What's Cropping Up?

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Stripe rust: a new challenge to wheat yield in New York

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Stripe rust, known in many parts of the world as 'yellow rust' for its yellow-orange urediniospores, is a relatively new problem for wheat production in the eastern U.S. However, the disease has been steadily increasing in severity and geographic range in the central and eastern U.S. over the past decade. It has been observed sporadically in New York State for several years, but occurred at epidemic levels associated with potential yield losses for the first time in New York in 2016. As of early June 2017, it has already been found in 24 states and three Canadian provinces. It has been observed in several wheat fields in the Finger Lakes and western New York and may become widespread in New York before the crop matures.

Stripe rust of wheat is caused by the fungus *Puccinia striiformis* f. sp. *tritici*. Stripe rust is identified by its telltale, yellow-orange spore pustules arranged in stripes along the leaves in contrast to the smaller, cinnamon brown pustules of leaf (brown) rust (Figure 1). Stripe rust isolates currently found in the Eastern U.S. do not attack barley. Like other cereal rusts, the stripe rust fungus only survives between growing seasons on living wheat plants. Therefore, stripe rust survives the winter primarily on winter wheat in frost-free areas of the southern U.S. Spores become airborne, move long distances in the atmosphere, and are deposited on green wheat plants in northern

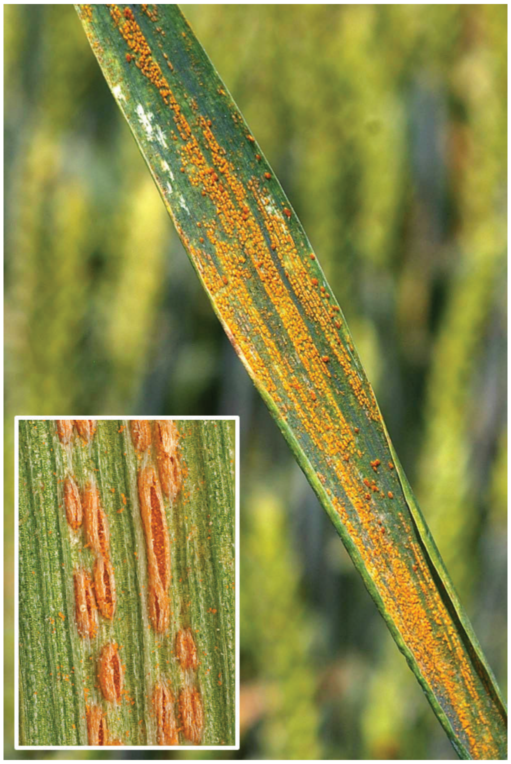

Fig. 1. Characteristic yellow-orange pustules of stripe rust urediniospores running in stripes or lines along veins on the wheat leaf surface. Smaller, circular, cinnamon-brown pustules of leaf (brown) rust of wheat may be seen on the same leaf. Photo by Gary Bergstrom. Inset photo (by Kent Loeffler) shows close-up of stripe rust pustules.

states each spring/summer. Occasionally stripe rust may overwinter on wheat plants in New York during mild winters or under snow cover, resulting in an earlier spring epidemic. Once infection begins in a field, new generations of rust spores can be spawned as quickly as every 10 days under mild temperatures and moist conditions, thus magnifying disease in individual fields and providing new spores to be blown to both nearby and distant fields. Significant yield losses can result when rust attacks the upper leaves of wheat during the critical first weeks of grain filling.

The best way to manage rust diseases is to plant resistant varieties. However, rust pathogens are tricky, and fungal populations can evolve new races that attack once-resistant wheat varieties. We are just beginning to understand the susceptibility of regional wheat varieties to stripe rust. We learned in 2016 that certain widely grown soft red and white winter wheat varieties were particularly susceptible to stripe rust (Figure 2). There are several foliar fungicides labeled for stripe rust control in New York and these will be very useful to utilize on susceptible varieties in years when there is a significant risk of stripe rust infection. Rust epidemics observed in 2016 developed primarily following head emergence of wheat. We found that a flowering time (Feekes stage 10.51) application of either Caramba or Prosaro fungicides for Fusarium head blight suppression provided complete protection of flag leaves against late-developing stripe rust. However, in future years when epidemics are initiated at earlier growth stages, it is likely that we will need to apply protectant fungicides at jointing to flag leaf emergence stages if scouting reveals the early presence of rust.

