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Yield and Nutritive Value of Three Browse Species for Small Ruminants during Summer

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Forage yields from grasses are markedly reduced during hot and dry summer months in the Southern US; therefore, browse species could add feed options for small ruminants during this time. Our objective was to compare total biomass and forage nutritive value of three browse species: bristly locust (*Robinia hispida* L.), sericea lespedeza (*Lespedeza cuneate* [Dum.-Cours. G. Don]) and smooth sumac (*Rhus glabra* L.). Plants were sampled monthly for two consecutive growing-seasons in 2012 and 2013 to determine foliar, shoot, and total aboveground biomass, as well as foliar nutritive value [crude protein (CP), acid detergent fiber (ADF), acid detergent lignin (ADL), and condensed tannins (CT)]. There was a species × harvest time interaction for foliar biomass yield ($P = 0.0125$). This interaction was likely due to low yield in bristly locust plots compared with sericea lespedeza and smooth sumac in June, but yield was similar across species in all other months. Bristly locust had the highest CP (16.9%), followed by sericea lespedeza (14.8%), and smooth sumac (12.3%). Acid detergent fiber and ADL were similar between bristly locust (38.5%) and sericea lespedeza (38.4%), which were higher than smooth sumac (22.1%). Condensed tannin, a plant anti-nutritive factor, was highest in smooth sumac, intermediate in bristly locust and lowest in sericea lespedeza. Plant foliar percentage, a percentage ratio of foliar to shoot, was highest in smooth sumac (55.1%), followed by sericea lespedeza (47.7%), and bristly locust (42.6%). In conclusion, smooth sumac had the highest foliar biomass and lowest ADF and ADL; however, this species had the lowest CP and highest CT. Further research is needed to compare browse utilization of these species by small ruminants.

Keywords: bristly locust, sericea lespedeza, smooth sumac, browse species, small ruminants

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Evaluation of Hairy Vetch as a Forage Legume for Southern Great Plains

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Hairy vetch (*Vicia villosa)* is a winter hardy annual legume that can be used as a cover crop, companion crop, green manure and as an annual forage for pasture, silage or hay. As a winter cover crop, it controls summer weeds, improves top soil tilth, reduces soil erosion and contributes nitrogen to the soil. Hairy vetch also produces high quality forage with substantially high biomass yields. Due to its versatility as a forage and cover crop, this study is aimed to evaluate the potential of hairy vetch as a forage legume that could be improved to suit Southern Great Plains. Fifteen varieties, consisting of eleven-plant introduction selections, three varieties from Auburn and one commercial variety were evaluated across two locations in Ardmore, OK and Vernon, TX in a randomized complete block design with three replications. The biomass yield was estimated from a quadrant of each plot at 50% flowering, and the seed yield was estimated from the remaining plot area after senescence. Biomass sampled at 50% flowering was also used for forage composition analysis. Varieties were significantly different for flowering date, biomass and seed yield. Significant variety × location interactions were observed for biomass yield, which is in most part attributable to magnitude rather than the rank change. High biomass yielding varieties had poor seed yield, while low biomass yielding were superior in seed yield. Significant differences were observed between varieties for all the forage composition traits measured. Most of the early flowering varieties had higher, and late flowering varieties had lower relative feed values compared to the checks. Given the amount of variation present for various agronomic traits related to forage production at both locations, there is a potential to develop high quality, high biomass hairy vetch varieties. Further studies are underway at Noble Research Institute to test the potential to breed for soft and hard seeded varieties to suit various forage/cropping systems of Southern Great Plains

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Brunswickgrass (Paspalum nicorae) - A Weed Contaminant in Southern Pastures and Bahiagrass Seed Production Fields

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Brunswickgrass (*Paspalum nicorae* Parodi) is becoming a problematic weed in summer perennial grass pastures in the southeast. This plant is native to southern Brazil, northern Argentina, Paraguay and Uruguay. It was introduced into the U.S. as a soil conservation plant for erosion control and as a potential forage crop. This plant has become naturalized and is contaminating bahiagrass seed production fields and pastures in Florida, Georgia and Alabama. Cattle will consume Brunswickgrass when it is young and tender. However, the plant quickly becomes rank and loses its palatability, and cattle avoid it. As it thrives under reduced competition, it spreads and becomes more difficult to eradicate. Because of the rhizomatous habit of the plant, those patches tend to increase in size year after year and eventually dominate the pasture.

