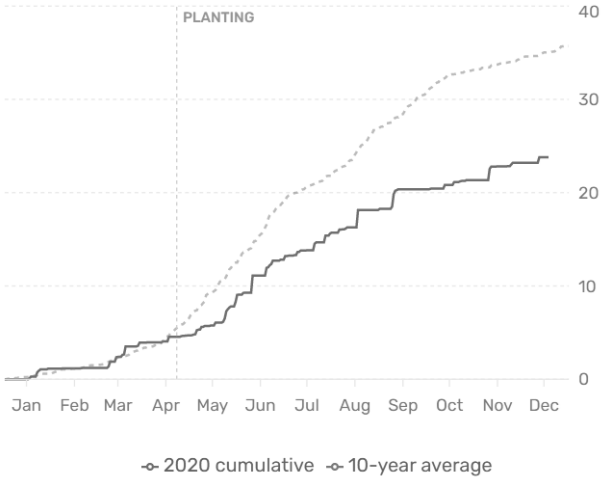
Rye Cover Crop Seeding Rate Effects on Irrigated Soybean

Study ID: 0129155202002
County: Saunders
Soil Type: Alda sandy loam occasionally flooded
Planting Date: 4/22/20
Harvest Date: 10/1/20
Population: 144,000
Row Spacing (in): 18
Hybrid: Pioneer® P28A42X
Reps: 4
Previous Crop: Corn
Tillage: No-Till
Herbicides: ***Pre:*** 10 oz/ac Veltyma™, 48 oz/ac Roundup® on 4/21/20 ***Post:*** None
Seed Treatment: None
Foliar Insecticides: 2.8 oz/ac Leverage® 360 aerially applied on 8/2/20
Foliar Fungicides: 4 oz/ac Fitness®, 4 oz/ac Priaxor® aerially applied on 8/2/20

Fertilizer: 100 lb/ac 11-52-0, 100 lb/ac 0-0-60, 25 lb/ac ammonium sulfate broadcast fall 2019
Irrigation: Pivot, Total: 9"
Rainfall (in):



Introduction: The objectives of this study were to evaluate the effect of rye cover crops on soil characteristics and the following soybean 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 29, 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". Soybeans were planted on April 22, 2020, at a planting depth of 1.5". Soil samples were taken on April 30, 2020, for chemical and biological analysis at a 0-8" depth. Soybeans were harvested on October 1, 2020. Soybean yield and net return were evaluated.

Results:

	----------Cover Crop---------			----------Soil (0-8")----------				----------Soybean----------		
	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	8.6 A	9 A	107 A	1,723 A	102,850 A	76 A	717.23 A
30 lb/ac	40 C*	2.0 B	9 A	8.1 A	13 A	138 A	1,463 A	98,494 A	74 A	684.98 A
60 lb/ac	71 B	3.2 AB	9 A	7.5 A	12 A	106 A	1,838 A	101,882 A	76 A	689.48 A
90 lb/ac	98 A	4.0 A	10 A	5.6 A	13 A	103 A	2,064 A	100,430 A	75 A	678.50 A
P-Value	0.002	0.021	0.148	0.143	0.567	0.133	0.915	0.989	0.937	0.304

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $9.50/bu soybean, $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 biomass increased with increasing seeding rate, but was overall very low. Cover crop biomass N (lb/ac) was higher for the 90 lb/ac seeding rate than the 30 lb/ac seeding rate. Cover crop C:N ratio was the same for all rye seeding rates.

- Soil nitrate, P, K, and total microbial biomass at 0-8" were not significantly impacted by the rye seeding rates.
- There were no differences in soybean yield or marginal net return between any of the treatments.

Sponsored by: University of Nebraska Lincoln

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