
2017-18	11,921	11,921	11,921	12,418	12,418	12,418	12,915	12,915	12,915
2018-19	11,507	11,557	11,582	12,241	12,295	12,322	12,976	13,033	13,061
2019-20	11,097	11,208	11,263	12,062	12,182	12,242	13,027	13,157	13,222
2020-21	10,694	10,874	10,964	11,882	12,082	12,183	13,070	13,290	13,401
2021-22	10,530	10,792	10,924	11,701	11,991	12,138	12,871	13,191	13,352
2022-23	10,355	10,728	10,932	11,506	11,920	12,147	12,656	13,112	13,362
2023-24	10,195	10,675	10,938	11,328	11,861	12,154	12,460	13,047	13,369
2024-25	10,037	10,632	10,960	11,152	11,813	12,178	12,268	12,995	13,396
2025-26	9,874	10,591	10,988	10,971	11,768	12,209	12,068	12,944	13,430

[a] Assumes yields are average from 2014-15.
[b] 50% of replacement planting level (roughly average planting level in recent years).
[c] 100% of replacement planting level.
[d] 125% of replacement planting level.

Table 15. Florida specialty production projections, actual for 2011-15 and FDOC estimates for 2016-17 through 2025-26.[a]

Season	Tangelos	Tangerines	Total
	million boxes		
2009-10	.90	4.45	5.35
2010-11	1.15	4.65	5.80
2011-12	1.15	4.29	5.44
2012-13	1.00	3.28	4.28
2013-14	.88	2.90	3.78
2014-15	.68	2.30	2.98
	A forecast for the 2015-16 season will be made in October 2015 by the USDA, Florida Agricultural Statistics Service.		
2016-17[b]	0.67	2.18	4.40
2017-18	0.65	2.12	4.16
2018-19	0.64	2.06	3.94
2019-20	0.63	2.02	3.74
2020-21	0.62	1.99	3.55
2021-22	0.62	1.96	3.37
2022-23	0.62	1.95	3.20
2023-24	0.62	1.93	3.03
2024-25	0.61	1.93	2.88
2025-26	0.61	1.93	2.54

[a] Assumes 100 percent replant rate

Table 16. Projected Orange Production Using Extrapolated Yields

Season	Early-Mid Oranges	Late Season Oranges	Total Production
	---------- 1,000 boxes ----------		
2016-17	39,625	40,703	80,328
2017-18	35,183	35,971	71,154
2018-19	31,250	31,836	63,086
2019-20	27,772	28,202	55,974
2020-21	24,674	24,989	49,663
2021-22	21,925	22,155	44,080
2022-23	19,485	19,636	39,121
2023-24	17,312	17,409	34,721
2024-25	15,383	15,429	30,811
2025-26	13,669	13,683	27,352

Table 17. Projected Grapefruit Production Using Extrapolated Yields.

Season	White seedless	Red seedless	Total Production
	---------- 1,000 Boxes ----------		
2016-17	2,897	8,230	11,127
2017-18	2,570	7,413	9,983
2018-19	2,293	6,705	8,999
2019-20	2,053	6,070	8,123
2020-21	1,842	5,501	7,343
2021-22	1,655	4,987	6,642
2022-23	1,490	4,525	6,015
2023-24	1,343	4,108	5,451
2024-25	1,211	3,731	4,942
2025-26	1,094	3,390	4,485

Table 18. Florida orange juice US presumed consumption and processed orange on-tree price/revenue projections

		16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25
		Scenario 1: Declining Yields with 50% Plant Rate[a]								
US Presumed Consumption	mil gal	753	750	750	750	745	745	743	741	736
Processed On-Tree Price	$/box	$10.42	$10.44	$10.44	$10.44	$10.48	$10.48	$10.49	$10.50	$10.53
Processed On-Tree Revenue	mil $	$984	$962	$935	$908	$883	$874	$863	$853	$843
		Scenario 2: Flat yields with 100% Plant Rate[b]								
US Presumed Consumption	mil gal	778	776	773	771	770	770	768	768	767
Processed On-Tree Price	$/box	$10.78	$10.80	$10.82	$10.83	$10.84	$10.84	$10.85	$10.85	$10.86
Processed On-Tree Revenue	mil $	$1,039	$1,036	$1,033	$1,031	$1,028	$1,026	$1,024	$1,022	$1,020
		Scenario 3: Increasing Yields with 125% Plant Rate[c]								
US Presumed Consumption	mil gal	829	829	829	831	835	833	833	833	834
Processed On-Tree Price	$/box	$11.46	$11.46	$11.45	$11.44	$11.41	$11.42	$11.42	$11.42	$11.41
Processed On-Tree Revenue	mil $	$1,696	$1,696	$1,697	$1,699	$1,703	$1,702	$1,702	$1,701	$1,703

[a] Assumes loss rates are at the average level in recent years (about 4%), planting rates are at the average level in recent years (about 2% or half the replacement level), and a 0% growth rate for US consumption and exports.

