The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Invited presentation at the 2018 Southern Agricultural Economics Association Annual Meeting, February 2-6, 2018, Jacksonville, Florida

Copyright 2018 by Author(s). *All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.*

The Economic Impact of Botrytis Fruit Rot on Strawberry Production in Florida

Berdikul Qushim, Feng Wu, Zhengfei Guan, and Natalia Peres

Introduction

Fresh strawberries are a major US fruit crop planted across 52,500 acres with a national farm gate value of $2.06 billion in 2016 (USDA, 2017). Due to its mild climate in winter, Florida is the largest producer of winter strawberries, with a production area of approximately 10,700 acre and a production value of $450 million in 2016. However, Florida strawberry yield has declined significantly in recent years, down 36% from 320 cwt per acre in 2007 to 205 cwt per acre in 2016. The prevalence of botrytis fruit rot (BFR) or gray mold contributes to this yield loss. Under favorable environmental conditions (prolonged leaf wetness and mild/warm temperatures), sporulation of *Botrytis cinerea* is rapidly dispersed throughout the field by wind, rain splash, and handling operations, resulting in abundant unmarketable fruit.

Objectives

The objective of this study is to examine the economic benefits and the effectiveness of biorational products and the broad spectrum fungicides to control and reduce BFR disease in Florida strawberry production.

First, we analyzed the cost-effectiveness of fungicides using multi-seasonal field trial data. Using partial budget analysis, we estimated costs and returns of different BFR management strategies for the Florida strawberry production.

Secondly, based on the partial budgeting results, risk analysis was performed. We used the method of stochastic efficiency with respect to a function (SERF), which orders a set of risky alternatives by calculating certainty equivalents (CE) for a specified range of attitudes to risk (Hardaker et al., 2004). The CE values provide growers less risky BFR management strategies.

Data

The strawberry field trial was conducted by the University of Florida Gulf Coast Research and Education Center (GCREC) over 2015-2016. Fungicide treatments included:

- A non-treated control
- Fracture
- Milstop
- Serenade Optimum
- Standard
- Thiram

Table 1 Summary statistics of BFR incidences and strawberry yield

Treatment	BFR[1] (%)	Yield (lb/acre)
Control	15.79 a	22,411.18 bc
Fracture	14.72 a	21,444.85 bc
Milstop	9.39 b	18,343.40 c
Serenade Optimum	14.24 a	23,450.33 b
Standard[2]	5.16 c	29,601.21 a
Thiram	6.61 bc	30,558.73 a

[1] BFR incidence is expressed as a percentage of all fruits harvested. [2] Standard comprises Switch and Captan.

Results and Discussion

Significant return and cost differences are observed in 2014-2015 season between Standard and Thiram compared to Control and other treatments (Table 2). In 2015-2016 season, Milstop had significantly lower return compared to Control, Standard, and Thiram.

Table 2 Partial budgeting results

	Return ($/acre)	Total Cost ($/acre)	Return over Total Cost ($/acre)
	2014-2015 season		
Control	26,610.50 bc	1,354.57 e	25,255.93 bc
Fracture	25,407.81 c	1,478.85 d	23,919.96 c
Milstop	28,703.65 bc	1,853.81 a	26,849.84 bc
Serenade Optimum	31,878.83 b	1,816.57 ab	30,062.26 b
Standard	40,888.17 a	1,737.02 b	39,151.15 a
Thiram	44,064.67 a	1,606.29 c	42,458.38 a
	2015-2016 season		
Control	38,233.45 ab	1,317.15 d	36,879.70 ab
Fracture	35,088.92 bc	1,496.55 c	33,592.37 bc
Milstop	27,469.41 c	1,888.65 a	25,580.76 c
Serenade Optimum	36,404.74 b	1,848.75 a	34,555.99 b
Standard	41,751.35 ab	1,684.32 b	40,067.03 ab
Thiram	44,641.22 a	1,623.45 b	43,017.77 a

