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Theme 3. Sustainability of grasslands- social and policy issues
Sub-theme 3.1. Multi-stakeholder learning platforms for grassland management

Using on-farm demonstrations to evaluate newly developed cool-season forages in the southeastern USA

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Introduction

Multiple demonstration sites throughout Florida were designed to evaluate and provide hands-on producer and county faculty access to newly developed cool-season winter forage crops that can be grown in the southeastern United States. Research funding for these projects was provided by the Dairy Research and Education Project, supported through the Georgia/Florida Dairy Industry check-off dollars. Early adopter producers interested in evaluating forages were identified for this cooperation. Long-term goals are to have the early adopter producer aid in the trialing and dissemination of information about improved varieties.

Cool-season forages for use on southeastern US livestock operations benefit the producer in providing

1. highly nutritional greenchop or silage crop for livestock,
2. winter cover to provide erosion and leaching protection on cultivated acreage,
3. potentially recycle nutrients or remove significant nutrients from the forage system, and
4. serve as a sentinel plots to help identify new or emerging pest problems related to forage production.

We also focus developing forages for both low and high end input systems that address environmental issues related to N and P in the soils. In the southeastern U.S. particularly in Florida, nitrogen and phosphorus accumulate in many production fields and these nutrients impact surface and ground water resources. We participate with the Florida Department of Agriculture and the dairy and beef cattle industry to develop "best management practices" (BMPs) that guide producers to lessen their negative impacts on the environment and improve upon their operation's sustainability and economic returns. This effort has led to the release of new cultivars from the University of Florida's Forage Program. While we focus, primarily, on cool-season small grains and ryegrass, our program also includes breeding other sub-tropical forage species for adaptation to our environment and to improve adoption of BMPs.

Materials and Methods

On an annual basis, approximately 20 to 30 commercially available cultivars and advanced breeding lines and blends of oat, triticale, rye, wheat and ryegrass are distributed to 20 counties/on-farm locations with collaborating county agents and producers (dairy or beef cattle producers). The county faculty are typically located in southern Georgia, southern Alabama and throughout Florida. They are responsible for coordinating with the producer on field preparation for planting and the management of the demonstration trials throughout the growing season. Typically these demonstration plots are replicated at each site to prevent any field bias and to allow breeders to see possible variations in forage performance due to site location. County faculty take field notes related to disease and insect pests, weed identification, the growth habit of the plant, forage production and quality of the forage at the time of harvest. Management of these forages differs from farm to farm, depending on the producer's ability and interests. We work with confinement and grazing dairies, as well as grazing beef cattle operations. Evaluating experimental breeding lines under a variety of conditions and various management systems, has allowed the breeders to see how well these advanced lines perform for the "end user". Typically when forage breeding programs select under on-farm ("real world") conditions during the breeding selection process we identify superior genotypes at an earlier stage of development, rather than at or after a cultivar has been released for commercialization. These demonstrations also serve as "sentinel plots" that might identify the presence of a pest problem in the area. County faculty, in addition to data collection, are responsible for arranging site tours and hosting a field day

prior to final harvest. This directly benefits local producers since they are able to view the various forages throughout the growing season. This has allowed them to become familiar with adapted forages and make better selections for their own operations. County faculty also becomes well acquainted with their producers, which fosters a positive working relationship.

Results and Discussion

The states of Georgia and Florida milk check-off program funding has supported our on-farm demonstrations and research for the past seven years. Beginning in 2008, we began testing advanced triticale (a rye-wheat cross) and oat lines as to their potential for dairy silage or grazing. Forages used from grazing differ in phenotype from silage-types. Silage types tend to be more upright and lower tillering than grazing types, more similar to a grain-type appearance. Forage species, as well as cultivars within each species, vary from one another in their nutritional composition and seasonal distribution of their quality. For example, soluble sugars, in general, are greater for oat cultivars and this is maintained over a longer duration of growth than with other cool-season forages. Adaptation to inherent soil types, or location also varied greatly among the forage species and cultivars. For example, we found triticale was well suited for a wide-range of environments, particularly for central and south Florida, where diseases, warmer climate, and drier, sandy soils are often problematic for ryegrass, oat and wheat.

Multi-site demonstrations provide an opportunity for county faculty to evaluate popular and newly developed forages in real-world settings with real-world limitations. These demonstrations offer hands-on learning experiences tailored to address the producer needs. These demonstrations have also convinced forage breeders to shift the timing of forage production to earlier in the season when forage is short in supply. This was accomplished through altering photoperiod and vernalization requirements through traditional breeding and selection. For the dairy sector, newly developed cultivars mature in time for spring corn planting and fit better into two- and three-crop rotations. For the beef cattle sector, early-season forage production reduces the need for feeding hay and supplements during the critical winter period. This affords substantial economic savings to the producer. Concurrently, as new forage lines are evaluated to maximize early quality and tonnage, we also focus on the environmental attributes of these forage systems.

With the development of any new forage cultivar, particularly for the dairies, we select cultivars exhibiting lower nutrient requirements or enhanced nutrient uptake, specifically N and P. Many confinement dairies in the southeastern U.S. utilize their lagoon effluent and solids for fertilization of their forages. Excess nutrients from their operations have negatively impacted their soil and water resources and recycling these nutrients into forage production has been an excellent outcome.

Access to irrigation has greatly improved the ability of the producer to grow forages outside the normal production periods when rainfall is inadequate. With our understanding of the growth habits of various forage cultivars and irrigation, we are able to blend forages in different ratios so as to provide a producer with blends to better suit their needs. We found that blends of forages, such as rye-ryegrass and triticale-ryegrass, may maximize forage yields. This is a win-win for cattle operations and for the environment. Since blends of forages tend to take up more P than monocultures, by maximizing cool-season forage production we simultaneously maximize nutrient removal. The data collected from these on-farm demonstrations have supported the development or improvement of best management practices.

On-farm testing of advanced forage breeding lines has led to the release and co-release of five new forage oat varieties such as “Horizon 201” and “RAM LA 99016”. In 2011 a new, early and high yielding, hulless forage oat, “FL02011”, was released by UF-IFAS. In 2013, crown rust resistant oat cultivars, grown in these on-farm demonstrations were devastated by a new strain of crown rust. Based on data from these on-farm sites, this new strain of crown rust of oats was identified and confirmed. Several experimental oat lines that were included in the on-farm demonstrations were found to be resistant to the new rust. The release of crown rust resistant “Legend 567” and “FL0720” directly resulted from this cooperative testing. Because of a need for an earlier maturing and disease resistant ryegrass, determined by dairymen from Georgia and Florida, the tetraploid ryegrass, “Earlyploid” was released by the University of Florida. Earlyploid’s production period peaks in time for harvest prior to the season’s first corn planting in early March. It also has excellent disease resistance since it was developed and tested at dairies under spray effluent fertigation.

Three triticale varieties, “Trical 342”, “Monarch” and a newly released awnless type, “FL01143”, also fit well in cool-season silage crop production systems for our southern dairies. They can also tolerate drier, less fertile conditions, more typical with grazing beef cattle operations. New experimental triticale lines are under consideration for release for the southeastern U.S. within the next few years because of adoption of triticale by the livestock industry in the region.

Conclusion

By participating in these projects, researchers were able to evaluate new forages when planted outside a university research setting. New relationships were developed among the county faculty, researchers and producers. The efforts from this research and extension outreach aid us not only with proof-of-concept for dairy and beef cattle operations, but also provide information that can be used in extension publications and variety recommendations that serve our industry clientele.