[b] Same as scenario 1 except US consumption and exports are projected to grow at 1% per year.

[c] Same as scenario 2 except planting rates are at the 125% of the replacement level (about 5%).

Table 19. Florida grapefruit juice US presumed consumption and grapefruit on-tree price/revenue projections

		16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25
		Scenario 1: Declining Yields, Low Plant Rate								
US Presumed Consumption	mil gal	38.3	37.0	35.7	34.4	33.2	32.6	32.1	31.6	31.1
Processed On-Tree Price	$/box	$3.35	$3.40	$3.45	$3.55	$3.60	$3.60	$3.65	$3.70	$3.75
Fresh On-Tree Price	$/box	$14.45	$14.85	$15.25	$15.75	$16.25	$16.35	$16.45	$16.65	$16.75
Total On-Tree Revenue	mil $	$93.5	$92.4	$91.3	$90.8	$89.9	$88.9	$88.2	$87.8	$87.2
		Scenario 2: Flat Yields, Medium Plant Rate								
US Presumed Consumption	mil gal	39.1	38.5	38.1	37.8	37.5	37.2	37.0	36.8	36.5
Processed On-Tree Price	$/box	$3.35	$3.30	$3.25	$3.25	$3.25	$3.25	$3.25	$3.25	$3.25
Fresh On-Tree Price	$/box	$14.25	$14.45	$14.65	$14.85	$15.05	$15.15	$15.21	$15.25	$15.45
Total On-Tree Revenue	mil $	$94.4	$93.6	$93.2	$93.4	$93.2	$92.9	$92.6	$92.7	$92.8
		Scenario 3: Increasing Yields, High Plant Rate								
US Presumed Consumption	mil gal	39.9	40.0	40.5	41.0	41.5	41.4	41.4	41.4	41.5
Processed On-Tree Price	$/box	$3.30	$3.25	$3.25	$3.20	$3.20	$3.20	$3.20	$3.20	$3.20
Fresh On-Tree Price	$/box	$14.05	$13.95	$13.89	$13.85	$13.79	$13.75	$13.73	$13.73	$13.69
Total On-Tree Revenue	mil $	$94.9	$94.5	$95.3	$95.8	$96.8	$96.2	$96.2	$96.3	$96.3

