

# Winter Pea Cover Crop as a N Management Tool in Ohio



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A five-year study is underway to determine if cover crops can be managed to aid in nitrogen management for corn. Trials were conducted at the Western Agricultural Research Station in west central Ohio, to evaluate the contribution of nitrogen from fall planted winter pea in Ohio. Winter pea was planted at two to three time periods and compared to a wheat stubble check. Corn was planted by no till method and three to four nitrogen levels were applied.

Insect and rodent pests reduced corn stands in 2006 in annual ryegrass and in the late planted winter pea cover. Early planted pea provided an excellent stubble for planting of no till corn. While there was some rotation benefit to winter pea, little response was shown for nitrogen supply.

Other treatments trialed as a possible cover for no till corn and nitrogen management were annual ryegrass and soybean.

## Project initiation:

- A local producer asked the question, "can I grow my own nitrogen?"
- Other Ohio State University co-workers were working to reduce nitrogen loss over the winter months to local streams and lakes by growing a cover crop.

Winter pea is the common theme in this work, planted after wheat harvest, the variety is common Austrian winter pea – sometimes Forage Master or Frost Master.

Results are measured by yield of harvested corn in the year following establishment of the cover crop.

Trial results – corn yield levels from 2006, 2007, 2009 and 2010 are reported.

Two hybrids were split-planted with a six-row John Deere no till planter, three rows of each, two harvested for a yield estimate.

Farmer, co-worker and researcher remarks and suggestions:

- Winter peas provide 75 to 125 lb N to the next crop.
- After two years of work, "you have to wait for the spring growth" to build that nitrogen.
- After four years of observations, winter pea planted the third week of September will overwinter in central Ohio.

## Trial detail across years

### 2006

- Winter pea planted August 16 and September 23, 2005
- Annual ryegrass planted September 23
- Made pass with Great Plains no till drill for "tillage" in wheat stubble comparison
- Corn hybrids – Seed Consultants SC1111 & SC1124A
  - Planted May 3 at 32,097 seed/A drop
- Nitrogen rates – 0, 75, 150 lb N/A – with 75 lb through planter
- Annual ryegrass terminated ten days before planting, remainder of treatments terminated at planting

### 2007

- Winter pea planted August 23 and September 23, 2006
- Annual ryegrass planted September 22
- Soybean planted August 23
- Made pass with Great Plains no till drill for "tillage" in wheat stubble comparison
- Corn hybrids – Seed Consultants SC1111 & SC1124A,
  - Planted May 2 at 32,097 seed/A drop, with Force Insecticide
- Nitrogen rates – 0, 75, 150 lb N/A – with 75 lb through planter
- Annual ryegrass terminated ten days before planting, remainder of treatments terminated at planting

### 2008

Lost due to herbicide carryover in wheat

### 2009

- Winter pea planted July 25, August 26 and September 23, 2008
- Made pass with Great Plains no till drill for "tillage" in wheat stubble comparison
- Corn hybrids – Seed Consultants SC11HQ38 & SC1119
  - Planted May 19 at 35,500 seed/A drop, with Force Insecticide
- Nitrogen rates – 0, 75, 150, 225 lb N/A – with 75 lb through planter
- Cover crop treatments terminated at planting

### 2010

- Winter pea planted September 1, 21 and October 21, 2009
- Made pass with Great Plains no till drill for "tillage" in wheat stubble comparison
- Corn hybrids – Seed Consultants SC11HQ38 & SC1119
  - Planted May 19 at 35,500 seed/A drop, with Lorsban insecticide
- Nitrogen rates – 0, 75, 150, 225 lb N/A – with 75 lb through planter
- Cover crop treatments terminated at planting

Cover Crop Data Tables – Western Research Station 2006

Table 1. Simple effects of the three-way interaction of cover crop, N rate, and hybrid on corn grain yield and crop stand at the Western Research Station in 2006.

Cover crop	N rate, lb/acre	Hybrid	Yield, bu/acre	Stand, plants/plot
None	0	SC1111	134	30.9
	0	SC1124A	138	29.4
	75	SC1111	149	30.5
	75	SC1124A	150	31.4
	150	SC1111	169	31.5
Winter pea (August 16)	150	SC1124A	162	31.4
	0	SC1111	118	31.3
	0	SC1124A	116	30.3
	75	SC1111	144	28.4
	75	SC1124A	147	30.5
Winter pea (September 23)	150	SC1111	192	31.0
	150	SC1124A	174	28.8
	0	SC1111	80	30.1
	0	SC1124A	86	29.9
	75	SC1111	130	25.6
Annual ryegrass (Sept. 23)	75	SC1124A	102	22.0
	150	SC1111	136	22.0
	150	SC1124A	157	27.0
	0	SC1111	22	3.0
	0	SC1124A	48	10.5
	75	SC1111	57	13.4
	75	SC1124A	49	11.8
	150	SC1111	72	11.8
	150	SC1124A	59	8.0

In 2006, no cover crop led to an improvement in yield over wheat stubble alone

Corn crop stand loss due to field mice, stalk borer and cutworm in annual ryegrass residue and one replicate of late planted winter pea and resulting reduced yield. In subsequent years we applied a soil insecticide at planting to avoid this.

