Mississippi Cover Crop Variety Trials, 2021

Introduction

Many seed companies and retailers that specialize in forage crops have expanded some of their products to act as cover crops. Cover crops are typically planted before a grain crop for several reasons. Cover crops can provide and stabilize N for the subsequent crop and add organic matter to the soil or increase weed suppression during the off season. Cover crops can also add root structure and ground cover to hold soil in place during rainfall, increasing the overall quality of the soil for the following crop. While legumes are valued for their ability to add nitrogen to the soil through fixation, grass crops can have an allelopathic effect towards invasive weed species.

Protocol

Varieties of several cover-crop species were evaluated during 2020-2021 at the Mississippi Agricultural and Forestry Experiment Station's (MAFES) small-plot trials. Entries were submitted by seed companies as well as breeding programs at state universities. All entries from privately owned companies are tested on a fee basis. Selected varieties that are publicly or commercially available may have been added by MAFES Forage Variety Testing program as a reference check for comparison purposes. In addition, varieties of interest to the region may also be added when applicable. Testing during 2020-2021 was conducted at the following locations: Leveck Animal Research Center at the Mississippi State campus, Coastal Plain Branch Experiment Station at Newton, and Black Belt Branch Experiment Station at Brooksville.

The cover crop trial was planted at all locations in October 2020. Plots were 6 feet by 10 feet and planted using a precision-cone seeder on a prepared seedbed. The trial was designed as a strip plot replicated three times with harvest/termination date representing a single strip. Recommended seeding rates used are presented in Table 1. Individual strips were harvested March 15, April 1, and April 15 to best represent cover crop incorporation before typical commodity crop production (corn, cotton, soybeans) in Mississippi.

Table 1. Recommended seeding rates for cover crops.

Type/Species	Rate (lb/A)
Small Grains	
Cereal Rye	100
Legumes	
Hairy Vetch	25
Berseem Clover	20
Balansa Clover	4
Ball Clover	3
Crimson Clover	30
Persian Clover	8
Winter Pea	40
Red Clover	10
Brassica	
Rape	4
Radish	4
Turnip	4

All plots were harvested to a 3-inch stubble height. Plots were harvested using a Winterstieger Cibus F plot harvester equipped with a reel-type header that collected a

4.8-foot-by-10-foot swath to calculate total yield. A subsample was collected and dried at 130°F until constant weight was achieved to calculate dry matter (DM) concentration. Forage quality was estimated using NIR (Foss 2500, Foss North America, Eden Prairie, Minnesota) and the 2018 mixed hay equation of the NIRS Forage and Feed Testing Consortium (Madison, Wisconsin). Data were used to populate a "Nitrogen Availability Calculator" Model (http://aesl.ces.uga.edu/mineralization/) developed by the University of Georgia College of Agriculture and Environmental Sciences (Athens, Georgia) to report estimated N availability after 2 weeks, 4 weeks, and 12 weeks after termination. Economics data were calculated using local (Mississippi) retail cost of seed from two sources per variety with that cost added to a fixed planting cost of $13 per acre (Falconer et al., 2016). Nitrogen value was presented as a national average value, and data were analyzed using the General Linear Model (PROC GLM) of SAS. Mean separation was conducted using LSD at α = 0.05.

Data presented in Tables 2–16 can be used to evaluate the performance of each forage crop within its respective trial. Mean and harvest comparisons were evaluated statistically by using the least significant difference (LSD) test at the probability level of α = 0.05. The LSD value represents the minimum amount of yield that must be observed between any two varieties to determine if the difference was due to variety variation alone. Sources of seed are presented in Table 17.

Starkville Results

In Starkville the greatest mean dry matter (DM) was observed when termination was delayed until April 15 (Table 2–3). March 15 proved to be too early for adequate growth to be achieved in all but the cereal rye plots. Total N availability was the greatest in berseem clover, red clover, and winter pea by April 1 with a slight decrease when termination was delayed until April 15 (Tables 4–5). Despite the increase in total N for clover entries, mean available N for all entries was similar by the 3-month time period for the April 1 and April 15 harvests.

Table 2. Dry matter yields of cover crop varieties at three termination dates in Starkville.

Variety	Species	March 15 termination	April 1 termination	April 15 termination
		lb/A	*lb/A*	*lb/A*
Bates RS4	Rye	2040	4841	3609
Elbon	Rye	656	3453	3771
NF95319b	Rye	2028	4601	2566
NF97325	Rye	1623	4563	3178
NF99362	Rye	—	5954	4510
Vivant	Turnip	13	1460	2158
Jackpot	Turnip	99	1699	1632
Aerifi	Radish	—	447	1297
Fixation	Balansa C.	—	774	2050
Frosty	Berseem C.	420	3178	4097
Go-Per-12	Persian C.	—	853	2651
Driller	Radish	—	568	716
Survivor	Winter Pea	136	2744	2895
Dynamite	Red C.	—	2183	2524
Q	Red C.	—	2426	3425
Purple Top	Turnip	44	2406	3790
Essex Rape	Rape	183	1121	1780
Mean		453	2545	2744
LSD (0.05)		370	963	2294
CV		40	22	42

Planted: 10/8/20
Soil: Marietta Fine Sandy Loam