FIGURES

Figure 1. Historical Early-Mid Orange Tree Density, by Age of Tree

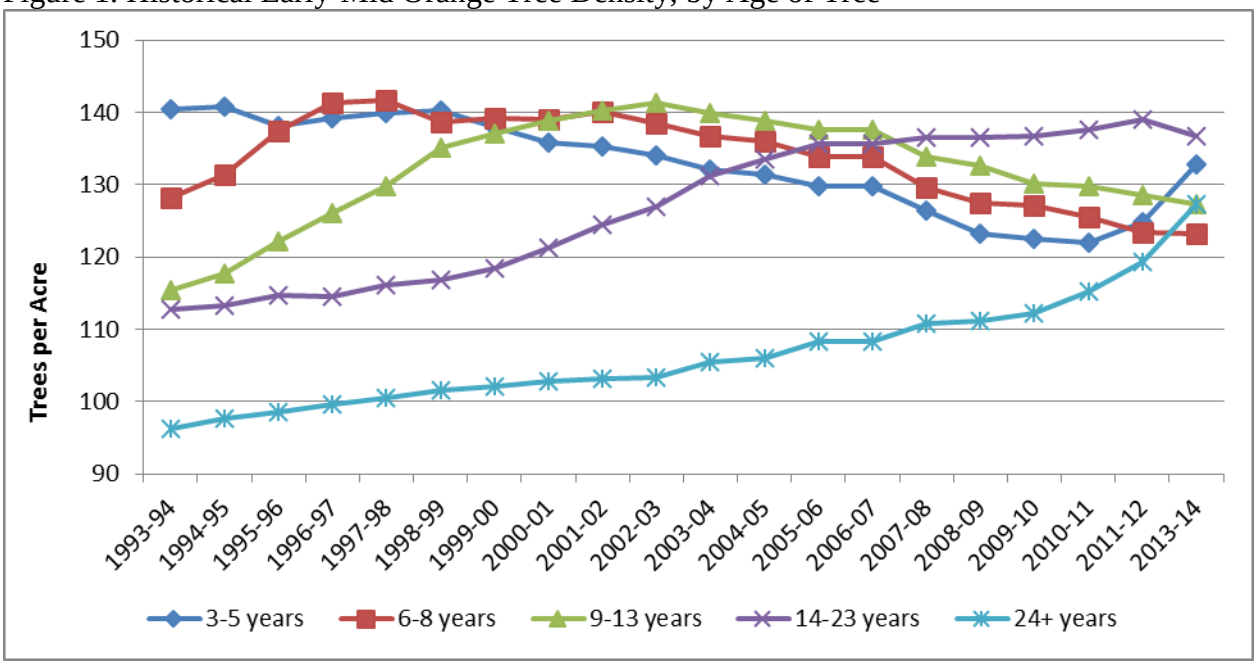

Figure 2. Historical Valencia Orange Tree Density, by Age of Tree