Brunswickgrass is a perennial summer grass with a growing season and appearance similar to those of bahiagrass. Brunswickgrass often has three to four racemes per seed head, while Pensacola bahiagrass (*P. notatum var. saurae* Parodi) typically has two to three racemes. Seeds are slightly smaller than those of Pensacola bahiagrass. The seed coat has a dark, chestnut brown center that varies somewhat in size, depending on the variety. The seeds are noticeably convex in shape compared to the relatively flat, tan seeds of Pensacola bahiagrass. Seed may average about 200,000 per pound, based on our estimates.

During the seed cleaning process, Brunswickgrass seed does not readily separate from Pensacola bahiagrass seed: both seeds are close in size and shape. This has made it difficult for bahiagrass seed processors to effectively eliminate Brunswickgrass in order to meet total weed seed specifications (2.0%) for saleable seed.

To our knowledge few herbicides currently exist that will selectively remove Brunswickgrass without severely injuring or killing the desirable pasture grass. Total field renovation with glyphosate or cultural (mechanical) methods may be required to destroy a contaminated stand. The best preventive actions a producer can take to avoid further distribution of this grass are to refrain from harvesting contaminated production fields and to always use certified seeds when establishing new pastures.

We have developed a tri-state (AL, GA and FL) cooperation among land owners, seed harvesters, state departments of agriculture, state regulatory agencies and university extension personnel agriculture to address the problem. Areas of impending research and extension concerning Brunswickgrass include its forage quality and palatability, % seed contamination in existing pastures and seed production fields, seed bank survival, hard seededness, developing extension information to identify and remedy its spread and address purity considerations in the bahiagrass seed production industry.

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Soil Health of Pastures under Varying Years of Grazing and Winter Annual Management

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Mild winters, with average lows of 14°C and highs of 25°C, in the Gulf Coast states make it possible to graze pastures longer than in more northern latitudes. Winter annual pastures of annual ryegrass are common, however, more producers are utilizing a diverse mixture of annual grasses, legumes, and crucifer species to provide biomass both above- and below-ground for forage, nitrogen fixation, and potentially increase soil moisture retention. The objective of this research was to determine the effect a mix of nine cool-season annuals had on soil health in a warm-season perennial pasture over time. The sites were located in southern Louisiana at a beef production farm on a Loring silt loam soil. Soil samples were collected in fall 2016, spring 2017, fall 2017, and spring 2018 to a depth of 30 cm in 7.5 cm increments. Samples were collected across three bahiagrass (*Paspalum notatum*) perennial pastures under increasing years (0, 4, and 10 years) of cool-season annuals and grazing management. Soils were analyzed for bulk density, pH, total inorganic nitrogen (TIN), soil organic matter (SOM), total carbon (TC), total nitrogen (TN), microbial enzyme activity, and microbial community structure. Bulk density was lower under 10 years of management at 1.33 g cm^{-3} than 0 or 4 years, 1.40 g cm^{-3} and 1.42 g cm^{-3}, respectively. The pH was found to be higher under more years of management (5.6, 5.7, and 6.0, respectively). Total inorganic nitrogen (TIN) which is a total of ammonium and nitrate-N was higher under 10 years compared to 0 years, at 9.9 and 9.5 mg kg^{-1}, respectively. Total carbon increased by .23% while TN increased by .02%, and SOM increased by .21%. Microbial community structure was unaffected by management; however, β-glucosidase and N-acetyl-β-glucosaminidase activity increased from 25.9 under 0 years to 41.2 mg p-nitrophenol kg^{-1} h^{-1} under 10 years of management and 23.8 to 41.0 mg p-nitrophenol kg^{-1} h^{-1}, respectively. Increased microbial enzyme activity indicated an improvement in soil health while slow changes in SOM, TC and TN indicated a long-term accumulation under pastures utilizing cool-season annuals.

