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Soybean Profitability Comparisons of “Automatic Applications” Versus “Treating as Needed” Approaches
for Insect and Disease Control

C. Robert Stark, Jr., Gus Lorenz, Travis Faske, Terry Spurlock, Nick Seiter, and Glenn Studebaker

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ABSTRACT

Arkansas soybean producers spend significant amounts of money on annual input costs. 2015 UA Division of Agriculture crop enterprise budgets estimated irrigated soybean average operating expenses at \$328.75 per acre across Roundup Ready, Liberty Link, and conventional systems. Commodity market price declines, such as have been seen in late 2015, increase the importance of input cost evaluations to maintain profitable returns. This study compares “automatic applications” made on crop phenology versus “treating as needed” systems where applications are made based on scouting for insect and disease thresholds. Seven large block trial locations were initiated in 2015 with five treatments utilizing insecticides, fungicides, combinations of products, and application system approaches. Partial budgeting methodology is employed to estimate economic outcome under each system. Cost, yield, and profitability measures are calculated for each treatment. The agronomic and economic research results will be used to evaluate overall profitability of current state extension recommendations including treatment threshold levels.

Introduction and Background

Agronomic management of insecticide and fungicide inputs typically considers effectiveness of products and application timing relative to pest populations. An extensive body of research has been developed through the agricultural experiment stations associated with land grant universities and is distributed through cooperative extension service publications (Giesler, 2008; Robertson, et al. 2009). Many of these studies focus on single pest scenarios such as soybean aphid (Myers, et al. 2005; Johnson, et al. 2009) or Asian soybean rust (Johansson, et al. 2006) and may use an integrated pest management approach (Song and Swinton, 2009). Results from these studies generally show a yield benefit from treatments, but the economic profits of the treatments often are variable. Economic thresholds for initiating treatments have been established for a limited number of pest species and tend to be geographically specific (Ragsdale, et al. 2007; Bueno, et al. 2013). Another prominent question within these studies is cost-effectiveness of preventative, concurrent management approaches Johnson, et al. 2008 found limited value from preventive soybean aphid treatments. Tinsley, et al. 2012 saw no yield-benefit from resistant cultivars or seed treatments, but recognized that higher and longer sustained pest densities could provide justifications. An economic evaluation of soybean fungicide seed treatments in Arkansas found a robust economic benefit for the seed treatment (Poag, et al. 2005). Comparisons of site-specific versus uniform management approaches pose additional questions. Early estimations based on hypothetical scenarios prior to development of current, site-specific equipment for product applications indicated only slightly greater returns for the site-specific approach (Krell, et al. 2003). A more recent study by Henry, et al. 2011 indicated that yield increases were possible using below-threshold applications of fungicides and insecticides, but questioned their economic benefits.

This specific objective of this study was to make economic comparisons of the “automatic applications” made on crop phenology versus “treating as needed” systems where applications are made based on scouting for insect and disease thresholds. “Automatic” product combinations and single treatments mimic management practices frequently employed by producers. Identification of the most cost-effective treatment strategy can optimize chemical use and impact on the environment while increasing producer net returns.



Photo 1.

Furrow Irrigated Soybean Production System

Photo courtesy of C. R. Stark, Jr.

Table 1

PRODUCTS & RATES	Arkansas Soybean Producers					
	Crawfordsville Chuck Farr	Marianna Bobby Griffin	Lonoke Jason Fortner	Nelson Crow	Matt Miles	NEREC
Variety	Armor 55R22	Asgrow 4232	Asgrow 4632	Asgrow 4642	Pioneer 47T36	Asgrow 4710
Treatment						
Insecticide + Fungicide	Automatic @ R3	Prevathon 14 oz + Approach Prima 6.8 oz	Prevathon 14 oz + Topaz 6.0 oz + Priaxor 4 oz	Prevathon 14 oz + Topaz 6.0 oz + Priaxor 4 oz	Prevathon 14 oz + Topaz 6.0 oz + Priaxor 4 oz	Prevathon 14 oz + Topaz 6.0 oz + Priaxor 4 oz
Insecticide Only		Prevathon 14 oz	Prevathon 14 oz	Prevathon 14 oz	Prevathon 14 oz	Prevathon 14 oz
Fungicide Only		Approach Prima 6.8 oz	Topaz 6.0 oz + Priaxor 4 oz	Topaz 6.0 oz + Priaxor 4 oz	Priaxor 4 oz	Priaxor 4 oz
Treat Only as Needed	None	None	None	None	None	None
Insecticide + Fungicide at R3 followed by Fungicide Only at R5	R3 & R5	Prevathon 14 oz + Topaz 6.0 oz + Priaxor 4 oz	Priaxor 4 oz	Priaxor 4 oz	Priaxor 4 oz	Priaxor 4 oz

