# Developing an Efficient Cover Cropping System for Maximum Nitrogen Recovery in Massachusetts

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- Cover crops reduce soil erosion, runoff, and nutrient leaching from fields.
- Winter rye grows aggressively in fall and early spring and a well established winter rye cover crop can recover more than 100 lb N/ac which otherwise will be lost to the environment.
- Date of cover crop planting plays a critical rule in maximizing N recovery released from fall applied manure and crop residues.
- A multi-year, multi-location research project was conducted from 2004 to 2009 to determine optimum time for planting winter rye cover crop in Massachusetts.
- For maximum N recovery winter rye requires collecting about 1050 GDDs.
- Delay in planting winter rye (even one week) will significantly reduce the amount of N recovery.
- Massachusetts was divided into five planting date zones and optimum planting date for each zone was determined.
- In northwest regions winter rye should be planted from Aug. 18 to Aug. 25.
- In warmer regions (close to Atlantic Ocean) it can be planted from Sep. 7 to Sep. 14.
- Other parts of the state, including the Pioneer Valley, should be planted between Sep. 1 and Sep. 7.
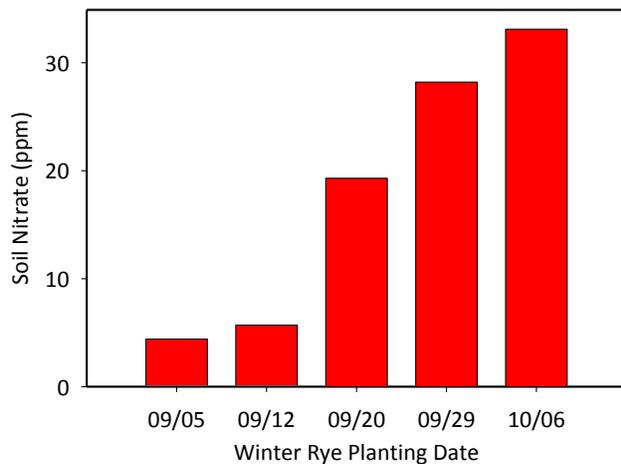
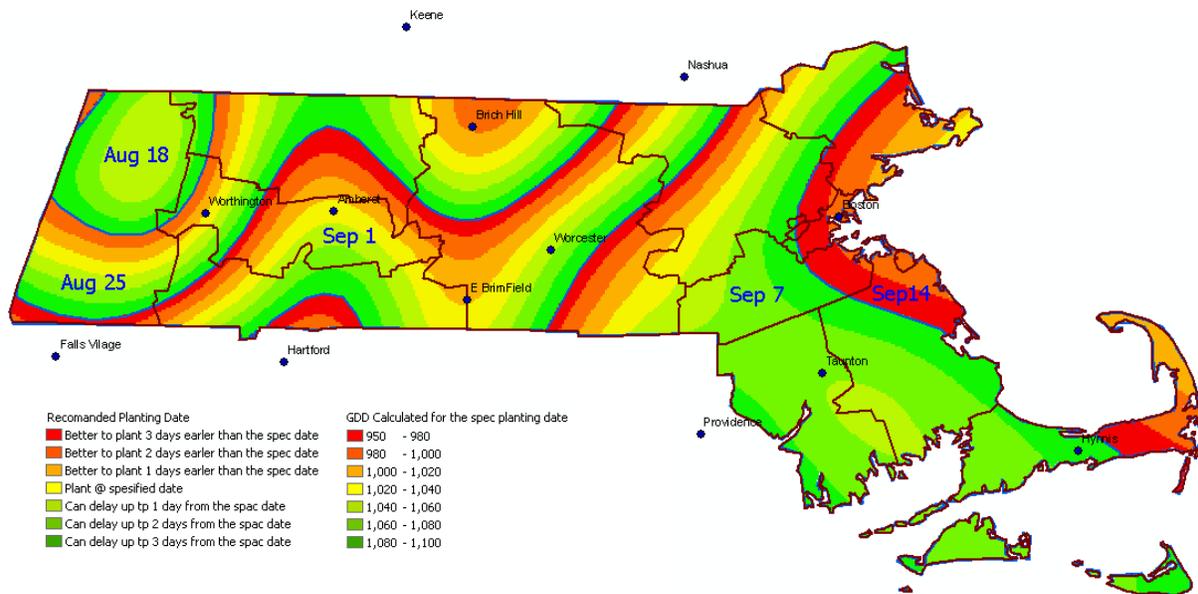Soil nitrate late fall 2008
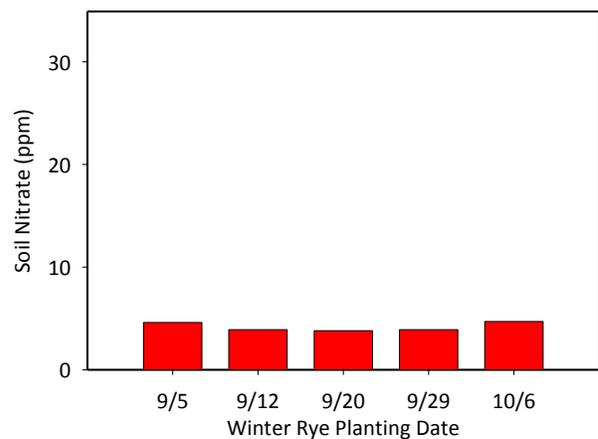
Soil nitrate early spring 2009
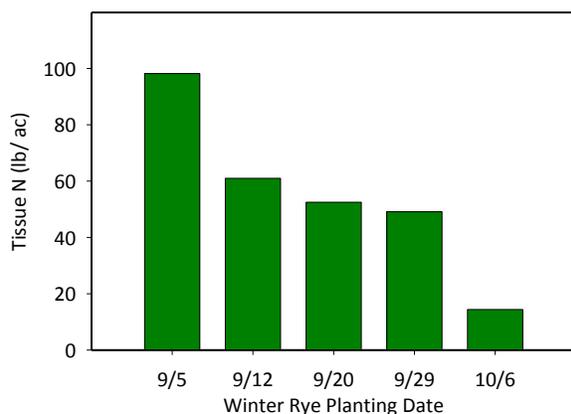
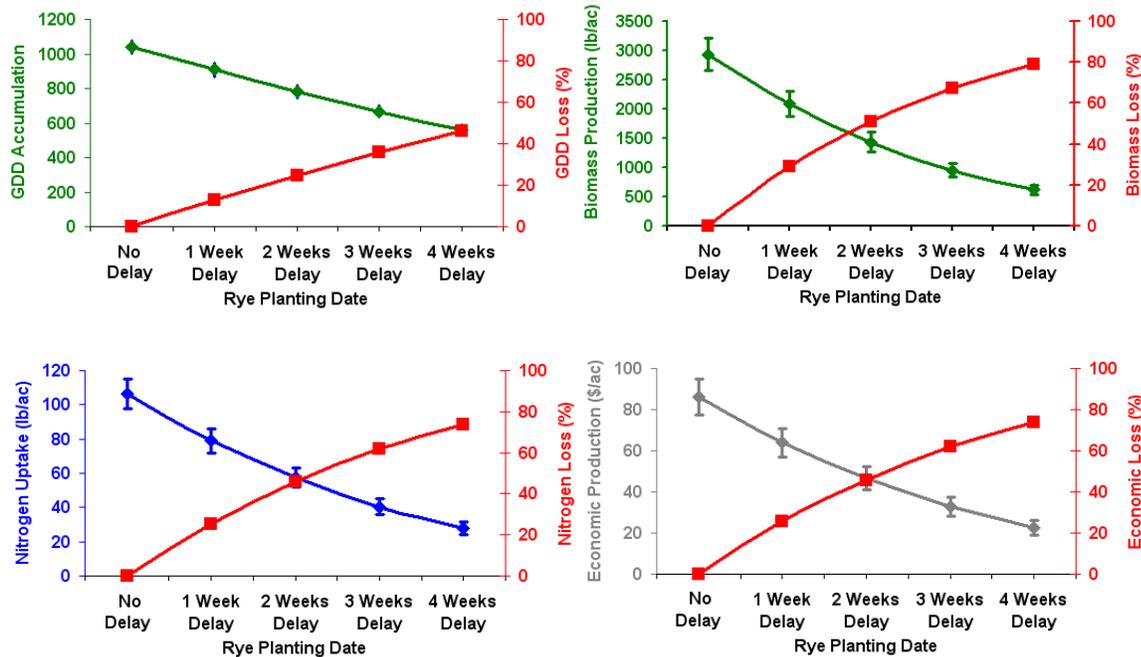Accumulated N in rye tissue, late fall 2008

Cover crops planted early September and early October. Picture is at the end of December.

Optimum planting date of winter rye cover crop for the five main planting zones in Massachusetts:

Effect of winter rye planting date on GDD, Biomass, nitrogen uptake, and economic loss in the Pioneer Valley, Massachusetts:

Rye Planting Date	GDD		Biomass		Nitrogen		Economic		
	Accum	Loss (%)	Product (lb/ac)	Loss (%)	Uptake (lb/ac)	Loss (%)	Product ($/ac)*	Loss ($/ac)	Loss (%)
No delay	1040	(0.00)	2932	(0.00)	106.20	(0.00)	55.22	(0.00)	(0.00)
1 week delay	908	(12.70)	2084	(29.00)	79.01	(25.46)	41.09	(14.06)	(25.46)
2 weeks delay	784	(24.69)	1437	(51.08)	57.49	(45.86)	29.89	(25.33)	(45.86)
3 weeks delay	666	(36.02)	954	(67.57)	40.42	(61.95)	21.02	(34.21)	(61.95)
4 weeks delay	560	(46.20)	617	(79.04)	27.81	(73.84)	14.46	(40.78)	(73.84)

* Calculations are based on $0.52/lb N