EVALUATION OF A WARM SEASON SUPPLEMENTAL FORAGE COMBINATION FOR WHITE-TAILED DEER: IRON AND CLAY COWPEAS AND ALYCECLOVER

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SUMMARY

A demonstration was established on the Cartwright Farm near Groveton, investigating the effects of four seeding rates of iron and clay cowpeas (12.5, 25.0, 37.5 and 50.0 lbs/ac) in combination with alyceclover (20 lbs/ac). Combination plots were established in a random block design on a bottomland site to determine: (1) adaptability and yield differences between various seeding rates of cowpeas, (2) acceptance by deer and (3) nutritive quality.

Supplemental warm season forage combinations of iron and clay cowpeas and alyceclover provided high quality forage based on crude protein, acid detergent fiber and total digestible nutrient analyses throughout the warm season (June-October). Standing crop estimates for cowpeas established at four seeding rates in combination with alyceclover did not appreciably differ. However, the presence of iron and clay cowpeas in this combination: (1) provided high quality forage through August, (2) provided protection for the alyceclover as it became established and (3) reduced undesirable weed competition by shading.

INTRODUCTION

The establishment of supplemental forages for wildlife historically has been accepted as a wildlife management tool. However, maximum benefits can only be obtained if supplemental forages are available during seasons when native forage is lacking or low in nutritional value. In East Texas, these "stress" periods traditionally occur in late summer and late winter. Warm season forages should provide sufficient quantities of high-quality forage during the August-September stress period. However, unpredictable rainfall patterns and native weed competition can negatively impact warm season forage production. The use of two or more forage varieties in combination can reduce the risk of stand failures and lengthen the period of forage availability.

Furthermore, many well-meaning landowners and hunters waste thousands of dollars annually because of ill-fated attempts to establish supplemental food plots for deer utilizing inappropriate varieties, inadequate sites and/or poor planting techniques. In addition, forage enhancement seldom produces maximum benefits unless accompanied by adequate control of deer populations and management of the

existing deer habitat.

Objectives of this study were: (1) Evaluate white-tailed deer acceptance and utilization of iron and clay cowpea-alyceclover forage combinations; (2) Evaluate adaptability and yield potential of iron and clay cowpea-alyceclover combinations using four seeding rates (12.5, 25.0, 37.5 and 50.0 lbs/ac) or iron and clay cowpeas and (3) Evaluate the nutritional value of these combinations for white-tailed deer using measurements of crude protein, acid detergent fiber and total digestible nutrients.

PROCEDURES

A bottomland site was selected on the Cartwright Farm near Groveton to conduct cowpea-alyceclover combination trials. The site was selected on the basis of (1) being representative of the location and (2) possessing the characteristics of a bottomland site since soil moisture potential is generally greater as compared to upland sites, particularly in the summer months when moisture availability is a major limiting factor for plant growth.

Soil samples were collected in order to determine agricultural limestone and fertilizer requirements. Site preparation was limited to mowing and disking using standard tractor implements. Plots were established on May 26 following precipitation to insure adequate soil moisture.

A random block design was utilized to test the four seeding rates (12.5, 25.0, 37.5 and 50.0 lbs/ac) or iron and clay cowpeas in combination with alyceclover seeded at 20 lbs/ac. Three replicates of each cowpea seeding rate were established in plots measuring 20' x 20'. Each plot was individually flagged and a buffer strip five feet wide was incorporated between plots and replicates.

Cowpeas and alyceclover seeds were inoculated at the time of planting. All seeds were pre-weighed following germination tests. Cowpea seeds were broadcast over each plot and covered to a depth of 1/2"-1". Alyceclover seeds were broadcast by hand and lightly covered by raking.

A three-foot diameter exclosure was staked on each plot at the time of seeding to provide a comparison between utilized and unutilized areas. Growth and utilization were measured monthly from June until plant growth ended in October. One forage sample using a two-foot diameter ring was taken randomly from each plot on a monthly basis from July (60 days) until plant growth ended in October (150 days). This technique measured forage quality at the end of each 30-day sample period and was therefore a reflection of forage status following utilization.

As a result, quality measurements obtained were assumed to be conservative in nature. At the end of the growing season, plant growth within each exclosure was also harvested. This technique provided a gross estimate of variety disappearance by comparing the stand crop of each plot inside and outside the exclosure. All forage samples were collected in individually coded paper bags and forwarded to the Soil and Forage Laboratory at Texas A&M University for nutrient content analyses.

