A Systems Approach to Cover Crops
(OSCIA Tier 1 – Norfolk)

Purpose:
In 2015, Norfolk Soil and Crop undertook a project to determine the viability of cover crops in relation to our varied crops (corn, soys, small grains and a myriad of horticulture crops) and soil types (primarily sand). With an extended fall; 2015 cover crop interseeded into corn, across all trial locations, was excellent. The mild winter allowed for vigorous spring growth, which presented its own challenges.

2015 Observations:

- *Less is more*: more than 15 pounds broadcast is not needed, and leads to higher input costs
- *Earlier, rather than later*: V4-V5 made for a more consistent rate of germination, when compared to anything applied at a later corn stage

Methods:
For 2016, the Committee decided to repeat the corn interseed project: fine tune timing along with seeding rates when going into corn. Due to the lack of moisture, many of the plots had poor (if any) timely emergence of the interseeded crop. The drought, much to our surprise, had a greater negative impact for germination and establishment on clay than on the sand soils. This generated a limited amount of data, results and opinion. 2017 is hopefully better.
The Port Rowan site was chosen for a “plant green” experiment due to timing, crop rotation, and excellent over-wintering of the 2015 cover crop (*Fig.1*). The goal here was to conserve soil moisture and suppress weed germination (namely: glyphosate tolerant fleabane) due to an ample mulch layer from the terminated cover crop (*Fig.2*).
“Planting Green” was done with a John Deere 1790CCS planter (24 rows, 20” spacing, 210k sds/acre); with no-till check blocks on either side of the plot. Issues arise when planting green: row closure being the primary one. Application of glyphosate (RoundUp WeatherMax, 1.5L/ac) and AMS (1L/ac) was applied three days before planting, with the cover completely dead in eight to nine days. This resulted in an excellent mulch layer, when also taking into account the stover from the previous corn crop. Fleabane was not seen in the plot until mid-August.

Results:

Figure 1. Overwintered Annual Ryegrass and Clover (Port Rowan Location)

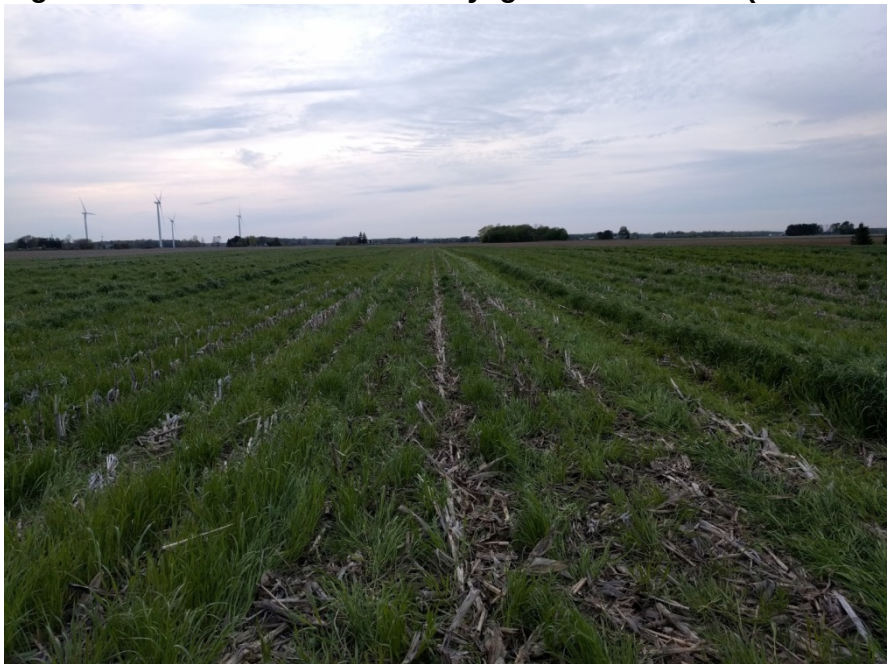


Figure 2. Mulch Layer of Corn Stover and Annual Ryegrass w/ soybean emergence (Pt Rowan)

