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Cowpeas

A New Forage Crop for South Dakota?

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In the northern Great Plains, cool-season pastures decline in productivity during summer. This reduces available forage supplies. Solutions to forage shortages during the summer traditionally have included the use of perennial and annual warm-season species for pastures, hay, or silage. Cowpeas, a non-traditional crop suitable for summer forage, have been investigated recently at SDSU.

Cowpeas (*Vigna unguiculata [L.] Walp.*) are an important legume in the southeastern United States, but since 1940 they have been replaced gradually by soybeans, clovers, and other legumes. Referred to as “black-eyed peas,” cowpeas are grown primarily for human consumption but also are suitable for hay, silage, and pasture.

Cowpeas are native to central Africa. They were introduced into the West Indies by early Spanish settlers and spread throughout the southeastern United States in the early 1700's.

Cowpeas are grown on approximately 200,000 acres annually in the United States, with Georgia, California, and Texas accounting for 65% of the total production area. Cowpeas are adapted to a variety of climatic and soil conditions, but they require considerable heat for optimum production. They also are extremely sensitive to cold temperatures, and hard frosts in the fall are almost always fatal.

Planting Date

A study was conducted at Beresford and Highmore in 1989 and 1990 to investigate the effect of planting date on forage production of cowpeas compared to other annual crops. The crops were seeded in mid-May, mid-June, or mid-July at each location.

Results indicate that cowpeas produce yields similar to or greater than Siberian hay millet. A notable exception to this occurred during 1990 at Beresford where the May planting of cowpeas was completely destroyed by the bean leaf beetle (Table 1). This insect attacked the cowpeas at early stages of plant growth and caused severe injury. The bean leaf beetle also attacks soybeans and since the high amount of precipitation received at Beresford during May prevented soybeans from being planted, the insects attacked cowpea plants instead. For both the June and July planting dates, cowpeas had the highest forage yield. The bean leaf beetle was not a problem on cowpeas for these planting dates.

These data indicate cowpeas are capable of producing excellent forage yields when planted in June or July. Avoid a May planting of cowpeas, especially if soybeans are a major crop in your geographical area

Planting Rate and Row Spacing

Another study was conducted to determine the effects of planting rate and row spacing on forage production of cowpeas. Forage yields of 50 and 100 pound per acre seeding rates were similar, indicating no practical advantage to the higher seeding rate. Apparently, the bushy nature of the crop compensates for lower seeding rates, much like soybeans. Forage yields for cowpeas increased with decreased row-spacing, indicating superiority of

Table 1. Forage yield of four species planted on three different dates at Beresford, S.D. in 1990.

Species	Planting date May 24	June 26	July 23
	tons per acre		
Mungbeans	2.7	2.5	1.4
Soybeans	5.3	2.9	0.7
Millet	2.9	3.3	1.9
Cowpeas	---[1]	4.6	2.4
LSD (0.05)	1.3	1.3	0.5

[1]Yield data not collected due to destruction of plots by the bean leaf beetle.

Table 2. Forage yield of cowpeas in three row spacings at two locations in 1987.

Row spacing	Location Brookings	Beresford
--inches---	------tons per acre-----	
10	3.8	2.9
20	2.8	2.4
30	2.8	2.0
LSD (0.05)	0.3	

narrow rows for forage production (Table 2).

The forage yield advantage of narrow rows may be due to less intra-row plant competition for water, nutrients, and solar radiation. Seeding equipment with openers set at 6 and 8 inches are commonly used for small grain in South Dakota and also could be used to plant cowpeas.

Forage Quality

In a related study, cowpeas had high crude protein concentration and in vitro dry matter digestibility (IVDMD), and low levels of neutral detergent fiber (NDF) and acid detergent fiber (ADF) (Table 3).

Cowpea forage in this study was comparable to alfalfa hay harvested at the late-vegetative to early-bloom stage.

Harvesting cowpeas at a later date will increase forage yield but decrease the quality of the forage. However, even when harvested at a later date with reductions in forage quality, **cowpeas are a higher quality alternative forage than warm-season annual grasses such as millet and sudangrass.**

Practical Applications

Results from this research at SDSU indicate that cowpeas can be used successfully as either an annual or emergency source of forage. Cowpeas can be planted and harvested with conventional equipment, thus no specialized implements are needed to produce this crop.

Cowpea forage has been successfully fed to beef cattle in Oklahoma and other states, and no palatability or anti-quality problems have been reported. The best option with this crop is to make haylage or silage. Cowpea hay tends to be stemmy. much like soybean hay. Cowpea hay also is difficult to cure because of its thick stems and heavy seed pods. Harvest cowpeas for forage when the pods begin to turn brown and some of them are mature.

Cowpeas also are utilized for soil improvement in the southern states. About 85% of the fertilizing value is in the forage and about 15% in the roots and stubble. Thus, cowpeas will provide some benefit to the soil, even if they are used for forage.

Limitations

One of the major problems, at present, that must be overcome before producers in South Dakota make cowpeas an important forage crop is seed availability. No seed dealers in the state market cowpeas, so purchasing must be done out-of-state. SDSU currently purchases seed for research purposes from a seed company in Oklahoma.

Table 3. Forage quality and yield of cowpeas grown at two locations and two cutting dates in 1986.

Measurement	Location Brookings	Highmore	Cutting date Early	Late
	% dry weight			
Crude protein	22.0	23.7*	24.4	19.7**
NDF	34.6	35.9	32.2	38.3*
ADF	26.4	27.9	25.7	28.6*
Lignin	6.5	5.8	5.5	6.8*
IVDMD	73.1	69.1*	72.9	69.2*
Yield, tons/acre	2.2	2.8*	1.6	3.4**

*,** Means differ within location or cutting date, P<0.05, P<0.01, respectively.

Seed prices vary from year to year, but generally they are between 20 and 40 cents per pound. If cowpeas are seeded with a grain drill, the recommended seeding rate would be about 80 pounds per acre, making seed costs between $l6 and $32 per acre. Transportation charges for the seed would have to be added to that figure.

Future Research

In an attempt to overcome the seed-availability problem, SDSU will be evaluating several different cowpea varieties to determine if they are capable of producing seed in South Dakota. If a variety can be identified and production of cowpea seed in South Dakota is possible, long-distance transportation costs for seed could be eliminated. This research will be conducted at several locations in the state during the next few years.

Another objective of SDSU's research is to determine if there are differences in forage quality among cowpea varieties.

Conclusion

Cowpeas seem to have great potential in South Dakota as a forage crop. If you like to experiment with different crops, this would be an excellent one to try. Grow it a season, make your own observations, and then decide if cowpeas would fit into your regular forage program.

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