

Cover Cropping Strategies for Nitrogen Management: Research and Farmer Participation

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Most vegetable and dairy farmers in Massachusetts plant cover crops after harvesting a cash crop in order to protect the soil from erosion. Recent work in the Dept. of Plant and Soil Sciences, has focused on the use of cover crops to manage nitrogen.

It is known that legumes, if allowed to grow sufficiently, can add significant amounts of nitrogen to the soil upon incorporation. Unlike most inorganic fertilizers, nitrogen from legumes is released slowly into the soil, ideally in synchrony with the nitrogen demands of the cash crop. This slow release of nitrogen decreases the possibility of nitrate leaching below the root zone and possibly into water supplies.

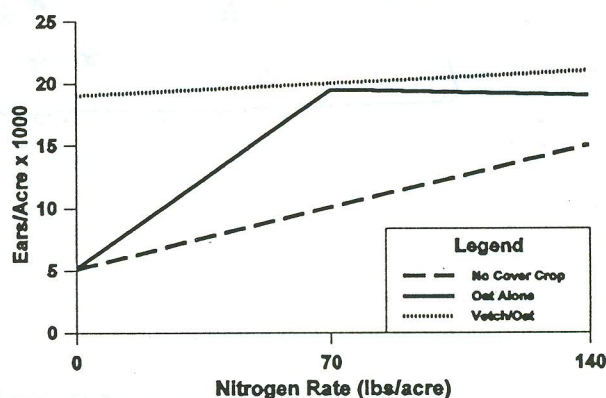
Research has demonstrated that non-leguminous cover crops are more efficient in extracting nitrogen from the soil than fall planted legume cover crop species. This 'mopping up' of soil nitrogen is important in the spring and fall when conditions are favorable for leaching. Early establishment of cover crops will increase water uptake which will also decrease the possibilities of leaching of nitrogen and groundwater contamination.

The research has focused on combining legume and grass mixtures as cover crops to gain the benefits from both. It has been demonstrated that these cover crop mixtures can supply most all the nitrogen required for production of vegetable crops as shown in the figure.

One important impediment to the adoption of these systems in New England has been the cost of hairy vetch based on recommendations of 40 lbs per acre. A favorable economic benefit can be achieved with lower seeding rates of hairy vetch (see table). The table was generated by a lotus template we have used to conduct cost analysis.

There have been both research and extension components to this project since its beginning in 1989. The

Sweet Corn Yields



Benefit/(Cost) of hairy vetch over rye alone

Price of N (\$/lb)	Vetch Seed Rate (lbs/acre)		
	20	30	40
\$0.25	\$6.59	(2.13)	(12.11)
\$0.30	10.59	2.12	(7.86)
\$0.35	14.59	6.37	(3.61)
\$0.40	18.59	10.62	0.64

Assumptions: Residual N credited to vetch was 80, 85 and 85 lbs/ac for seeding rates of 20, 30 and 40 lbs vetch/ac.
Seed cost: Vetch - \$0.95; Rye - \$0.11
Seed rate of rye: Alone - 112 lbs/ac.; With vetch - 56 lbs/ac.

majority of the work in the first couple of years was research-oriented. There were many unanswered questions that needed to be addressed before these cover crop strategies could be extended to growers. Presently the project is running in the fifth year with a greater emphasis on extension.

The process of introducing these cover crops to growers was partially achieved by distribution of seed materials to farmers. Growers were provided enough seed to cover a 1/2 acre. Cover crops are seeded in the fall by the grower, and technical assistance was provided to the grower for cover crop establishment, and to monitor the growth of the cover crop and the cash crop that follows it.

This is the second year that cover crops have been made available to growers. Last year growers were able to reduce nitrogen inputs by an average of 70lbs/acre. Shown on the map are locations of cooperators this year. These activities are part of USDA-SARE, -CES and University of Massachusetts supported projects.



Location of Cooperators in 1994