

MISSISSIPPI SUNN HEMP

VARIETY TRIALS, 2023

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MISSISSIPPI'S OFFICIAL VARIETY TRIALS



MISSISSIPPI STATE UNIVERSITY™
MS AGRICULTURAL AND
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Trade names of commercial and public varieties tested in this report are included only for clarity and understanding. All available names (i.e., trade names, experiment code names or numbers, chemical names, etc.) and varieties, products, or seed sources in this research are listed on page 7.

Mississippi Sunn Hemp Variety Trials, 2023

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INTRODUCTION

Sunn hemp is a tropical legume with the potential to be a productive forage as well as quick-growing cover crop in the Southeast. It is claimed to be drought tolerant, but little growth is achieved when rainfall is limited due to a shallow root system (Fig. 1). However, it remains regulated in the state of Mississippi as opponents argue that it may become an invasive species. This point, however, is contradicted by the USDA and other entities under the argument that it does not produce seed in the continental United States. According to the USDA, sunn hemp has the potential to produce 500-2200 lbs. seed per acre but is not considered likely to produce seed above 28-degree latitude.

To maintain forage nutritive value to satisfy livestock requirements, it is suggested that sunn hemp be harvested 45 days after planting. In doing so, lignin concentrations and stem-to-leaf ratio will be low enough to provide high crude protein (CP) and total digestible nutrient (TDN) values for grazing livestock. Much is mentioned of sunn hemp dry matter (DM) yield when utilized as a green manure, which maximizes above-ground biomass (5000 lbs. DM/A). However, little is reported on forage DM yield, which must be considered in conjunction with forage nutritive value.



Figure 1. Sunn hemp shallow tap root system.

PROTOCOL

Varieties and brands of sunn hemp (*Crotalaria juncea*) were evaluated in small-plot forage and seed trials. Entries were provided by seed companies and other institutes as well as purchased from commercially available sources. Testing was conducted at the following locations: MAFES H. H. Leveck Animal Research Center Forage Unit on the Mississippi State University campus, MAFES Black Belt Branch Station in Brooksville, MAFES Coastal Plain Branch Station in Newton, and MAFES McNeill Research Unit in McNeill.

Sunn hemp was planted at these four locations in June. At all locations, soil samples were taken and analyzed by the Mississippi State University Soil Testing Laboratory. Trial areas were amended with lime and fertilized with phosphorus (P_2O_5) and potassium (K_2O) according to the soil test recommendations for individual species. Plots were 6 ft. x 10 ft. and planted using an ALMACO precision cone seeder on a prepared seedbed. The trial design was a randomized complete block replicated four times. Sunn Hemp was planted at a rate of 25 lbs./acre. Individual trials were harvested approximately 45 days after planting except for the fourth replication, which was allowed to mature to evaluate flowering and seed yield. All plots were harvested to a three-inch stubble height using a Winterstieger Cibus F equipped with a forage plot harvester reel type header that collected a 4.8 ft. x 10

ft. swath to calculate the total yield. A subsample was collected and dried at 130°F until a constant weight was achieved to calculate DM concentration. Data were analyzed using the General Linear Model (PROC GLM) of SAS, and mean separation was conducted using LSD at $\alpha = 0.05$. Subsamples were ground to pass through a 1-mm screen using a Wiley mill. Forage nutritive value was estimated using a Foss DS2500 NIR and applying the legume hay equation developed by the NIRS Forage and Feed Testing Consortium.

Data presented in Tables 1-4 are used to evaluate the performance of each entry within its respective location. Forage yield and nutritive quality comparisons were statistically evaluated by using the least significant difference (LSD) test at the probability level of $\alpha = 0.05$. The LSD value represents the minimum amount of dry matter yield (lb. DM/A) that must be observed between any two varieties to determine if the difference was due to the variety's performance alone. Tables 5 and 6 represent observations from one replication that was not statistically analyzed. Sources of seed are presented in Table 7.

RESULTS

Plots at McNeill were subject to extreme herbivory from deer (Fig. 2). As a result, McNeill was not considered for data collection. Dry matter yields were collected from Starkville, Brooksville, and Newton in a single harvest at each location (Table 1). Mean yield was the greatest in Brooksville and Newton while

Starkville produced about a ton of DM after 45 days of growth. Dry matter production was not significant among entries. Plots planted before June had suppressed growth due to cool spring temperatures (Fig. 3).



Figure 2. Sunn hemp under heavy herbivory in McNeill, MS



Figure 3. May planted sunn hemp in competition with crabgrass

Table 1. Sunn hemp dry matter yield in Starkville, Brooksville, and Newton MS during the 2023 growing season.

Harvest Date			
Variety/Brand	Starkville	Newton	Brooksville
Harvest Date	7/19/23	7/16/23	7/26/23
lb. DM /A			
Petcher	2294	3211	2855
Loei	1833	2766	2997
Crescent Sunn	1977	2917	2920
Hancock Seed	1837	2385	2791
Tillage Sunn	2504	2402	3207
Imperial Whitetail	2111	2803	3385
Mean	2093	2747	3026
CV, %	20	21	31
LSD 0.05	NS	NS	NS
Planted: Starkville (6-5-23), Newton (6-7-23), Brooksville (6-8-23)			

FORAGE NUTRITIVE VALUE

The forage nutritive value (FNV) of the above-ground biomass was the greatest in terms of crude protein in Starkville (Table 2). Total fiber (NDF) was the least in Brooksville (Table 3). Lignin, which represents indigestible portions of the plant, is found mostly in the stem and was the greatest at the Newton (Table

4) location, which also happens to be the farthest south of the three locations. In general, FNV did not correlate well with yield where we expect FNV to decrease as yield increases. Similar to forage DM yield, FNV was not significant among entries.

