Title:
Continued Evaluation of Fall Planted Broad Leaf Cover Crops on Muck Soils

Project Leader:
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Cooperator:
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Project location:
This work occurred in Orange County. These results could be applied throughout the Northeast.

Abstract:
Many onion fields have been in continuous, unbroken production for decades. Insect and disease populations build up when no rotation is employed. Over the last few years, onion bulb mites have increased as a problem. Some growers suspect mites over-winter on the traditional grass cover crops of oats and barley. This has lead to interest in evaluating broad leaf cover crops. After harvest in 2003, a field was divided into 90' by 90' plots. These plots were planted in six different cover crop treatments: Sprint (an oat/ cow pea mix), buckwheat, hairy vetch, red clover, mustard and a check of oats. The grower plowed down the cover crops mid winter and in the following spring planted onions in the whole field. Just before harvest, we evaluated for weight, size and number of onions in each treatment. Surprisingly, we found no statistical difference between the various treatments and the check in terms of number of onions, weight of onions and onion size.

Background and justification:
Onions are a high value crop. Many fields in Orange County have been in continuous, unbroken onion production for 50 years or more. Growers agree there is a need to find a rotational crop to break the insect and disease cycle. There are approximately 6000 acres of muck onions grown in Orange County. With the fear that bulb mites over-winter on the traditional fall cover of barley or oats, many onion growers are not planting fall cover crops. This leads to soil loss from wind erosion. Sorghum sudangrass (Sudex) has been evaluated in rotational studies, but not all growers feel sudangrass is the answer for their operations. We have looked at lettuce, spinach and potatoes as rotational options but alternate crops do not fit into many grower production capabilities. Growers know onions always grow better after any rotation. Traditionally, onion vigor is increased, stand counts and yields are higher in rotated fields. There is no one "silver bullet" answer for all growers.

The disease and insect cycles need to be broken by some crop and the reason annual crimson clover, field peas, yellow mustard, hairy vetch and buckwheat were selected for evaluation is because they each have strengths. There may not be a "silver bullet" rotational cover but by looking at different cover crops, it is possible a specific crop may work for a specific grower.

Field trials from 2001 gave encouraging results. Field peas, yellow mustard and barley established quickly and produced good cover growth. It was felt the hairy vetch and

clover needed more time to establish. An earlier planting date is needed for these two cover crops and may not be suitable for post onion harvest planting.

A fear by growers was yellow mustard would become a weed in their fields. This proved not to be the case at all. Mustard needs long days and cool temperatures to flower. By planting in the fall, neither of these conditions are present.

One of the hopes of this trial was onion bulb mites would not like the broad leaf covers. Prof. Dick Straub ran trials on all the seed. In his laboratory trials, he found mites were not repelled by any of the trial crops. It is felt mites over winter on almost anything but certainly have preferences. Further studies need to be carried out to establish these preferences.

In 2003 a grower firmly agreed to follow the trial with onions the following year. Ninety by ninety foot plots were planted to Sprint (an oat/field pea mix), red clover, hairy vetch, mustard, buckwheat with oats as the check. During the summer of 2004, the field was scouted and insect/disease levels were evaluated. After the 2004 growing season, a harvest evaluation was carried out in the field.

Objectives:

1 - To increase the onion grower's ability to make sound cultural and economic rotational crop decisions.

2 – To evaluate the effect of the fall covers on onion production. Is onion yield increased? Are stand counts higher? Are disease counts lower? Are weeds more of a problem? Is there too much trash in the field?

3 – To continue evaluation of yellow mustard, field peas and buckwheat on whole field trials.

Procedures:

An onion field was harvested in late August. After the grower finished cleaning and fitting the field for planting, it was divided into 90' by 90' plots. These plots were then planted into Sprint (an oat/field pea mix), buckwheat, hairy vetch, red clover, oriental mustard with a check using the grower standard – oats. The field was planted the first week of September 2003. From previous experience, the grower knew the hairy vetch and clover would be thick and a problem for spring planting so he plowed down the whole field in late December. This allowed almost four months of growth. The following spring, the grower planted the field to onions. Germination and pest populations throughout the season were normal and did not show unusual impacts from any of the cover crops.

Just before the grower was to come in to harvest the field, a harvest evaluation was carried out in each of the plots. Five three foot sections of bed were harvested from each 90' by 90' plot. Onions were counted, weighed and twenty random onions were measured for size. All this data was evaluated number of onions, weight of onions and onion size using an analysis of variance (ANOVA).

Results and discussion:

Often we come into a trial with a desired or hoped for result. If that hoped for result is not achieved, even that can tell you something useful. The P-value (analysis of variance) for the total number of onions between the various treatments (buckwheat, hairy vetch, oriental mustard, red clover, and sprint compared to oats) was 0.91. The P-value for the

weight was 0.79 and for size was 0.98. Any P-value less than one means there is no statistical difference between the treatments or check.

What does this tell us? Fall planting of a cover crop on an organic (muck) soil may be a good thing in terms of preventing soil from eroding over the winter. It may also help the soil in a minor ways like aiding moisture absorption during the winter. In New York, researchers are looking at what are the qualities of a good soil. We are finding that structure is a major component to a "good soil". The tillage involved in utilizing a cover crop and preparing the soil for planting the following spring pretty much works against soil structure. Incorporating the cover crop into the soil green, while aiding the spring planting process, contributes very little to the nutrients or decreased insect/disease levels in the soil.

Growers traditionally use oats and sometimes barley as a fall cover. In terms of soil erosion on organic soils, the practice should be recommended. Growers must realize very little is being accomplished in terms of increased soil nutrients, decreased insect/disease population or soil quality. Other types of cover crop may have small advantages like quickness of establishment, etc. but have no advantage over the oats or barley.

In previous studies, we have found increases in onion production after season long rotations. The previous studies involving almost any crop demonstrated increases in yields. From this study, it is apparent fall planted cover crops do not demonstrate the increased yields season long rotations show

Researchers have found that organic (muck) soils can build structure over time but only if there is not tillage to break it down. Also, it has been found that a long-term cover crops like sorghum sudan-grass is probably the a better soil quality option because it sends roots deep down through the plow layer, allowing water to penetrate deep into the ground. Sorghum sudan-grass, unlike green manures, brakes down slowly, allowing for slow release of nutrients into the soil. Studies have found there may be increased yield the second year after sorghum sudan-grass because of the time involved in breakdown and release of nutrients. Sorghum sudan-grass allows the soil to "rest" during the summer long growing season, allowing for soil structure to begin re-establishing.