RESULTS

Cowpea and alyceclover combinations were planted on May 26, 1989. Soil tests indicated a need for 100 lbs/acre of 20-50-70 fertilizer.

Fertilizer was applied when germination of peas became evident. To be considered as a viable warm season supplemental forage for white-tailed deer, plant combinations should be judged on four criteria: (1) the combination must produce enough standing crop to justify establishment (in other words, be adapted to the location and site), (2) be readily accepted by white-tailed deer, (3) be of value nutritionally to white-tailed deer as measured by crude protein, acid detergent fiber and total digestible nutrients and (4) be present during the major stress period (August-September) to supplement (rather than compete with) native forage. Warm season forages can be particularly useful to managers/landowners interested in intensive deer management because of the potential increase in forage quantity and quality corresponding with the seasons of lactation by does, fawns growth and antler development by bucks.

Adaptability and Yield: Based on standing crop estimates inside plot exclosures, all seeding rates of iron and clay cowpeas in combination with alyceclover produced suitable quantities of forage on the bottomland site (Table 1). The 12.5 lbs/ac per seeding rate yielded only 616 pounds/ac less forage than the 50.0 lbs/ac per seeding rate. However, the presence of peas did serve as a nurse crop by protecting alyceclover until adequate growth was achieved to withstand browsing and served to reduce weed competition by providing a canopy over the shade tolerant alyceclover.

Forage Quality: Forage quality was measured using crude protein, acid detergent fiber and total digestible nutrient content. Forages that maintain crude protein content of at least 16 percent, acid detergent fiber below 40 percent and total digestible nutrient content of at least 60 percent are considered to be of high quality for white-tailed deer. The alyceclover-cowpea combination met and exceeded these criteria for all treatments (Tables 2-4). Forage quality remained high until

a killing frost occurred on October 19.

TABLE 1. STANDING CROP ESTIMATES AND DISAPPEARANCE (lbs/ac) OF IRON AND CLAY COWPEA-ALYCECLOVER COMBINATIONS ON THE CARTWRIGHT FARM, TRINITY COUNTY, TEXAS

Cowpea Seeding Rate (lbs/ac)	Standing Crop		
	In-Cage	Out-Cage	Disappearance
12.5	5810.9	2701.6	3109.3
25.0	6269.6	2854.4	3415.1
37.5	6167.6	3058.3	3109.2
50.0	6626.1	4026.8	2599.2

TABLE 2. MEAN CRUDE PROTEIN CONTENT (% DRY WEIGHT) OF IRON AND CLAY COWPEAS-ALYCECLOVER COMBINATIONS ON THE CARTWRIGHT FARM, TRINITY COUNTY, TEXAS

Cowpea Seeding Rate (lbs/ac)	Days Since Planting			
	60	90	120	150
12.5	20.0	19.7	22.0	10.6
25.0	19.8	19.0	20.3	10.1
37.5	18.9	19.8	21.8	10.8
50.0	19.4	19.0	20.5	10.9

TABLE 3. MEAN ADF CONTENT (%) OF IRON AND CLAY COWPEA - ALYCECLOVER COMBINATIONS ON THE CARTWRIGHT FARM, TRINITY COUNTY, TEXAS

Cowpea Seeding Rate (lbs/ac)	Days Since Planting			
	60	90	120	150
12.5	24.6	29.0	28.0	51.9
25.0	28.2	28.0	28.0	50.1
37.5	29.0	28.4	28.2	49.3
50.0	27.3	29.8	28.1	45.1

TABLE 4. MEAN TDN (%) OF IRON AND CLAY COWPEA - ALYCECLOVER COMBINATIONS ON THE CARTWRIGHT FARM, TRINITY COUNTY, TEXAS

Cowpea Seeding Rate (lbs/ac)	Days Since Planting			
	60	90	120	150
12.5	72.4	67.7	68.8	28.6
25.0	68.6	68.7	68.8	32.4
37.5	67.7	68.3	68.6	34.8
50.0	70.3	66.9	68.7	41.7