Since stripe rust is still fairly new to New York, we are tracking its progress and making collections of the fungus to determine races and genetic variation. Please contact your Cornell Cooperative Extension Field Crop Educator or the Cornell Field Crops Pathology Program if you find stripe rust in your wheat over the next few weeks. You can help us learn more about this new yield robber and how we can minimize the risk.

Acknowledgements:
This work is supported in part by funding from USDA-NIFA Hatch grant NYC153436 and USDA-NIFA Smith-Lever grant NYC153652.

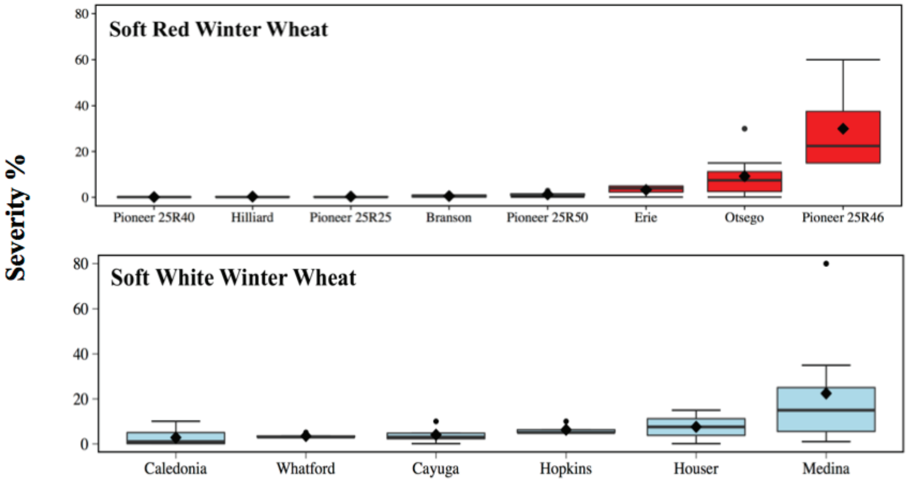

Fig. 2. Relative severity of stripe rust observed on soft red and soft white winter wheat varieties compared over four New York nursery locations in June 2016. The boxplot midlines are median values, and the diamonds mark the average severity.

Crop Disease Management

Alternaria leaf spot of wheat in New York

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A new foliar disease of wheat was found in New York in summer 2015. The disease was spotted in Monroe County at a regional wheat variety trial conducted as part of the Cornell Small Grains Project under the direction of Mark Sorrells. The Cornell Field Crops Pathology Program lead by Gary Bergstrom first identified the pathogen and has continued to study this disease. Symptoms are distinct from other foliar diseases of wheat, and lesions resemble those of scald on barley, i.e., with bleached white centers and dark borders. Damage occurs primarily on leaves but can also be seen on spikes and occasionally stems (Figures 1-3). We are calling this new disease 'Alternaria leaf spot' as it is caused by fungal isolates shown by matching DNA sequences to belong within the diverse Alternaria infectoria species group. This group includes fungi with no demonstrated pathogenic ability as well some wheat pathogens known to cause disease outbreaks that range from minor to severe in other countries. Yet no previous report of fungi in this species group has been associated with the very distinctive foliar lesions we have observed in New York.

Alternaria leaf spot was confirmed in Monroe County, at two separated sites near Lake Ontario, during the past two growing seasons. We are now confirming a likely reoccurrence in Monroe Co. in 2017. We are also using comparative DNA sequencing to determine if the same pathogen was the cause of unusual glume symptoms observed on winter wheat in Jefferson County, also near Lake Ontario, in 2015. Though not confirmed outside of a small geographic area, the disease has occurred in both variety trial plots and commercial fields. All the varieties observed at these locations, over 60 soft white and red winter wheats, have been susceptible to the pathogen. Damage to the flag leaf in severely impacted fields may be significant enough to cause a reduction in yield. However, the disease seems to require an unusually long period of leaf wetness to develop, which may explain why we are finding the disease in maritime environments with persistent fog and dew. No information exists at this time about the efficacy of foliar fungicides against this pathogen and no fungicides are registered for this use. Further research into the pathogen's complete distribution, inoculum sources, and appropriate management strategies is ongoing. For now, we recommend continuing to scout fields and managing more common pathogens as necessary.

