

Costs, Returns, and Nitrogen Application Decisions in Florida Potato Production

Serhat Asci, Tatiana Borisova, John VanSickle and Lincoln Zotarelli¹

¹The authors are (respectively): Graduate Student, Assistant Professor, and Professor, Food and Resource Economics Department, and Assistant Professor, Horticultural Sciences Department, University of Florida

ABSTRACT

This study examines fertilizer application decisions by Florida potato producers. Fertilizer application rate is one of agricultural best management practices (BMPs) that producers are required to implement in the areas where water quality problems are documented and Basin Management Action Plans are adopted. BMPs are defined as “practical and cost-effective” (FDACS 2005). However, there is no agreement between potato producers, agencies, and researchers about the fertilizer rate that is “practical and cost-effective”. This study uses survey, interviews and partial budget analysis to examine growers’ fertilizer use decisions. The analysis shows that potato production costs and returns are highly sensitive to the changes in yields, and hence, even weak perceived association between fertilizer application rates and yields creates incentives for the growers to increase the fertilizer use.

INTRODUCTION

The study focuses on the Tri-County Agricultural Area (TCAA) around Hastings, northeast Florida (Figure 1). Key characteristics of this area are:

- It accounts for 24% of nation’s spring potato production (VanSickle et al. 2009)
- Growers practice spring planting and May - June harvesting (USDA 2010)
- Primary target markets: chipping potato processing plants in northeastern US
- Potato industry in the area has been shrinking (agricultural lands are being converted to urban), and ~30 potato producers remain in the area
- Large part of TCAA is located in the Lower St Johns River Basin, which is classified as impaired with respect to nutrients. To address nutrient impairment, Basin Management Action Plan (BMAP) was adopted in 2008, making best management practices (BMPs, including fertilizer management) mandatory for the potato producers

Figure 1. Study Area: Potato Industry around Hastings, FL



Source: <http://www.bestplaces.net/city/florida/hastings>

METHODOLOGY

1. Survey of potato producers:
 - Goal: Understand growers’ production practices
 - Survey instrument: Developed by a multi-disciplinary research team, included 40 questions
 - ✓ General farm characteristics
 - ✓ Irrigation and fertilization practices
 - ✓ Crop rotation
 - ✓ Future of the industry
 - ✓ Perceptions of weather events
 - ✓ Informational needs
 - Survey instrument was reviewed by extension agents and one potato grower
 - Survey was administered to 20 potato growers who attended 2011 Florida Potato School
 - Ten growers completed the survey.
2. Interviews with key extension faculty members and agents; a grower; a field trip to study area
3. Review of research and policy reports
4. A partial budget analysis to explore the sensitivity of production costs and returns to:
 - fertilizer prices and application rates;
 - potato yields;
 - potato sale prices.

Data were collected from USDA (2007-2010) and ERS (2007) and UF interactive potato budgets (Smith and VanSickle, 2009).

Figure 2. Production Costs for Alternative N Application Rates and Potato Yield Levels

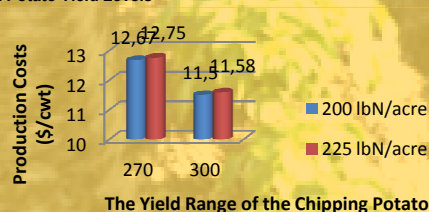
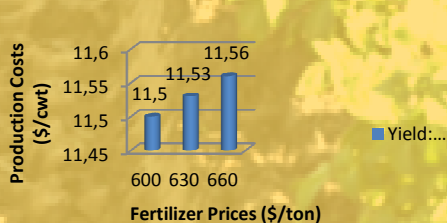


