Field Pea Relay Cover Crops

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In the North Central Great Plains, field peas are typically harvested in late summer. Pea fields are commonly tilled or sprayed in the fall to manage volunteer peas in order to prepare the field for the next season. Rather than viewing volunteer peas as a problem, they can be viewed as an opportunity to take advantage of late season heat units using a field pea relay cover crop. This opportunity may also exist in the Pacific Northwest depending on crop sequencing after pea grain crops. Like any legume cover crop, this practice has the potential to contribute nitrogen to subsequent crops, increase soil organic matter, and protect the soil from erosion. Field pea relay cover crops are very attractive to farmers due to their low seed costs and the limited time and effort needed to establish them during the busy harvest season.

Field peas are able to grow later into the fall as they are tolerant of minor freezing temperatures and can recover from frost damage. Field pea relay cover crops near Carrington, ND, have been observed to grow until late October and early November, depending on the season. Preliminary work in 2008 found biomass accumulation ranged from 1500-3000 lb/ac (Table 1) for field pea relay cover crops. The total nitrogen content of this biomass represented 60-130 lb of N per acre. This nitrogen could represent nitrogen take up from the soil as well as fix atmospheric nitrogen.

Table 1: Field pea relay cover crop biomass, percent nitrogen (N), and total N for above ground plant tissue in three fields at the Carrington Research Extension Center in fall of 2008.

Field Number	Cover crop biomass (lb/ac)	Percent N of cover crop (%)	Total N in plant tissue (lb/ac)
14B	3026	4.3	130
14A	1582	4.0	63
12	1877	3.7	69

The amount of biomass produced and total amount of nitrogen accumulated in the plant tissue depends upon the pea plant density, the timing of initiation of re-growth, soil moisture, rainfall, and the date of a killing frost event. Farmers have little control over environmental factors but have several tools to improve plant density of the relay cover crop by providing good seed to soil contact. An experiment at the CREC in 2009 found that field pea relay cover crop fostering and seeding rate had a positive impact on both the cover crop and a wheat test crop (Table2). Fostering field pea growth using a disk with harrows increased cover crop biomass from 334 to 1844 lb/ac and its nitrogen contribution from 12 to 71 lb/ac. Increasing the seeding rate of the field pea relay cover crop resulted in a wheat test crop with a greener canopy and increased the yield of a wheat test crop by approximately 3 bushels.

Table 2: Fostering management and increasing field pea relay cover crop seeding rate and increased cover crop biomass and total nitrogen and resulted in a wheat test crop with a darker crop canopy and higher yield in 2008 at the Carrington Research Extension Center.

Fostering method	Seeding rate (seeds/ft^2)	Pea cover crop biomass (lb/ac)	Total Nitrogen in cover crop biomass (lb/ac)	Wheat test crop canopy color (NDVI)	Wheat test crop yield (bu/ac)
None	6	334c	12.9b	0.695b	53.9b
Disk with harrows	6	1844b	71.7a	0.713b	56.4b
Disk with harrows	12	2215a	88.5a	0.758a	59.6a

Field peas are already valued for the diversity and nitrogen they contribute to crop rotation in the North Central Great Plains. Field pea relay cover crops present an opportunity to increase these benefits making it more attractive to farmers that are looking for convenient ways to reduce their nitrogen fertilizer input costs.