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Characterization of Bermudagrass (Cynodon dactylon L.) Germplasm for Nitrogen Use Efficiency

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Bermudagrass is the most important warm-season pasture in the Southern USA with exceptional forage production potential and abiotic stress tolerance. However, it requires high nitrogen (N) supply to reach its full biomass and quality potential. Our objective was to 1) develop a nitrogen use efficiency (NUE) screening protocol for bermudagrass in controlled or semi-controlled conditions, 2) identify contrasting genotypes for NUE from natural variants and, 3) develop a knowledge base of NUE in bermudagrass. A collection consisting 290 *Cynodon* sp. genotypes were first pre-screened in the greenhouse. Thirty-nine genotypes with high NUE, five with low NUE were selected for further evaluations along with check cultivars in greenhouse and hoop-house under four N rates. Biomass, crude protein and N content were evaluated. N uptake efficiency (NUpE), N utilization efficiency (NUtE) and NUE were calculated based on biomass production. Genotypes and N rates ($P < 0.05$) showed significant influences in the majority of the response variables. The only exception was no-significant differences for NUpE among N rates in greenhouse ($P=0.185$). No significant genotype x N rate interaction was observed for NUE in either greenhouse ($P= 0.24$) or hoop-house ($P=0.41$) indicating that N use efficient genotypes are the same in low and high N rates. NUE had strong correlation with biomass production and NUpE, which even got stronger with the increment of N rates. In N limiting conditions, bermudagrass showed a trade-off between biomass maintenance and crude protein content. Both biomass and crude protein were found to be increased under N applications. However, when N is abundant the crop has the ability to improve crude protein. Several genotypes presented high NUE due their high NUtE and NUpE. Genotypes with contrasting NUE were selected and subjected under further field evaluation. Superior genotypes for NUE will be used in the breeding program to enhance NUE in bermudagrass.

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Setaria parviflora Control in Tall Fescue

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Setaria parviflora, more commonly known as knotroot foxtail is a problematic perennial weed in forage crops grown for hay. The dried seed heads cause numerous irritating problems for horses and other livestock when grazed. The objective of this study was to evaluate different herbicides for their control or suppression of knotroot foxtail. Different herbicides, timings, and programs were evaluated in a tall fescue field to determine the best control methods. A randomized complete block design with 4 replications was utilized for this study. Dormant applications of pendimethalin, imazapic, hexazinone, and indaziflam were applied alone and in sequential programs (after first cutting) with quinclorac, quinclorac + pendimethalin, nicosulfuon + metsulfuron-methyl, imazapic, and hexazinone. For dormant applications, no injury was observed from any of the pendimethalin treatments. Imazapic and hexazinone caused the highest amount of observable injury, with indaziflam causing about 45 percent injury. The dormant applications were observed at 170 days after application. Pendimethalin showed that as you added more product, you received more control on the knotroot foxtail. The lower rate controlled foxtail around 60 percent, the medium rate controlled it around 74 percent, and the high rate showed around 85 percent control. The imazapic and hexazinone were rated around 20 percent control and the indaziflam showed around 50 percent control. In the post application foxtail control was observed 40 days after the second application and 225 days after initial application. The hexazinone followed by hexazinone application controlled the foxtail around 97 percent which was the best, however the tall fescue injury was also observed above 95 percent. The nicosulfuron + metsulfuron also showed over 80 percent control but the fescue injury was observed above 90 percent. These are not an option in tall fescue. The dormant pendimethalin followed by quinclorac or followed by pendimethalin + quinclorac provided around 75 percent control and caused no injury to the tall fescue. Quinclorac alone provided around 50 percent control of the knotroot foxtail. If a pendimethalin + quinclorac program can be developed to suppress seed heads or completely control knotroot foxtail it would be extremely beneficial for forage producers in the South.

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Evaluation of Rapeseed for Winter Forage Production Potential in Lower Southeast Region

