Improving the Quality of Research in Agriculture through Industry Feedback

Kaylene Sattanno, Alia DeLong, Marilyn E. Swisher, Jinghui Wang, Kelly N. Moore, Xin Zhao, Monica Ozores-Hampton, Zhifeng Gao, Jason Hong, Francesco Di Gioia, Haichao Guo, Zack Black and Erin Rosskopf

INTRODUCTION

Once used extensively as a pesticide, methyl bromide is now banned for use as a soil fumigant. There has been considerable research into broad-spectrum chemical alternatives in the U.S., but the results show inconsistent pest control. In conjunction with the Agricultural Research Service (ARS), researchers at the University of Florida are investigating a new option: anaerobic soil disinfestation (ASD). This is a biointensive method of integrated pest management that involves the pre-plant soil incorporation of a labile carbon source and adequate water to saturate the soil.

In this study, the researchers used 9 t/acre of composted chicken litter and 1400 gal/acre of molasses for the full rate (1.0) ASD application and 4.5 t/acre of chicken litter and 700 gal/acre of molasses for the half rate (0.5) ASD application. Table 1 shows differences between the conventional soil fumigation (CSF), full rate ASD, and half rate ASD treatments with regard to total cost and net return.

This study sought to involve technical service providers that regularly engage with the tomato growing industry to assess the ASD method and other treatments in the study. This approach yields unique insight and perspective not otherwise captured by research trials that exclusively collect data that can only be analyzed quantitatively. Researchers can then use participant feedback to inform discussions on whether to add, change or remove treatments and/or measurements in future trials.

OBJECTIVES

We had two main objectives:

1. Determine the largest barriers to adoption of the ASD method for tomato growers.
2. Determine what research design revisions need to be made for future trials.

	Immokalee			Citra		
	CSF	ASD0.5	ASD1.0	CSF	ASD0.5	ASD1.0
Net return	31007.24			1656.24		
Total cost	14313.31			15612.83		
Net return		31536.36			1663.47	
Total cost		16553.22			18444.22	
Net return			37489.86			-3824.58
Total cost			20479.41			19761.23

Table 1. Economic data of CSF, ASD 0.5, & ASD 1.0 ($/acre)

METHODS

We invited both growers and service providers who regularly work with commercial tomato production to blindly assess six (6) plots with different treatments including full rate ASD (1.0), half rate ASD (0.5) and CSF (Pic-Clor 60), each with and without herbicide (Sandea). This study took place at two University of Florida research sites in Citra and Immokalee, FL.

The participants assessed tomato plants in terms of plant vigor, fruit production, weed control efficacy, and disease symptoms. Next, the participants took part in interactive group activities to determine which treatments outperformed the others. In the photo below, you can see where participants selected best and worst plot overall, weed coverage, and weed vigor using green and red sticky dots to denote their choice (Figure 2). These activities prompted group discussions that influenced the direction of additional study.

Figure 1. Participants assess tomato plots in Citra, FL.

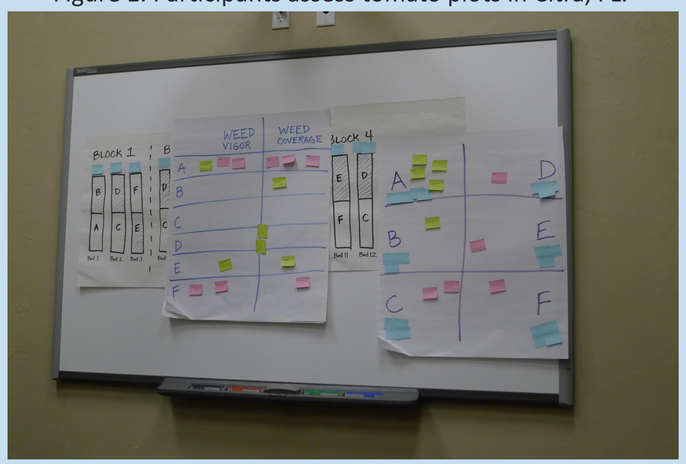

Figure 2. Researchers facilitate interactive group activities.

RESULTS

Objective 1 Results: Barriers

- "The ASD method is cost and time prohibitive": Cost and time were by far the most prohibitive aspects of the ASD method. In order to switch methods, many growers thought the time consumed hauling and sourcing materials, alone, was enough to deter them.
- Lack of longitudinal data: One grower suggested that the method would be more appealing if there were evidence of significantly higher yields over time.
- Machinery: Many growers involved in our study at Citra are small farmers and do not have the equipment necessary for ASD application, such as large tractors and plastic covering (see plastic covering in Figure 1). In fact, one grower stated they have moved away from using plastic covering because it is time consuming and ineffective at weed suppression.

Objective 2 Results: Changes in Research Design

- After the blind assessment, a majority of growers selected the half rate ASD plus herbicide application as the most productive. In future trials, we can consider one-third or one-quarter rate applications to cut the cost of supplies.
- What about a different, less expensive carbon source? Growers discussed the potential of using citrus pulp waste in place of molasses as a way to cut down on costs.
- High-tunnel trials are also an appealing option to growers. This would allow them to test ASD before applying it to their entire field.
- Many growers expressed interest in multi-year on-farm trials.

CONCLUSIONS

ASD is a useful technique that has the potential to reduce detrimental environmental impact and increase crop productivity. Since the half-rate ASD application plus herbicide is the most promising technique, we will explore alternative application rates as well as investigate other cost-saving techniques to make this method more appealing to growers. Given the concern of the time to switch to an ASD method, it is critical to target new growers who likely operate, initially, on a small scale. We will also consider a high-tunnel design so that growers may apply ASD in that system. Overall, we received valuable and insightful recommendations from growers, and we will carefully consider their concerns as we continue our research. By including this interactive method of assessing research alongside quantitative field measurements, we have created a practical and transparent approach to increase the quality of agricultural research.