Fig. 1. Foliar lesions photographed during grain filling. The bleached white centers and dark irregular margins are unique to this wheat pathogen. Photo by Gary Bergstrom.

Fig. 2. Bleached glumes with the characteristic dark margins on a wheat spike. Photo by Jaime Cummings.

Fig. 3. Three leaves with different levels of disease severity. Photo by Michael Fulcher.

The recent discovery of Alternaria leaf spot in New York is the first recorded incidence of the disease in the United States. We suspect that this disease is more widespread than we currently know. We are cooperating with wheat pathologists in other states to diagnose symptoms they have observed that are similar to those that we have attributed to Alternaria leaf spot in New York. If you encounter symptoms of Alternaria leaf spot, please contact your local field crops extension educator or the Cornell Field Crops Pathology Program.

Acknowledgements:
Funding for this work is provided by USDA-NIFA Hatch grant NYC153436, and the Mycological Society of America through the Emory Simmons Research Award.

Reduced Tillage and Cover Crops Have Additive Effect for Improving Soil Health

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Background

Soil health constraints may significantly limit crop productivity and sustainability in New York. Typically, soils with poor soil health are less resilient to drought and flooding impacts, and are more prone to soil erosion and chemical runoff during heavy rainfall events. Moreover, building and maintaining healthy soils is essential to supporting a robust population of beneficial soil organisms crucial to the cycling of carbon, nitrogen and other plant nutrients, as well as additional biological processes like disease suppression, and root proliferation.

Cornell University led the development of a suite of soil health measurements that focus on optimization of physical, chemical and biological soil properties for sustained productivity and minimal negative impacts on the environment (soilhealth.cals.cornell.edu). Our Comprehensive Assessment of Soil Health (CASH) approach includes a scoring function framework for interpreting soil health laboratory test results and identifying remediation options. Increasingly many farmers, government and non-government organizations, and researchers are interested in understanding how cover crops, reduced tillage, crop rotation, intercropping, and organic amendments help to improve soil health. We are using a long-term tillage study, with recently incorporated cover crops, to quantify the soil health and yield benefits of these practices.

Procedures

Beginning in 1994, continuous corn grain management was implemented on replicated (6) plots on a Lima Silt Loam under strip-till (ST) vs. plow-till (PT) treatments. In 2013, we added cover cropped (CC) vs. no cover crop (NC) management in subplots, for a total of 4 individual treatments (PT-NC, PT-CC, ST-NC, ST-CC). The cover crops were established as a "cocktail" of grasses and legumes (Figure 1) using a drill interseeder in late spring (just after sidedressing nitrogen to the corn). The mix included annual ryegrass (10 lb/a), Red Clover (5 lb/a), Crimson Clover (10 lb/a) and Hairy Vetch (7.5 lb/a). Corn yields were assessed by representative sampling (four twenty-foot long row sections per plot).

In the early spring of the 2016 season we collected a composited CASH soil sample from each of the four tillage x cover crop treatments to get a summary report of the soil health status.

Results

Soil Health Indicators

Table 1 shows the 2016 measured values of the physical and biological soil health parameters for each treatment. We included the continuous sod (sample from adjacent field border) as a benchmark of the soil health potential of these soils. The table uses the same color scheme as in the CASH report to interpret the laboratory values from very low (red) to very high (dark green). These results demonstrate that a change from plow to strip-till resulted in clear benefits for soil health and that combining strip-till with cover cropping had an *additive* benefit vs. just reducing tillage alone. We observed this pattern for the indicators of Aggregate Stability, Organic Matter, Soil Protein, and Active Carbon, with approximately equal and additive benefits from reduced tillage and cover cropping. For Available Water Capacity and Soil Respiration, however, we observe primary benefits from transition from plow to strip-till, and less benefits from cover cropping. Surface and subsurface hardness (penetrometer measurements) were not affected by these management changes. Overall, it appears that

