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IMPACTS OF A BAN ON THE SALES OF FLORIDA HONEY TANGERINES IN CALIFORNIA DUE TO CITRUS BLACK SPOT

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Impacts of a Ban on the Sales of Florida Honey Tangerines in California Due to Citrus Black Spot

Citrus black spot (CBS) was discovered in March of 2010 near Immokalee in Collier County. CBS is a fungal disease which results in blemished fruit (black lesions), premature fruit drop and requires additional grove management practices and increased production costs to control the disease (application of fungicides and control of leaf litter where spores that spread the disease develop).

Although juice from fruit is not affected by CBS, the disease makes the fruit unacceptable for the fresh market. For some Florida citrus varieties, such as tangerines, the fresh market is the primary outlet for the fruit. In many seasons, 70% or more of the Florida tangerine crop is utilized fresh.

As a result of CBS, some countries and U.S. states that produce citrus may put a ban on importing Florida fresh citrus in fear of the disease spreading to their production areas. The California market for Florida honey tangerines is one area of concern. Annual sales there in the last decade have accounted for as much as 20% of Florida fresh honey tangerines.

The purpose of this paper is to examine the potential impact on Florida grower earnings of losing the California market for fresh honey tangerines. The focus is on how much price may decrease as a result of losing the California market in the upcoming season. It is assumed that the fresh honey tangerine supply situation will be unchanged next season, but demand for fresh honey tangerines will decrease by the size of the California market. Thus, price would be expected to drop, reducing grower returns. Although not examined here, increases in grove care costs to manage CBS would also be expected which would further reduce grower returns.

Graphical Analysis

Table 1 shows that, over the last decade, 98.4% of Florida's fresh honey tangerine shipments went to the domestic market (89.9%) or to Canada (8.5%). During the years when the Canker eradication restrictions were not in effect, California accounted for 17.7% of Florida honey tangerine shipments, ranging from 14.4% in 2005-06 to 20.1% in 2001-02.

A graph of supply and demand for the domestic Florida honey tangerine market is shown in Figure 1. The x axis shows quantity and the y axis shows price. The vertical line at the 1.375 million 95-pound box level (2.75 million cartons) indicates supply. This supply level occurred in 2009-10 and is assumed to occur next season, 2010-11. The demand curve for 2009-10 is indicated by the line connecting the blue squares. The equilibrium FOB price that equates supply and demand is \$15.23/carton. If the California market were lost, the quantity of Florida honey tangerines demanded would be reduced at each price level. Assume the reduction is the decade average of 17.7%. In this case, the demand curve is shown by the line connecting the red

diamond shapes in Figure 1. The new equilibrium FOB price that equates supply and this reduced demand is \$13.03/carton, a reduction of \$2.20/carton. This reduction is a function of the elasticity of demand (steepness of the demand curve in Figure 1). In Figure 1, the elasticity of demand is -1.25 (based on a preliminary regression relating historical quantity to price). If the demand curve is steeper (less elastic), the change in price is greater and vice versa. For example, if the demand elasticity were cut in half (more inelastic), price would decrease to \$11.15/carton or \$4.08/carton less than the 2009-10 level.

Quantitative Analysis

The above results can be straightforwardly obtained based on the double log specification of demand for Florida fresh honey tangerines. Formally, this demand curve can be written

$$(1) Q_t = \alpha P_t^\varepsilon,$$

where Q_t is the quantity demanded of Florida fresh honey tangerines in period t , α is constant, P_t is the FOB price in period t and ε is the elasticity of demand which indicates the percentage change in quantity for a one percent change in price. The linear form of equation (1) is $\log(Q_t) = a + \varepsilon \log(P_t)$, where a is the $\log(\alpha)$.

Given the California honey market accounts for 17.7% of Florida's volume sales, loss of this market means that demand for Florida honey tangerines will shrink to 82.3% of its previous size, all else constant. In this case, demand equation (1), say in period $t+1$, becomes

$$(2) Q_{t+1} = .823\alpha P_{t+1}^\varepsilon.$$

Assume quantity demanded equals quantity supplied, so that Q_t and Q_{t+1} are also supply levels. Also, let periods t and $t+1$ be for the 2009-10 and 2010-2011 seasons, respectively, and assume the supply levels in these two seasons are the same, i.e., $Q_t = Q_{t+1} = Q$. Thus, we can write

$$(3) Q = \alpha P_t^\varepsilon, \quad (\text{supply equals demand in 2009-10})$$

$$(4) Q = .823\alpha P_{t+1}^\varepsilon, \quad (\text{supply equals demand in 2010-11})$$

Given supply Q is the same in equations (3) and (4), the right-hand sides of the two equations can be equated to each other and a solution for P_{t+1} can be found:

$$(5) \alpha P_t^\varepsilon = .823\alpha P_{t+1}^\varepsilon$$

or, solving for P_{t+1} ,

$$(6) P_{t+1} = P_t (1/.823)^{(1/\varepsilon)}.$$

In 2009-10, the FOB price P was \$15.23/carton and assuming the price elasticity is -1.25, the price in 2010-11 is estimate at \$13.03/carton:

$$(7) P_{2011} = (15.23) (1/.823)^{(-1/1.25)}$$

$$= (15.23) (.856) = 13.03.$$

The elasticity of demand for Florida honey tangerines is an important factor in this calculation. Based on preliminary analysis, this elasticity ranged from -1.25 to -1.61. If the more elastic value of -1.61 were used in equation (7), the FOB price estimate for 2010-11 would be \$13.49/carton.

Thus, based on the -1.25 demand elasticity, the loss of the California market for honey tangerines would result in an estimated FOB price decline from \$15.23/carton to \$13.03/carton or by \$2.20/carton (a decline of 14.4%). Alternatively, based on the -1.61 demand elasticity, the FOB price is estimated to decline to \$13.49/carton or by \$1.74/carton (a decline of 11.4%). If the margin between the FOB and on-tree prices is unchanged, this means the on-tree price would also decrease by \$4.40/box (\$3.48/box), given two cartons per box.

Conclusions

CBS may adversely impact citrus growers both through demand and supply impacts. This paper has focused on the demand side of the equation. The analysis has also focused on Florida honey tangerines and the market in California. This market accounts for about 17.7% of Florida honey tangerine sales. If Florida product were banned from California in fear of CBS spreading there, the FOB price for Florida honey tangerines is estimated to decline by \$3.48 to \$4.40 per box, all else constant. The on-tree price would be expected to decline by the same amounts. However, with respect to production costs, all else would not be constant. Growers would be expected to bear increased grove care costs to control CBS. Thus, with higher grove care costs and the same production next season, the grower price for Florida honey tangerines net of grove care costs would decline by more than the \$3.48 to \$4.40 per box levels.

Table 1. Florida Fresh Honey Tangerine Shipments

	Total 1000 4/5 bushel cartons	U.S.	Canada	Offshore	California	% total
2000-01*	2,368	2,099	218	51	429	18.1%
2001-02*	2,627	2,378	194	56	528	20.1%
2002-03	3,380	3,033	260	88	647	19.1%
2003-04	3,968	3,546	330	92	738	18.6%
2004-05	2,771	2,504	202	65	492	17.8%
2005-06	3,252	2,923	256	73	469	14.4%
2006-07**	2,639	2,347	283	9	-	
2007-08**	2,874	2,610	256	8	-	
2008-09**	1,686	1,512	174	-	-	
2009-10	2,750	2,503	206	41	427	15.5%
Average						17.7%

* San Diego District

**Canker restrictions in effect.

