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Impacts of EPA Proposed Buffer–Zone Restrictions on Profitability of Florida Strawberry Growers[1]

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Abstract

The objective of this study was to characterize the impact of the proposed buffer-zone restriction on the economic returns to Florida strawberry growers. Florida is the second largest strawberry-growing state in the United States, with 8,400 acres grown in 2007 and cash receipts of $239.14 million. Using a stochastic simulation model, it was found that a representative grower with 53 acres of strawberries would suffer a loss of $43,234 in net worth as a result of losing 2.7 percent of his land to a 100-foot buffer-zone restriction. The imposition of a 1,000-foot buffer-zone restriction would result in the representative grower losing 74.6 percent of his land and $1,089,521 in anticipated net worth. A representative grower suffering a 100 percent loss of land from a 4,000-foot buffer zone would lose $1,157,871 in net worth. Growers under these conditions would need to move to new production sites where buffer-zone restrictions are less imposing, or cease operations altogether.

Introduction

Strawberries are an important crop to the state of Florida. Florida cultivated 8,400 acres of strawberries in 2007, which generated $239.14 million in cash receipts (Table 1). Florida ranked second to California in production and value, producing counter-seasonal to the production window of California. Florida's production accounted for 15.8 percent of the nation's strawberry production in 2007. Hillsborough County is the largest producing county of strawberries in Florida and ranks fifth nationally in the production of strawberries. Strawberry production starts in November and continues through May of the following year. Peak production typically occurs in February and March.

Strawberries are a high-value crop in Florida, with production and marketing costs totaling $27,165.16 per acre, or $10.87 per flat on a farm, with an average yield of 2,500 flats per acre (Table 2). Current production practices use methyl bromide and Chloropicrin as soil fumigants with high-barrier, gas-impermeable, plastic mulch. Methyl bromide has been used in recent years as allowed under a Critical

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Use Exemption (CUE) approved by the United States Department of Agriculture (USDA) and the United States Environmental Protection Agency (U.S. EPA) as part of a CUE process monitored by the international body Montreal Protocol.

There is significant concern in the agricultural industry surrounding the proposed implementation of buffer zones with the application of many soil-fumigation products. Buffer zones as large as 1,440 meters (4,724 feet) have been proposed by the U.S. EPA for Chloropicrin and methyl bromide. Noling et al. (2008) estimate that buffer zones of 100; 200; 300; 400; 500; 1,000; 2,000; and 4,000 feet will cost Hillsborough County strawberry growers approximately $6.4, $20.6, $41.4, $66.0, $91.9, $178.5, $234.7, and $239.2 million, respectively, by reducing available land by 2.7, 8.6, 17.3, 27.6, 38.4, 74.6, 98.1, and 100 percent, respectively.

The impacts of these restrictions on individual strawberry growers will be significant. We have transformed the aggregate estimates of land lost to buffer zones as estimated by Noling et al. to represent the potential loss of acreage by individual growers producing strawberries. Some growers will lose a minimum amount of land (2.7%) if they are required to produce strawberries using a 100-foot buffer zone, while others will lose significantly larger portions of their production capacity (as much as 100%) if they are forced to adopt the larger buffer zones.

The objective of this study is to estimate the impact that buffer zones can have on a representative strawberry grower in Hillsborough County. This is accomplished by the simulation of a representative strawberry grower who experiences successive reductions in the amount of productive land that he has for strawberries as larger buffer zones are required by new regulations. A representative farm model for strawberries was developed using Simetar© software, an add-in software for Microsoft® Excel spreadsheets developed by James Richardson at Texas A&M University. A representative farm is modeled by using a production budget for strawberries and simulating the cash flow of the operation for a 10-year horizon. Prices and yields are stochastic in the model, determined by the distribution of actual prices and yields for the 1986–2006 production period. Statistical regression techniques are used to determine the trend over time for price and yield. These trend prices and yields are then applied to the probability distribution function estimated from their actual results from 1986 to 2006. These results are used to project prices and yields for the 2007–2016 production seasons. These results are then simulated in Simetar with 100 iterations to determine the potential distribution of the net present value of returns for the representative grower for the 2007–2016 time horizon. The 100 iterations allow for frequencies to be estimated for expected returns to the representative grower.

