

Southeast Dairy Producer's Check-Off Program Research Summary

Cool-season forage evaluations to promote greater productivity, quality, and nutrient mitigation for southeastern dairies

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Methods

Two studies were conducted on-farm, as part of a multi-year effort. The first study (Legume study) was located at the Dairy Research Unit, Hague, FL and planted on 26 October 2023. The land received a combination of spray effluent and synthetic fertilizer as nutrient sources. This was generally a repeat of the previous year's study. Planting rate proportions (legume: small grain) of one winter pea and one hairy vetch variety, blended with either cereal rye or triticale were 100:0, 75:25, and 50:50 (grass:legume). The full seeding rate for small grains, winter pea, and vetch seed were 120, 60, and 20 lbs/acre, respectively. Additionally, we tested different small grain monoculture seeding rates with no legume inclusion. A randomized complete block design was used with 14 treatments × 4 replicates (n=56). Winter pea and vetch seed were treated with inoculant on the day of planting to ensure adequate nodulation. Whole plants were harvested on 12 March 2024, with fresh weights and dry weights recorded, following drying at 50°C in a forced air oven. Oven-dried samples were sent to the University of Tennessee for forage quality analyses.

A second study (Forage variety study) served as combined variety trials and demonstrations, located at four Florida dairies in Alachua, Lafayette, Suwannee, and Madison counties. Five cereal rye cultivars, five triticale cultivars, three wheat cultivars, two experimental black oat lines, five oat cultivars, four annual ryegrass cultivars, three winter pea cultivars, three chickpea cultivars, and three vetch cultivars were planted. Mixtures of triticale and rye with winter pea and vetch planted at a 75:25 grass:legume ratios were also assessed. Three dairies were planted between 23 and 25 October, while the Madison county dairy planting was delayed to 20 November, due to Hurricane Idalia damage at the dairy. The varieties were replicated twice at each location and plants harvested from 20 to 24 February, except for Fayette county (dairy crew accidentally cut down study site) and on 12 March for the Madison county dairy. Dry weights were recorded, following drying at 50°C in a forced air oven (Figure 1). The oven-dried samples were sent to the University of Tennessee for forage quality analyses.

Results

Hurricane Idalia caused extensive damage to the region and it delayed planting at one of the dairies that we used. Even so, the 2023/2024 cool-season forages produced well across dairies. It is interesting to note that our forage establishment and resulting early vigor seemed to outpace a couple of the dairies this past season, even when planting at the same time. Fertilization and general land management were not different. The only noticeable difference was that we constructed a heavy roller attachment that packed the soil (set in front of tractor), ahead of the plot planter. Soil packing pre-planting was not a common practice for the dairies. However, some would pack the soil (rolling) after seeding and others would run irrigation post planting to help settle the soil. Our method may have resulted in more consistent seed placement depth, while also creating good seed to soil contact. Based upon early growth observations, it appeared that our plots received more fertilizer (N) than its surroundings, but that was not the case. This will be investigated further next season.

The Legume Study demonstrated that reducing small grain seeding rate by 25% (90 lbs/acre) had no impact on yields. Additionally, if vetch was included, then the small grain seeding rate could be cut 50% (60 lbs/acre) and not compromise harvestable yield (Figure 2). In the case of Florida 405 rye, the reduction in seeding rate to 60 lbs/acre was similar in yield to the full rate even without legume addition. Smaller seed size typically allows for lower planting rates and therefore, cereal rye can maintain high yields compared to larger seed small grains, such as triticale and oats. We will investigate seeding rate and plant density comparisons further in the 2024/2025 season, on-farm. There were differences in forage quality between cereal rye and triticale, with ash concentrations lower (3.7 vs 5.4%), crude protein lower (11.5 vs 12.9%), IVTDMD-48 lower (57.2 vs 64.4%), and RFQ lower (67 vs 76%) for rye versus triticale. A 50:50 planting ratio of grass with vetch shifted CP slightly higher from 11.5 to 12.0% for rye vs rye-vetch and from 12.9 to 13.8 for triticale vs triticale-vetch. Phosphorus tissue concentrations were modestly higher in triticale (0.31%) than rye (0.27%) but total uptake was the same (22 lbs P/acre) due to greater dry matter production under rye. Subsamples from this and the Forage Variety Study were used to simulate ensiling. However, the materials tended to be too dry at the time of ensiling and therefore further strategies and logistics will be developed to obtain more representative samples to compare against field-scale values in the future.

In the Forage Variety Study (pooled data from three dairies), rye and triticale, along with their mixtures, produced the most forage, compared to other species (Figure 3). Within a crop species, it was encouraging to observe the highest yielding cultivars represented newer releases, primarily developed by Florida breeders. For example, Juggernaut and Legend 567 dominated the oat trials, Florida 405 ranked among the highest rye producers, Trical 1143 led triticale cultivars, and Patagonia led the vetch options. The desi-type chickpea was better adapted to local growing conditions than the garbanzo bean (or Kabuli) chickpea varieties, and desi types tend to be more cold tolerant. Dr. Babar is developing cold hardy Kabuli types for double duty use as human and animal feed, as well as forage. Although chickpeas (as with all the tested legumes) can utilize soil N stocks, we plan to locate a more viable inoculant for chickpea next season, to help enhance their production in the future.

A field day was held at dairies in Lafayette and Suwannee counties on 02 March 2023 to share on-farm successes using cool-season forages in their operations (Figure 3). We showcased our newer oat and cereal rye varieties and addressed how incorporating some legumes into small grains as a mix provides opportunities to potentially enhance forage quality and resilience, particularly with grazing dairies. Dr. Vyas spoke to the participants about ensiling cool-season forages during lunch at the NFREC-Live Oak pavilion. The event also included a roundtable discussion to promote producer participation and to entertain their production questions.

Impacts

The second year of a two-year study suggests that lower seeding rates may save producers cool-season small grain seed costs of 20% or more. The goal for 2024-2025 season will be to better quantify seeding and plant density responses across dairies, as the dairies differ in the number of inputs and with their land fertility management. Serendipitously, we also observed that our method of land preparation (rolling preceding drilling) may provide better and faster establishment than current on-farm practices. We will test our theory on-farm, in the 2024-2025 season. The pay-off of testing new cool-season forage experimental lines on dairies is also demonstrable through greater yielding, commercial forage varieties that are available (or soon to be) for purchase by dairy producers.

References of Published Work

Release of SunBall ball clover

2023 Release of "Sunball" ball clover for use in grazing systems for grazing dairies. PVP will be applied for in 2024. A.R. Blount, E. Rios, K.H. Quesenberry, J. Dubeux, M.O. Wallau and J.C. Jones. Seed is currently in breeders seed and Florida Foundation Seed increase.

Wallau, M., M.E. Mailhos, C. Mackowiak, and D. Vyas. 2024. Cool-season forage variety recommendations. 02 Aug. Panhandle Agriculture eNews. <https://nwdistrict.ifas.ufl.edu/phag/2024/08/02/2024-cool-season-forage-variety-recommendations/>