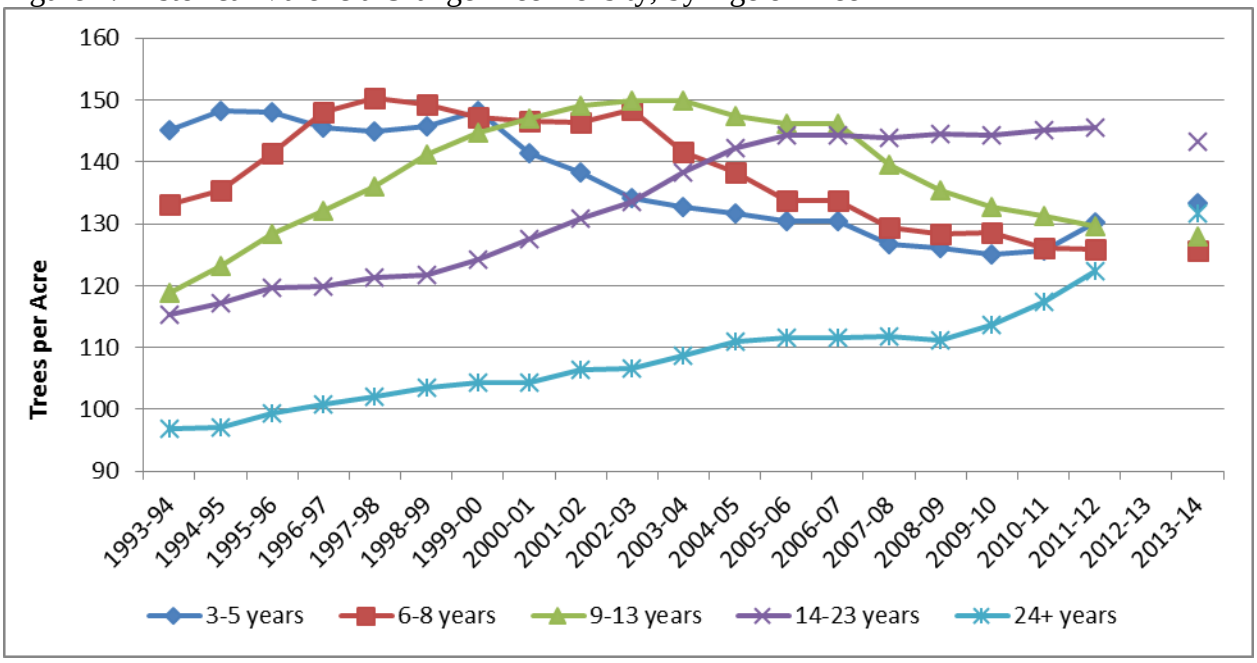

Figure 3. Historical Early-Mid Orange Tree Yields, by Age of Tree

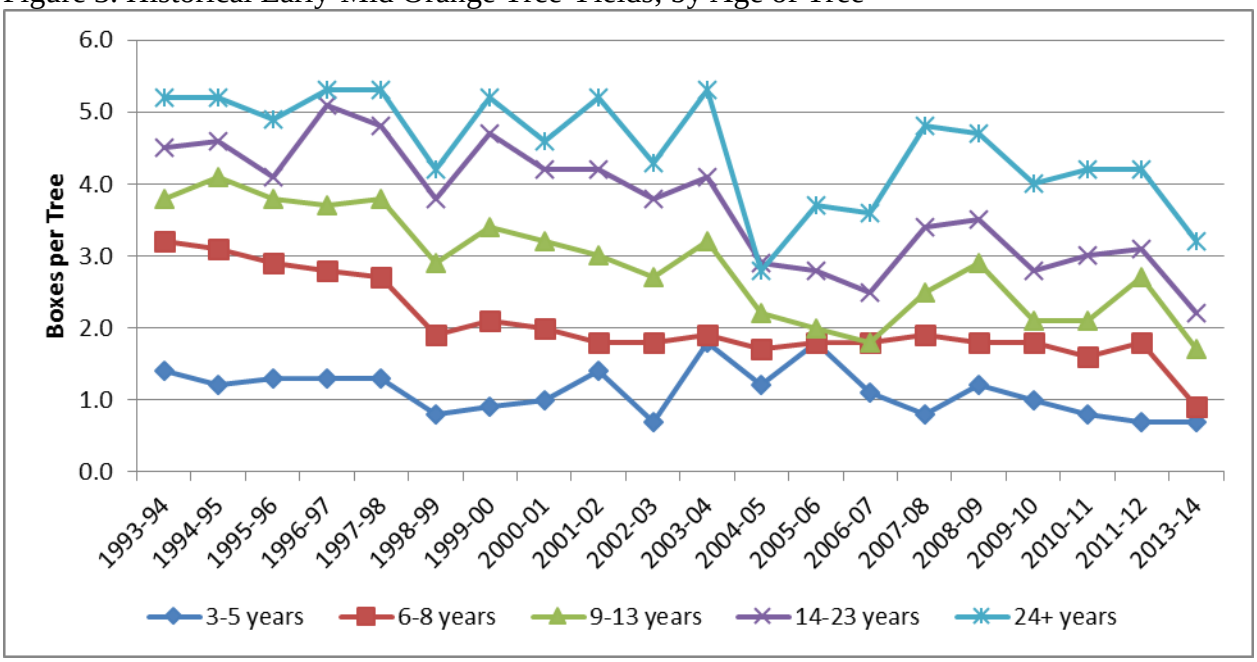

Figure 4. Historical Valencia