

Cover Crop Outreach Demonstration and Education for Diverse NY Farms

Final report for ONE16-286C

Project Type: Partnership

Funds awarded in 2016: \$11,000.00

Projected End Date: 12/31/2017

Grant Recipient: Cayuga County SWCD

Region: Northeast

State: New York

Project Leader:

[Doug Kierst](#)

Cayuga County SWCD

Project Information

Summary:

In 2016 -2017 four on-farm demonstration trials and their associated three field days were conducted on two dairy farms and two vegetable farms. They were located in Jefferson, Albany and Schoharie counties in New York. There was also three days of programming in 2016 and 2017 at Empire Farm Day's Soil Health Seminar Center in Seneca County, NY. This project allowed NY farmers, conservation planners, extension personnel and other agriculture service providers from a wide geographic area in NY to observe a variety of warm and cool season cover crops and mixes, planted at different dates and establishment techniques. There were presentations from University, Agri-business and NRCS personnel and farmer panels in which attendees learned how they can fit cover crops into their rotations and increase their knowledge and use of cover crops. There was a total of eight on farm demonstrations highlighted during the six workshops. We utilized 26 farmers who were used as panelists, presenters or were used during field tours. 385 farmers and 257 Ag professionals attended.

Cover crop demonstration plots were implemented at all 4 farms utilizing field scale equipment. A total of 87 plots of warm and cool season species and mixes at different planting dates and locations were planted. There were an additional 30 plots available that were installed by seed companies at Empire Farm Days that was an integral part of the program. These demonstrations showed establishment methods of interseeding, no-till drilling, conventional drilling, broadcast with cultivation and cultipacking and broadcast without cultivation. We provided information related to the seed box settings for the different species and mixes. These plantings were unreplicated but dry matter biomass measurements were calculated. Photographs were taken and are included for documentation.

At Dave Magos farm in Jefferson County, NY we demonstrated three seed establishment methods for post silage corn harvest planting of cereal rye. These included no-till drilling, broadcast with and without tillage. The seeding was

conducted on 9/30/16 and the data was collected on 11/1/16. The broadcast/cultimulched treatment had the highest percent cover by transect method and dry-matter (DM) biomass of 82%, and 421 lb/ac respectively, followed by the drilled at 52%, and 246 lb/ac and the surface broadcast 31.5%, and 144 lb/ac. By the end of the season the drilled and broadcast/cultimulched treatments had almost 85% cover and the undisturbed broadcast had approximately 50% cover. At Mike Northrup's farm we also viewed several successful fields which used the Interseeding Technologies drill. The seeding conducted on 6/24/16 consisting of annual ryegrass 12 lb/ac, red clover 8 lb/ac and Daikon radish 3 lb/ac was very dense and tall with 100% cover. The red clover was partially stunted under the cover crop mix canopy of radish and annual ryegrass but was well represented in the mix. Due to a drought the corn did not compete with the cover crop and the additional sunlight benefited the interseeding. The corn looked comparable to non-cover cropped corn in the area.

At Tim Stanton's farm in Albany County, NY the plots were directly no-tilled into sweet corn residue. The biomass, percent cover and weed evaluations were taken on 10/24/16. The August 5th planting had an average biomass of 6,686 DM lb/ac with a range from 1,568 lb/ac to 13,242 lb/ac, with the highest being Summer Feast mix predominately pearl millet and some T-raptor rape. The large range is indicative of the wide variety of species as well as some herbicide damage on the legumes. The average for warm season species and mixes was 9,830 lb/ac compared to the cool season species and mixes at 5,195 lb/ac. The August 25th planting was comprised of only cool season species and had an average biomass of 4,541 DM lb/ac with a range from 348 lb/ac to 10,628 lb/ac with the highest being dwarf Essex rape. In comparison cereal rye had a biomass of 2,526 lb/ac. The September 15th planting was comprised of only cool season species and had an average biomass of 1,405 DM lb/ac with a range from 435 lb/ac to 2,875 lb/ac with the highest being Barkant turnip. In comparison cereal rye had a biomass of 610 lb/ac. The brassicas and warm season species will not overwinter so consideration should be given for species like cereal grains which will provide more erosion control, nutrient uptake and provide additional biomass in the spring when those are your objectives but will require mechanical or herbicide termination.

At the Schoharie Valley Farm in Schoharie County, NY we conducted an interseeding demonstration with 7 cover crops treatments into corn. The treatments included: annual ryegrass; a mix of annual ryegrass, red clover and daikon radish; King's Broadcaster mix and King's Rays crazy fall mix. There was little reduction in corn yield due to the interseeding. The control without cover crops yielded 19.2 t/ac compared to an average for all cover crops of 18 t/ac corrected to 35% dry matter. There were sufficient cover crop stands with 40 - 60% cover for erosion control this fall. We drilled 5 plots of warm season species and mixes on August 2nd and 15 plots of cool season species and mixes, on Aug 15th. The species and mixes, the drill settings and approximate cost per acre is presented. The total amount of seed used was calculated by weighing the seed before and after. All the plots established very well with little weed pressure. There was approximately 95 -100% cover on all warm and cool season plots when evaluated on 10/27/17 and is documented by a representative number of pictures. The warm season species were cut on Oct. 11th and the cool season cover crop species were cut on Oct 27th. The samples were dried and weighed to calculate biomass. The cool season cover crops when sampled on 10/27/17 averaged 1.86 t/ac dry matter with a range from 0.99 t/ac - 2.81 t/ac. The highest yielding cool season treatment was radish monoculture which yielded 2.54 t/ac top growth with an additional 1.41 t/ac for root. An oat dominated Kings

“Cargo” mix yielded 2.81 t/ac top growth. The 3 clover treatments yielded an average of 1.16 t/ac, cereal rye 1.86 t/ac and annual ryegrass 1.73 t/ac. The warm season treatments when sampled on 10/12/17 averaged 2.31 DM t/ac with a range from 1.90 t/ac to 2.99 t/ac the highest yield was 2.99 t/ac for the sorghum x sudangrass monoculture.