Disappearance and Utilization: Disappearance was utilized as a relative index to estimate deer acceptance of the cowpea-alyceclover combinations. Disappearance was calculated as an estimate of the amount of forage (lbs/ac) that "disappeared" from the plot as compared to the amount of forage protected from utilization by each plot exclosure. Table 1 indicates disappearance estimates for the various treatments of pea seeding rates. The highest disappearance estimate was for the 25.0 lb/ac seeding rate of cowpeas (3415.2) while the lowest estimate occurred at the 50.0 lbs/ac seeding rate (2599.2)

Rate of utilization provides a better estimate of acceptance than disappearance alone since utilization observations were recorded over the entire growing season. Utilization of cowpeas increased until 60 days after planting, then declined and

were completely eliminated between 90 and 120 days (August-September) after planting (Table 5). This corresponded with below normal rainfall for August and September which could have been partially responsible for utilization resulting in the elimination of pea stands in all plots. Alyceclover was not readily available for utilization until approximately 60 days after planting. Utilization was moderate at 60 days (July) then declined in August but increased slightly in September. The decrease in utilization of alyceclover in August corresponded to the elimination via browsing of cowpeas from all plots.

Since cowpeas were completely eliminated between 90-120 days (August-September), alyceclover provided the bulk of the forage available for deer during the last 60 days of the growing season. As a result, this combination served to provide forage availability soon after planting (cowpeas) to the end of the growing season (alyceclover).

TABLE 5. UTILIZATION (%) OF IRON AND CLAY COWPEAS AND ALYCECLOVER PLANTED IN COMBINATION ON THE CARTWRIGHT FARM, TRINITY COUNTY, TEXAS

Cowpea Seeding (lbs/ac)	Variety	Days Since Planting				
		45	60	90	120*	150**
12.5	alyceclover	0.0	13.3	5.0	10.0	--
	cowpea	46.7	71.3	41.7	--	--
25.0	alyceclover	0.0	18.3	6.7	8.3	--
	cowpea	30.0	85.0	43.3	--	--
37.5	alyceclover	0.0	28.3	6.7	11.7	--
	cowpea	36.7	85.0	30.0	--	--
50.0	alyceclover	0.0	23.3	5.0	11.7	--
	cowpea	48.3	83.3	73.3	--	--

* Cowpeas were completely eliminated from all plots by day 120.
**Frost on October 19 caused leaf drop of alyceclover preventing utilization rating on day 150.

Warm season supplemental forage can positively impact the nutrition available for white-tailed deer from June through October. In general, per acre establishment costs vary from $75.00 to $100.00 per acre depending on site preparation and

cowpea seeding rate. By planting one to three percent of the total habitat base available, landowners can provide a high quality supplemental forage to enhance the nutritional plane available for white-tailed deer during the seasons when lactation, fawn growth and antler development occur. Based on production achieved in this demonstration, alyceclover-cowpea combinations were produced at costs of less than $0.02 per pound of dry weight forage.

CONCLUSIONS

Warm season forage combinations of alyceclover and iron and clay cowpeas can positively impact the forage quality and quantity available for white-tailed deer. The combination of these forage varieties appears to successfully increase the availability of high quality forage through the summer stress period (August-September) for white-tailed deer. The combination approach of multi-variety establishment vs monocultural plantings also reduces the likelihood of total stand failure due to disease, parasites, climatic conditions, etc.

Based on yield, disappearance, utilization and nutritive quality, alyceclover-cowpea combinations were judged to be suitable for white-tailed deer, particularly when established on bottomland sites capable of maintaining suitable soil moisture.

Although the use of cowpeas in the combination provided forage in June, July and August, the seeding rate of peas did not appear to be a limiting factor in overall production. Plots seeded with cowpeas at 12.5 lbs/ac produced almost as much forage as the plots seeded with cowpeas at 50.0 lbs/ac. However, the presence of cowpeas appeared to decrease weed growth and served as a nurse crop by providing some protection from browsing in the early stages of alyceclover development. The treatment consisting of a 25 lbs/ac cowpea seeding rate ranked highest of all treatments (first in disappearance, second in total production).

Recommendations for establishing iron and clay cowpea/alyceclover combinations include: (1) Select bottomland sites with adequate soil moisture for planting but avoid areas prone to flooding; (2) Soil test to determine lime and fertilizer requirements. Lime several months in advance of planting if possible; (3) Inoculate cowpea and alyceclover seed at the time of planting; (4) Utilize 20 lbs/ac of alyceclover and a moderate seeding rate for cowpeas (25.0 lbs/ac).

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