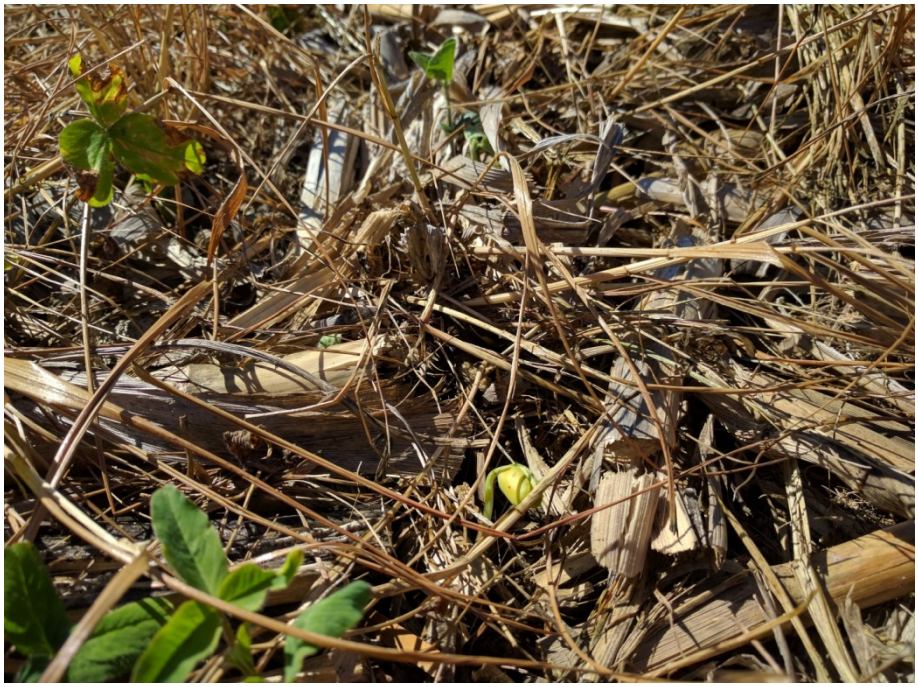
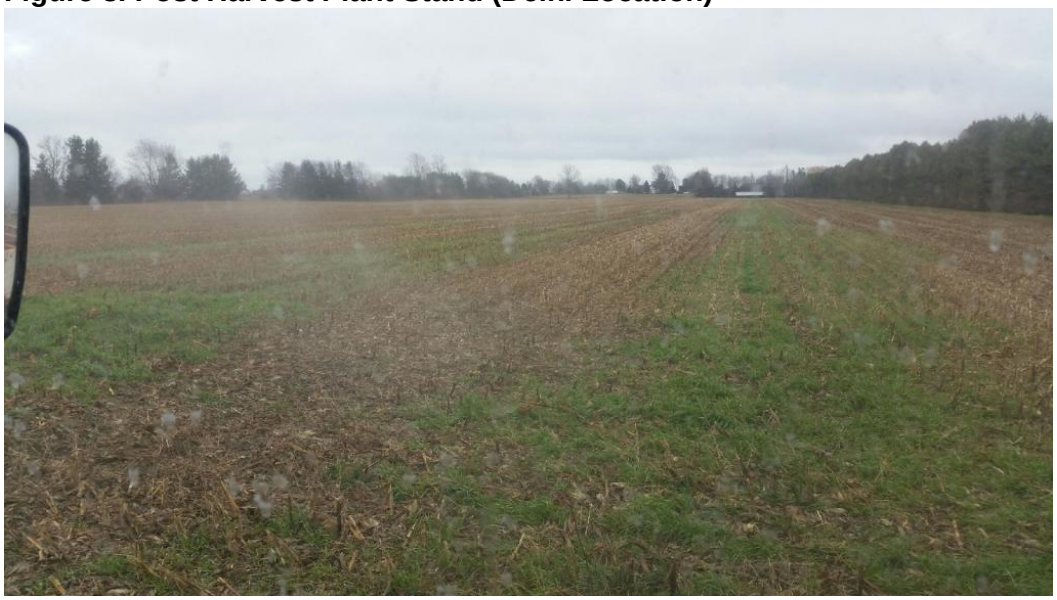


