Evaluation of Systematic Spray Programs to Reduce Onion Center Rot Incidence

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Introduction & Objectives

The bacterial disease, Center Rot (*Pantoea* spp.) is the leading cause of loss in Vidalia Onions each year. Center rot pathogen is transmitted by tobacco thrips. Researchers have evaluated numerous ways to mitigate center rot incidence by reducing and preventing weeds, minimizing and preventing thrips infestation, and by utilizing bactericides to reduce incidence. We evaluated four separate integrated disease management programs with different input levels over three years and compared which integrated practices resulted in significant reduction in center rot incidence in bulbs. We also conducted economic analysis of each integrated practices that utilized different inputs. These input levels included a low input, grower standard, high input, and OMRI-listed. Researchers hypothesized that while the high input level reduced center rot incidence significantly, economically, the grower's standard would perform better. The results; however, found that the high input and grower's standard systems had similar bulb incidence of rot but while the high input level cost more to manage, it did have the greater adjusted revenue.

Methodology

Onions (variety Century) were transplanted into 6-ft beds at the Vidalia Onion and Vegetable Research Center located in Lyons, GA. The fertility program was consistent with University of Georgia Extension Service recommendations. Experimental design consisted of a randomized complete block with four replications. Treated plots were 20-ft long and were separated on each side by non-treated border panels. Plots were separated by a 3 ft bare-ground buffer within the row. Treatments were applied with a backpack sprayer calibrated to deliver 33 gal/A at 40 psi through TX-18 hollow cone nozzles. Applications were made based on the input levels throughout the growing season. The treatments for each input level are listed in Table 1 below. Natural infection was relied upon. Center rot bulb symptoms were assessed 14 days after harvest following incubation at 28℃ and 50% RH. Marketable yield was also calculated for each treatment.

Table 1. List of inputs utilized for each integrated disease management practices

Low Input	Growers Standard	High Input	Organic (2022/2023)
Goal @ 1 Quart	Goal @ 1 Quart	Goal @ 1 Quart Goal @ 3oz	Hand Weeding
Prowl @ 1 Quart	Prowl @ 1 Quart	Prowl @ 1 Quart	
Kocide 3000 @ 1.5 lbs. 1 app- 2022 2 apps- 2021/ 2023	Kocide 3000 @ 1.5 lbs. 3 apps- 2022 4 apps- 2021/ 2023	Kocide 3000 @ 1.5 lbs. 8 apps- 2021 5 apps- 2022 7 apps- 2023	Nordox @ 1 lbs. 3 apps- 2022 4 apps- 2023
No insecticide app	Mustang Maxx @ 4oz.	Torac @ 24 oz 1 app- 2021/ 2022 2 apps- 2023	No insecticide app
		Radiant @ 10 oz 1 app- 2021/ 2022 2 apps- 2023	

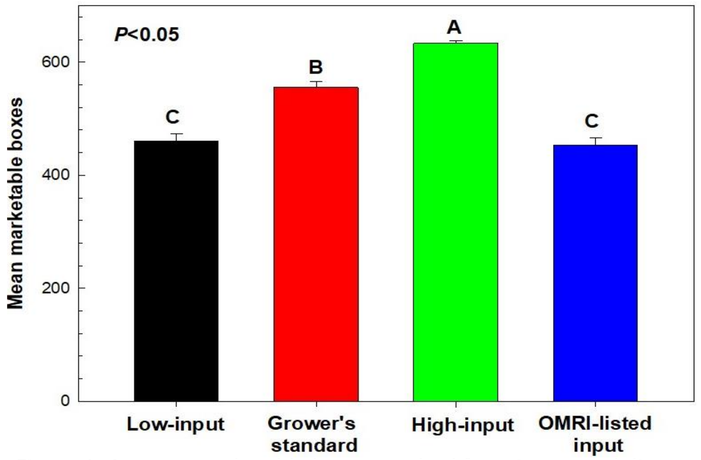


Figure 1: Average marketable boxes resulted from integrated disease management practices with different input levels.