These results for both the warm and cool season treatments although not in a replicated trial indicates that when compared by yield alone monocultures out yielded mixes. The low average weight of the clovers along with observations indicates that clovers tend to get outcompeted. The hairy vetch monoculture yielded 2.13 t/ac indicating a potential for that species to be used for nitrogen fixation in late summer seedings. The two cool season mixes both visually had large components of legumes indicating the potential for balanced mixes of grasses and legumes. King’s soil builder yielded 1.76 t/ac, and the mix of Austrian winter pea, triticale, and crimson clover yielded 2.0 t/ac. The hairy vetch had excellent winter survival for all treatments while there was extensive winter injury with the crimson clover and annual ryegrass in both monoculture and mixes.

Project Objectives:

Through three on-farm demonstration trials and associated field days and a Soil Health Seminar Center at Empire Farm Days in Seneca County in 2016 and 2017 this project will allow over 500 NY growers managing 15,000-20,000 acres to see a variety of cover crops and establishment techniques they can fit into their rotations and increase their knowledge and use of cover crops. We will highlight successful practices providing attendees opportunities to see the results on farm and talk with the farmers as well as to conduct cover crop demonstration to observe how species as well as mixes perform in different environments across the state of New York.

The objective of the Stanton’s Feura Farm demonstration and field day is to no-till seed a variety of warm and cool season cover crop species and mixes into harvested sweet corn starting approximately July 15, 2016 and thereafter into subsequent sweet corn plantings August 1, August 15 and September 1, 2016. The location of the demonstration is at Feura Bush, in Albany Co., NY on Valois Gravelly Loam soils. We will collect data on % cover and weed occurrence using visual estimates and cut biomass of cover crops and mixes to be used for further education and outreach. We will observe the cover crops in the field described above and provide costs of the cover crop mixes and establishment as part of a handout. We will discuss the benefits of the cover crops in relation to their N fixation, N-recycling, C:N ratio, weed control and other cover crop attributes.

The objective of the Dave Magos Farm demonstration and workshop is to demonstrate interseeding in silage corn using a cover crop mixture of 12 lb/ac of annual ryegrass, 8 lb/ac of red clover and 3 lb/ac of daikon radish. We will have the opportunity to look at multiple large fields (unreplicated) at the Mike Northrup farm on Farmington silt loam soils, in Jefferson County, NY. We will use the string line transect method to evaluate the cover crops and do visual estimates of ground cover compared to using a photo graphic application for smart phone ‘Canopeo’. We will discuss the purpose of the individual species and the mix, discuss herbicide issues, management of cover crops in no-till situations, and demonstrate and discuss post-harvest cereal grain cover crop establishment techniques using 1) no-till drill, 2) light disk and broadcast 3) no disturbance surface broadcast. Timing will also be discussed. The establishment demonstration is on Dave Magos farm on Collamer silt loam soil.

The Schoharie Valley Farm is operated by the New York State Commissioner of Agriculture and Markets, Richard Ball and his son Ethan Ball. The location of

the demonstration project is in Schoharie, NY, on Barbour and Tioga Loam soils and will be implemented in 2017 with an early fall workshop. The objective of this project is to demonstrate interseeding in silage corn; seven cover crop treatments will be used. Corn biomass will be taken and pictures will be taken to evaluate establishment of the cover crop treatments. In addition 20 cover crops and mixes with representative species of both warm and cool season species will be drilled at a time coinciding with early vegetable harvest in August. Total biomass measurements and percent cover will be evaluated and recorded. A workshop will be conducted to highlight these demonstrations along with speakers from NRCS, Cornell University and a farmer panel. We will discuss the purpose, establishment, herbicide issues and seeding rates of the individual species, and the mixes.

The *Empire Farm Days (EFD)* component of this project, is scheduled for August 2016 and August 2017, in Seneca Co., NY. The project will support stipends for 9 cover cropping farmers to participating in panel discussions held at the dedicated Soil Health Seminar Center (SHSC) which is the project of the NY State Soil Health Workgroup (NYSSHWG) a partnership between conservation agencies, Cornell, SUNY Ag & Tech's, farmers, consultants and agribusiness.

Introduction:

In New York and other colder regions establishing cover crops after the main crop is difficult due to the early onset of winter, this makes the use of alternative seeding methods such as interseeding and looking at whole farm management systems important when trying to fit cover crops into field crop and vegetable systems. For many years growers have used rye grain as a cover crop, which does allow for late fall planting but also limits the expected benefits compared to other species and mixes of cover crops. If cover crops can be fit into the rotation earlier in the year, the species options (legumes, brassicas, other grasses and broadleaf plants which attract beneficial insects) would be expanded as well as mixtures with those species. The meaningful benefits producers will receive for the timely implementation of cover cropping systems include erosion control, N cycling, weed and disease suppression, enhanced beneficial insects, soil health, resiliency to short drought periods and intense rainfall events (Snapp et al. 2005).

Vegetable growers do have opportunities in many cases after harvesting early season crops such as early sweet corn or before late plantings of crops such as brassicas to plant a variety of species and mixes. Crop farmers can use interseeding methods which have been used successfully in the last couple years in NY, shorten their silage corn varieties and plant a cover crop or a harvestable crop like triticale or diversify their rotations to plant winter cereal grains allowing for planting following small grain harvest. There is an opportunity for planting cover crops by interseeding, or timely seeding following silage corn, or in vegetable crop systems harvested at the appropriate time frame but it is still necessary to demonstrate the importance of timely planting and good establishment methods for both timely germination and overall successful stand establishment.

