Nitrogen from Cover Crops for Vegetable Crop Uptake

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Goals:

1. Vegetable farmers in Massachusetts didn't know how much nitrogen they had in fields where cover crops were planted or when that nitrogen would become available to their cash crops. Our first goal was to measure when nitrogen is being released by cover crops in relation to cash crop growth stages on different farms.

2. These farmers were also interested in finding ways to provide nitrogen to their crops in cost effective ways and without additional phosphorus. Our second goal was to **reduce fertilizer use.**

Methods:

Three Treatments

1. No Cover Crop
2. Rye (70 lbs/A) and Vetch (20 lbs/A)
3. Farmer Choice

With and w/out 60 lbsN/A after incorporation

Six Vegetable Farms in Massahcusetts

Randomized Complete Block Design

Timeline:

Sept. 2016: Plant cover crops.
Sept. 2016 – May 2017: Collect % cover data monthly.
May 2017: Collect biomass and incorporate cover crops.
May – July: Collect soil nitrate every 2 weeks for 8 weeks.
Two weeks after incorporation: Apply 60lbsN/ac to split plots.
Four weeks after incorporation: Plant a cash crop.
End of season 2017: Collect yield data.

Observations

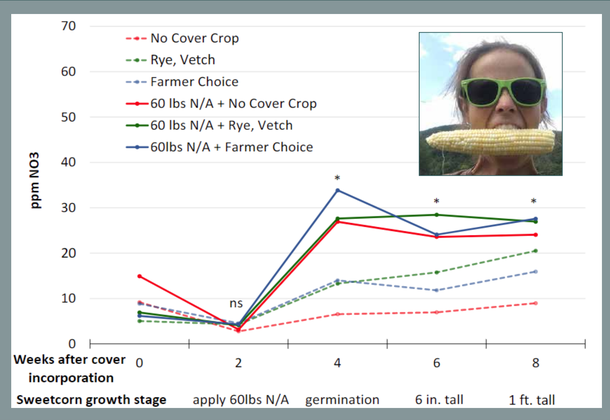
Farms and Farmer Choices	Fall 2016 % SOM and ppm NO3	Soil Nitrate	Sweetcorn and Cabbage Yields

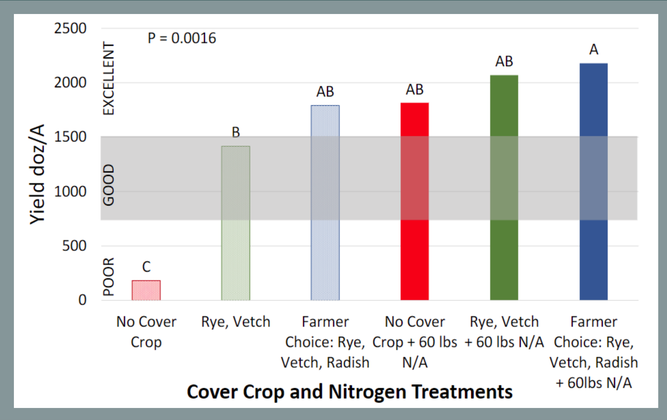
UMass

FC = Winter rye (60 lbs/A), Hairy Vetch (20 lbs/A), Tillage Radish (5 lbs/A)
Cost = $96

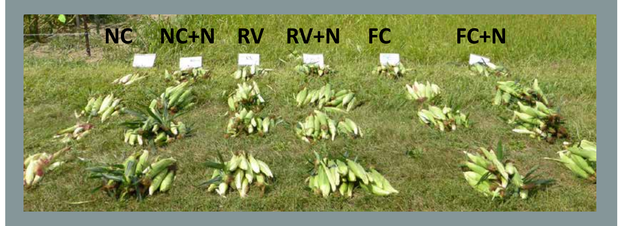
1.7 %

20 ppm NO_3





NC = No Cover crop, NC+N = No cover crop + nitrogen fertilizer, RV = Rye and vetch, RV+N = Rye and vetch + nitrogen fertilizer, FC = Farmer choice, FC+N = Farmer Choice + nitrogen fertilizer



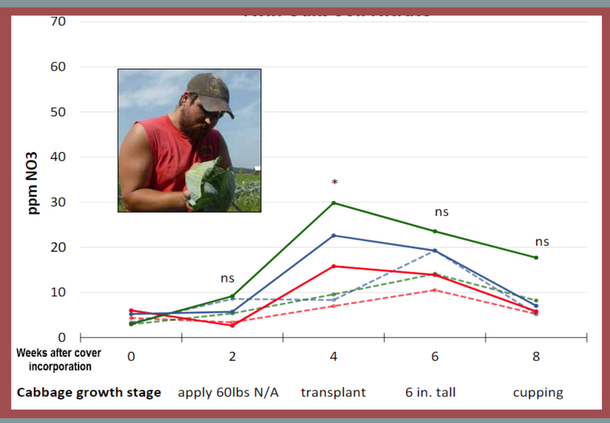
A 'Good' yield for sweetcorn is 750-1,500 doz/A and for cabbage is 20,000-40,000 lbs/A according to the New England Vegetable Management Guide.

