

2011 Progress Report: SARE Program

Project Identification: Skip Row Corn Planting Techniques with Cover Crops for Sustainable Grazing

Project Number: FNC10-817

Project Leader: Harry Cope

Description of Project:

In solid row stands, canopy density light penetration limits winter cover crop establishment until midpoint of crop senescence. By skipping planter rows at corn establishment extra light would allow earlier planting with dealer available high clearance ground equipment. An earlier emerging and more robust cover crop would result in greater forage mass, higher quality forage and lower grazing costs for 400 feeder lambs followed by ewes and beef cattle. Skip-rows would also allow ease of controlled grazing with portable electric fencing.

Summary:

The 2010 year had ample rainfall. Late season rains allowed a late emerging stand of fall panicum, which dominated the biomass dry matter per acre. Corn yields were impacted by the panicum. In addition, the cereal rye and the Graza radish cover crop species did not germinate in any of the treatments. Field peas, Winford turnip kale dominated the cover crops harvested with some spring oats. In a good moisture year the higher corn population treatments yielded the best.

In the 2011 study year weather forced a replant and dry weather limited corn yields. However, with a soil applied herbicide, few weeds grew and cover crop species dominated. Oats and Winford turnip kale dominated the mix. In a dry year the lower population of corn populated yielded the highest. Once again the cover crop radish did not germinate.

Observations suggest that increasing cover crop seeding rates is necessary to result in enough cover crops feed for livestock. In addition, uncertainty in weed control suggests that skip-row planting may not result in enough extra dry matter per acre to be worth losing corn grain.

The study to date indicates some changes in cover crop species mix is necessary for greater cover crop yield; using soybeans in place of skip-rows could greatly increase pounds per acre of grazing; and the continued use of pre-emerge herbicides is necessary for weed suppression.

Measurable Objectives:

The study captured seed at the soil level to measure potential differences in seed to soil contact by population and row spacing.

In addition, the below the corn canopy biomass was measured and converted to air dried weights at corn harvest. The cover crop species were separated from weeds and both were adjusted for pounds per acre of biomass.

The corn grain was harvested and converted to standard moisture and weight and reported in bu/acre.

Procedures:

The study used a randomized complete block planting plan with five replications. Each of the treatment plots was 0.75 acres in size for a total study size of fifteen acres. The treatments were:

26,000 corn population in six rows (SS26), control treatment

20,000 corn population in six rows (SS20)

26,000 corn population dropped in planter rows 1-3-4-6, skipping rows 2 and 5 (SK26)

32,000 corn population dropped in planter rows 1-3-4-6, skipping rows 2 and 5 (SK32)

2010 Pre-project Year:

Glyphosate was used as a burndown and as a post emergent herbicide. No soil residual herbicide was used. In 2011, glyphosate was used in a preplant burndown application with Dual Magnum II for a soil residual.

Cover crop seed was broadcast on June 30, 2010 at the V9-10 stage of growth with a John Deere high clearance dry fertilizer applicator. Trays placed between corn rows captured seed at the soil level. Seeding rates were: Graza radish @ 2.3 lb/ac; cereal rye @ 16.4 lb/ac; spring oats @ 19.5 lb/ac; Winford turnip kale @ 2.3 lb/ac; and field peas @ 13.6 lb/ac.

Cover crops forage was cut, separated from weeds and dry matter calculated at the time of harvest (October). A representative portion of the treatments was machine harvested and adjusted for moisture and standard weight.