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Rapeseed (*Brassica napus*) has been considered a valuable crop for the production of oilseed in Canada and the northern USA. The cultural value of the crop has expanded to cover crop utilization and perhaps forage production. Five rapeseed cultivars (relative maturity ranging from 90 to 110) were sown at a seeding rate of 6 lbs per acre on Tangi silt loam soil in early October at the LSU AgCenter Southeast Research Station (30° 47' N, 90° 12' W) located in Franklinton, Louisiana to evaluate winter forage production potential. Nitrogen, phosphorus, sulfur, and potassium fertilizers were applied according to soil test results at planting and an additional 40 lbs per acre of nitrogen fertilizer was applied when the rapeseed was 2-3 inches tall. Winter forage production and nutrient value were measured through harvests in December and January. Along with forage production, oil seed production was measured. Mean forage yield of rapeseed in December and January were 1,812 and 1,162 lbs per acre, respectively. Early maturing rapeseed is more advantageous for earlier forage utilization potential and greater regrowth for 2nd harvest than late maturing rapeseed cultivars. Yield comparison of 1st and 2nd harvest rapeseed forage indicated average yield reduction of early maturing rapeseed was 27% while yield reduction of late maturing rapeseed averaged 32%. Fiber analysis indicated greater accumulations of NDF and ADF in the 2nd harvest than the 1st harvest. The mean CP content in the 1st harvest was 25% while that in the 2nd harvest was 15%. The average IVTD of both harvests was greater than 90%. Although there are some concerns related to low DM intake potential due to low dry matter content in rapeseed fodder (ranging from 9 to 11%) and high sulfur containing compounds affecting livestock health, cultivation of early maturing rapeseed from October to early spring will realize production of highly nutritive value forage for winter livestock feeding in lower southeastern region.

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Production and Economics of Grazing Wheat and Tall Fescue in the Southern Great Plains

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Grazing cool-season grasses such as wheat (*Triticum aestivum* L.) and rye (*Secale cereale* L.) is common in beef cattle (*Bos* spp.) operations in the southern Great Plains of the USA. However, grazing perennials such as tall fescue [*Schedonorus arundinaceus* (Schreb.) Dumort., nom. cons.] and alfalfa (*Medicago sativa* L.) can have fewer production expenses and fewer negative environmental consequences than annual forages. The objectives of this experiment were to determine the effects of different annual and perennial cool-season forages on animal performance and production economics of beef cattle grazing in Ardmore, OK from 2013 to 2017. Forage treatments were planted in three replications and were 1) NF101 wheat, 2) 'Flecha' tall fescue, 3) 'Chisholm' tall fescue, and 4) Flecha tall fescue + 'Bulldog 505' alfalfa. Excessive rainfall in spring 2015 resulted in premature alfalfa stand loss, which necessitated replanting of alfalfa and tall fescue in September 2015. There were no differences in average daily gain (average 2 lb day^{-1}), grazing days acre^{-1} (average 193 days acre^{-1}), or animal gain acre^{-1} (average 382 lb acre^{-1}) among the forage treatments. However, net return of Flecha tall fescue was greater than tall fescue + alfalfa (188 and 83 \$ acre^{-1}, respectively) which was primarily due to two establishment costs of tall fescue + alfalfa in four years. In the absence of alfalfa stand failure and a singular tall fescue + alfalfa establishment cost, net return of tall fescue + alfalfa would have been similar to Flecha tall fescue (186 and 188 \$ acre^{-1}, respectively). Based on these results, perennial cool-season grasses appear to have potential in beef cattle grazing operations in the southern Great Plains. This research is on-going and will continue until there is no longer a viable stand of alfalfa in the tall fescue + alfalfa treatment.

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Utilizing Hairy Vetch (Vicia villosa Roth.) as Winter Leguminous Cover Crop in an Early-Planted Mississippi Corn Production System

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Cover crops are a continually popular use of leguminous forage species in commodity cropping systems. Agronomic benefits of leguminous cover crops include soil stability and nutrient binding, which can be maximized with a longer season of growth. Establishment of a legume cover crop following an early-planted Mississippi corn production system ideally requires planting cover crop species in early September and terminating in March. However, germination of cool-season legumes is commonly restrained by secondary dormancy due to sub-optimal soil temperatures. This study compares germination, plant emergence, plant area coverage, and biomass accumulation of unselected (US) and heat-selected (HS) populations from the cool-season legume species hairy vetch (*Vicia villosa* Roth.) at four planting dates (August, September, October and November). Statistical analysis was conducted using PROC MIXED, significance set at α=0.05. Efficacy of recurrent phenotypic selection in reducing secondary dormancy was assessed in lab (104/68°F 12 hr. light/dark photoperiod regime) and field comparisons for two consecutive years (2016 and 2017) using US and HS populations. In 2016, laboratory germination results at 104°F showed the HS population velocity of germination was significantly greater than the US population through six days. In 2017, the overall mean laboratory germination at 104°F decreased as compared to the previous year (2016), while under normal conditions (68°F) HS population of the overall mean germination was significantly greater. At 104°F in year two (2017) the HS population was significantly greater than the US population through 26 days. A replicated field trial was established to determine if lab differences persist under field conditions. Field results indicated the HS population plant emergence was significantly greater than the US population in November (2016), September (2017), and October (2017). In 2017, plant area coverage was significantly greater in the HS population. Further selection is necessary to fully reduce secondary dormancy in hairy vetch.

