Economics of Aflatoxin Risk Management in the Selected Southern States

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Background

Aflatoxins are primarily produced by the fungal strains *Aspergillus flavus* and *Aspergillus parasiticus.* They are soil born organisms, and as they grow on a food source, aflatoxin can be produced and build up (Horne et al. 1991). Aflatoxins are classified as a group 1 carcinogen (IARC 1993). Vardon *et al* (2003) estimated the annual cost of aflatoxin contamination in the U.S. at about $500 million, while Robens and Cardwell (2003) calculated additional annual costs of aflatoxin management in the U.S. at $20-$50 million. The economic threats include market restrictions and possible price discounts that can exceed $1.00 per bushel, or forced crop destruction impacting the livelihood of crop producers and numerous other feed and food industry participants. Aflatoxin contamination has been a perennial problem for Texas corn producers and users and an occasional problem across other Southern States.

The recent development of biological controls (Aspergillus strains that do not produce aflatoxin, referred to as atoxigenics) may provide a cost effective means of risk management. These non-aflatoxin producing strains can be applied to fields to out-compete the aflatoxin producing strains already in the soil. AF-36 ® and Afla-Guard ® are the two atoxigenic products currently utilized across the South.

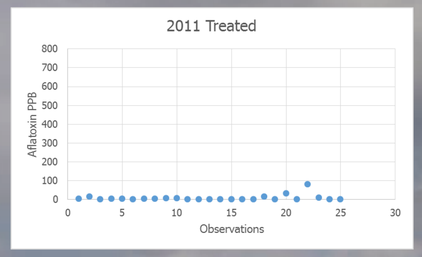
The atoxigenic strains are relatively inexpensive, however, significant aflatoxin problems do not occur every year nor do the atoxigenics completely eliminate afflatoxin, leaving producers with the question of whether using a mitigation tool is economical given the risk. Federal crop insurance does provide some protection against revenue losses due to high aflatoxin levels in corn. However, the test for aflatoxin is inexact with two tests of the same trailer load often having significantly different results. This means there is a real chance that a producer can have corn rejected at an elevator for aflatoxin levels above acceptable levels only to test acceptable or even zero contamination when tested by official crop insurance labs. This introduces an added dimension of risk for producers.

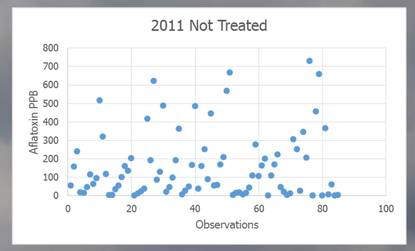
Field Tests of Product Effectiveness

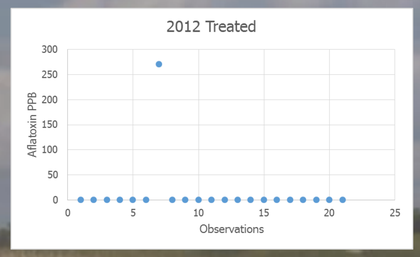
Both of the atoxigenics have been field tested to prove their effectiveness in decreasing aflatoxin contamination, specifically in Texas corn with good results in some tests, and less desirable results in others. A Texas A&M AgriLife extension service trial conducted during the severe drought of 2011 across multiple Texas locations showed less effectiveness with reductions in aflatoxin levels ranging from near 0- 94% reduction across locations and products. The research concluded that the products may not work as well in severe drought years.

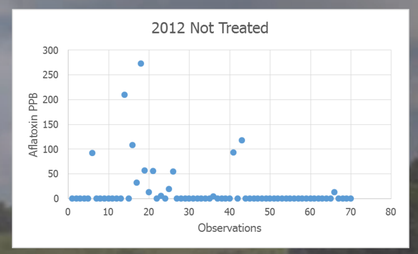
Data

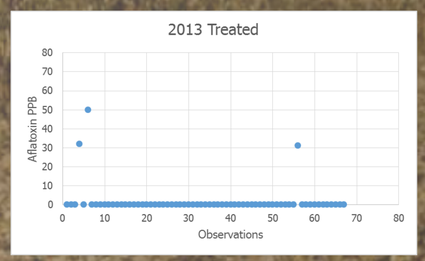
Cooperators were identified to provide multi-year field level data for both treated and untreated fields, allowing for an analysis of the effectiveness of atoxigenics under various conditions. The following charts indicate an overall effectiveness from atoxigenic treatment in Texas.

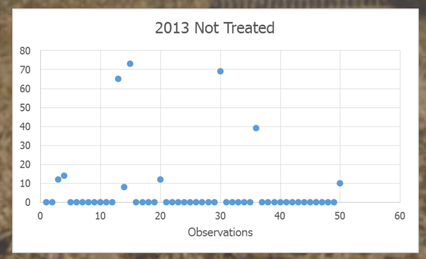












Objectives and Methods

The objective of this study was to perform an economic analysis, incorporating risk, on the decision to use available atoxigenic treatments on a corn crop, and evaluate the economic outcome at different crop insurance levels for corn producers in Selected Southern States. The study used a partial budget simulation model combined with an aflatoxin contamination simulation model to complete a risk analysis on the decision to use atoxigenic mitigation methods. These components are built into a web-based online decision tool for producers to use in evaluating the cost-effectiveness of adopting the atoxigenics technology given historic aflatoxin contamination levels in drought stressed and non-drought stressed years, potential market price discounts, insurance coverage, and cost and treatment effectiveness, and their impact on farm profitability.

Major Results and Implications

Some of the important questions addressed by information gained in this study include:

1. Has the use of atoxigenics reduced the occurrence, and level of severity, of aflatoxin contamination of corn produced in Selected Southern States?
2. Are Southern corn producers increasing the use of atoxigenics?
3. What is the cost effectiveness of atoxigenics as an aflatoxin risk management tool depending on various conditions conditions, previous history of aflatoxin contamination levels, price discounts associated with various levels of contamination, and insurance costs/coverage for Southern corn producers?
4. What educational implications do these findings have for Southern corn producers, and for extension economists conducting risk management and farm management education programs?

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