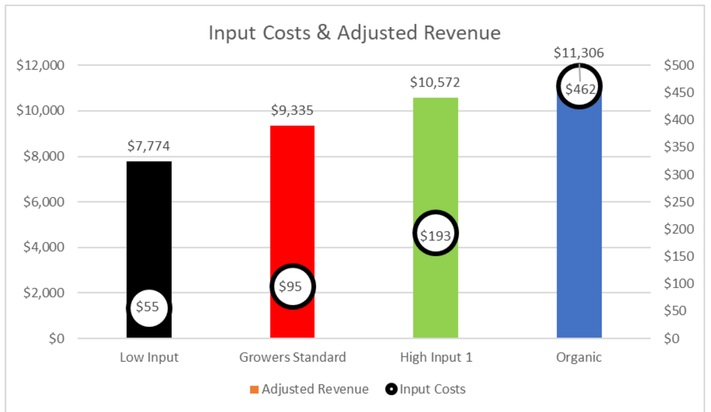
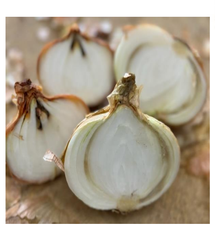


Figure 2: Average input cost and adjusted revenue resulted from integrated disease management practices with different input levels.



Results and Impact

Based on a three-year field assessments we observed that integrated management practices with different input would impact average marketable yield and center rot in stored bulbs. While we hypothesized that the high input practice would likely result in significantly higher marketable yield, the grower's standard would result in a higher adjusted revenue (Figures 1 and 2). However; the high input adjusted revenue was $1237 more than the grower's standard input. The research also showed that while the input cost on organic onions is $367 more per acre than the growers standard (Figure 2) and had on average 9.04% more center rot incidence than the grower's standard (Figure 3), the adjusted revenue for organics was $1971 more (Figure 2). Adopting a high input system or even an organic system could result in a higher return on investment. That being said, both of those input levels require additional inputs, labor, and time. If labor and time is a concern, it is likely that a producer will adopt our grower's standard input level, which will result in a suitable adjusted revenue, yield, and center rot incidence reduction. In the event a producer utilizes as low input system, it is likely they will see reduced revenue and increased center rot resulting in loss of profitability.

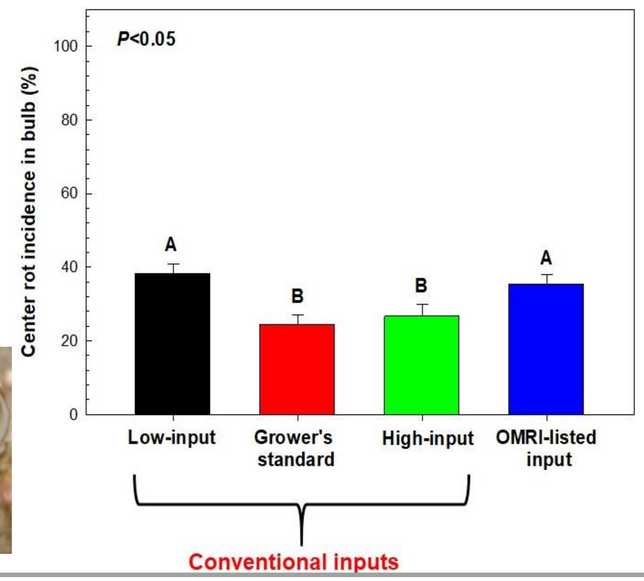
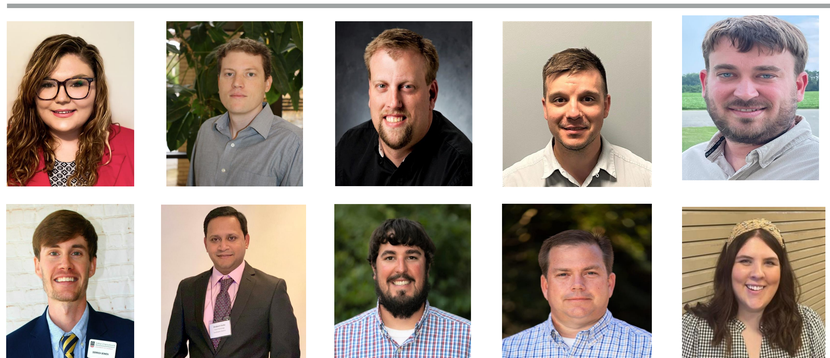


Figure 3: A three year average of center rot bulb-incidence resulted from integrated disease management practices with different input levels.



Partnerships

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