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Impact of Poultry Litter Application on Yield and Quality of Alfalfa Grown in Mississippi

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Demand for high quality forages has increased in the southeastern U.S. due to the desire to improve livestock productivity and grazing efficiency. Alfalfa (*Medicago sativa* L.) is an ideal species that can be inserted into traditional haying and grazing systems to enhance forage quality. Furthermore, in an era of high-priced protein and energy supplements, the higher quality of alfalfa and alfalfa-grass mixtures is of significant value to the beef and dairy industry, along with other forage-based livestock producers. Poultry production was the top agricultural commodity in Mississippi for 2016, grossing nearly $2.3 billion in sales and ranking 5th in the nation. Poultry has been the leading commodity in Mississippi for 20 subsequent years, employing 28,000 workers, and generating $2.1 billion in wages and salaries. Poultry litter (a mixture of manure, feathers, and bedding material) is a valuable source of plant nutrients and organic matter that is of great interest to many livestock and row crop farm managers across Mississippi and remains the most sustainable option for disposal. Often times, poultry litter is the most economical, and most available source of fertilizer in Mississippi. As alfalfa acreage across Mississippi and the Deep South increases, information regarding fertility management in this crop will be crucial in helping new farmers produce an economically sustainable forage. This project seeks to bridge this knowledge gap by evaluating the impacts of poultry litter on alfalfa production in Mississippi. This project has the following two goals: 1) Determine the impact of poultry litter fertilization on forage yield, plant persistence, forage quality, yield components, and economic analysis in Mississippi; and 2) Implement an Extension and Outreach program to educate beef cattle producers and small and medium-sized dairies about the use of alfalfa in their production systems with a sustainable poultry litter nutrient management program.

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Forage Nutritive Value Characteristics of Early vs. Late-Maturing Annual Ryegrass Varieties Following Delayed Planting in North Alabama

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Planting cool-season annual forages in the early winter or spring months may be considered as an emergency forage option in years following summer drought conditions in the Southeast. There is limited published information on forage production and nutritive value characteristics of cool-season annual grasses planted outside of the recommended fall window of establishment in the region. In winter 2016, a research study was established to determine the impact of late-planting annual ryegrass on seasonal dry matter production and forage nutritive value characteristics following summer drought conditions at the Sand Mountain Research and Extension Center in Crossville, AL. Early- (cv. 'Winterhawk') and late-maturing (cv. 'Marshall') varieties were planted on the following planting dates: December 15, 2016; February 1, 2017; and March 1, 2017. Each variety × planting date combination was replicated in two, 2-acre paddocks. Pastures were managed with rotational stocking using growing beef heifers (initial body weight: 736 lb) when pastures reached an average target height of 8 inches. Overall, annual ryegrass seasonal herbage accumulation ranged from 4,000 to 11,000 lb DM/acre across planting dates. Grazing was initiated on late-planted varieties in early March for December-planted treatments, whereas February- and March-plantings were unable to support grazing until May. Forage nutritive value was greatest for December-planted varieties (20.5% CP, 72.3% TDN; 41.8% NDF, and 21.3% ADF) compared with February and March planting dates (mean 12.4% CP, 57.9% TDN, 61.6% NDF, and 39.8% ADF for both). Spring-planted annual ryegrass varieties had an observed flush of growth in late April/early May which led to rapid onset of maturity in both varieties. This plant maturity response was likely a result of a shortened growing season window relative to the typical fall-planting recommendation and increasing photoperiod length. December plantings maintained a more vegetative-stage of production until the end of the growing season in June. During the one-year evaluation, delayed planting of annual ryegrass supported animal gains of 1.4 lb/d for growing heifers, which illustrates the high-quality of forage growth in this system. However, significant year-to-year variation may occur with this system considering environmental variations in North Alabama.