Figure 3. Post Harvest Plant Stand (Delhi Location)



Yield check was taken:

	Plant Green (Avg)	Check (Avg)
Yield	43.9	54.6
Moisture	14.3	12.1

Summary:

2016 Observations:

- *Drought Hurts:* Heavy soil crusting, from the summer drought, impeded proper germination on the clay soils. The sandy soils had a much higher rate of success (*Fig.3*). Timely rains, when and where they did come, definitely helped
- *Planting Green Takes Effort*: Row closure, proper down pressure and planting speed, along with timely cover kill are all management points that need to be focused on.

Next Steps:

With 2017 (Year Three) ahead of us, the committee has agreed to continue to work on a set of Best Management Practices (timing, rates, species) for interseeding into corn on Norfolk sands. Soil tilth, worm activity, compaction

mitigation as well as overall ROI on the test sites will also be monitored and measured.

Acknowledgements:

Many thanks go to all who cooperated with a trying 2016 season:

- Heritage Lane Farms (Langton): Plot Location
- Petker Farms Inc. (Port Rowan): Plot Location
- Ruppert Farms Inc. (Delhi): Plot Location
- Robinson Agraservices (Courtland): Plot Location
- Norfolk Cover Crop (Port Rowan): Seed and Analysis
- OSCIA: Tier 1 Grant

Project Contacts:

Location of Project Final Report:

Appendix A.

Cover Crops in an Organic Horticulture Production System (Heritage Lane Produce)

In 2016 two different cover crop seed mixes was used. Mix 1 was 2 bushels of oats/acre and Mix 2 was 1 bushel of oats, 4lbs annual rye grass and 3 lbs white clover/acre. Both mixes was applied on the same day to the same planting of cauliflower. The seed was mixed with side-dress fertilizer and applied via John Blue side-dresser on a Farmall C.

The reason for choosing other seed species was because in 2015, while the oats established under the cabbage crop (*Fig.1*), it did not under the more densely shaded cauliflower and broccoli crops. The thought was that annual rye grass and clover being a small seeded, slower growing species that it would establish and stay dormant until the crop canopy is removed via harvest at which time it would start to re-grow. *Fig.2* shows just that. The 4 rows on the left (oat, ryegrass, clover mix) shows the green ryegrass and clovers (not visible in the picture) while the 4 rows on the right (oats) shows that there is only spotty oat establishment.

Figure 3 shows the results from under-seeding squash with 12 lbs white clover/acre in mid August after crop was fully vined. After the crop was harvested (Sept. 15) the vines were chopped and rye no-till into squash stubble. Results varied (patchy establishment).

My theory: I am ruling out lack of moisture due to the regular irrigations that took place and believe the patchiness could be due to the crop stage in which the clover was spread. At full vine and foliage much of the seed was captured by the foliage itself and failed to make contact with the soil. After a rain event the seed washed to the soil surface and pooled in patches. A better approach for 2017 will be to broadcast seed earlier prior to the last cultivation and incorporate.

2017: I will evaluate the spring re-growth of the annual rye and clover and determine whether it is a cover crop that has a place in an organic system. Such issues as ease of incorporation and pest problems affecting the next crop are a concern in an organic system when a green crop is allowed to grow through the winter and remerge the following spring.

I will once again under-seed the squash crop to clover and following my own recommendations mentioned above.