Orange Tree Yields, by Age of Tree

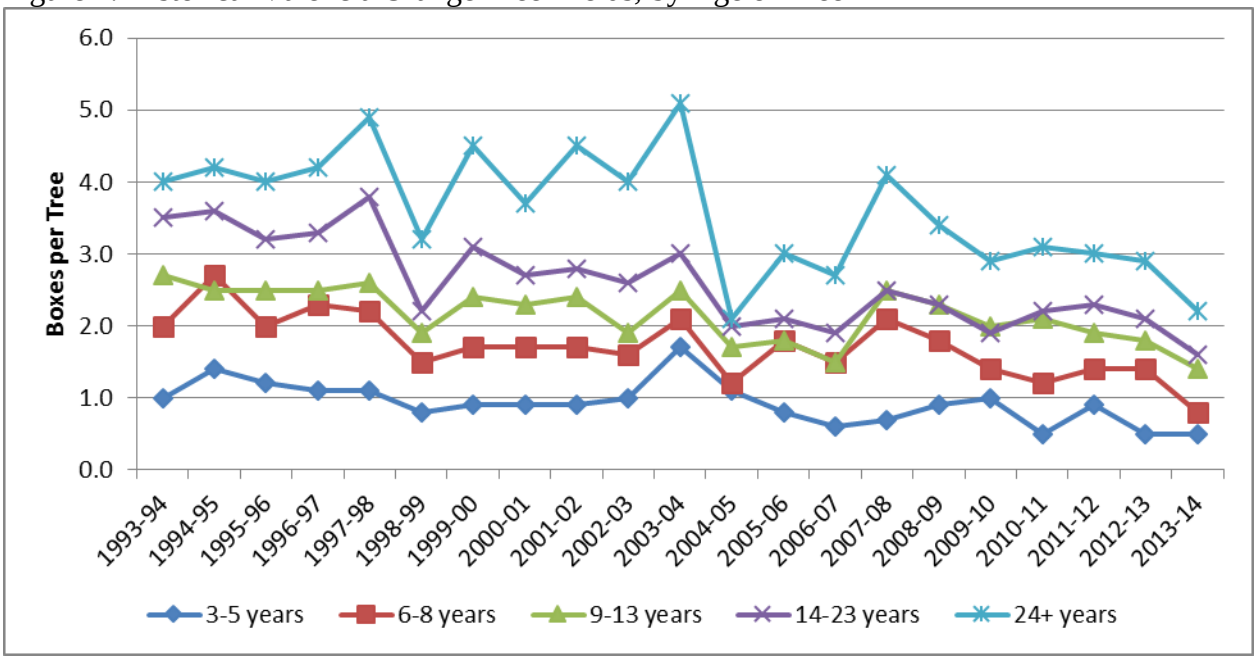

Figure 5. Historical White Grapefruit Tree Density, by Age of Tree

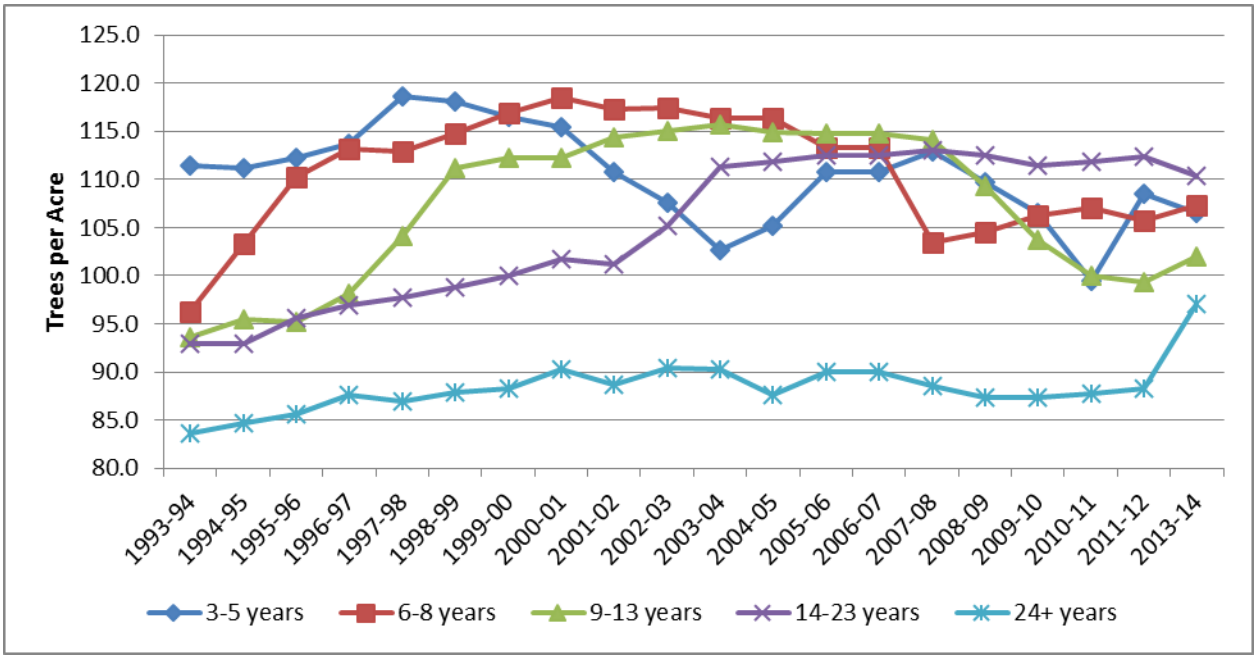