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Evaluation of Brassica Types for Potential Forage and Cover Crop Utilization in the Southern Great Plains

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Forage brassicas (Brassicaceae) are commonly utilized throughout the world for ruminant livestock grazing. Utilization of these species for their potential soil health benefits and as cover crops is also of increasing interest to agricultural producers. The objective of this experiment was to evaluate autumn dry matter yield (DMY) and forage nutritive value, relative glucosinolate levels in vegetative tissue, winter-hardiness and spring regrowth characteristics, relative maturity (50% flowering date), and spring DMY of 36 commercially available forage brassica types in south central Oklahoma in 2016-2018. Autumn yields 57 and 54 days after planting for 2016 and 2017, respectively, ranged from 1,062 to 1,916 lb ac^{-1}. The experimental locations experienced low air temperatures of 9°F and 2°F in December 2016 and January 2018, respectively, which resulted in winter-kill of several entries. A total of 47 separate glucosinolate compounds were detected from vegetative tissues by liquid chromatography/mass spectrometry chemical analysis. Interpretation of this glucosinolate data is ongoing. Forage nutritive value was generally high and similar to alfalfa. Crude protein, acid detergent fiber, and neutral detergent fiber ranged from 25.8 - 35.0%, 12.6 - 22.0%, and 22.5 - 28.0%, respectively, in the autumn, and from 11.6 - 25.4%, 23.0 - 43.2%, and 32.5 - 57.3%, respectively, for winter survivors in May 2017. Several entries (Pacific gold mustard, Master white mustard, African cabbage, Carwoodi, Concorde, Ecotill, and Daikon radishes) consistently winter-killed. Graza radish survived the first season and produced great amounts of EOS biomass (vegetative and reproductive tissues), but winter-killed in the colder second season. Preliminary results suggest several brassica entries (Dwarf Essex rape, Seven Top turnip, Impact forage collards, Trophy rape, and Siberian Kale) appear to be adapted and suitable for forage or cover crop in the southern Great Plains. The second year's spring DMY data collection is not yet complete and the experiment will continue for additional seasons.

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A train-the-trainer Short Course Series for Understanding the Ecology and Management of Alabama Grazing Systems

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A series of four, two-day hands-on workshops related to forage ecosystem management and sustainability were held from May 2016 through May 2017 for USDA Natural Resources Conservation Service – Alabama (NRCS) personnel and Alabama Cooperative Extension System (ACES) extension agents in Alabama. The goal of these workshops was to provide experiential learning opportunities related to forage management for technical service providers with these agencies. In-classroom and hands-on demonstrations were used to demonstrate grazing management concepts, and facilitate group problem-solving and discussion. Topics included basic plant physiology and growth in grazing systems, grazing methods, forage and weed identification, and pasture and animal condition scoring. Workshops were held at Auburn University Agricultural Research and Extension Centers during different times of the year to illustrate various growing seasons, plant adaptation, and soil conditions representative of Alabama farms. Pre- and post-course surveys (n = 81 responses over 4 trainings) were conducted with the participants at each workshop using a clicker-based response system to determine change in knowledge, behavior, and application of the information within their respective organization. Of the participants from the training series, 55% were from USDA NRCS and 45% were from ACES. Fifty two percent of the participants had less than 5 years of experience with their respective organization, illustrating the program reached a large group of newer employees within each group. Attendees reported that outdoor, hands-on demonstrations related to grazing management concepts were the most effective in improving their knowledge of forage practices (68%), followed by indoor group discussions (17%) and classroom lectures (15%). Participants reported a 26% increase in knowledge in soil and forage testing practices as part of this training. Field demonstrations on pasture condition scoring and grazing methods were listed as the most useful to participants (56% of respondents). Participants were highly likely (65%) or likely (35%) to share these practices with farmers during farm site visits and one-on-one consultation with clientele in the next 12 months following these programs. Results indicate that joint in-service training opportunities among university and government organizations may benefit communication and application of forage management practices in on-farm settings.

