

Research Report 2017
to
Vegetable Research Committee
on
Long-Term Cover Crop Research.

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This is an annual report of two long-term cover crop trial that was initiated in 2007 (site L2E) and repeated 2008 (L2W) and a planting-date trial established in 2008 (site L1). For more detailed results over the years, please see previous reports (crop yields, weeds, insect and disease pressure, N cycling). The focus of this report was to summarize 2017 crop yield.

Methods:

Location: Ridgetown Campus research plots on a sandy loam soil

Two long-term trials: 2 side-by-side sites a year a part initiated in 2007 and 2008 (called L2E and L2W) and a different trial L1 to evaluate cover crop planting date of either Early (July-Aug.) or Late (Aug.-Sept.) depending on main crop.

Design: Randomized complete block design (RCBD) with four replications

Crop Rotation: Processing vegetable crops followed by cover crops. And some field crops.

Cover Crops: TRIAL L2E/L2W

- 1) no cover crop
- 2) oat (seeding rate 72 lb/ac)
- 3) oilseed radish (12)
- 4) winter cereal rye (60)
- 5) oilseed radish & fall rye (8 + 30)

TRIAL L1

- 1) no cover crop
- 2) oat (72)
- 3) oilseed radish (12)
- 4) winter cereal rye (60)
- 5) forage pea (225)
- 6) hairy vetch (25)

Field Operations:

- After main crop harvest, the trial site was disked and cultivated (once or twice depending on crop)
- Cover crops were planted as soon as possible after main crop harvest between mid-July (after peas) and early Sept (after tomatoes)
- Cover crops were planted with a drill
- Cover crops were left over winter
- In early May the following year, rye was terminated (glyphosate sprayed on whole trial)
- Cover crop residue was incorporated (disked and cultivated) and the main crop planted (mid-May to early June)
- Main crop was grown according to typical grower production practices

Research Results:

Cover crop growth in fall and following spring (Table 1)

- The cover crops grew well, accumulating over 2000 lb/ac dry matter except late-planted hairy vetch (425 lb/ac). This amount of biomass is typical with a mid-Aug. planting, and late frost
- Early-planted (26 July) cover crops generally had more aboveground growth than late-planted (22 Aug) but it depended on the cover crop
- For the most part, there were few differences in early- and late-planted cover crops in the amount of N taken up in by the plant. This was likely due to differences in stage of development (i.e., early-planted radish was blooming and setting seed).
- Crop residues the following spring were greater than 1000 lb/ac, an amount generally accepted to reduce erosion and nutrient loss.
- The following spring, winter-killed cover crop residues contained only 10 lb/ac nitrogen
- Hairy vetch and cereal rye were growing in the spring and contained 24 to 63 lb/ac of nitrogen.

Table 1. Effect of cover crop species and planting date on above-ground cover crop growth parameters in fall 2017.

Cover crop		October 2016			3 May 2017		
Planting date	Species	Dry biomass lb/ac	N content lb/ac	C:N	Dry biomass lb/ac	N content lb/ac	C:N
Early 26 July 2016	Oat	2184 bc	55.6 bcd	18.7 c	875 abc	11.9 c	24.2 bc
	Cereal rye	3620 b	148 a	11.1 d	1290 abc	24.6 b	23.5 bc
	Oilseed radish	7620 a	82.7 abcd	42.5 a	1350 ab	12.4 c	46.3 a
	Forage pea	2013 bc	42.0 cd	24.6 b	775 c	11.4 c	23.7 bc
	Hairy vetch	2290 b	91.4 abc	10.7 d	1190 abc	32.5 b	13.9 cd
Late 22 Aug 2016	Oat	2170 bc	85.7 abcd	11.0 d	859 abc	11.8 c	21.9 bcd
	Cereal rye	3830 b	129 ab	10.3 d	1680 a	24.4 b	29.3 b
	Oilseed radish	2970 b	109 abc	11.2 d	892 abc	10.6 c	28.0 b
	Forage pea	2950 b	112 ab	10.7 d	996 abc	13.3 c	22.8bcd
	Hairy vetch	425 c	25.3 d	8.34 d	1750 a	63.7 a	11.2 d
	SE	796.606	27.181	1.6212	202.02	3.7050	3.998
P values	Cover	0.0166	0.2416	<.0001	0.0193	<.0001	0.0032
	Date	0.0021	0.4078	<.0001	0.2487	0.0329	0.1578
	Cover*Date	0.0001	0.0047	<.0001	0.078	0.002	0.0567