The representative farm model is first simulated with no adjustments imposed by the proposed regulation to form a baseline for comparison to results that are estimated when buffer zones are imposed. The buffer-zone restrictions were implemented in the model by reducing the acreage by the amount necessary to create the buffer zone. The results of the simulations with the buffer-zone restrictions imposed can be compared to the results in the baseline to provide an estimate in the loss of net present value in the farming operation resulting from the buffer-zone restrictions.

Representative Strawberry Grower

The finances of the representative strawberry grower presented in Table 2 were modeled using budgets published by Smith and Taylor (2007). Because the last season for which budgets were available was 2006, the budgets were updated to represent the 2008 production season by increasing the cost of diesel fuel to $4.50 per gallon and the cost of electricity to $0.11 per kilowatt hour. Material inputs (fertilizer, chemicals, and other items) were increased 30 percent to represent the increase in costs for these input expenses. It is estimated that the representative grower would incur $13,165 in pre-harvest costs to grow strawberries ready to be harvested. Smith and Taylor estimate that harvesting costs are $5.60 per flat, and that packing and selling expenses are $3.10 per flat. A strawberry grower who harvests 2,500 flats per acre would realize harvesting and marketing expenses of $14,000 per acre, bringing the total cost to grow, harvest, and sell the strawberries to $27,167.16 per acre for the 2008 season.

Data published by the USDA for the 1986–2006 seasons show that yields have ranged from 1,833 flats per acre to 2,917 flats per acre, with a mean yield of 2,228 flats per acre. Prices have ranged in value from $7.09 per flat to $14.88 per flat, with a mean value of $9.88 per flat. The yield trend shows that yields have increased over this period by about 10.44 flats per acre annually. The price trend shows that prices have trended upward as well, increasing about $0.345 per flat annually.

The results of the simulation show that a representative strawberry grower would realize a net present value for returns to strawberry production of $1,102,640 for growing strawberries over the 2006–2016 seasons. The simulation of the representative farm model yields a distribution of total returns ranging from $760,547 to $1,505,576 as a result of the distributions for price and yield. The results also suggest there is a 76.3 percent probability that the net present value of returns will exceed $1,000,000 for the entire 11-year period, and a 13.6 percent probability that it will exceed $1,500,000.

The previous results represent the baseline for comparison for when restrictions are placed on a grower with buffer zones. The representative farm model was also simulated with buffer zones that were expected to take 2.7, 8.6, 17.3, 27.6, 38.4, 74.6, 98.1, or 100 percent, respectively, of the available productive land. Table 3 shows the results of these simulations. The results indicate that a representative grower with 53 acres normally devoted to strawberry production would lose $43,234 in net present value of the income stream from 2007 to 2016 if he only loses 2.7 percent of his land area as a result of imposed buffer zones on his farm. That same grower would lose $137,676 if he loses 8.6 percent of his land area to buffer zones. A grower who loses 74.6 percent of his land as a result of buffer zones would lose $1,009,521 in the net present value of his income stream from 2007 to 2016 growing strawberries, or nearly all of the net present value generated from his strawberry-growing activities. In addition, there is a 28.8 percent probability that the farmer would experience a loss in net worth if he were to continue growing strawberries with a regulation that would result in a loss of 74.6 percent loss of his available productive land.

Conclusions

The results suggest that a loss of productive land would result in significant losses in net worth to growers of strawberries. A 53-acre strawberry grower in Hillsborough County could expect a 50 percent probability that he would realize a gain of $1,102,640 in net worth as a result of growing strawberries over the 2007–2016 production seasons, but loss of productive land without replacement would result in significant losses in these potential gains in net worth. A grower who realizes a minimal loss in productive land (2.7%) would realize only a $43,234 reduction in the expected gain in net worth from growing strawberries. A grower who loses 74.6 percent of his land could expect to lose almost all of the anticipated gain in net worth expected from growing strawberries without the buffer-zone restriction. These results suggest that these regulations will have significant impacts on growers, depending on the amount of land lost as a result of buffer-zone regulations.