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Chisholm Tall Fescue: A Summer-Dormant Cultivar for the Southern Great Plains

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Chisholm is a synthetic cultivar developed from selections of 'Flecha', a perennial, forage type tall fescue [*Festuca arundinaceum* (Schreb.) S.J. Darbyshire] of Tunisian parentage. Chisholm belongs to the group of Mediterranean-type (summer-dormant) tall fescues which are characterized by increased growth in mild winters and dormancy in dry, hot summers. Selections were made from Flecha in north Texas and southern Oklahoma emphasizing persistence under grazing and drought tolerance. Chisholm differs significantly ($p < 0.05$) from Flecha by possessing a later heading date (4 days) and a more erect growth habit. Plants of Chisholm have wider ($p < 0.05$) flag and tiller leaf widths when compared to plants of Flecha. When tested in small plot grazing trials for persistence in southern Oklahoma and north Texas from 2011–2016, final stands of Chisholm were 23% greater ($p < 0.05$) than Flecha and the Mediterranean cultivar Prosper when averaged across all locations. Small plot yield trials conducted in Oklahoma and Texas during 2012-2016 revealed no consistent differences in yearly or average forage yields over 3 years when Chisholm was compared with the cultivars Flecha or Prosper. Chisholm had significantly greater ($p < 0.05$) crude protein when compared to Flecha and Prosper or the summer-active cultivars Kentucky 31 and Texoma MaxQ II. No significant differences for *in vitro* true dry matter digestibility (IVTDMD) were noted, but IVTDMD was numerically greater (higher number desirable) in forage of Chisholm when compared to Flecha. When plots were visually scored an average of 57 days after sowing, Chisholm seedlings scored significantly greater (0.9) in vigor than Flecha or Prosper seedlings when averaged across all sites. Chisholm tall fescue was released for its improved persistence under grazing when compared to Flecha. Chisholm is intended for livestock producers needing a grazing persistent, endophyte free, cool-season perennial forage option for the hot, dry summer's common to the southern Great Plains. Chisholm tall fescue is capable of producing high quality pasture from autumn through spring to provide a perennial forage option to complement or replace the planting of winter annuals, such as dual-purpose wheat or cereal rye. Other benefits of this perennial forage include a reduction in soil erosion and improvement in soil health. Chisholm is licensed for commercial sales to Warner Brothers Seed Company, Lawton, OK.

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Nutritional value of forage soybean [Glycine max (L.) Merr] at two locations in Puerto Rico

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Forage soybean [*Glycine max* (L.) Merr] lines that are adapted to the humid tropics and capable of producing quality forage are limited. Recent studies in Puerto Rico identified two forage soybean lines (FSB) lines (PR0986-1-1 and PR0968-16-2) yielding 7.8 Mg/ha at the R6 phenological stage of growth (PSG). The objective of this study was to assess percentage of crude protein (CP), neutral detergent fiber (NDF), acid detergent fiber (ADF) and acid detergent lignin (ADL) of two FSB lines and three PSG [R2 (flowering), R4 (pod formation) and R6 (50-75% of pod grain fill)] at two locations in Puerto Rico (Isabela and Tai Farm, Lajas). The experiment was multi-factorial (2 SL x 3 STG X 4 replicates) established at the Agricultural Experimental Station, Isabela (PR1-1 and 162) and Tai Farm, Lajas (PR1-1 and 22-3). Three random samples (500 g) were taken in each replicate and dried in a forced-air oven for 72 h at 60 °C, then ground through a 1-mm sieve for chemical analysis. The data were analyzed by location using the statistical package INFOSTAT. There was no interaction (P>0.05) between FSB lines x PSG at Isabela for CP, FDN, ADF or ADL. There were differences (P≤0.05) for PSG for CP (18.0, 16.7, and 16.5% for R2, R4, and R6, respectively). There were also differences between FSB lines for ADL (9.3 and 10.6%, for 1-1 and 16-2, respectively). At Tai Farm there was also no interaction (P>0.05) between FSB lines x PSG for CP, NDF and ADF as well as no differences between lines (P>0.05) in CP, NDF, ADF or ADL. There were differences, however, between PSG (P≤0.05) where R2 (14%) had greater concentration compared to 9 and 9.23% for R4 and R6, respectively. In conclusion, nutritional values were different by location, where CP was greater in Isabela.

Key words: humid tropics, nutritional value, phenological stage of growth

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