Table 2. Simple effects of cover crop type on the corn grain yield at the Western Research Station in 2007.

2007 Western Cover Crop - Yield by Cover cover crop	Mean yield bu/A
pea Sept. 23	135.5
soybean Aug. 23	117.3
annual ryegrass Sept. 22	115.6
pea Aug. 23	114.4
no cover	110.4

In 2007, only September 23 winter pea was significantly higher in yield than wheat stubble (no cover)



Aug 26 pea stubble



Sept 21 pea stubble

Table 3. Effects of cover crop type by nitrogen rate on corn grain yield at the Western Research Station in 2009.

Cover	N rate	Yield bu/A	At 0 lb N rate
No cover	0	80.0	no pea yielded significantly lower than early planted pea (P = 0.0246)
Jul 25 Pea	0	108.4	no pea yielded similar to mid planted pea (P = 0.6623)
Aug 26 Pea	0	85.4	no pea yielded similar to late planted pea (P = 0.0684)
Sept 23 Pea	0	102.9	
No cover	75	107.9	At 75 lb N rate
Jul 25 Pea	75	150.2	no pea yielded significantly lower than early, mid, and late planted pea (P = 0.001, 0.0022, and 0.0033)
Aug 26 Pea	75	147.2	
Sept 23 Pea	75	145.5	
No cover	150	172.6	At 150 lb N rate
Jul 25 Pea	150	190.5	no pea yielded similar to early planted pea (P = 0.1521)
Aug 26 Pea	150	205.5	no pea yielded significantly lower than mid planted pea (P = 0.0096)
Sept 23 Pea	150	191.1	no pea yielded similar to late planted pea (P = 0.1397)
No cover	225	208.7	At 225 lb N rate
Jul 25 Pea	225	212.0	no pea similar to early, mid, and late planted pea (P = 0.7871)
Aug 26 Pea	225	217.0	
Sept 23 Pea	225	204.6	

Table 4. Effects of cover crop type by nitrogen rate on corn grain yield at the Western Research Station in 2010.

Cover	Nrate	Yield bu/A	At 0 lb N rate
no cover	0	46.8	no pea yielded significantly lower than early planted pea (P = 0.0034)
Sept 1 Pea	0	67.4	no pea yielded significantly lower than mid planted pea (P = 0.0114)
Sept 21 Pea	0	64.5	no pea yielded similar to late planted pea (P = 0.8911)
Oct 21 Pea	0	45.8	
no cover	75	67.5	At 75 lb N rate
Sept 1 Pea	75	98.3	no pea yielded significantly lower than early planted pea (P = 0.0001)
Sept 21 Pea	75	97.6	no pea yielded significantly lower than mid planted pea (P = 0.0001)
Oct 21 Pea	75	76.9	no pea yielded similar to late planted pea (P = 0.1716)
no cover	150	128.2	At 150 N rate
Sept 1 Pea	150	149.5	no pea yielded significantly lower than early planted pea (P = 0.0025)
Sept 21 Pea	150	144.4	no pea yielded significantly lower than mid planted pea (P = 0.0196)
Oct 21 Pea	150	138.0	no pea yielded similar to late planted pea (P = 0.1520)
no cover	225	154.8	At 225 lb N rate
Sept 1 Pea	225	170.8	no pea yielded significantly lower than early planted pea (P = 0.0222)
Sept 21 Pea	225	164.0	no pea yielded similar to mid planted pea (P = 0.1843)
Oct 21 Pea	225	155.6	no pea yielded similar to late planted pea (P = 0.9086)

## Recommendations:

**Do not grow annual ryegrass in a C-S-W rotation, it's too difficult to control.**  
**If you want to plant a cover then winter pea is a good choice, plant September 1<sup>st</sup> to the 3<sup>rd</sup> week of the month, plan to use an insecticide.**  
**- If Sept 1, the pea will winter kill – this makes a great no till seed bed for planting corn.**  
**Do not reduce the rate of nitrogen you expect to apply for corn production.**

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