Organic Farming Systems Report

ORGANIC FARMING
RESEARCH FOUNDATION

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Introduction

Organic farming relies on ecological systems to cycle nutrients, maintain balance of pests and diseases, and produce food and other agricultural products in a stable, resilient and sustainable way. The study of organic farming systems requires a systems based approach that takes into account site specific conditions such as soil and climate, along with plant genetics and farm management to examine how these complex interactions influence yield, quality, and other factors. Organic farmers often rely on systems research to make better informed decisions that they can apply to the real-world situations of their own farms. Farming systems research often takes place on operating commercial farms where field tests can provide results that give more validation to farmers than results in highly controlled laboratory or experiment station conditions.

Fall Season High Tunnel Production Effects of Warm Season and Cool Season Crops with Row Covers

Krystal Conway (Presenter), Shawn Lucas, Kirk Pomper, Anthony Silvernail

The project objectives were to evaluate the quality and quantity of a warm season crop (basil) and a cool season crop (broccoli) under row covers in high tunnels during the fall season, and to determine the feasibility of high tunnel basil production in Kentucky during the fall season. High tunnel production is used by organic producers to extend the growing season of crops. The study showed that there was a small increase in yield when row covers were used, but the difference was not significant. The additional expense for materials and labor does not seem to justify the practice. No differences in quality were seen between treatments. The experiment was conducted during a warmer than average fall. The project will be replicated again in the coming Fall season. Row covers will be applied immediately after planting and adjustments will be made with irrigation. If there are no significant differences again, the project will conclude that organic farmers will not increase their yield or quality by using row covers inside high tunnels, and the practice is not worth the extra cost.

Optimizing No-till Cover Crop Management for Organic Vegetable Production

David Robb (Presenter), Nishanth Tharayil, Holly Garrett, Dara Park, Shawn Jadrnicek, Robin (Buz) Kloot and Geoffrey Zender

The objective of the project is to improve weed management, reduce tillage, cultivation and labor use, and optimize the management practices to produce organic vegetables in no-till cover crop systems. Weed management is a research priority for organic farmers, and there is concern that

tillage and cultivation erodes soil on organic farms. No-till in organic vegetable cropping systems can reduce soil erosion and save labor. Field trials performed on no-till organic vegetable cropping systems in three geographic regions of South Carolina compared weed suppression and soil nutrient availability with different planting and termination dates. between early-, mid-, and late-season fall planting dates, and also three spring termination dates of a roller-crimped cereal rye + crimson clover cover crop. Vegetable yields and nitrogen availability were comparable between tilled and no-till systems. Results from year one of this study will be used to develop recommendations to optimize cover crop planting and termination dates for the different growing regions, which will be tested in two additional years of research in organic no-till summer and fall vegetable production. Preliminary data showed that significantly more biomass was attained by delaying cover crop termination until later in the spring. Also, significantly greater weed suppression was found with early-planted cover crops compared to mid- and late-season planting treatments. Preliminary nutrient (nitrate) analyses of the first year trial indicated no significant net nitrification differences between cover crop termination treatments. The project will take the best results from year one and will continue to fine-tune the system looking at yield, management costs, and soil moisture between tilled and no-till systems. Successful outcomes will help organic farmers maintain soil health and reduce management costs.

Effect of Planting Time and Use of Biologically-Based Products on Germination and Survival of the Organic Sweet Corn 'Luscious' at Lincoln University's Alan T. Busby Certified Organic Farm

Zelalem Mersha (Presenter) and Martha O'Connor

The objective of the study is to see whether biological treatments of the seed increase the germination and survival rates of plants, using sweet corn as a model. A growing number of microbial inoculants are being marketed, and organic farmers want to know whether any are effective. The study compared the germination and survival of sweet corn grow in Missouri soil inoculated with biologically based products in 2015 and 2016. The treatments with the active ingredients *Streptomyces lydicus* (Actinovate®) and *Trichoderma spp.* (RootShield® and Rootshield® Plus) were compared with a no treatment control. The results depended on timing and weather conditions. Germination rates were poor for both the treatments as well as the control. Rootshield® and Rootshield Plus® had better germination rates than the control, but the results were not significant. Actinovate® treated soil had a lower germination rate than the no treatment control, but again was not significantly different. The project will next look at tomatoes, cucurbits, and other high tunnel vegetables, and will look at other biologically based fungicides. Results will be shared at field days so that farmers can observe the results and apply them to their own farms.