Crop Yields

- In 2017, soybean yield, moisture or test weight was not affected by long-term cover cropping (9 yr) (Table 2).
- Cover crops planting date (either in late July or mid-Aug.) did not influence following soybean yield (Table 2).
- In 2016 and 2017, neither processing pea yield, tenderometer readings, nor adjusted-yields were affected by cover crops (Table 3).
- In 2017, sweet corn yield was not influenced by long-term cover cropping (9yr). Nitrogen fertilizer increased yield by 2.6 ton/ac (Table 4). This will be repeated in 2018.

Table 2. Effect of long-term cover cropping (9 years) and cover crop planting date on soybean yield in 2017 (Site: L1).

Cover crop	Yield† (bu/ac)	Moisture (%)	Test weight (g/0.5L)
No cover	44.2	12.9	354
Oat	40.4	12.7	353
Forage pea	44.1	12.8	351
Radish	42.9	12.8	353
Cereal rye	42.3	12.7	356
Hairy vetch	45.2	12.8	356
se	2.2065	0.1558	1.3108
Cover Crop Planting Date			
Early (July)	43.0	12.8	354
Late (Aug.)	43.6	12.8	354
se	1.2731	0.1057	0.6329
P values			
Cover	0.7197	0.341	0.1943
Date	0.6062	0.5578	0.9678
Cover*Date	0.9041	0.7348	0.8726
CV	11.5	2.58	0.954

†Yield corrected for moisture (13%)

Table 3. Effect of long-term cover cropping (8 years) on processing fresh pea in 2016 and 2017†.

Cover crop	2016			2017		
	Yield	Tenderometer reading	Tenderometer corrected yield‡	Yield	Tenderometer reading	Tenderometer corrected yield‡
	lb/ac	PSI	lb/ac	lb/ac	PSI	lb/ac
No cover	2600	56.3	4100	5790	111	5980
Oats	2280	58.8	3710	4590	102	5260
Radish	1750	53.3	3340	5400	101	6110
Radish + RYE	1980	58.5	3420	5050	96.4	6210
Rye	1710	58.3	3160	4540	104	5020
SE	337.7	2.191	296.14	595.05	4.422	697.8
CV	33.5	7.78	17.6	25.8	16.9	26.4
P value	0.3046	0.2022	0.2457	0.474	0.214	0.4941

†Based on 20 plots in 2016 (Trial name: L2E) and 40 plots in 2017 (L2W). Peas were grown with 36 lb/ac (actual N) of 27-0-0 applied preplant, broadcast incorporated

‡Yield adjustment of ± 28 lb/ac from target of 110 PSI in 2016. Adjustment in 2017 based on Agricornp conversion factor to target of 110 PSI.

Table 4. Effect of long-term cover cropping (9 years) and fertilizer nitrogen on processing sweet corn yield in 2017 (trial L2E).

Effect	Treatment	Yield (ton/ac)
Cover crops	No cover	6.05
	Oats	6.06
	Radish	7.78
	Radish + RYE	6.70
	Rye	7.20
	se	0.5651
Fertilizer N†	125 lb/ac	8.05 a
	Zero	5.46 b
	se	0.3082
P value	Cover	0.2012
	Nrate	<.0001
	Cover*Nrate	0.7694
	CV	28.5

†Preplant broadcast incorporated 27-0-0.