Figure 3. Production Costs for Alternative Fertilizer Prices



RESULTS

1. Survey results:
 - *Factors that influence nitrogen fertilizer rate:* nine out of ten respondents indicated soil test results, and two-third of respondents mentioned rainfall volume and intensity, as well as the potato variety.
 - For the question “*What are the top challenges for the future success of your farm?*”, 90% of respondents mentioned environmental regulation, and 80% mentioned costs of fertilizer, pesticides, and other chemicals.
 - For the question “*the biggest threat to the industry*” five of seven mentioned low prices of the output and/or high costs of production, and two explicitly mentioned regulations.
2. Interview / field trip results:
 - Uniform nitrogen fertilizer BMP rate contradicts growers’ approach to farm management that relies on continuous changes in response to weather events and the market variability.
 - Nitrogen fertilizer application is perceived by the growers as an insurance against yield reduction in the case of unfavorable weather conditions.
 - Reduction of nitrogen fertilizer rate as perceived as a threat to farms’ economic viability.
3. Results of sensitivity/partial budget analysis
 - Production costs:
 - Due to the lack of relevant data, we assumed that fertilizer rate does not affect the yield. Sensitivity of production costs to the changes in *fertilizer application rate* is relatively low (Fig. 2, compare blue and red bars)
 - Variations in *yields* have significant effect on the production costs (Figure 2, compare blue bars).
 - The effect of changes in *fertilizer prices* on production costs is relatively low (Figure 3).
 - Overall, growers’ tendency to apply more fertilizer is related to perceived impact of fertilizer on yields.

- Returns from potato production:
 - Returns are highly dependent on the potato *sale prices* (Figure 4, compare red and blue bars).
 - Returns are highly sensitive to *yield changes* (Figure 4, compare blue bars).
- => Growers’ tendency to apply more fertilizer is related to perceived risk of losing yields, which can increase costs and reduce returns.

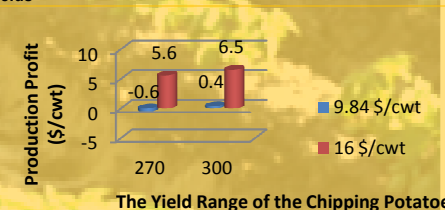
CONCLUSION

- Growers believe that reduction in nitrogen application to BMP level can affect potato yields
- To address growers’ concerns, economic analysis should complement horticultural research in BMP development process
 - Economic analysis focuses on profit / producers’ utility maximization (as opposed to yield maximization)
 - Economic analysis allows researchers to evaluate producers’ perceptions about yield variability and risks
 - Economics offers a variety of methods to analyze the relationship between fertilizer application, weather conditions, soil characteristics, and average yield / yield variability.

ACKNOWLEDGEMENT

The authors would like to acknowledge the University of Florida’s Institute of Food and Agricultural Science for funding support to this study. We would also like to thank to Mr. Danny Johns, Dr. Michael Dukes, Dr. George Hochmuth, and Dr. Charles Moss for their help and useful suggestions.

Figure 4. Production Returns for Alternative Sale Prices and Yields



REFERENCES

- American Cristal Sugar Company. Undated. NPK/Fertilizer Calculator-Compare Fertilizer Costs. Available at <http://www.cristalugar.com/agronomy/nutrods/npk>
- ERS Potato Statistics (91011). 2007. Monthly grower prices for all U.S. potatoes, 1949-2007, Table 055. <http://usda.mannlib.cornell.edu/DocumentInfo.do?documentID=3248>
- FDACS. 2005. Water quality/quantity best management practices for Florida vegetable and agronomic crops. Florida Department of Agriculture and Consumer Services, Office of Agricultural Water Policy. http://www.floridawaterpolicy.com/PDF/Bmps/Bmp_VegetableCrops2005.pdf
- Munoz-Arboleda, F. 2004. Improving Nitrogen Management in Potatoes Through Crop Rotation and Enhanced Uptake. PhD Dissertation, University of Florida.
- Smith S., and J. VanSickle. 2009. Interactive Budgets. <http://www.fred.ifas.ufl.edu/ufatp/budgets09.php>
- USDA. 2007-2010. Potatoes 2006-2009 Summary, National Agricultural Statistics Service, Pot 6 (07-10), September.
- VanSickle, J.J., S. Smith, and R. Weldon. 2009. Impacts of EPA Proposed Buffer-Zone Restrictions on Profitability of North Florida Potato Growers. FE994, EDIS, <http://edis.ifas.ufl.edu/fe994>
- Zotarelli L., P.D. Roberts, W.M. Stall, S.E. Webb, S.A. Smith, B.M. Santos, S.M. Olson and E.H. Simonne. 2011. Potato Production in Florida. Vegetable Production Handbook for Florida - Chapter 17; 235 - 251. <http://media.therowser.com/documents/pdf-gr-Fla-vegprod2011.pdf>