Table 2. Sunn hemp forage nutritive value at Starkville, MS.

Variety/Trade Name	CP	ADF	Ash	Lignin	WSC	NDF	Insol CP
%							
Petcher	18.67	40.00	9.33	6.67	7.00	45.67	8.67
Loei	20.00	38.33	9.33	6.67	7.00	43.67	9.33
Crescent Sunn	20.67	37.00	9.67	6.33	7.33	42.00	10.00
Hancock Seed	20.00	37.33	9.33	6.00	7.33	42.67	9.33
Tillage Sunn	20.00	36.33	9.33	6.00	8.00	40.67	9.33
Imperial Whitetail	18.67	40.67	9.33	6.67	6.67	45.67	8.33
Mean	19.67	38.28	9.39	6.39	7.22	43.39	9.17
CV, %	7.70	6.60	7.50	13.30	14.90	4.60	11.40
LSD 0.05	NS	NS	NS	NS	NS	3.6	NS
Planted: Starkville 6-5-23 NS: Not Significant							

Table 3. Sunn hemp forage nutritive value at Brooksville, MS.

Variety/Trade Name	CP	ADF	Ash	Lignin	WSC	NDF	Insol CP
%							
Petcher	15.33	35.67	7.67	6.00	9.67	41.00	7.67
Loei	14.00	35.33	7.67	6.00	10.33	40.33	7.00
Crescent Sunn	14.33	35.33	7.67	6.00	10.67	40.00	7.67
Hancock Seed	15.67	31.00	8.67	4.67	10.67	35.00	8.33
Tillage Sunn	14.00	37.67	8.00	6.00	10.00	42.67	7.33
Imperial Whitetail	15.33	35.33	7.67	6.00	10.33	40.33	7.67
Mean	14.78	35.06	7.89	5.78	10.28	39.89	7.61
CV, %	12.00	8.00	8.00	11.00	7.60	8.70	17.50
LSD 0.05	NS	NS	NS	NS	NS	NS	NS
Planted: Starkville 6-8-23 NS: Not Significant							

Table 4. Sunn hemp forage nutritive value at Newton, MS.

Variety/Trade Name	CP	ADF	Ash	Lignin	WSC	NDF	Insol CP
%							
Petcher	12.67	36.00	11.00	7.67	8.33	48.00	7.00
Loei	20.33	30.00	12.67	7.00	8.00	39.67	12.00
Crescent Sunn	14.00	35.00	11.67	7.67	9.00	44.00	8.00
Hancock Seed	16.33	32.33	12.00	7.00	8.33	42.33	9.67
Tillage Sunn	17.00	32.00	11.33	7.33	8.00	43.67	9.67
Imperial Whitetail	12.00	38.67	11.33	8.67	8.00	49.67	6.33
Mean	15.39	34.00	11.67	7.56	8.28	44.56	8.78
CV, %	27.40	13.20	13.70	16.50	13.60	15.20	28.60
LSD 0.05	NS	NS	NS	NS	NS	NS	NS
Planted: Starkville 6-7-23 NS: Not Significant							

SEED YIELD/GERMINATION

Seed germination was consistent across locations and entries with no combination having less than 95% germination (Fig 4). Seed yield was much greater at the Starkville location compared to Brooksville, with yields reaching as high as 2000 lbs./ac for the 'Tillage Sunn' entries (Tables 5 and 6). Stem counts were also greater at the Starkville location, suggesting better establishment and individual plant survival leading to greater seed production. The entries from Hancock Seed were the only VNS entries in these trials that did not exhibit flowering by August (60 DAP) (Fig 5).



Figure 4. Germinated sunn hemp seed.



Figure 5. Sunn hemp flowers in August at Starkville.

Table 5. Sunn hemp seed production, germination, and stem counts in Starkville, MS.

Variety/Trade Name	Seed Yield	Germination	Stem count
	lb/A	%	2.25 ft ²
Petcher	1301	97	90
Loei	1660	98	105
Crescent Sunn	1830	95	95
Hancock Seed	-	-	101
Tillage Sunn	2083	96	85
Imperial Whitetail	1521	97	106
Seed harvest: 11-10-23			

Table 6. Sunn hemp seed production, germination and stem counts Brooksville, MS.

Variety/Trade Name	Seed Yield	Germination	Stem count
	lb/A	%	2.25 ft²
Petcher	242	98	56
Loei	323	95	56
Crescent Sunn	222	96	84
Hancock Seed	60	90	55
Tillage Sunn	161	94	56
Imperial Whitetail	164	95	85
Seed harvest: 11-8-23			

Table 7. Seed sources for the 2023 Sunn hemp variety test.

Variety/Trade Name	Seed company/source
Petcher (VNS)	Pecher Seeds
Loei	Tropical Seeds LLC
Crescent Sunn	Tropical Seeds LLC
Hancock Seed (VNS)	Hancock Seed
Tillage Sunn (VNS)	Seed Barn
Imperial Whitetail (VNS)	The Whitetail Institute

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