Figure 1. 2015 Oats Under Cabbage

Figure 2. Annual Ryegrass under Cabbage, Broccoli (2016, South Langton Location

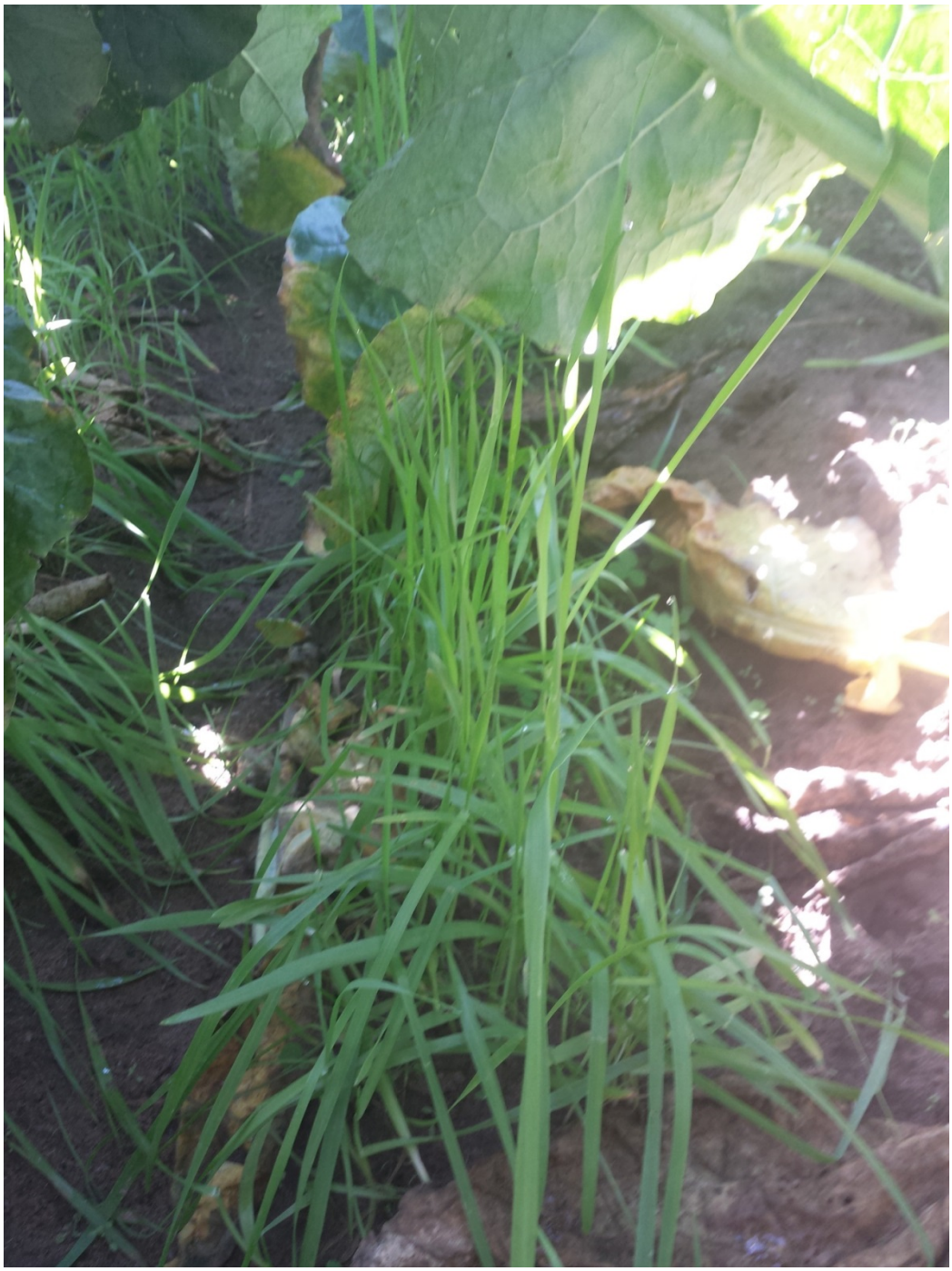


Figure 3. White Clover, Cereal Rye, Tillage Radish post harvest (South Langton Location)