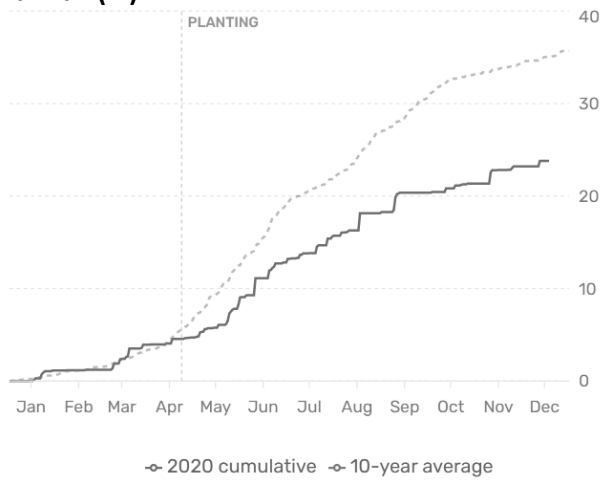
Rye Cover Crop Seeding Rate Effects on Irrigated Corn

Study ID: 0129155202001
County: Saunders
Soil Type: Alda fine sandy loam occasionally flooded
Planting Date: 4/23/20
Harvest Date: 10/29/20
Population: 32,500
Row Spacing (in): 30
Hybrid: Pioneer® P1563AM
Reps: 4
Previous Crop: Soybean
Tillage: No-Till
Herbicides: ***Pre:*** 10 oz/ac Verdict®, 48 oz/ac Roundup® on 4/21/20 ***Post:*** 5 oz/ac Status®, 3 oz/ac Callisto®, and 1 pt/ac AAtrex® applied 6/5/20
Seed Treatment: Poncho® 250
Insecticides: Capture® with planting; 5 oz/ac Brigade® aerially applied on 7/26/20
Foliar Fungicides: 7 oz/ac Veltyma™ aerially applied on 7/26/20

Fertilizer: 3 gal/ac 10-34-0, 1 pt/ac zinc, 1 gal/ac Humi[K] as starter; 5 gal/ac 32% UAN, 15 gal/ac 10-34-0, 1 gal/ac thiosulfate, 2 gal/ac Humi[K] applied 4/23/20; 40 gal/ac 32% UAN, 3 gal/ac thiosulfate applied 6/15/20; 15 gal/ac 32% UAN, 3 gal/ac thiosulfate fertigated 7/15/20
Irrigation: Pivot, Total: 8"
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 cereal rye cover crops (variety not stated) 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 16, 2019. Rye biomass was sampled on April 22, 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 22, 2020, at a height of 6". Corn was planted on April 23, 2020, in 30" row spacing at a planting depth of 1.75". 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 29, 2020. Corn yield and net return were evaluated.

Results:

	----------Cover Crop----------			----------Soil (0-8")----------				----------Corn----------		
	Dry Biomass (lb/ac)	Biomass N (lb/ac)	C:N	Nitrate (lb/ac)	P (ppm)	K (ppm)	Microbial Biomass (ng/g)	Stand Count (plants/ac)	Yield (bu/ac)†	Marginal Net Return‡ ($/ac)
Control	N/A	N/A	N/A	9.4 A	14 A	103 A	1,432 A	30,167 A	262 A	918.81 A
30 lb/ac	229 B	10.0 A	10 C	4.6 B	25 A	95 A	1,601 A	29,250 A	264 A	906.28 A
60 lb/ac	317 A	11.7 A	12 B	4.7 B	16 A	94 A	1,593 A	30,417 A	268 A	911.29 A
90 lb/ac	361 A	12.0 A	13 A	4.3 B	25 A	93 A	1,784 A	31,333 A	269 A	910.09 A
P-Value	0.013	0.137	0.0001	0.001	0.357	0.632	0.686	0.226	0.513	0.912

*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, $21/ac for 30 lb/ac rye seed and drilling, $27.60/ac for 60 lb/ac rye seed and drilling, and $34.20/ac for 90 lb/ac rye seed and drilling.

Summary:

- Cover crop total dry biomass was greater for the 60 lb/ac and 90 lb/ac seeding rate. Cover crop biomass N (lb/ac) was not statistically different between the three rye seeding rates; however, cover crop C:N ratio increased with increasing rye seeding rate.

- Soil nitrate at 0-8" was significantly reduced where the rye cover crop was planted; there was no difference in soil nitrate between the rye seeding rate treatments. Soil P, K, and total microbial biomass at 0-8" were not different between the rye seeding rates.
- There were no differences in corn yield or marginal net return between any of the treatments.

Sponsored by: University of Nebraska Lincoln

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