Winter Wheat and Cover Crops in Organic Rotations in the Western Corn Belt
Christina M. Bavougian (Presenter) and Charles A. Shapiro

The objective of the study was to look at cover crops rotations and nitrogen inputs to optimize organic winter wheat yield and quality. In Nebraska field trials, ten treatments followed the harvest of winter wheat. These included a no cover crop control, compared with the following cover crops: winter rye, winter triticale, hairy vetch, red clover/yellow sweet clover mix, buckwheat, spring oat, berseem clover, soybean, and sudangrass. Cover crop termination was performed by roll-crimping, flaming, or disking two weeks prior to planting. Flaming and roll-crimping were equally effective in termination, and flamed plots had higher yields of corn and soybeans in one of the trials. However, both roll-crimped and flamed plots had lower yields of both corn and soybeans than the disked plots. Winter rye and hairy vetch were best suited to roller-crimper or flaming termination. Supplemental nitrogen sources included cattle manure and a foliar nitrogen product allowed for organic production. The results indicated that organic winter yield and quality may be produced without costly N inputs; thus, manure could be more effectively used on a summer crop such as corn. On-going work includes continued optimization of the selection of cover crops and timing of the operations. The results are expected to help organic farmers save money in fertilizer costs.

Extending the Market Season with High Tunnel Technology for Organic Fruit Production
Rom, C.R., J. Popp, D.T. Johnson, M.E. Garcia, H. Friedrich, L. Freeman, H.G. Rodriguez, J. McAfee, A. McWhirt (Presenter)

The objectives of the study were to see if high tunnels (HT) can be used to 1) advance floricane blackberry harvest and blueberries, and 2) extend the harvest season of primocane fruiting blackberries and raspberries cultivars. Researchers conducted two field studies in Arkansas using high tunnel technologies and modifications to tunnels. Experimental results indicated that both had potential to fit in organic farming systems. High tunnels were modified to include A) tunnels within tunnels (TnT) around the fruiting plants, B) total screening of the tunnels to exclude insect pests, and C) an overhead micro-fogger system to reduce summer temperatures. Results will continue to be shared with organic farmers and others through various outreach and extension methods.

Strategic-Rotational Grazing in Beef-Pastures for Improving Sustainability, as Measured by Soil Health, and Forage Productivity
Dahal Subash, Dorcas H Franklin, Taylor J Hendricks; Miguel L Cabrera, Dennis Hancock, Lawton Stewart

The objective of the on-going study is continuous improvement of the grazing management system, for a healthy, productive, and more-sustainable beef-pasture. A baseline soil health study was conducted in 10 pastures of Georgia Southern Piedmont. The design involved strategic-

rotational grazing that excluded vulnerable areas. These areas were over-seeded, then short-term or flash-grazed. Cattle were lured using portable shade, hay, and water. In most of the study sites, differences were not significantly different, but in one, significantly less hay was required in the pastures managed by strategic-rotational grazing compared with conventionally grazed pastures. The results presented were preliminary, and future work will continue to examine soil health and forage productivity. The study is expected to benefit organic beef producers in Georgia Southern Piedmont pastures.

Conclusion

Organic farming systems are diverse and site-specific. Replication of complex system studies is needed to draw conclusions about what works and what does not. Organic farmers consider research that is conducted under conditions like their own farm to be the most credible and useful. On-farm research that directly involves farmers can be used to demonstrate the practical application of research. Farmers and others interested in the results can observe and learn the results of these projects at field days.