There are still significant barriers to the acceptance of cover cropping in this region. Opportunity costs due to foregone income from potential yield reduction in cash crops can be an important disincentive to the adoption of cover crops that compete in time or space with cash crops (Snapp et al. 2005). Cover crops require more management and there is a need for more education to prevent unnecessary problems. Cover crops can be alternative hosts to insects and disease pests, and mismanagement of cover crops could result in weed problems. There can be problems of persistent residual herbicides affecting earlier planted cover crops

reducing the stand and their effectiveness as well as the selection of herbicide programs with shorter residual activity which may reduce weed suppression, lead to the buildup of resistant weeds and reduce crop yields. There is also concern with both chemical and mechanical termination of the cover crop impacting proper seedbed preparation, poor kill and other chemical, biological or physical interactions affecting yield.

Snapp, S.S., S.M. Swinton, R.L. Labarta, D. Mutch, J.R. Black, R.L. Leep, J. Nyiraneza, and K. O'Neil. 2005. Evaluating cover crops for benefits, costs and performance within cropping system niches. *Agron. J.* 97:322-332.

Cooperators

- [Dr. Paul Salon](#) (Educator and Researcher)

paul.salon@ny.usda.gov

NE Region Soil Health Specialist

USDA-NRCS (Government agency)

3266, Rt 352

Corning, NY 14830

607-562-8404 ext. 103 (office)

- [Charles Bornt](#)

cdb13@cornell.edu

Extension Program Leader

Cornell Cooperative Extension (1862 Land Grant)

24 Martin Road

Voorheesville, NY 12186

(518) 272-4210 (office)

Research

Materials and methods:

Accomplishments

Project Time Line (project activities from proposal are italicized)

Tim Stanton Farm:

Pre-project activities to initiate demonstrations:

June 2016 - Order cover crop seed.

Working with Dave Wilson and Rod Porter from King's Agriseeds. We ordered the seed; any seed obtained for plantings prior to 8/1/16 was donated by King's Agriseeds. [Table 1. Stanton Farms Seed Costs per Pound and Acre.](#)

July 10th - Obtain cover crop seed, weigh out, calibrate drill and seed for the first two planting dates (seed donated by Kings Agriseed).

We obtained from Rod Porter and Paul Salon suggestions for planter settings for John Deere 750 no-till seeder used for the project for cover crop seeds based on their experience with the size and shape of the seed in relation to common crop and forage species that have settings in the manual. Attached is the information handed out during the field day which indicates species, hopper used, gate setting and the common species used for guidance. [Table 2. Stanton Farms Seeding Rates and No-till Drill Settings](#)

Project Activities:

Aug 5th - Obtain cover crop seed for rest of planting dates.

Received the rest of the seed needed for later plantings.

Aug 5 - September 1, 2016 - No-till cover crops seeded into early harvested sweet corn.

A summary of the planting information for the sweet corn and cover crops which included herbicide and fertilizer treatments and weather information is presented in [Appendix 1. Stanton Farm Sweet Corn, Cover Crop Planting and Weather Information](#). The soils at the demonstration site is Valois gravelly loam. The plots were 15 x 200 ft.

Due to weather related issues the planting dates and some mixes were modified. The updated planting plan is attached in [Fig 1. Stanton Farm 2016 Final Cover Crop Plot Layout](#). Chuck Bornt and Nick Stanton conducted the seedings. Despite the drought the seedings established very well.

Aug 1 - Oct. 15th - Monitor cover crop progress in different planting dates. Collect unreplicated data on % cover using visual estimates. Cut biomass of cover crops, mixes and weeds.

Evaluations were conducted at the end of the season for % cover, biomass and weed ratings which will be used for follow up educational outreach in newsletter and for future workshops.

August 2016 - Prepare Qualtrics Survey for October grower meeting. Start advertising Cover Crop Field Day Event at Stanton Feura Farm.

The announcement used to advertise the event is presented in [Fig 2. Stanton Farm Cover Crop Workshop Announcement](#).

Oct 1st - 15th Summarize data and prepare handouts and presentations.

Handouts used for the workshop were prepared by Chuck Bornt Albany Co. Capital District Regional Vegetable Program and are included as attachments as Table 3. Summary information for all of the species used is presented in [Table 3. Summary Information for Time of Planting, Rates, Depth and Uses](#).

October 13, 2016 - Host Cover Crop Field Day at Stanton Farm. Conduct Qualtrics survey of attendees and summarize results of both the cover crop demonstration and survey.

The workshop included power point presentations by Paul Salon and Dave Wilson and included a wagon tour of the cover crop plots with a tour led by Paul Salon and Dave Wilson. Tim Stanton and son Nick demonstrated their Unverferth Ripper Stripper unit and discuss their reduced tillage and cover crop system for vegetables. Summary Attendee Survey data is presented in [Fig 3. Cover Crop Attendee Survey Summarized Results](#). The workshop had 35 attendees which included: 17 farmers, 5 CCE and 2 NRCS, 3 Agribusiness and 8 others.

Project Time Line: Dave Magos Farm

Pre-project activities to initiate demonstrations:

May 2016- Line up all farms and fields involved and make herbicide and seeding recommendations. Select date 10/28/16 and reserve Smithville Fire Hall.

Conducted by Dave Komoroski, NRCS. Herbicide recommendations made by Mike Hunter Cornell Cooperative extension who recommended 8 oz. Outlook and 1 oz. Sharpen. Discussed potential demonstrations and agenda with Dave Magos and Mike Northrup.