Fig. 1. Growth of the cover crop cocktail shown about 6 weeks after interseeding.

soil health differences between plow-till and no-till are expressed through the physical indicators (Available Water Capacity and Aggregate Stability), while the benefits of the cover crop cocktail are additionally apparent in the biological indicators. Notably, Aggregate Stability, a critical soil physical property, showed substantial additive benefits of tillage and cover cropping changes with a total increase from 17.0 to 57.6% from the conventional (continuous plow-till, no cover crop) treatment to the strip-tilled, cover cropped treatment. The biological indicators of Soil Protein and Active Carbon also demonstrated substantial improvement in measured values (increases of 40% and 24% in measured values, respectively).

As a result, the overall soil health score (Table 1) increased 7 points for strip-till over plow-till (41 to 48 and 49 to 56), and increased 8 points when adding the cover crop cocktail (41 to 49 and 48 to 56), which are remarkably consistent results. It is noteworthy that the cover crop treatment had only been in place for 3 years, while the tillage treatments had been in place for 22 years, suggesting that cover cropping results in faster soil health benefits, especially for biological processes. The sod benchmark comparison shows that none of the corn-based treatments were able to reach soil health values that are similar to an undisturbed and continuously covered reference site, although the strip-tilled, cover cropped treatment was closest.

Yields

Improved soil health does not always translate into higher crop yields due to annual variations in weather and management. However, for the recent 5 years, we observed an increase of 12 bu/a on average from the strip-till treatments compared to plow till. It is important to note that these results are based on just 3 seasons, and that it is still too early to determine the full extent of yield improvement from the recent addition of cover crops into the rotation.

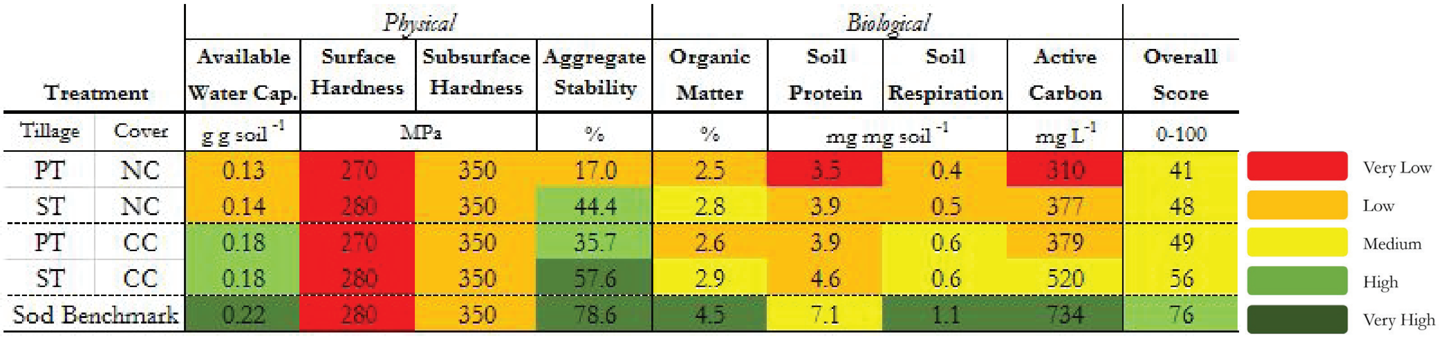
Conclusions

The results of this study are interesting in that they show measurable soil health increases from reducing tillage over the long term. Adding cover crops resulted in benefits after only a few seasons, and these were observed in addition to the benefits from reducing tillage. This study involved a continuous corn experiment, and showed that the sustainability of such an intensive row crop system can be considerably improved with reduced tillage and the use of cover crops.

Acknowledgements

We are grateful for the funding support from the New York Farm Viability Institute, the Northeast Sustainable Agriculture Research and Education program, the New York State Department of Agriculture and Markets, USDA-NRCS, and the USDA-AFRI Water Quality Grant.