Table 2

YIELDS	Arkansas Soybean Producers					
	Crawfordsville Chuck Farr	Marianna Bobby Griffin	Lonoke Jason Fortner	Nelson Crow	Matt Miles	NEREC
Variety	Armor 55R22	Asgrow 4232	Asgrow 4632	Asgrow 4642	Pioneer 47T36	Asgrow 4710
Treatment						
Insecticide + Fungicide	Automatic @ R3	76.0 a	48.1 b	67.2 a	74.0 a	77.8 a
Insecticide Only		74.9 a	48.9 b	60.4 b	63.7 b	74.5 a
Fungicide Only		75.2 a	48.1 b	60.0 b	72.7 a	68.6 a
Treat Only as Needed		76.7 a	41.4 c	54.7 c	63.1 b	73.56 a
Insecticide + Fungicide at R3 followed by Fungicide Only at R5			54.1 a	75.2 a	66.8 a	

Means followed by same letter do not significantly differ (P=.10, Duncan's New MRT)

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Photo 2.

Furrow Irrigated Soybean at Bloom Stage

Photo courtesy of C. R. Stark, Jr.



REFERENCES

- Bueno, A.F., S.V. Paula-Moraes, D.L. Gazzoni, and A.F. Pomari. “Economic Thresholds in Soybean-Integrated Pest Management: Old Concepts, Current Adoption, and Adequacy.” *Neotropical Entomology*, 42.5 (October 2013).
- Giesler, Loren J. “Deciding When to Apply Soybean Fungicides.” *Crop Watch*, 17 (July 25, 2008).
- Henry, Ryan S., William G. Johnson, and Kiersten A. Wise. “The Impact of a Fungicide and an Insecticide on Soybean Growth, Yield, and Profitability.” *Crop Protection*, 30.12 (December 2011): 1629-1634.
- Johansson, R.C., M.J. Livingston, J. Westra, and K. Guidry. “Simulating the U.S. Impact of Alternative Asian Soybean Rust Treatment Regimes.” *Agricultural and Resource Economics Review*, 35.1 (April 2006): 116-127.
- Johnson, Kevin D., Matthew E. O’Neal, Jeffrey D. Bradshaw, and Marlin E. Rice. “Is Preventive, Concurrent Management of the Soybean Aphid (Hemiptera: Aphididae) and Bean Leaf Beetle (Coleoptera: Chrysomelidae) Possible?” *Journal of Economic Entomology*, 101.3 (June 2008): 801-809.
- Johnson, Kevin D., Matthew E. O’Neal, David W. Ragsdale, Christina D. Difonzo, and Scott M. Swinton. “Probability of Cost-Effective Management of Soybean Aphid (Hemiptera: Aphididae) in North America.” *Journal of Economic Entomology*, 102.6 (December 2009): 2101-2108.
- Krell, R.K., L.P. Pedigo, and B.A. Babcock. “Comparison of Estimated Costs and Benefits of Site-Specific Versus Uniform Management for the Bean Leaf Beetle in Soybean.” *Precision Agriculture*, 4.4 (December 2003): 401-411.
- Myers S.W., D.B.Hogg, and J.L. Wedberg. “Determining the Optimal Timing of Foliar Insecticide Applications for Control of Soybean Aphid (Hemiptera: Aphididae) on Soybean.” *Journal of Economic Entomology*, 98.6 (December 2005): 2006-2012.
- Poag, Paul Scott, Michael Popp, John Rupe, Bruce Dixon, Craig Rothrock and Carol Boger. “Economic Evaluation of Soybean Fungicide Seed Treatments.” *Agronomy Journal*, 97.6 (November/December 2005): 1647-1657.
- Ragsdale, D.W., B.P. McCornack, R.C. Venette, D.A. Potter, E.W. McRae, E.W. Hodgson, M.E. O’Neal, K.D. Johnson, R.J. O’Neil, and C.D. DiFonzo. “Economic Threshold for Soybean-Aphid (Homoptera: Aphididae).” *Journal of Economic Entomology*, 100.4 (August 2007): 1258-1267.
- Robertson, Alison., Daren Mueller, Nate Bestor, Matt O’Neal, and Rebekah Ritson. “Considerations for Soybean Insecticides and Fungicides.” *Integrated Crop Management News*, (July 2009).
- Song, Feng, and Scott M. Swinton. “Returns to Integrated Pest management Research and Outreach for Soybean Aphid.” *Journal of Economic Entomology*, 102.6 (December 2009): 2116-2125.
- Tinsley, N.A., K.L. Steffey, R.E. Estes, J.R. Heeren, and M.E. Gray. “Field-level Effects of Preventative Management Tactics on Soybean Aphids (Aphis glycines Matsumura) and their Predators.” *Journal of Applied Entomology*, 136.5 (June 2012): 361-371.

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