Figure 6. Historical Red Grapefruit Tree Density, by Age of Tree

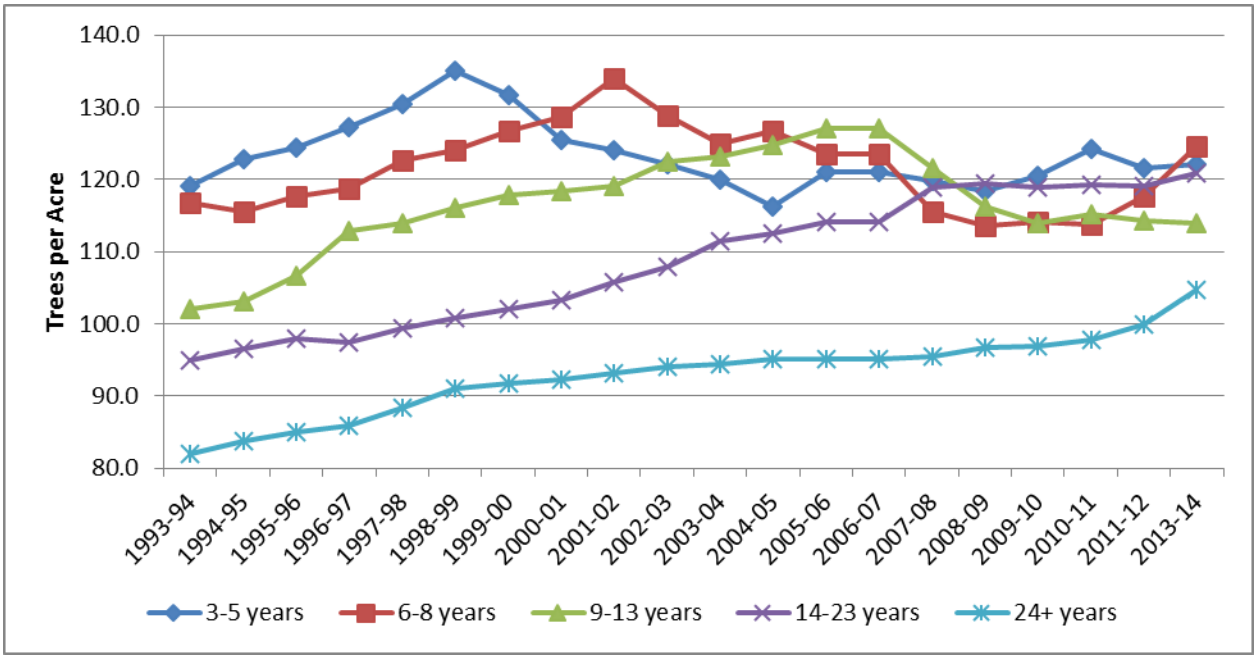

Figure 7. Historical White Grapefruit Tree Yields, by Age of Tree