Table 1. Soil health parameter values for factorial treatments of plow-till (PT) vs. strip-till (ST) and cover cropped (CC) vs. no cover crop (NC), as well as a sod benchmark. The colors in the table are the same as those used to 'score' the raw laboratory data values given in the soil health report. The lower the score, the greater the constraint in the proper functioning of processes as represented by the indicator. Red values are 'very low' and indicate major constraints. Green values are 'high' or 'very high' and suggest that the soil processes represented by these indicators are likely functioning well. As such, management goals should aim to maintain such conditions. Low and medium scores do not necessarily represent a major constraint to proper soil functions, but suggest places for improvement in management planning.best, orange second worst and red are the worst.



		Physical				*Biological*				
Treatment		Available Water Cap.	Surface Hardness	Subsurface Hardness	Aggregate Stability	Organic Matter	Soil Protein	Soil Respiration	Active Carbon	Overall Score
Tillage	Cover	g g soil $^{-1}$	MPa		%	%	mg mg soil $^{-1}$		mg L^{-1}	0-100
PT	NC	0.13	270	350	17.0	2.5	3.5	0.4	310	41
ST	NC	0.14	280	350	44.4	2.8	3.9	0.5	377	48
PT	CC	0.18	270	350	35.7	2.6	3.9	0.6	379	49
ST	CC	0.18	280	350	57.6	2.9	4.6	0.6	520	56
Sod Benchmark		0.22	280	350	78.6	4.5	7.1	1.1	734	76

🟥 Very Low
🟧 Low
🟨 Medium
🟩 High
🟩 Very High

Organic and Conventional Corn Have Similar Emergence and Early Plant Densities in 2017

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We initiated a 4-year study at the Aurora Research Farm in 2015 to compare different sequences of the corn, soybean, and wheat/red clover rotation in conventional and organic cropping systems under recommended and high input management during the 3-year transition period (2015-2017) from conventional to an organic cropping system. We provided a detailed discussion of the various treatments and objectives of the study in a previous corn article (http://blogs.cornell.edu/whatscroppingup/2015/07/23/emergence-early-v4-stage-and-final-plant-populations-v10-psnt-values-v4-and-weed-densities-v12-in-corn-under-conventional-and-organic-cropping-systems/). Unfortunately, we were unable to plant wheat after soybean in the fall of 2016 because green stem in soybean compounded with very wet conditions in October and early November delayed soybean harvest until November 9, too late for wheat planting. Consequently, we altered the rotations to accommodate the situation (Table 1). This article will focus on corn emergence (days) and plant densities (% plant establishment) at the V2 stage following wheat/red clover (intended previous crop before corn in the rotation) and after soybean (unintended previous crop but had to plant corn instead of wheat) before the rotary hoeing operation in the organic cropping system.

The red clover green manure crop (~3.25 dry matter tons/acre) was mowed down on May 16. The fields were plowed on May 17, then cultimulched on the morning of May 18, the day of planting. We planted a treated (insecticide/fungicide seed treatment) GMO corn hybrid, P96AMXT, in the conventional system; and its isoline, the untreated non-GMO, P9675, in the organic cropping system at two seeding rates, ~29,600 kernels/acre (recommended input treatment) and 35,500 kernels/acre (high input). The high input organic treatment also received the organic seed treatment (in-hopper), Sabrex.

Weather conditions were cool and wet for the first 10 days after planting (59^{o} F average temperature and 2.0 inches of precipitation). Nevertheless, corn emergence required only 9 to 10 days (Table 2), or 90 to 95 growing degree days, instead of the typical 110-120 growing degree days. Presumably, the wet soil conditions at the time of planting shortened the emergence time below the typical thermal unit requirement. Surprisingly, the non-GMO P9675, with or without the organic seed treatment (only in high input), compared with its isoline, the GMO P9675AMXT with seed treatment (insecticide/fungicide), emerged at the same time. In 2014, another year with wet and cool conditions, the GMO hybrid emerged about 0.50 days more rapidly than the non-GMO hybrid (http://blogs.cornell.edu/whatscroppingup/2015/06/16/days-to-emergence-and-early-corn-and-soybean-plant-populations-under-conventional-and-organic-cropping-systems/). Days to emergence did not differ between the recommended and high input treatments in the organic cropping system, indicating that Sabrex, the organic seed treatment, did not hasten corn emergence in 2017, similar to results in 2015 and 2016.

