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Final year of field research on alternatives to black plastic

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By Lindsey Brielle

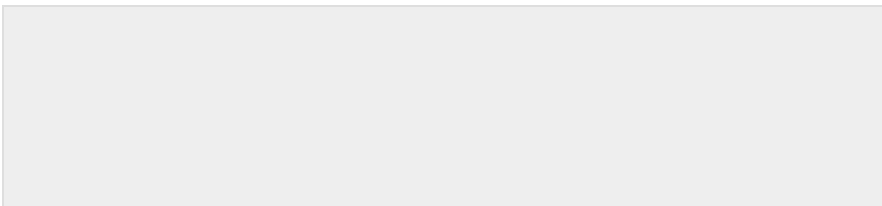
The SARE Vegetable Trial is a field study designed to identify the impacts of black plastic and cover crop mulches on weeds, soil quality, yields and season length for a variety of crops at Rodale Institute (RI) and on four collaborating farms. At RI, the study consists of nine treatments that incorporate one of three cover crops (rye, vetch and rye/vetch) killed by one of three different termination methods (roll, mow and black plastic). The project also encompasses work at four collaborating farms where the growers have implemented replications of two different treatments: their standard practice and rolled rye/vetch. For in-depth experimental design and last year's data, read [Cover crops go round three with black plastic and Black plastic alternatives: Fertility, variety, seasonality](#).

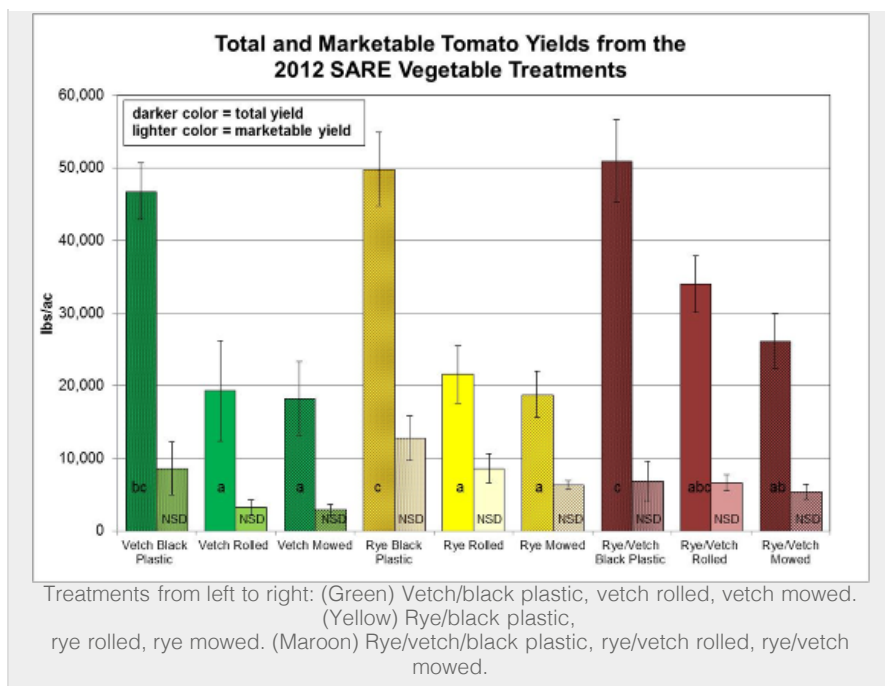
The 2012 growing season was yet another interesting year, with regular rainfall and good plant growth that was hampered by a late blight infection that hit in August. As a result, the SARE Vegetable Trial field generated markedly different outcomes from last year. Unlike year 1 and year 2, in which there were clear frontrunners, there were no significant differences between the nine treatments in our tomato yield in 2012, due most likely to weather and disease.

Late blight leaves little

Though total tomato yields were reasonably strong in 2012, late blight greatly affected the quality of the fruit. While the yield data between treatments is not statistically different, the differences that are present in yields are worth a mention. The mowed rye and the rolled rye/vetch treatments were the least affected, both losing 65% of their yields to poor fruit quality. The rye/black plastic plots lost 70% and 80% was lost in the rye/vetch/black plastic treatment. The average loss from all the treatments was 76% in 2012 compared to an average loss of just 3.7% in 2011.

Marketable yields showed no significant difference between the nine treatments this year, whereas in 2011 and 2010 the differences between treatments were significant. The blight affected the crop to such a degree that the yield differences between treatments provide little useful comparison. We can say with certainty that no one treatment provided any greater protection against late blight than the others.