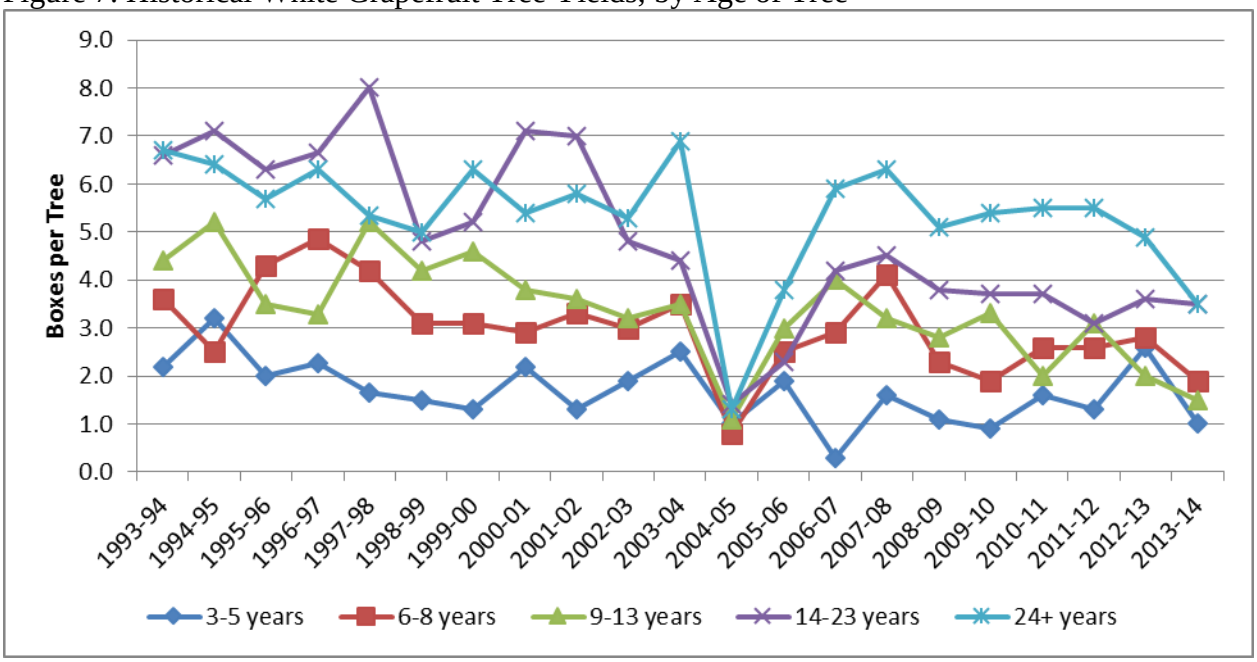

Figure 8. Historical Red Grapefruit Tree Yields, by Age of Tree

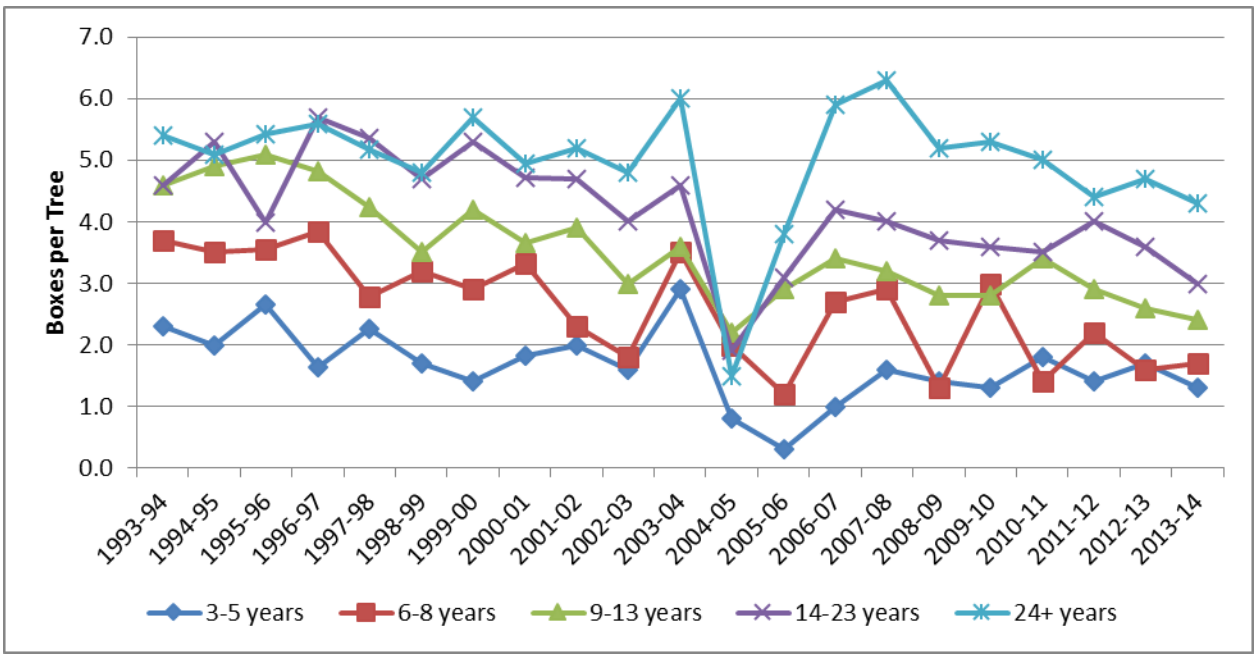

Figure 9. Scenarios for Production Trends.