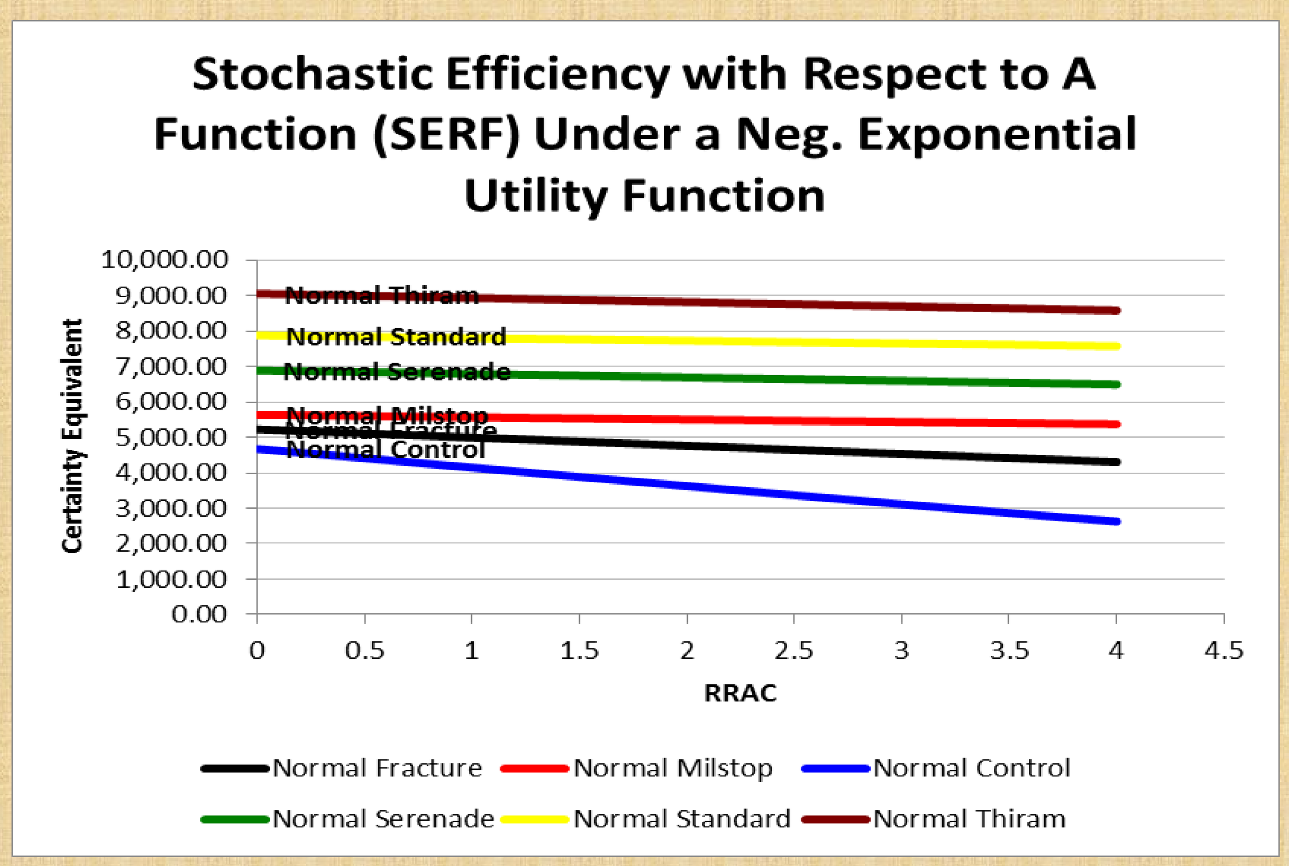

Figure 1. Comparison of the CE values of treatments' returns for over period of 2014-2016

Certainty Equivalent Analysis

The results of CE analysis are plotted over relative risk aversion coefficient (RRAC) values (from 0 to 4) in Figure 1. The CE analysis suggests that Thiram management option was the least risky choice, followed by Standard, Serenade, Milstop, Fracture, and Control treatments.

Conclusion

- The results from risk-efficiency analysis are consistent with the findings from the cost-effective analysis.
- Thiram was found to be the most consistent and least risky fungicide for a risk averse decision maker followed by the Standard.
- The results of analysis show evidence of potential economic gains from Thiram and Standard treatments.
- These BFR management options are more effective to control and reduce BFR incidence and significantly increased yield compared to Control and other fungicide treatments.

References

Hardaker, J.B., Huirne, R.B.M., Anderson, J.R., Lien, G. (2004). Coping with Risk in Agriculture, 2nd eds. Oxfordshire, UK: CABI Publishing.