2011 Project Year

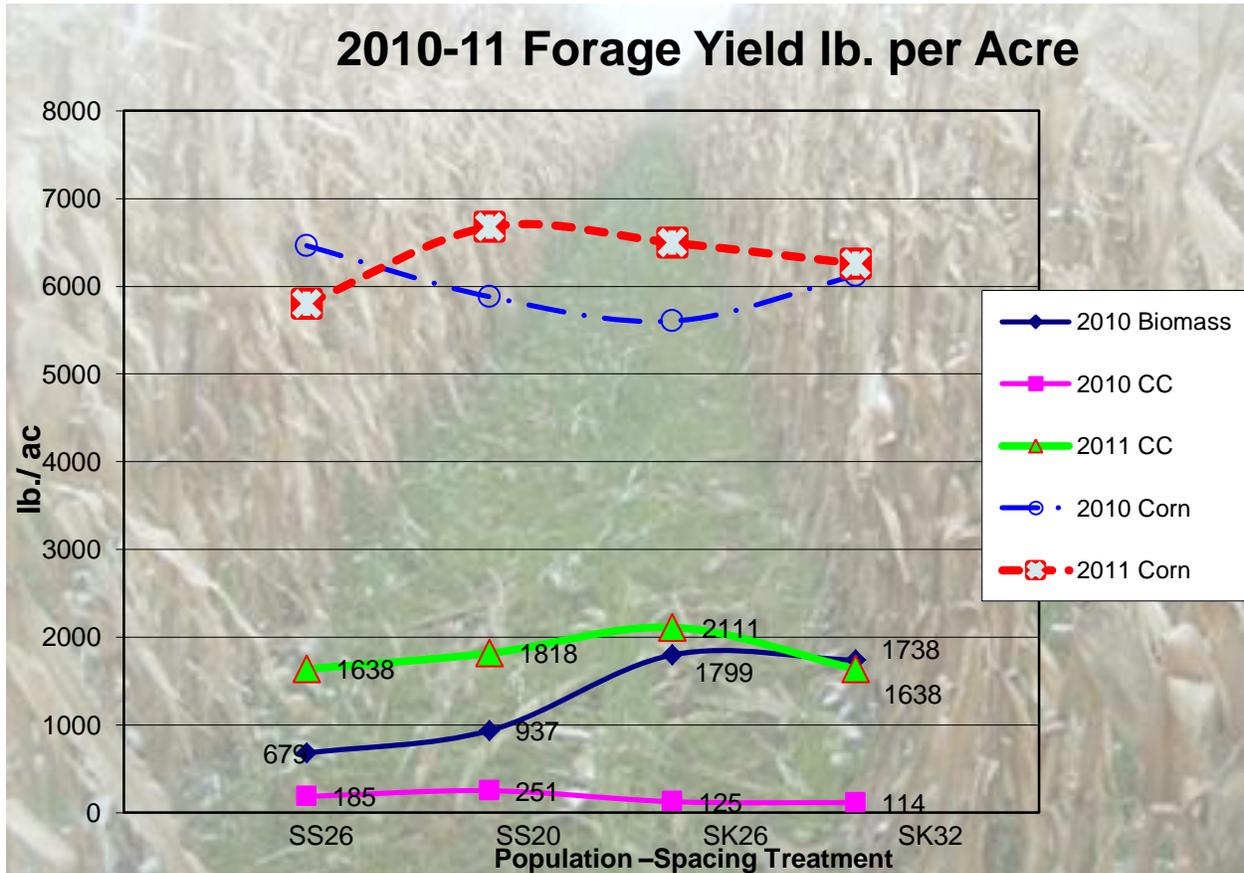
The study was repeated in 2011. Corn was planted in tilled soil in April with Prowl herbicide for soil residual weed control. Weather conditions and a poor stand forced a replant in late May.

The timing of the cover crop seed was changed to the end of July at the VT stage of growth. Broadcast was with a John Deere high boy tractor with a spinner box attached. Cereal rye was dropped from the cover crop mix and annual ryegrass was added.

Corn harvest was by hand at three locations in each plot. Ears were shelled using a stationary plot combine and adjusted for standard moisture and weight for bushel per acre results.

Results:

The chart below lists the results of the pre-grant and first year grant corn grain and cover crop biomass yields.



In 2011 feeder lambs were assigned to two treatments of solid-row treatments and skip-row treatments, with three replications. Tagged lambs were individually weighed in and out of treatment replications. It soon became apparent that the amount of cover crops was not sufficient and the animals were weighed at a nine day interval and a small square bale of hay was added each day to balance the nutritional requirements. Lambs were weighed at the end of 27 days. Lambs were given free choice in corn/cover crop field and adjacent mixed legume-grass pasture.

	27 Day Average Gain			Average
	Rep 1	Rep 2	Rep 3	
SS	3	-0.6	1.2	1.2
SK	1.2	3.6	-2.6	0.73

Work Plan for 2012

The study will be repeated in 2012 for the final year of the study. Observations and data collected suggest some changes in the final years study. The skip-rows will be planted to maturity group VI or VIII to generate more pounds dry matter per acres and prevent late season weeds from reducing cover crop yields. In addition, radishes and kale will be dropped from the cover crop seeding mix and oats, and annual ryegrass seeding rates will be increased. Additions to the cover crop species mix will include: crimson clover and annual ryegrass.

The feeding portion of the study will be modified to reflect what was learned in 2011. Lambs will be selected and individually weighed prior to being assigned to treatments:

--pasture grazing only

--free choice standing corn/cover crops (weather dependent on successful cover crop stand)

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Outreach:

The field study was used by University of Missouri Extension and the Missouri NRCS/SWCD in a SARE PDP called "Cover Crop Use in Crop and Livestock Systems" held on October 14-15, 2010.