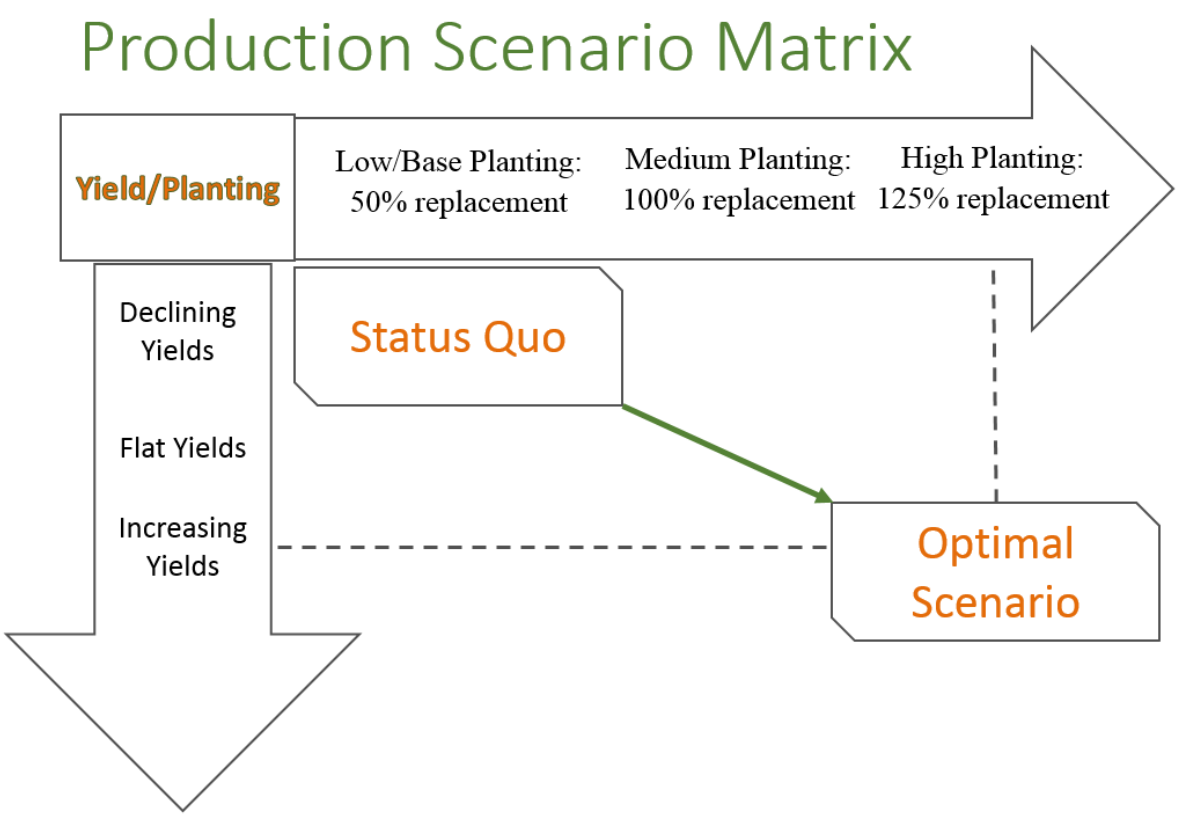

Figure 10. Forecasted Orange Production Using Extrapolated Yields.

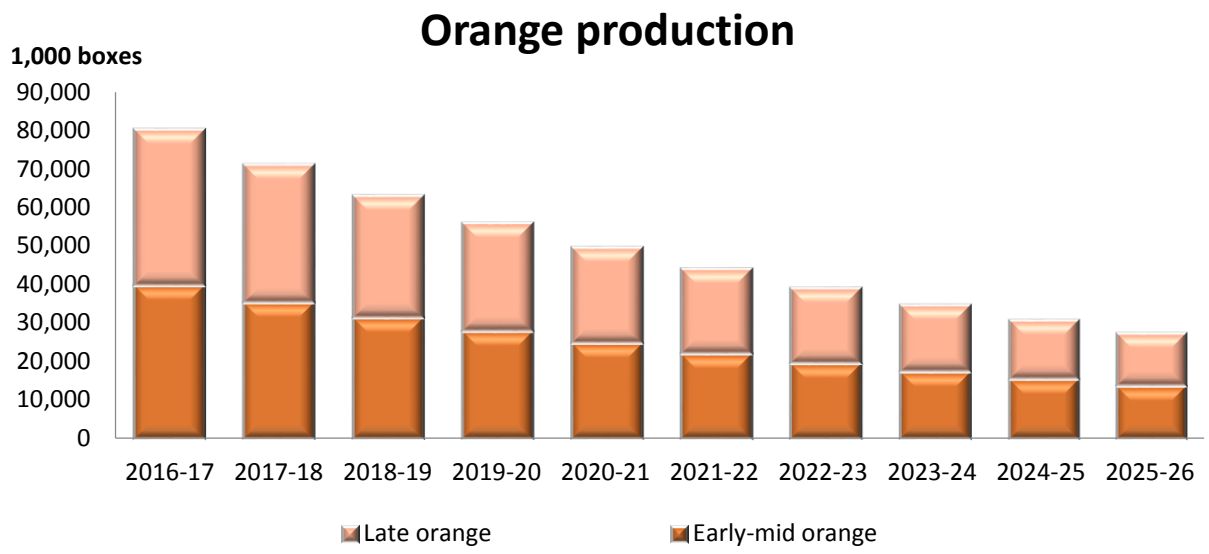

Figure 11. Forecasted Grapefruit Production Using Extrapolated Yields.