June 2016 - Obtain cover crop seed and plant interseeding demo (not charged to grant).

Cost of seed and planting was part of a NRCS EQIP project and was conducted by Mike Northrup on 6/24/16.

Project activities:

Aug 2016- Obtain cover crop seed for the post harvest cereal rye cover crop demo. Seed used was harvested by Dave Magos and charged to grant.

August 2016 - Prepare Qualtrics Survey for October grower meeting. Have planning meeting. Start advertising Cover Crop Field Day Event at Magos Farm.

The announcement we used is documented in [Fig. 4 Jefferson Co. Soil Health Workshop Announcement 102816](#). The survey form attached was not conducted through Qualtrics as it was copied from another event. An example is provided in Fig 8 below.

Sept 15 - September 20, 2016 - Layout and seed the post-harvest silage corn cereal rye demonstration.

The post harvest silage corn cereal rye demonstration was layed out in 50 x 200 ft un-replicated plot for demonstration to evaluate the differences in establishment by drilling, surface broadcasting and cultimulching (slight tillage and cultipacking) and surface broadcast with no soil disturbance. The demonstration plots which also included a drilled plot of a diverse mixture was conducted by Dave Magos.

October 2016 - Collect unreplicated cover crop data by clipping three 2 x 2 ft plots and using drying oven and weighing entire sample determine total dry-matter.

Summarize and prepare handouts and presentations. Host Cover Crop Field Day at Magos Farm on 10/28/16. Have interseeder and no-till planter on hand for discussion. Have attendees complete workshop survey.

Workshop and Survey completed.

November 2016 - Summarize results of both the cover crop demonstration and survey.

Survey summary completed and cover crop demonstration information is linked as Table 4 in the conclusion section. Certified crop advisors and DEC pesticide credits were approved for the workshop.

Project Time Line: Empire Farm Days 2016

Pre-project planning activities:

April 2016- A planning meeting with all stake holders including the show manager, Melanie Wickham, from Empire Farm Days was conducted on 4/29/16 with 16 people in attendance. The themes for each day were selected and volunteers were recruited to obtain farmer panelists, three for each of the three days.

May-June 2016 - Get commitments for all farmer panelists, finalize agenda for promotional campaign.

The promotional material was developed in collaboration of Kara Dunn public affairs specialist for Empire Farm Days, it was sent out to media outlets prior to the event,

was in the Empire Farm Days program and received a lot of coverage by other media outlets following the event. The promotional material was adhered to and is shown below to document project activities. Farmer questionnaires Fig. 5. [2016-Farmer-Panel-questionnaire](#) were provided to farmer panelists to facilitate their participation in the panel discussion.

Project activities:

August 9, 10, 11, 2016 – Conduct soil health and cover crop workshop including the farmer panels each day, handout and collect completed survey forms from attendees.

The Empire Farm Days Seminar Center was conducted as planned the promotional material was sent out in a timely manner and the material used in Fig. 6 and 7 below to document the information. There were 11 table top exhibitors and soil health demonstrations including the large rainfall simulator that were conducted during the days. There were cover crop demonstrations that were implemented and tours given by Seedway and King's Agriseeds. Dave Wilson from King's Agriseeds and member of the SARE cover crop team led the discussion on their plots each day as part of the program. Adam Robertson from Seedway discussed their cover crop demonstration each day as well. We had featured speakers each day to cover: Cover crop interseeding by Matt Ryan from Cornell, Soil Biology by Janice Thies from Cornell and the use of cover crops as forage by Joe Lawrence from Cornell's Pro-Dairy Program. The SARE grant provided stipends to the farmer panelists for 3 farmers for each day of the event (9 total). We had a total of 11 farmer panelists. Mark Lott from the host farm of Empire Farm Days and Vaughn Sherman both donated their time. There were 90 attendees in total for all 3 days of cover crop tours. There may be some overlap of the 112 counted for attending the presentations and the 118 attending the farmer panels. The promotional material for the farmer panels including farmer background information and the topic of each of the panels is documented in [Fig. 6 Empire Farm Days Soil Health Panels 2016](#). The promotional material documenting the presentations is in [Fig. 7 Empire Farm Days Soil Health Seminars 2016](#). A copy of the survey form used for each of the days is documented in [Fig. 8 Empire Farm Days 2016 Evaluation Form](#). Certified Crop Adviser credits were approved for the presentations.

Project Time Line: Empire Farm Days 2017

Project activities:

February 2017- A planning meeting with all stake holders including the Show Manager, Melanie Wickham, for Empire Farm days was conducted on 2/22/17 with 16 people in attendance. The themes for each day were selected and volunteers were recruited to obtain farmer panelists. We also discussed other items including changing the order of events each day to get more people to attend the cover crop tour.

May-June 2017 – Get commitments for all farmer panelists and speakers and finalize the agenda for the promotional campaign.

The promotional material was developed in collaboration with Kara Dunn public affairs specialist for Empire Farm Days. The promotional material was sent out to media outlets prior to the event, in the Empire Farm Days program and was picked up by other media outlets both before and after the event. Questionnaires similar to 2016 were provided to farmer panelists to facilitate their participation in the moderated panel discussions.

August 8, 9, 10, 2017 – Conduct soil health and cover crop workshops each day which included presentations, cover crop tour and the farmer panels, have survey evaluation forms similar to 2016 completed and handed in.

The Empire Farm Days Seminar Center was conducted as planned, the promotional material was sent out in a timely manner (Fig. 9 [2017EFDSoilHealth Promotion](#)) to document the event. There were 11 table top exhibitors, web soil survey and soil health demonstrations including the large rainfall simulator that were conducted during the three days of the show.

