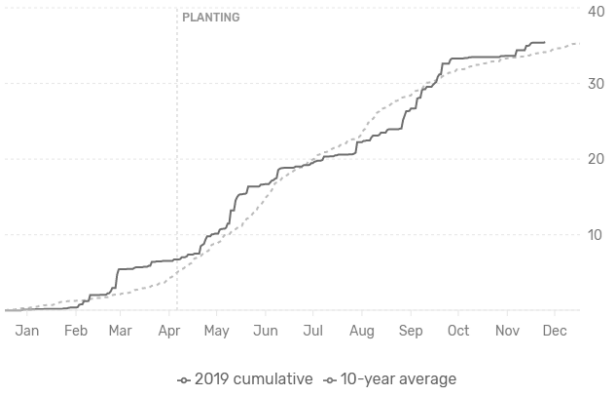
Rye Cover Crop Seeding Rate Effects on Non-irrigated Soybean

Study ID: 0919053201901
County: Dodge
Soil Type: Alcester silty clay loam 2-6% slopes; Moody silty clay loam, 2-6% slope; Moody silty clay loam, 6-11% slope; Monona silt loam terrace, 0-2% slope
Planting Date: 4/20/19
Harvest Date: 10/17/19
Seeding Rate: 130,000
Row Spacing (in): 15
Variety: Pioneer® P25A54X
Reps: 4
Previous Crop: Corn
Tillage: No-Till
Herbicides: ***Pre:*** 15 gal/ac, of carrier AMS, 32 oz/ac Roundup PowerMAX®, and 0.32 lb/ac Sonic® on 4/19/19 ***Post:*** 20 gal/ac, 2 lb carrier AMS, 7 oz/ac crop oil, 32 oz/ac Roundup PowerMAX®, 5 oz/ac Section® Three, 11 oz/ac Sinister™ on 6/26/19

Foliar Insecticides: None
Foliar Fungicides: 2 oz/ac Stratego® YLD 7/22/19
Fertilizer: None
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 soybean 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 experimental design was randomized complete blocks with 4 replications. The cover crop was planted by drilling on October 19, 2018 in 15" rows. The cover crop was terminated on April 19, 2019 with 32 fl oz/ac Roundup PowerMAX®. Cover crop height at the time of termination was 6-12". Soybeans were planted on April 20, 2019 in 15" row spacing at a planting depth of 1.25". The final soybean stand was around 100,000. The soybean crop was harvested on October 17, 2019. Cover crop biomass, soil samples, soybean yield, and net return were evaluated.

Results:

	-----Cover Crop-----		----------Soil (0-8")----------				----------Soybeans----------		
	Dry Biomass (lb/ac)	Biomass N (lb/ac)	Nitrate (ppm)	P (ppm)	K (ppm)	Total Microbial Biomass (ng/g)	Moisture (%)	Yield (bu/ac)†	Marginal Net Return‡ ($/ac)
Check	0 D*	0.0 C	7.5 A	57.3 A	154.6 A	2,696.3 A	11.4 A	63 A	510.16 A
30 lb/ac	90 C	4.8 B	7.3 A	56.6 A	153.6 A	2,203.3 A	11.5 A	63 A	489.44 A
60 lb/ac	129 B	6.4 AB	5.5 B	77.6 A	168.7 A	2,399.1 A	11.4 A	62 A	474.09 A
90 lb/ac	172 A	8.0 A	5.3 B	61.4 A	152.4 A	2,540.3 A	11.4 A	64 A	485.22 A
P-Value	<0.0001	<0.0001	0.002	0.510	0.665	0.244	0.181	0.942	0.644

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre adjusted to 13% moisture.
‡Marginal net return based on $8.10/bu soybean, $23.88/ac for 30 lb/ac rye seed and drilling, $29.76/ac for 60 lb/ac rye seed and drilling, and $35.64/ac for 90 lb/ac rye seed and drilling.

Summary:

- Cover crop total dry biomass increased with increasing rye seeding rate. Total biomass N followed a similar trend.
- Soil nitrate concentration in 0-8” was significantly reduced for the 60 lb/ac and 90 lb/ac rye treatment, compared to the no cover crop check and 30 lb/ac treatment.
- There were no differences in total microbial biomass, moisture, yield, or marginal net return between any of the treatments.

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