Table 1. Amended crop rotations because of the inability to plant wheat after soybean in the fall of 2016 (green stem in soybean compounded with excessively wet conditions in October and early November prevented a timely soybean harvest and wheat planting). Consequently, we will now compare a corn-soybean rotation with a corn-soybean-wheat/red clover rotation (without wheat in the first transition year, 2015) in conventional and organic cropping systems.

	CROP ROTATION		
2015	RED CLOVER (RC)	CORN	SOYBEAN
2016	CORN	SOYBEAN	WHEAT/RC
2017	SOYBEAN	CORN	CORN
2018	WHEAT/RC	SOYBEAN	SOYBEAN

Table 2. Days to emergence and early plant densities (% plant establishment) of corn at the 2nd leaf stage (V2) under conventional management (P9675AMXT-GMO hybrid treated with insecticide and fungicide) and organic management (P9675-non-GMO hybrid) before the rotary hoe operation in organic corn at recommended inputs (~29,600 kernel/acre seeding rate) and high input (~35,500 kernels/acre plus the organic seed treatment, Sabrex, in the organic cropping system). Red highlighted values are significantly higher for comparisons within a column (i.e. previous crops), based on the interaction LSD. The LSD values under the plant density subheading are for % plant establishmentorganic cropping systems.

	PREVIOUS CROP (2014)		
TREATMENTS	**SMALL GRAIN**	**CORN**	**SOYBEANS**
	Emergence (days)		
CONVENTIONAL			
Recommended-wheat/RC	9.75	9.67	10.0
Recommended-soybean	9.75	9.67	10.0
High Input-wheat/RC	9.67	10.0	10.0
High Input-soybean	10.0	9.67	10.0
ORGANIC			
Recommended-wheat/RC	9.50	9.67	10.0
Recommended-soybean	9.50	9.67	10.0
High Input-wheat/RC	9.50	9.67	10.0
High Input-soybean	9.50	10.0	10.0
LSD 0.05	0.20	0.25	NS
	Plant densities-V4 stage (plants/acre)		
CONVENTIONAL			
Recommended-wheat/RC	26,244 (89%)	25,682 (87%)	26,653 (90%)
Recommended-soybean	26,315 (89%)	25,337 (86%)	26,610 (90%)
High Input-wheat/RC	31,348 (88%)	29,600 (84%)	30,329 (86%)
High Input-soybean	31,776 (90%)	30,159 (86%)	31,518 (89%)
ORGANIC			
Recommended-wheat/RC	26,623 (90%)	25,559 (86%)	25,823 (87%)
Recommended-soybean	26,827 (91%)	26,741 (90%)	25,965 (88%)
High Input-wheat/RC	31,170 (88%)	30,518 (86%)	30,337 (86%)
High Input-soybean	31,580 (89%)	30,815 (87%)	31,097 (88%)
LSD-% 0.05	NS	3.2%	NS

We estimated corn plant densities in all treatments at the V2 stage (June 2), just prior to the rotary hoeing operation. We will take measurements before the subsequent close cultivation to determine to what extent the rotary hoeing operation reduced corn densities in the organic cropping system. Visual observation, however, indicated very little damage. Corn emergence was relatively high in 2016 (Table 2) given the wet and cool conditions. Conventional and organic corn generally had 85% to 90% plant establishment with no significance difference between cropping systems. In previous years, organic compared with conventional corn had significantly fewer plants/acre. Measurements in the two previous years, however, were taken shortly after the rotary hoeing operation, which probably reduced early plant densities in organic corn. Percent early plant establishment did not differ between the recommended and high input treatments in the organic cropping system, indicating that Sabrex, the organic seed treatment, did not improve stand establishment in 2017, similar to results in 2015 and 2016. Likewise, the previous crop (wheat/red clover or soybean), did not influence plant densities at the V2 stage in organic and conventional cropping systems.

Based on the crop emergence and plant density data at the V2 stage, organic and conventional corn have the same yield potential. It remains to be seen if plant densities are similar between cropping systems after the numerous cultivations, especially the rotary hoe and close cultivation operations, in organic corn.