There were cover crop demonstrations of individual species and mixes that were implemented and tours given by Seedway and King's Agriseeds. Rod Porter from King's Agriseeds led the discussion on their plots each day as part of the program. A representative from Seedway discussed their cover crop demonstration each day as well. Paul Salon, grant cooperater, assisted in the tours. We had featured speakers each day: Day 1) Fertilizer, Manure and Nutrient Management, and Cycling in Cover Cropping and Reduced Tillage Systems with USDA NRCS Northeast Regional Soil Health Specialist Jim Hoorman, Findlay, OH. Day 2) Preventing, Reducing and Mitigating Compaction and Its Impact on Soil Health and Crop Production with USDA NRCS Northeast Regional Soil Health Specialist Jim Hoorman, Findlay, OH. Day 3) Utilizing Soil Health Practices in Vegetable Cropping Systems with Dr Thomas Bjorkman, Associate Horticulture Professor, Cornell University. There was a total of 10 farmer panelists for the 3 day event. The panelist's discussion focused on the theme of the day which was highlighted by the speakers in the morning. On August 9th there was an additional presentation in the afternoon on soil invertebrate biology by Dr. Carmen Greenwood from SUNY Cobleskill. The SARE grant provided a total of 10 stipends to the farmer panelists for the three days.

Project Time Line: Schoharie Valley Farm 2017

Project activities:

March -Meet with collaborators and farmer to develop work plan.

A meeting was conducted with Charles Bornt Cornell extension, Thomas Lacko NRCS, Paul Salon NRCS and Ethan Ball farmer early March to lay out plans.

May 15th -Order cover crop and corn seed. Arrange for interseeder and transportation using Interseeder Technology Seeder from farmer in Otsego Co.
Cover crop and corn seed ordered from Kings Agriseeds. Arrangements were made with a private company to move the interseeder to and from the farm.

June 1st - Provide corn seed for interseeding to farmer for planting, develop mixes and weigh out seed.

Corn seed was shipped UPS and cover crop seed was weighed out. Corn was planted 6/18/17 sprayed only with roundup after emergence.

June 15th - Provide seed for cover crop interseeding, to farmer and cooperater and provide drill settings for interseeding.

Seed was dropped off 6/20/17 and with consultation with Rod Porter and Paul Salon who conducted and calibrated a similar interseeder using the same seed at the USDA-NRCS Big Flats Plant Materials Center recommended the settings.

July 7th - Provide calibration and information for no-till interseeder drill spacing modification, conduct interseeding. Starting and final seed weights recorded to determine actual seed delivered.

Drill spacings were determined and drill modified with some units removed to be utilized on 3 ft corn spacing. Not an easy task. The plots were approximately 20 x 200 ft.

July 15th - Weigh out cover crop mixes for drilled plots. Provide guidance on drill settings based on John Deere BD11 Grain drill setting guide in manual and develop

cover crop plot layout.

Completed

August - Develop workshop agenda, announcement; arrange site logistics, promotion and survey forms.

The workshop announcement is presented in Fig. 10 [Cover-Crops-Field-Day-Schoharie-10122017-Final](#)

August 2nd - Drilled warm season mixes using JD BD11 series grain drill, weighed seed before and after.

Field prepared by 2 diskings and one perfecta cultivation; no herbicides or fertilizer was used the seeding was conducted on 8/2/17. The plots were approximately 10 x 200 ft.

August 15th - Drilled cool season species and mixes using JDBD11 drill, weighed seed before and after.

The field was recultivated and seeded on 8/15/17. The plots were approximately 10 x 200 ft.

September 22nd - Cut and weigh corn for interseeding cutting two 15 ft rows and weighing wet taking subsample wet and drying and reweighing to determine % moisture and calculate total DM and correct to 35% dry matter t/ac.

Completed on 9/22/17 to simulate corn silage harvest.

September - Finalize agenda and promote workshop, calculate actual seed used for plantings. Applied for Crop Advisor and Pesticide Credits.

Completed agenda, promotion, seed calculations and CCA and pesticide credits approved.

Oct. 11th - Cut warm season species for biomass using 3 x 3 ft squares and weighing entire sample and dried in forced air drying oven to 100% DM, visually determine % cover.

Completed on 10/11/17 All plots were between 95 -100% cover.

Oct. 12th - Host Cover Crop and Soil health Workshop and field day and presentations, conduct survey.

Completed

Oct 27th - Cut cool season species for biomass using 2 x 2 ft squares; visually determine % cover.

All material was brought to drying oven for drying to 100% DM. Radish roots were weighed separately. Completed

November: Summarize Qualtrex attendee survey results. Calculate and summarize cover crop biomass dry matter.

Fig. 11 [2017-Cover-Crop-Survey-Report-Schoharie-Valley-Farms-Meeting](#). Biomass data in results section, Table 8.

Research results and discussion:

At the Tim Stanton farm we planted an un-replicated cover crop demonstration which included three planting dates with some cover crop treatments included in multiple planting dates for a total of 55 plots. The dates were August 5th, 25th and September 15th. The planting plan is attached in [Fig 1. 2016 Final Cover Crop Plot Layout](#). Chuck Bornt and Nick Stanton conducted the seedings. The cover crops were no-tilled drill into relatively heavy sweet corn residue. The dates were chosen to follow his early sweet corn which, due to the droughty nature of the soils, Valois

gravelly loam, his earliest field and is continually cropped to sweet corn. Due to the multiple number of treatments it was decided not to calibrate and to utilize settings on the seeder from similar species and to interpolate for those not in the manual and for the mixes. Attached is Table 2. which indicates species, hopper used, gate setting and alternative species used for guidance. [Table 2. Seeding Rates and No-till Drill Settings](#). This information could be useful for those using John Deere drills and maybe other drills since we indicate alternative species used for guidance which would be on other drills. A summary of the planting information for the sweet corn and cover crops which included herbicide and fertilizer treatments and weather information is presented in [Appendix 1. Sweet Corn, Cover Crop Planting and Weather Information](#). Since the producer did not want to alter his usual herbicide treatment outlined in Appendix 1., there was some herbicide damage on the early legumes and despite the drought overall the seedings established very well. Results are discussed in the conclusion section and reported in Appendix 2.

