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Grower Costs of Having Citrus Canker in Florida¹

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Introduction

Citrus canker (*Xanthomonas campestris* pv. *citri*) poses a serious threat to the Florida citrus industry. The bacteria disease was first detected in dooryard citrus trees in the Miami-Dade County area during 1995. The disease has since spread to the commercial groves in southwest Florida where more than 870,000 trees have been destroyed since 1998. Florida's current canker control regulatory program is eradication. However, the question has been asked as to what the economic cost/impact would be on Florida's citrus industry if citrus canker became endemic. [Can Florida's citrus industry afford to live with or manage citrus canker?]. This document will attempt to address this hypothetical question. A companion publication (EDIS, FE 285) reviews Argentina's citrus canker control programs which provide the conceptual basis from which to estimate cultural costs.

What Would Be the Cost to Florida's Citrus Industry IF Citrus Canker Became Endemic in Florida?

Historically, the Florida citrus industry has strongly endorsed eradication of citrus canker. Therefore, when one attempts to address the hypothetical scenario of managing endemic citrus canker, the following limitations should be recognized:

1. Except for eradication, Florida has no experience with effective control programs for citrus canker.
2. To address/evaluate managing or living with canker in Florida requires assuming that the citrus canker control programs utilized by growers in countries endemic with citrus canker (e.g., Argentina) would be employed in Florida with similar effectiveness.

If canker were to become endemic in Florida, cost to manage the disease would have to evaluate the following:

1. The capital investment cost of additional spray equipment.
2. The additional costs of copper sprays for most citrus varieties.

1. This is EDIS document FE 286, a publication of the Department of Food and Resource Economics, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL. Published June 2001. The citrus canker control program information came from visits to Argentina and UF/IFAS and USDA researchers. Please visit the EDIS website at <http://edis.ifas.ufl.edu>

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3. The cost of planting windbreaks for fresh market varieties and for most susceptible processed varieties.
4. The value of possible fruit loss due to citrus canker infestation.
5. The cost of additional inspections for fresh export certification
6. Additional sanitation costs at grove site, harvesting, packinghouse and juice processing plants.

Capital Investment Cost for Additional Spray Equipment

An effective copper-spray control program for citrus canker would require spraying the entire citrus acreage over a two-to-three-week period/window as compared to an effective greasy-spot control program for processed citrus which would require a five-to-six-week spray period/window. Therefore, the spray program for managing citrus canker will likely require additional capital investment for tractors and airblast sprayers. From discussions with Florida citrus growers, a PTO-powered airblast sprayer applying 125 gallons per acre will cover an average 28 acres per day. Using the five-days-per-week spray program, 280 acres can be covered during a two-week spray window and 420 acres for a three-week spray window, while the six-days-per-week spray program would cover 336 acres during a two-week spray window and 504 acres for a three-week spray window.

Either an 85-hp or a 90-hp tractor with enclosed cab would be required to power a PTO airblast sprayer. The estimated costs are \$40,000 for an 85-hp tractor and \$45,000 for a 90-hp tractor. A 1,000 gallon PTO-powered airblast sprayer would cost about \$23,000, and a 500 gallon PTO-powered airblast sprayer with tree see technology would cost \$28,000. Also, a 1,000 gallon nurse truck to supply the sprayers would cost about \$45,000. As can be seen from the cost of the tractors, sprayers, and supply trucks, there would be a very high capital cost for additional spray systems.

Additional Copper Sprays for Most Citrus Varieties

Managing citrus canker in Florida would require additional copper sprays for most varieties. The production programs for many fresh fruit varieties, especially grapefruit, already include several copper sprays. However, there usually is no spray application at the time of the first spring flush or just before bloom. Therefore, a canker control program would include two additional copper sprays—one at pre-bloom and a second at petal fall. On blocks of processed oranges, especially the more susceptible Hamlin varieties, copper sprays would be required at "petal fall" and one additional summer spray. If the processed fruit program includes two summer oil sprays, then the copper spray material would only need to be added to one of the summer spray applications.

If adding copper to one normal summer spray application is required, the cost of the copper material would be \$5.64 per acre. For a processed fruit program, at least one additional copper spray application will be required that is estimated to cost \$26.72 per acre (\$5.64 per acre material cost plus \$21.08 per acre application cost). If the cultural program is for fresh fruit, then two additional spray applications would likely be required at a cost of \$53.44 per acre. The total additional copper spray costs for processed and fresh fruit spray programs are estimated to be \$32.36 per acre and \$59.08 per acre, respectively.

Cost of Planting Natural Windbreaks

Florida citrus grown for the fresh fruit market and the most susceptible early processed orange varieties will probably require natural windbreaks to reduce the spread of the citrus canker bacteria. The assumptions used to estimate the cost for establishing a windbreak, along with expected revenue loss as a result of the windbreaks, are as follows:

1. The weather conditions that necessitate windbreaks in Argentina for citrus canker control would be similar in Florida.
2. Size of grove blocks: 10 acres, 20 acres, and 40 acres.
3. Eucalyptus and pine trees would be planted in a staggered double row, five feet apart.

4. Due to shading, fruit yields from the two adjacent rows next to the windbreaks would be reduced by one-third.
5. The grove situation would be a seedless grapefruit grove with 116 trees per acre and 10-year Florida average seedless grapefruit production of 414 boxes per acre, or 3.57 boxes per tree.