Soybean Emergence and Early Plant Densities (V1-V2 Stage) in Conventional and Organic Cropping Systems in 2017

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We initiated a 3-year study at the Aurora Research Farm in 2015 to compare different sequences of the corn, soybean, and wheat/red clover rotation in conventional and organic cropping systems under recommended and high input management during the 3-year transition period (2015-2017) from conventional to an organic cropping system. We provided a detailed discussion of the various treatments and objectives of the study in a previous soybean article (http://blogs.cornell.edu/whatscroppingup/2015/09/16/emergence-early-v2-stage-plant-populations-and-weed-densities-r4-in-soybeans-under-conventional-and-organic-cropping-systems/). This article will focus on soybean emergence (days), and early plant densities (% early plant establishment) at the 1st to 2nd node (V1-2 stage) in 2017.

Corn preceded soybean in the rotation in this study. The fields were plowed on May 17 and then cultimulched on the morning of May 18, the day of planting. We used the White Air Seeder to plant the treated (insecticide/fungicide) GMO soybean variety, P22T41R2, and the non-treated non-GMO variety, 92Y21, at two seeding rates, ~150,000 (recommended input) and ~200,000 seeds/acre (high input). Unlike the corn comparison, P96Y21 is a not an isoline of P22T41R2 so only the maturity of the two varieties and not the genetics are similar between the two cropping systems. As with corn, we treated the non-GMO, 92Y21, in the seed hopper with the organic seed treatment, Sabrex, in the high input treatment (high seeding rate). Unlike corn, however, we used different row spacing in the two cropping systems with the typical 15” row spacing in the conventional cropping system and the typical 30” row spacing (for cultivation of weeds) in the organic cropping system. Consequently, the soybean comparison is not as robust as the corn comparison for emergence and early plant establishment because of the different row spacing and genetics between the two cropping systems.

Wet and cool conditions (59° F average temperature and 2.0 inches of precipitation) in the 10 days following planting resulted in relatively slow emergence and plant establishment, especially in conventional soybean. Organic soybean required about 10 days for emergence but conventional soybean required about 11 days (Table 1). The more rapid soybean

Table 1. Day to emergence and plant densities (and % plant establishment) of soybean at the 1st -2nd node stage (V1-V2) under conventional management (P9675AMXT-GMO hybrid treated with insecticide and fungicide) and organic management (P9675-non-GMO hybrid with no seed treatment) at recommended input (~150,000 seeds /acre seeding rate) and high input (~200,000 seeds/acre plus the organic seed treatment, Sabrex, in the organic cropping system) in fields with final conventional crop in 2014. Red highlighted values are significantly higher for comparisons within a column (i.e. previous crops), based on the interaction LSD. The LSD values under the plant density subheading are for % plant establishment.

	PREVIOUS CROP (2014)		
TREATMENTS	**SMALL GRAIN**	**CORN**	**SOYBEANS**
		Emergence (days)	
CONVENTIONAL			
Recommended	**11.33**	**11.0**	**10.75**
High Input	**10.5**	**10.67**	**10.75**
ORGANIC			
Recommended	9.75	10.0	10.0
High Input	9.75	10.0	10.0
LSD 0.05	0.55	0.50	0.44
		Plant densities-V4 stage (plants/acre)	
CONVENTIONAL			
Recommended	118,166 (**79%**)	123,000 (82%)	123,667 (**82%**)
High Input	142,166 (71%)	156,367 (78%)	144,833 (72%)
ORGANIC			
Recommended	120,833 (**81%**)	140,067 (**93%**)	123,333 (**82%**)
High Input	153,667 (**77%**)	178,500 (**89%**)	157,833 (**79%**)
LSD-% 0.05	6.0%	5.5%	7.0%