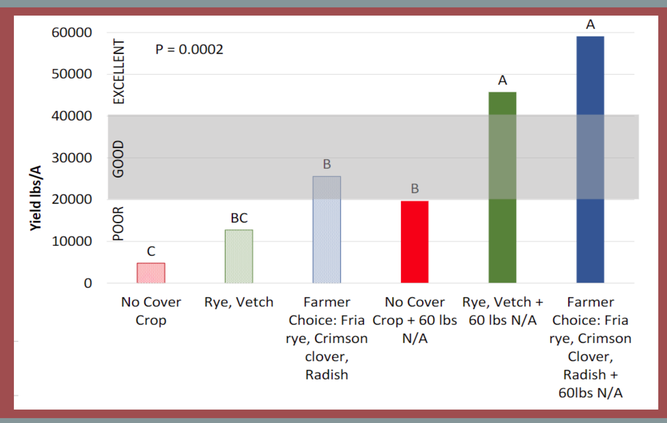
Twin Oaks

FC = Fria Annual Rye (6 lbs/A), Crimson Clover (4 lbs/A), Tillage Radish (10 lbs/A)
Cost = $51

2.2 %

28 ppm NO_3





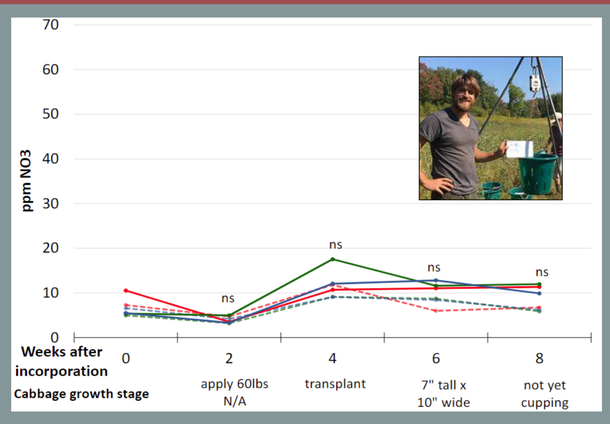
A 'Good' yield for cabbage is 20,000-40,000 lbs/A according to the New England Vegetable Management Guide.

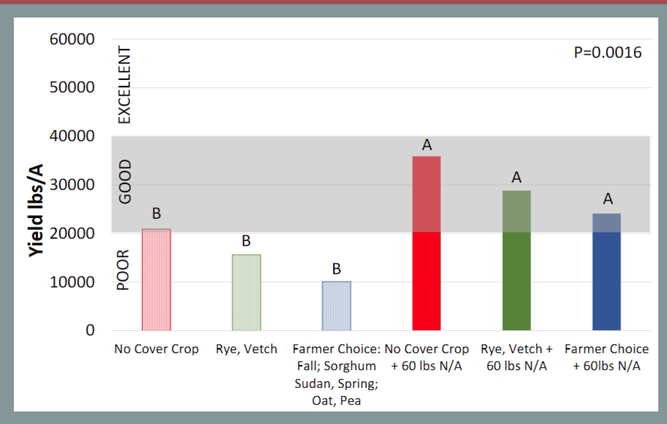
Many Hands

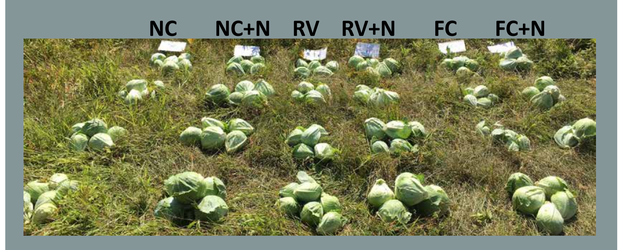
FC = Summer 2016 seeded: Sorghum Sudan (90 lbs/A) Cost = $234
Spring 2017 Seeded: Oat (100 lbs/A), Pea (100 lbs/A) Cost = $251