For citrus grown for the fresh market, smaller acreage (e.g., 10-acre blocks) would require windbreaks. This would provide better protection from the citrus canker bacteria being transported by wind and rain into the block. Depending on the susceptibility of the citrus variety, large windbreaks (e.g., 40-acre blocks) would be suitable. Also, depending on the width and length of a block along with the direction of the predominant wind and rain, larger blocks with windbreaks may be possible. The costs for establishing a natural windbreak were amortized over 20 years. The estimated establishment and annual maintenance costs for the windbreaks were \$11.18 per acre, \$7.33 per acre, and \$5.06 per acre for 10-acre, 20-acre, and 40-acre blocks, respectively.

Associated with establishing natural windbreaks is the loss of fruit due to trees removed to plant the windbreaks and shading from the tree rows adjacent to the windbreaks. The estimated annual revenue losses due to the establishment of a windbreak in a grapefruit grove were estimated to be \$54.23 per acre, \$44.06 per acre and \$39.83 per acre for 10-acre, 20-acre, and 40-acre blocks, respectively. The total annual cost and revenue loss from natural windbreaks were estimated to be \$65.41 per acre, \$51.39 per acre, and \$44.89 per acre for 10-acre, 20-acre, and 40-acre blocks, respectively.

Value of Possible Fruit Loss Due to Citrus Canker

If citrus canker became endemic in Florida, the more susceptible citrus varieties grown (e.g., Hamlin oranges and grapefruit) would likely have higher annual fruit droppage even with an effective canker control program. Valencia oranges which is less susceptible to citrus canker infection would also likely experience some increase in annual fruit

droppage. The result would be a potential loss in grower returns.

From discussions with Argentina citrus growers, an increase in annual fruit droppage as a result of a citrus canker infestation was estimated. For early and mid-season oranges as well as seedless grapefruit, increased fruit droppage could range from 5% to 10% annually. For Valencia oranges the increase could be 2% to 5% annually. Also, an ineffective citrus canker control program (e.g., incorrect timing of the copper spray applications) could result in a 30% increase above normal fruit droppage. Using 10-year average-per-acre yields and on-tree prices for Florida citrus, the estimated loss revenue due to increased fruit droppage ranged from \$80 per acre to \$160 per acre for early/mid-season oranges, \$31 per acre to \$79 per acre for Valencia oranges, and \$69 per acre to \$137 per acre for seedless grapefruit.

The Cost of Additional Inspection for Fresh Export Certification

If Florida's citrus industry had to manage citrus canker, growers who produced citrus for the fresh market would likely incur additional costs to certify that their grove blocks and fruit are canker free. A certification program similar to the one used in Argentina would probably be required in Florida to export fresh citrus to Europe and perhaps within the United States.

The canker-free certification for fresh market citrus would require both field inspections in citrus groves/blocks and fruit inspections in packinghouses. Eight citrus canker field workers can inspect a 120-acre citrus grove in an eight-hour day. The grove/block would have to be inspected and certified canker free three times before harvesting. The total cost of field investigations including labor, transportation, overhead, and administrative costs would be \$26.46 per acre (three inspections at \$8.82 per acre, or \$1,058.63 per 120 acres). In addition to the field inspections, the citrus fruit would have to be inspected and certified canker free in the packinghouse. Packinghouse certification for seedless grapefruit is estimated to cost \$31.50 per acre. The total estimated canker free certification cost for fresh packed seedless grapefruit would be \$57.96 per acre.

Conclusion

If Florida's citrus industry had to manage or live with citrus canker, grower costs would increase. Additional capital investments in airblast spray systems may be required. Lost revenue may occur as a result of reduced yields due to natural windbreaks and additional fruit loss/droppage caused by citrus canker. Also, in order to ship fresh fruit to the European market and possibly within the United States, the fruit in both the grove blocks and the packinghouses will have to be certified canker free. The estimated economic impact to Florida's citrus growers is summarized in Table 1.

For processed early and midseason oranges, the economic impact would range from a low of \$182.53 per acre to a high of \$314.49 per acre. Processed Valencia oranges would have an economic impact ranging from \$133.53 per acre to \$233.49 per acre. Citrus canker would have the largest economic impact on seedless grapefruit ranging from \$229.49 per acre to \$349.45 per acre. The potential total per acre economic impact that citrus canker would have on Florida's citrus growers and industry is summarized in Table 2.

The estimated additional costs and net revenue loss are based on similar citrus canker control programs used by Argentine citrus growers. Although climatic conditions, cultural practices, and fruit varieties are similar in northeast Argentina and Florida, more accurate projections will depend on actually knowing how citrus canker would behave under Florida's growing conditions and management practices.

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Table 1. Estimated economic impact to Florida's citrus growers.

Impacts	Cost
Additional airblast spray systems	\$23,000 to \$68,000
Additional copper sprays	\$30/acre to \$60/acre
Windbreaks and lost revenue (40-acre block to 10-acre block)	\$45/acre to \$65/acre
Reduced revenue due to increased fruit loss/droppage	
Early/mid-season oranges	\$80/acre to \$160/acre
Valencia oranges	\$30/acre to \$80/acre
Seedless grapefruit	\$70/acre to \$140/acre
Certification of fruit for fresh markets	\$58/acre
Grove disinfection, harvesting, transport equipment and trailers, and workers	\$25/acre to \$30/acre

Table 2. Summary of the economic impact citrus canker would have on Florida's citrus growers and industry, 2000.

Product	Range	
	Low	High
	<i>\$/Acre</i>	<i>\$/Acre</i>
Early and mid-season processed oranges	\$183	\$315
Valencia processed oranges	\$134	\$233
Fresh market seedless grapefruit	\$229	\$350