emergence in the organic system is similar to 2015 (http://blogs.cornell.edu/whatscroppingup/2015/06/16/days-to-emergence-and-early-corn-and-soybean-plant-populations-under-conventional-and-organic-cropping-systems/) and 2016 results (http://blogs.cornell.edu/whatscroppingup/2016/07/28/emergence-plant-densities-v2-stage-and-weed-densities-r3-stage-of-soybean-in-conventional-and-organic-cropping-systems-in-2016/). As in previous years, variety differences rather than cropping system differences probably influenced days to emergence. Pioneer rated P92Y21, the variety used in the organic system, with a higher field emergence score (8 out of 10 rating) compared with P22T41R2 (7 out of 10), which probably contributed to the more rapid emergence in the organic system. The organic cropping system also was planted in 30 inch rows so there were 8.5 or 11.5 seeds emerging through the developing soil crust in 1 foot of row in the organic system compared with 4.25 or 5.75 seeds emerging in 1 foot of row in the conventional system. Days to emergence did not differ between the recommended and high input treatments in the organic cropping system, indicating that Sabrex, the organic seed treatment, did not hasten soybean emergence in 2017, similar to results in 2015 and 2016.

We estimated soybean plant densities at the V1-2 stage (June 2), a few hours before the rotary hoeing operation in organic soybean. Organic soybean generally had higher plant establishment rates (77% to 93%) compared with conventional soybean (71 to 82%, Table 1). Differences were more pronounced between cropping systems in the high input treatment for reasons that are unclear. We will estimate soybean densities again before the close cultivation in soybean to determine if rotary hoeing reduced soybean populations. We did not see much visual damage to soybean plants after rotary hoeing. In fact, it is conceivable that populations may increase because the rotary hoe broke the developing soil crust that had formed after the numerous heavy rain showers after planting.

Early plant populations in all treatments exceed the 114,000 threshold limit for maximum soybean yields in NY so organic and conventional soybean have similar yield potential at the V1-2 stage. Adequate control of weeds in the organic soybean will thus be the main factor in determining yield differences between organic and conventional soybeans, provided aphid infestation and/or disease incidence does not occur.

Implementing the Use of Compost in Agriculture, Turf, Landscaping and for Erosion Control

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Over the years, we have been adding less organic material to soil; applications of compost on roadsides will control erosion and establish vegetation in local highway projects, as well as improve yield, suppress disease and improve water-holding capacity in soils. It is important to cycle organic residuals back into the soil system as would occur in an undisturbed system. Cornell Waste Management Institute is running a project to demonstrate and disseminate information to increase compost use through demonstration projects that enhance local, municipal and farm compost use, knowledge, experience and practices using locally manufactured compost products. Compost use posters from this project can be found at http://blogs.cornell.edu/cwmi/2017/02/07/compost-use-posters/.

Compost application on Soybean Field: Seventy-five cubic yards of compost was spread on a 2 acre plot and planted with soybeans 4 days later. Five weeks after planting, soybeans in the test plot with compost were 34”, while those in plots with no compost were 28”. At harvest, the plot with compost yielded 40.1 bushels/acre compared to 32.7 bushels/acre without compost.

Compost application for sediment and erosion control: The use of compost socks reduce sediment, fertilizers, chemicals, metals and other pollutants from reaching surface water by acting as a filter. Compost spread on slopes keeps seeds in place, offers a higher rate of plant germination and establishment and protects the soil from erosion.

Nov 8, 2016. Socks installed, compost spread.

April 19, 2017. Vegetation holds soil in place.

May 24, 2017. Good vegetative growth on slope.

May 24, 2017. Socks capture sediment after heavy rains.

Compost socks to restore an undercut bank.

Calendar of Events

JUL 6	Seed Growers Field Day - Ithaca, NY
JUL 13	Aurora Farm Field Day - Aurora, NY

Have an event to share? Submit it to jnt3@cornell.edu!

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What's Cropping Up? is a bimonthly electronic newsletter distributed by the Soil and Crop Sciences Section at Cornell University. The purpose of the newsletter is to provide timely information on field crop production and environmental issues as it relates to New York agriculture. Articles are regularly contributed by the following Departments/Sections at Cornell University: Soil and Crop Sciences, Plant Breeding, Plant Pathology, and Entomology. **To get on the email list, send your name and address to Jenn Thomas-Murphy, 237 Emerson Hall, Cornell University, Ithaca, NY 14853 or** jnt3@cornell.edu**.**

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