6.2 %

5 ppm NO_3





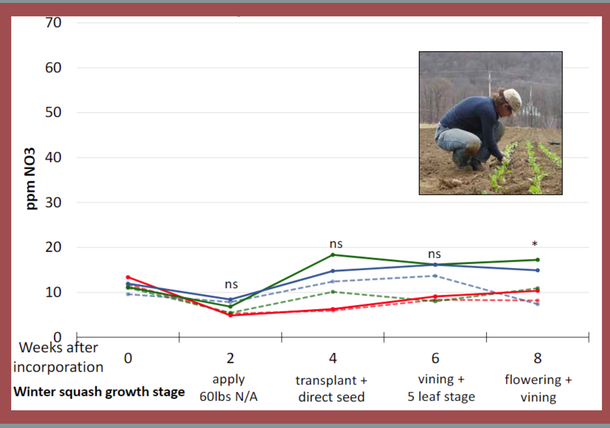


Lyonsville

FC = Fria Rye (15 lbs/A), Crimson Clover (15 lbs/A), Hairy Vetch (18 lbs/A)
Cost = $136

2.9 %

25 ppm NO_3

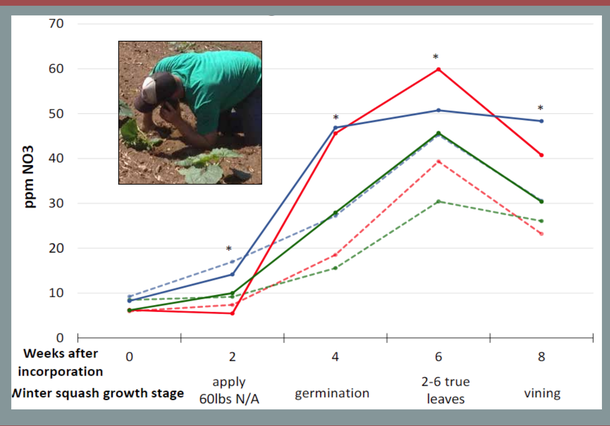


Langwater

FC = Oat (90 lbs/A), Pea (50 lbs/A), Hairy Vetch (40 lbs/A)
Cost = $308

6.8 %

105 ppm NO_3

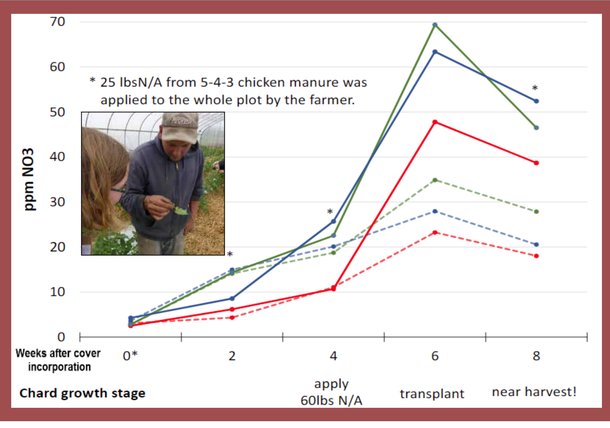


Tangerini

FC = Oat (90 lbs/A), Crimson clover (15 lbs/A), Hairy Vetch (18 lbs/A)
Cost = $205

3.4 %

30 ppm NO_3



Conclusions:

- **There were statistically greater amounts of nitrates in plots with additional fertilizer on all farms and in most cases there were statistically greater amounts of nitrates in plots with cover crops than those without.**
- **Well managed cover crops with or without additional nitrogen resulted in Good to Excellent yields without any additional phosphorus in 2 out of 3 loca tions in this trial.**
- **It is possible to exceed sufficiency ranges for cash crop N requirements with only the use of cover crops and prior amendments (compost in the fall of 2016 at Langwater and poultry fertilizer in spring 2017 at Tangerini).**

Farmer Adoptions as a Result of this Trial:

- **Transplant 4 weeks after incorporating a cover crop.**
- **Direct seed 2 weeks after incorporating a cover crop.**
- **Experiment with less nitrogen fertilizer.**
- **Take a soil nitrate test 4-6 weeks after incorporating cover crops in the spring to measure peak N release.**
- **Take more Soil Nitrate Tests.**
- **Plant Tillage Radish at 10bs/A for weed control.**
- **Start growing crimson clover in Massachusetts.**

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