References

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Smith, Scott and Timothy Taylor. Various years. Estimated production costs and net returns for various price and yield combinations for strawberries. Agricultural Business Center, Food and Resource Economics Department, University of Florida, Gainesville, FL. http://www.agbuscenter.ifas.ufl.edu/cost/COP05-06/Strawberries.doc

Table 1. Florida strawberries: Acreage, production, and value, crop years, 2002–03 through 2006–07.

Crop Year	Acreage		Yield Per Acre	Production	Value Per Flat	Total Value
	Planted	Harvested				
	(*Acres*)		(*12-pound flat*)	(*1,000 flats*)	(*Dollars*)	(*1,000 Dollars*)
2002–03	7,100	7,100	1,833	13,017	9.92	129,117
2003–04	7,100	7,100	1,917	13,608	13.08	177,997
2004–05	7,300	7,300	2,042	14,908	13.20	196,790
2005–06	7,400	7,300	2,333	17,033	14.04	239,148
2006–07	8,400	8,300	2,667	22,133	14.88	329,344

Source: United States Department of Agriculture, National Agricultural Statistics Service (USDA/NASS).
http://www.nass.usda.gov/QuickStats/

Table 2. Strawberry production and marketing costs for strawberries grown in Hillsborough County, Florida in the 2008 growing season.

Category	Average Per Acre	Average Per Flat
Yield (Flats / Acre)	2500	
	(*Dollars*)	(*Dollars*)
Operating Costs		
Fertilizer	528.00	
Fumigant	720.00	
Fungicide	686.73	
Herbicide	151.35	
Insecticide	593.63	
Labor	44.50	
Seed	45.00	
Transplants	2,000.00	
Machinery	770.76	
Machinery Labor	283.59	
Miscellaneous Costs		
Transplant Labor	440.00	
Plastic Disposal	115.00	
Cut Run / Hoe / Weed	170.00	
Farm Truck(s)	141.84	
Drip Tube	500.00	
Plastic Mulch	400.00	
Scouting	385.00	
Predatory Mites		180.00
Crop Insurance	100.00	
Interest	624.52	
Total Operating & Miscellaneous Cost	8,879.92	

Table 2. Strawberry production and marketing costs for strawberries grown in Hillsborough County, Florida in the 2008 growing season.

Category	Average Per Acre	Average Per Flat
Yield (Flats / Acre)	2500	
	(*Dollars*)	(*Dollars*)
Fixed Costs		
Land Rent	1,000.00	
Machinery	173.65	
Supervision	0.00	
Overhead	3,111.59	
Total Fixed Costs	4,285.24	
Total Pre–Harvest Costs	13,165.16	5.27
Harvest and Marketing Costs		
Pack / Sell / Other	7,750.00	3.10
Harvest Berries	6,250.00	2.50
Total Harvest and Marketing Cost	14,000.00	5.60
Total Cost	27,165.16	10.87

Table 3. Mean net present value (NPV) of cash flow for a representative strawberry grower with 53 acres, 2007–2016, baseline and with land loss of 2.7%, 8.6%, 17.3%, 27.6%, 38.4%, 74.6%, 98.1%, and 100% from buffer–zone restrictions.*

Land Loss	Mean NPV	NPV Loss
	(*Dollars*)	(*Dollars*)
0% (Baseline)	1,102,640	N/A
2.7%	1,059,406	43,234
8.6%	965,036	137,604
17.3%	826,176	276,464
27.6%	662,341	440,299
38.4%	491,022	611,618
74.6%	13,119	1,089,521
98.1%	(50,420)	1,153,060
100%	(55,231)	1,157,871

* Land loss represents the farmland the farmer will loss to a buffer–zone restriction.
Mean NPV is the net present value of income generated growing strawberries.
NPV loss is the reduction in net present value of income generated growing strawberries as a result of the buffer–zone restrictions.