At the Dave Magos farm we conducted a simple unreplicated demonstration comparing seed establishment methods for post silage corn harvest planting of cereal rye. The treatments were drilled, cultimulched (slight tillage and cultipacking in one pass) and broadcast, and broadcast without soil disturbance, see Table 4. We also wanted to compare evaluating for percent cover using a string line vs the canopeo app. We felt the seeding method demonstration was very important due to the frequent reason people give for not cover cropping in this region is a lack of time and growing conditions to establish in the fall. We wanted to demonstrate that it can be done. The interseeding using the Interseeding Technologies drill on 6/24/16 at the Mike Northrup farm was very dense and tall with 100% cover. Due to a drought the corn did not compete with the cover crop and the additional sunlight benefited the interseeding. The corn looked comparable to non cover cropped corn in the area.

At the Schoharie Valley Farm in 2017 we were targeting vegetable growers who may be able to plant cover crops in early and mid August; as well as to demonstrate interseeding into silage corn for dairy farmers. We demonstrated in un-replicated plots seven interseeded cover crop treatments which included both single species and mixes. We photo documented the stand establishment and determined corn yields to demonstrate no adverse impacts from the cover crops. We also drilled 5 plots of warm season species and mixes on August 2nd and 15 plots of primarily cool season species and mixes, on Aug 15th. The total amount of seed used was calculated by weighing the seed before and after planting. All of the plots established very well with little weed pressure. Data is presented in the conclusion section.

Research conclusions:

At the Tim Stanton's farm dry matter (DM) biomass, percent cover and weed evaluations were taken on 10/24/16, and is presented in [Appendix-2.-Stanton-Cover-crop-biomass-2016](#). The August 5th planting had an average biomass of 6,686 DM lb/ac with a range from 1,568 lb/ac to 13,242 lb/ac, with the highest being Summer Feast mix predominately pearl millet and some T-raptor rape. The large range is indicative of the wide variety of species as well as some herbicide damage on the legumes. The average for warm season species and mixes was 9,830 DM lb/ac compared to the cool season species and mixes at 5,195 lb/ac. The August 25th planting was comprised of only cool season species and had an average biomass of 4,541 DM lb/ac with a range from 348 lb/ac to 10,628 lb/ac with the highest being dwarf Essex rape. In comparison cereal rye had a biomass

of 2,526 lb/ac. The September 15th planting was comprised of only cool season species and had an average biomass of 1,405 DM lb/ac with a range from 435 lb/ac to 2,875 lb/ac with the highest being Barkant turnip. In comparison cereal rye had a biomass of 610 lb/ac. The brassicas and warm season species will not overwinter so consideration should be given for species like cereal grains which will provide more erosion control, nutrient uptake and provide additional biomass in the spring when those are your objectives but will require mechanical or herbicide termination. The results of the demonstration provided the farmer with first hand knowledge to add diversity to his existing cover crop system which was only oats. The multiple planting dates and species allowed attendees to observe the importance of selecting the right species for the planting date to achieve the highest biomass, weed suppression and other associated benefits. The farmer Tim Stanton participated as a farmer panelist in the Schoharie Valley Farm workshop where he shared knowledge gained from this demonstration. The farmer continued with a variety of these cover crops in 2017.

At the Dave Magos farm the seeding was conducted on 9/30/16 and the data was collected on 11/1/16. The broadcast/cultimulched treatment had the highest percent cover by transect method and Canopeo method and DM biomass of 82%, 41% and 420.6 lb/ac respectively, followed by the drilled at 52%, 29% and 245.5 lb/ac and the surface broadcast 31.5%, 12% and 143.9 lb/ac. By the end of the season due to the warm fall the drilled and broadcast/cultimulched treatments had almost 85% cover and the undisturbed surface broadcast had around 50% cover. The data is presented in [Table-4.-Dave-Magos-Corn-Silage-Post-Harvest-Cereal-Rye-Demo-Data](#) and pictures in [Fig. 12 Pictures of Magos Post Harvest Cereal Rye Demo](#). The interseeding demonstration looked at a field scale planting and the no-till interseeder was on hand which was discussed and is pictured in [Fig.-13-Pictures-of-Mike-Northrups-Interseeded-Cover-Crop-Mixture](#). We were able to look at the very successful seeding after silage corn and in a narrow strip of corn that was left standing to somewhat show the difference due to shading that could have been expected from a corn grain harvest. The red clover was partially stunted under the cover crop mix canopy of radish and annual ryegrass but was well represented in the mix. We also included in the packet 2 economic farmer profiles of both of the host farm Dave Magos [Fig. 14 Soil Health Profile and Economic Case Study of Dave Magos](#) and farmer presenter John Kemmeren [Fig. 15 Soil Health Profile and Economic Case Study of John Kemmeren](#). These were produced independently of this project. The attendee survey is presented in [Fig. 16 Magos On Farm Cover Crop Workshop 2016 attendee evaluation](#) a summary is discussed in the learning outcomes section.