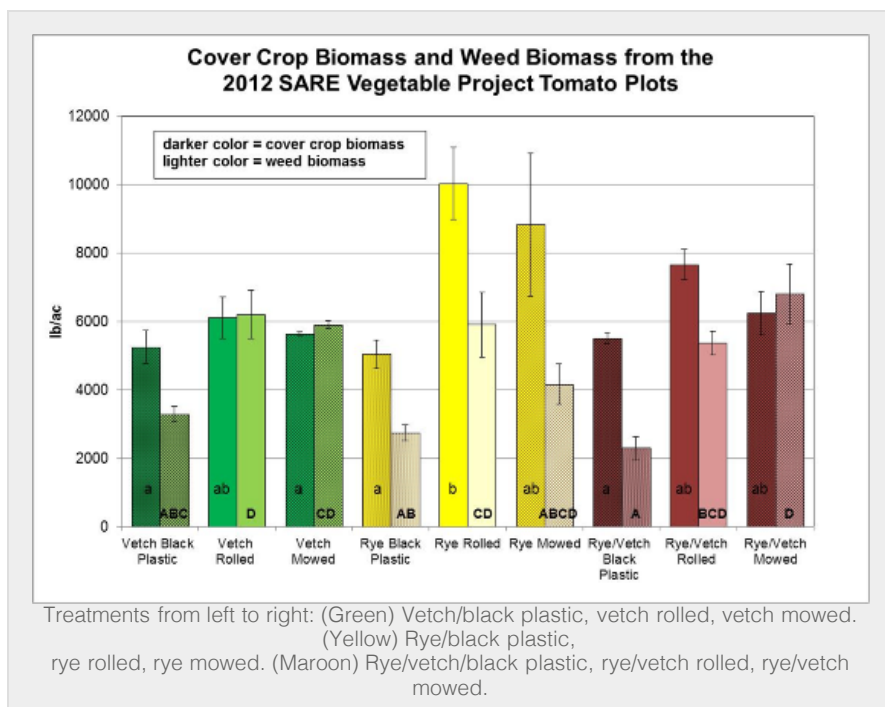




Weeds? No worries.

A growing theory that both last year and this year's data support is that certain levels of weed pressure (around 4,000 lbs/acre) don't seem to affect total tomato yield in organically managed fields. To any farmer's or gardener's eye, 4,000 lbs of weeds per acre is a lot of weeds—more than is usually seen on any person's farm. As such, if you are managing your weeds at a level that allows you to comfortably access your crop, then your weed pressure is probably not affecting your yields much.

Data collected from the Rodale Institute's Farming Systems Trial (FST) also support the idea that organic systems have a reasonably high tolerance for weed pressure. In a peer-reviewed publication drawn from FST data, Ryan et al. concluded that "Mean weed biomass was 4.5–6.3 times greater in the organic systems compared with the CNV [conventional]. Despite higher weed biomass in the organic systems, there was no difference in maize yields between the organic and CNV systems. Soybean yields did not differ between the MNR [manure] organic system and the CNV system." (1) This topic is worth looking into further and may inform future research projects.



Soil health

In the soils from these plots, total bacterial biomass, total fungal biomass, the three major groups of protozoa, and nematode numbers were assessed using direct microscope shadowing methods in the different treatments in the spring and summer at Rodale Institute and the spring and fall on the collaborating farms. All soils were bacterial-dominated throughout the season, and while some protozoa were observed, their

numbers were not high in any treatment at any time. There were no significant differences between treatments in spring or fall, nor were there differences between the seasons.

Disturbance seems to be the determining factor in hampering improvement in organism diversity or biomass. All the fields in these treatments, on all farms, were tilled several times during the yearly cycle. While cover crops were part of the experimental design, these cover crops were planted anew each year because the project field plan required that the farmers rotate into new fields in each successive year. If the same field was used in all three years of the project and the cover crops were planted without tillage for the duration of the experiment, it is possible that differences in soil biology would have been detected. Given the existing design of the experiment, soil disturbance may have obscured any potential biological differences among the treatments.

Conclusion

We are still performing lab work and analysis for this project. Soil samples collected at both the beginning and end of the season have been sent to Cornell University for active carbon testing, and we will be analyzing total nitrogen and carbon on the cover crops, pre- and post-season soil, and the tomato plants collected from the Rodale Institute field. Other data, such as soil temperature and soil moisture, are also being analyzed and will be reported on in the spring of 2013.

As the final year for field work on this project wraps up, the project team will be performing economic analyses of the systems and writing a paper for publication. Although there was no statistical difference in the tomato yields this year, we will be compiling a report that synthesizes the past three years of data to be released in 2013. A Farmer's Guide that details Rodale Institute's cover cropping methods for this project will also be in the works for release sometime in the fall of 2013.

(1) Ryan, M.R., R.G. Smith, D.A. Mortensen, J.R. Teasdale, W.S. Curran, R. Seidel, and D.L. Shumway. (2009). Weed-crop competition relationships differ between organic and conventional cropping systems. *Weed Research* 49, 572-580.

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