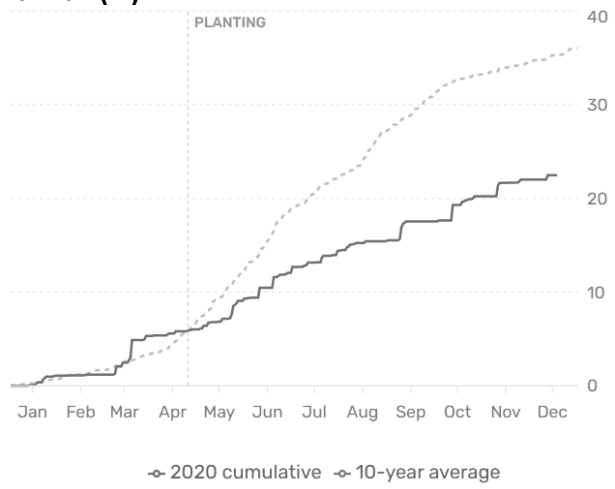
Rye Cover Crop Seeding Rate Effects on Non-Irrigated Corn

Study ID: 0919053202001
County: Dodge
Soil Type: Alcester silty clay loam 2-6% slopes; Moody silty clay loam 2-6% slopes; Moody silty clay loam 6-11% slopes; Monona silt loam 0-2% slope
Planting Date: 4/25/20
Harvest Date: 10/1/20
Seeding Rate: 30,012
Row Spacing (in): 30
Hybrid: Pioneer® P1244AM YGCB HX1, LL, RR2
Reps: 4
Previous Crop: Soybean
Tillage: No-Till
Herbicides: ***Pre:*** 2.8 oz/ac Balance® Flexx, 45.16 oz/ac Harness® Xtra, 7.53 oz/ac NutriSphere-N® HV, and 30.1 oz/ac Roundup Ultra® MAX on 4/27/20 ***Post:*** 1.5 lb/ac AMS, 7.98 oz/ac atrazine 4L, 1.5 oz/ac Enlite®, 2.99 oz/ac Laudis®, and 31.93 oz/ac Roundup Ultra® MAX on 6/9/20

Foliar Insecticides: None
Foliar Fungicides: None
Fertilizer: 144 lb/ac N as anhydrous ammonia on 11/12/19; 5 gal/ac 10-34-0 on 4/23/20; 44 lb/ac N as 32% UAN on 4/27/20
Irrigation: None
Rainfall (in):



Introduction: The objectives of this study were to evaluate the effect of rye cover crops on soil characteristics and the following corn crop yield. The rye cover crops were planted at three different seeding rates: 30 lb/ac, 60 lb/ac, and 90 lb/ac and included a 0 lb/ac control. The cover crop was planted by drilling on October 19, 2019. Rye biomass was sampled on April 27, 2020, from 20 ft^2 per plot. Biomass was oven-dried, weighed, and analyzed for carbon and nitrogen content. The cover crop was terminated on April 27, 2020, at a height of 12". Corn was planted on April 25, 2020, in 30" row spacing at a planting depth of 2.5". Soil samples were taken on April 30, 2020, for chemical and biological analysis at a 0-8" depth. The corn crop was harvested on October 1, 2020. Corn yield and net return were evaluated.

Results:

	----------Cover Crop--------		----------Soil (0-8")----------						
	Dry Biomass (lb/ac)	Biomass N (lb/ac)	Nitrate (lb/ac)	P (ppm)	K (ppm)	C %	Microbial Biomass (ng/g)	Bacteria Biomass (ng/g)	Fungi Biomass (ng/g)
Check	N/A	N/A	37.9 A	86 A	155 A	2 A	1,174 A	570 AB	102 A
30 lb/ac	293 B*	15.4 A	39.4 A	113 A	182 A	2 A	1,231 A	529 AB	79 A
60 lb/ac	459 AB	22.8 A	23.6 A	103 A	210 A	2 A	962 A	403 B	84 A
90 lb/ac	594 A	28.4 A	20.8 A	80 A	176 A	2 A	1,364 A	701 A	111 A
P-Value	0.114	0.162	0.237	0.108	0.287	0.153	0.411	0.067	0.718

	Corn			
	Stand Count (plants/ac)	Moisture (%)	Yield (bu/ac)†	Marginal Net Return‡ ($/ac)
Check	28,167 A	15.3 B	275 A	966.26 A
30 lb/ac	26,917 A	15.7 AB	274 A	941.83 AB
60 lb/ac	25,819 A	15.8 AB	280 A	959.26 AB
90 lb/ac	28,708 A	16.1 A	272 A	926.77 B
P-Value	0.138	0.023	0.312	0.086

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $3.51/bu corn, $19.82/ac for 30 lb/ac rye seed and drilling, $24.64/ac for 60 lb/ac rye seed and drilling, and $29.46/ac for 90 lb/ac rye seed and drilling.

Summary:

- Cover crop total dry biomass increased with increasing rye seeding rate. Cover crop biomass N (lb/ac) was not statistically different between the three rye seeding rates.
- Soil nitrate, P, K, and C at 0-8" were not different between the rye seeding rates. Total microbial biomass was also not different between the rye seeding rates.
- Corn yield was not impacted by the rye treatments. Corn grain moisture was higher following the 90 lb/ac rye treatment compared to the no cover crop check. The 90 lb/ac rye treatment also had lower net return compared to the no cover crop check.

Sponsored by: University of Nebraska Lincoln

In Partnership with: Nebraska Corn Board; Nebraska Soybean Checkoff; Nebraska Corn Growers Association; Nebraska Dry Bean Commission