At the Schoharie Valley Farm we conducted an interseeding demonstration with 7 cover crops treatments into corn. The treatments included: annual ryegrass; a mix of annual ryegrass, red clover and daikon radish; King's Broadcaster mix; crimson clover; red clover; a mix of orchardgrass and white clover; and King's Rays crazy fall mix. The Interseeding treatments, actual and planned seeding rates and settings on the interseeder and approximate costs per acre are presented in [Table-5-Interseeding-seeding-rate-information](#). The data for the corn yields and list of cover crop treatments are presented in [Table-6.-Corn-Yield-Schoharie-Valley-Farm-Interseeding](#). There were little reduction in corn yield due to the interseeding. The control without cover crops yielded 19.2 t/ac compared to an average for all cover crops of 18 t/ac corrected to 35% dry matter. There were sufficient cover crop stands with 40 - 60% cover for erosion control this fall. The interseeding percent cover is documented by pictures [Fig.-17-Schoharie-Valley-Farm-interseeding-photo-102717](#). We drilled 5 plots of warm season species and mixes on August 2nd

and 15 plots of cool season species and mixes, on Aug 15th. The species and mixes, the drill settings and approximate cost per acre is presented in [Table 7. Cover-crop-warm-and-cool-season-seeding-rate-information](#). The total amount of seed used was calculated by weighing the seed before and after. All of the plots established very well with little weed pressure. There was approximately 95 -100% cover on all warm and cool season plots when evaluated on 10/27/17 and is documented by a representative number of pictures in [Fig. 18. Schoharie-Valley-Farm-Cover-Crop-Species-and-Mix-Photos](#) The warm season species were cut on Oct. 11th using a 3 x 3 ft sampling area and the cool season cover crop species were cut on Oct. 27th using a 2 x 2 ft sampling area. The samples were dried in a force air drying oven to 100% DM. The samples were weighed to calculate biomass. The biomass determinations and % cover is presented in [Table-8.-Schoharie-Valley-Farm-cover-crop-biomass-and-cover](#).

The cool season cover crops when sampled on 10/27/17 averaged 1.86 t/ac dry matter with a range from 0.99 t/ac - 2.81 t/ac. The highest yielding cool season treatment was radish monoculture which yielded 2.54 t/ac top growth with an additional 1.41 t/ac for root. An oat dominated Kings "Cargo" mix yielded 2.81 t/ac top growth. The 3 clover treatments yielded an average of 1.16 t/ac, cereal rye 1.86 t/ac and annual ryegrass 1.73 t/ac. The warm season treatments when sampled on 10/12/17 averaged 2.31 dry matter t/ac with a range from 1.90 t/ac to 2.99 t/ac the highest yield was 2.99 t/ac for the sorghum x sudangrass monoculture.

These results for both the warm and cool season treatments although not in a replicated trial indicates that when compared by yield alone monocultures out yielded mixes. The low average weight of the clovers along with observation indicates that clovers tend to get outcompeted. The hairy vetch monoculture yielded 2.13 t/ac indicating a potential for that species to be used for nitrogen fixation in late summer seedings. The cool season mixes; King's soil builder plus (with triticale, crimson clover, hairy vetch, annual ryegrass and radish) yielded 1.76 t/ac and a mix of; Austrian winter pea, triticale and crimson clover yielded 2.0 t/ac both visually had large components of legumes indicating the potential of these mixes for a more balanced mix of grasses and legumes. The hairy vetch had excellent winter survival for all treatments while there was extensive winter injury with the crimson clover and annual ryegrass in all monocultures and mixes. Prior experience at the Big Flats Plant Materials Center has shown that seeding these species too early results in less winter hardiness. Annual ryegrass and crimson clover are known for winter hardiness issues in this region in some years.

Participation Summary

3 Farmers participating in research

Education & Outreach Activities and Participation Summary

8 On-farm demonstrations

6 Workshop field days

PARTICIPATION SUMMARY:

385 Farmers

257 Number of agricultural educator or service providers reached through education and outreach activities

Education/outreach description:

For this grant we had three on farm workshops at: Tim Stanton's, Dave Magos' and Schoharie Valley Farms which included presentations, cover crop tours and farmer panelists or farmer speakers. We also had three days of workshops which included presentations, cover crop tours and farmer panelist at Empire Farm Days in 2016 and in 2017. There were attendees who responded to surveys from six states who attended the Empire Farm Days events. There were also a numerous amount of farmers who were engaged during the soil health demonstration exhibits outside of the seminar center at Empire Farm Days. There were two field demonstrations at each event location for a total of 8. If you count all of the power point presentations at these events there was a total of 15 power point presentations. In addition at the Schoharie Valley Farm there were speakers during the field tour at 6 separate stations speaking for 20 minutes with the attendees broken up into 6 groups and rotated through. In addition there were farmer panels at these events for a total of 24 farmer panelists with an additional 2 who spoke during field tours. There were soil pits with a soil scientist discussing benefits of cover crops at the Magos and Schoharie Valley Farm. Agendas for all meetings are attached which provide further information about all of the meetings.

Learning Outcomes

112 Farmers reported changes in knowledge, attitudes, skills and/or awareness as a result of their participation

Key areas in which farmers reported changes in knowledge, attitude, skills and/or awareness:

Note: the 112 reported above from all activities gaining knowledge is only indicative of those who filled out the surveys not of all attendees. The Tim Stanton Farm cover crop attendee Qualtrics survey which is attached as Fig. 3 (linked in the project activities section) indicates the following. Of the attendees participating in the survey 54.6% indicated they cover cropped every year while 27.3% indicated they never cover cropped and 18% said sometimes. Following the workshop their was an increase in desire to cover crop. 91% indicated they would like to cover crop every year and 9% stated they would like to cover crop every other year. Following the workshop 66.7% indicated they would like to try new cover crop species and 40% indicated they would like to try mixtures, 7% would continue with a single species. All of the attendees who answered survey indicated they would attend a similar meeting in the future and 87% indicated this workshop would impact their farm operation. 15 farmers indicated they will make a change to their operation as a result of the workshop.

