Forage Quality, Nitrogen and Biomass Yield of Sunn Hemp and Brassicas in Combination with Fall Planted Clovers

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Introduction

Livestock and row crop producers in the state of Mississippi have expressed interest in utilizing sunn hemp (*Crotalaria juncea*) as a forage and a cover crop. However, due to state regulations controlling the use of sunn hemp little is known how it would best fit into present grazing systems. Radish (*Raphanus sativus*), turnips (*Brassica rapa*) and sunn hemp can be planted late in the summer (August 15) to supply high quality forage that has the potential to provide as a cover crop or be removed as an early fall (October) forage crop before clovers are planted. White et al. (2024) demonstrated that sunn hemp is best planted after June in Mississippi and that forage quality is greatest at 45 days after planting. Traditionally cool-season clovers provide the greatest and most consistent supply of quality forage and nitrogen in the deep south. Warm-season legumes are often unpredictable and low yielding suggesting that utilization could not affect cool-season growth. A cool-season legume combined with a warm-season legume could provide nitrogen and and increase yield for livestock producers. However, this combination may not provide sufficient biomass yield due to the short amount of time to grow for the summer crop and the possible negative effects upon the subsequent clover establishment.

Materials and Methods

'Purple Top' turnip, 'Driller' radish, and 'Crescent Sunn' sunn hemp were planted by August 15th at Starkville, MS. Forages were allowed to grow for 45 days in a strip-split plot design replicated three times with half the plot sprayed and desiccated to represent a cover crop. The remaining half of the plot was harvested and removed to represent a forage system. Two weeks after harvest and termination crimson (*Trifolium incarnatum*), balansa (*Trifolium michelianum*), and berseem clover (*Trifolium alexandrium*) were planted into the stubble harvested in the spring at peak growth. Subsample were taken from harvest dried and ground to pass through a 1mm screen and forage nutritive value determined using NIR.

Results

Sunn hemp produced more biomass and N in the aboveground biomass compared to both radish and turnip with radish producing the least amount after 45 days of growth (Table 1). The utilization of late summer forages did not negatively interact with clover growth and nitrogen production with the exception of balansa which produced 85% less when planted after a warm-season cover. Lower yields were most likely due to incomplete termination of the warm-season crop and subsequent competition combined with low seeding vigor characteristic of balansa seedlings. Dry matter yield and nitrogen production and therefore crude protien in general was split evenly between the summer and spring growth. The best combination was between crimson and sun hemp mixtures when considering both nitrogen contribution and biomass yield which averaged more than 153 and 4400 lbs/ac respectively.

Conclusion

Utilizing Sunn Hemp late in the summer after an annual warm-season forage or in a row crop system is a viable option for producers in Mississippi. Within 45 days sunn hemp and turnips produced comparable yields to that of cool-season forage legumes without directly competing with them. Considering livestock producers, sunn hemp could be used as a high protein hay or within a pasture system that late in the summer before transitioning to cool-season planting. However, rain can be sporadic and unpredictable during the late summer and fall months leading to potential droughty conditions that could hinder sunn hemp growth. As a cover crop sunn hemp could provide nitrogen to a system to be used by a cool-season grass or accumulate in the soil along with what clovers provide to eventually feed a corn system. However, more information is needed considering the effect of the summer nitrogen from sunn hemp on clover nodulation and the eventuall fate of the fixed nitrogen from both crops.

Table 1. Forage Dry Matter (DM) yield, abovegroud nitrogen yield of harvested fall and spring crop measured as individual and total season accumulation

Summer Crop	Spring Crop	Fall DM Yield	Nitrogen Yield	Spring DM Yield	Nitrogen Yield	Total Nitrogen Yield	Total DM Yield
		lbs/ac					
Sunn Hemp	Crimson	2106	75	2369	79	154	4475
Turnip	Crimson	1585	64	1722	58	122	3307
Radish	Crimson	1678	72	2112	77	149	3790
Sunn Hemp	Balansa	1826	70	397	17	87	2224
Turnip	Balansa	1448	53	717	29	82	2165
Radish	Balansa	1597	62	747	29	91	2343
Sunn Hemp	Berseem	1138	47	2144	72	120	3282
Turnip	Berseem	1337	56	1289	47	103	2626
Radish	Berseem	808	28	2117	75	104	2925
Sunn Hemp	.	1413	58	.	.	58	1413
Purpletop	.	2453	102	.	.	102	2453
Driller Daikon	.	1316	50	.	.	50	1316
.	Berseem	.	.	3372	124	124	3372
.	Crimson	.	.	1058	36	36	1058
.	Balansa	.	.	2646	103	103	2646
	Mean	1589	63	1490	54	101	3079
	CV	40	41	19	17	.	.
	LSD	NS	NS	551	18	.	.

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