The Magos workshop had the following activities: presentations, soil pit, machinery discussion cover crop tours including interseeding and farmer discussions. Based on a survey question all felt some or all aspects of the workshop was useful. A comment which stood out about the value of the components during the day was "If I can see what is being discussed the better I understand". As is typical not all

attendees filled out survey forms. Thirty two forms were submitted. Based on questions concerning better understanding of soil health and cover cropping concepts, and increased use of soil health management practices and cover cropping 20 farmers responded positively and three responded no change. Of the agency attendees seven responded positively, two responded no change. Overall there was a 88% positive response and 12% neutral or already felt they had the knowledge. 15 farmers indicated they would make a change to their operation as a result of this workshop in the next twelve months. This region of the state is far north and very challenging to incorporate cover cropping following harvest. Some of the comments indicating changes in attitude, skills and awareness are listed below. Thinking of buying no-till drill, buy no-till corn planter, increase use of no-till practices, continue to apply new ideas to my no-till program, use different cover crops in the fall and planting green, learn more about machinery for no-till and cover crops, do more cover cropping, quicker to recommend cover cropping, try some no-till planting after tillage radish, always have something growing, reduce amount of tillage without chemicals, look at using mixtures instead of single species.

A similar survey was used for Empire Farm Days to see if farmers are more apt to implement a soil health management practice as a result of attending that program. Due to the continued success in 2016 the Empire Farm Days is planning on expanding its demonstrations on cover cropping and reduced tillage in 2017. For Empire Farm Days 2016 there was a total of 39 respondents in which 24 were farmers and 14 were consultants/agency. Farmer responded 88% that they had better understanding of cover cropping and were more willing to try cover cropping, increase acreage or try new techniques. Most of the others responded neutral or were already advanced cover crop practitioners. There were 15 farmers who indicate that they plan to do something different as a result of this workshop in the next 12 months. Some of their comments as to what they will do differently in the next 12 months were: Make contact to share more info on cover crops and no-till. Plant as much cover crops as possible, initiate cover cropping first time, try cowpeas, add some different species to their current oat/radish mix and promote soil health. Try to increase cover crop acreage. Establish 125 acres of cereal rye or triticale for forage. Talk with demonstration seed dealer for more information on cover crops. Plant more triticale and possibly start more double cropping.

For Empire Farm Days 2017 there was a total of 45 respondents in which 40 were farmers and 5 were consultants/agency. Farmer responded 70% that they had better understanding of cover cropping and were more willing to try cover cropping, increase acreage or try new techniques. Most of the others responded neutral or were already advanced cover crop practitioners. There were 21 farmers who indicate that they plan to do something different as a result of this workshop in the next 12 months. Some of their comments as to what they will do differently in the next 12 months were: Look into different types of cover crops best suited for our farm. Incorporate new innovative practices. Improve my soil management, do more cover crops, learn how cutting height of cover crop and manure influence rooting depth. Research cover crops for my area. Try many of the things talked about. Try some no-till beans. "Yes" I will do something as a result of this workshop in the next 12 months. Get cover crops on earlier. Look closer at cover crop cocktails. Tillage radish, more cover crops, clovers (10 lb/ac), lime, keep trying, "Thank you".

The Schoharie Valley Farm cover crop workshop attendee Qualtrics survey summary, is attached as Fig. 11, (link is in the project activities section) and indicates the following. Of the attendees participating in the survey 55% indicated they cover cropped every year while 25% indicated they never cover cropped and 20% said sometimes. Following the workshop there was an increase in desire to cover crop. 89% indicated they would like to cover crop every year and 11% stated

they would like to cover crop every other year. Following the workshop 50% indicated they would like to try new cover crop species and 42% indicated they would like to try mixtures, 8% would continue with a single species. All of the attendees who answered survey indicated they would attend a similar meeting in the future and 97% indicated this workshop would impact their farm operation. 26 of the attendees indicated they would make a change to their operation as a result of this workshop. The host farmer, the son of the New York State Commissioner of Agriculture indicated he will be cover cropping more and trying some of the species he observed in the field demonstration plots.

Project Outcomes

1 Grant applied for that built upon this project

Project outcomes:

As a result of the workshop we know that the host farms have made changes to their operation to increase cover cropping. Based on the results and comments in the survey discussed in the Learning Outcomes section, many farmers wrote that they planned to increase cover crop acreage and try new species and mixes. Dave Magos signed up for the National Association Conservation District's Soil Health Champion program and he is on two farmer panels in 2018. Two of the farmers who attended the Schoharie Valley Farm project have since participated in farmer panels in 2017 and are scheduled for 2018.

Assessment of Project Approach and Areas of Further Study:

I think this project exceeded my expectations. It points to an example of how building strong professional networks with both agency personnel and farmers can build synergy and leverage activities. We were able to successfully plant a diverse mixture of species and mixes over a span of planting dates which were very successful and we were able to look at several mixes with different ratios to fine tune making diverse cover crop mix recommendations. I think that the timing of planting cool and warm season cover crops is very important and it is not only the earliest date which works the best especially when looking at weed competition. I would apply for a larger grant to get additional help to replicate, calibrate and to get better data. This work supports a cover crop mix calculator that I developed being used by NRCS and is one of the tools being considered by the Northeast Cover Crop Council.

Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture or SARE.



www.sare.org US Department of Agriculture



This site is maintained by SARE Outreach for the SARE program and is based upon work supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award No. 2019-38640-29881. SARE

Outreach operates under cooperative agreements with the University of Maryland to develop and disseminate information about sustainable agriculture. [USDA is an equal opportunity provider and employer.](#)

© 2022 Sustainable Agriculture Research & Education