TEFF: WHAT DO WE KNOW AND WHAT DO WE NEED TO KNOW?

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INTRODUCTION

Having warm-season grasses in a forage system could save producers money because less hay would be fed during the hottest part of summer. The main benefit is that warm-season annual grasses are most productive during hot weather and can provide badly needed forage during times of water deficit. Teff (*Erogrostis tef* (Zucc.)) is an annual warm-season grass from Ethiopia, that has potential to help fulfill this need. Teff has several advantages that make it a viable alternative over other summer annual forages, including its ability to thrive both in moisture-stressed and waterlogged soils, and its lack of anti-quality compounds as found in sorghum-related annuals (Ketema, 1997, Ketema, et al., 1993). Teff is a bunch type grass (Figure 1). Despite its small seed size (Figure 1), it germinates within 3-5 days and is an aggressive competitor once established (Figure 3). In its native habitat, maximum production of Teff occurs with a growing season rainfall of 11 to 22 inches and a temperature range of 50 to 85°F. During extremely dry summers such as 2007, a crop such as Teff might make the difference between financial success or disaster.

Producer demand for suitable warm-season annual forages will likely grow in the future as our climate warms and droughts may become more common. Increased surface temperatures (IPCC, 2001) will almost certainly influence regional precipitation patterns (Jackson et al., 2001). Many climate change prediction models suggest that periodic droughts will become more common and extreme rainfall events more frequent (Frederick and Major, 1997). A combination of increased dry periods interspersed with larger individual rainfall events will result in extended periods of soil moisture deficit and greater variability in soil water content (Jackson et al., 2001). Climate change in the coming decades may well require a shift from a cool-season forage base (that requires high moisture and soil fertility) to forages that use resources more efficiently and that can be grown in a wide array of soils. Although Teff has great potential for grazing and hay production (Fig. 4), more information is needed about its cultural practice, establishment and overall management.

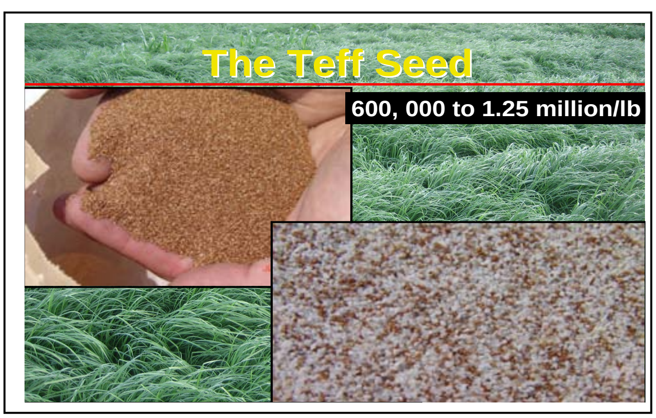

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Figure 2. The Teff plant has a bunch type of growth habit

Figure 3. Teff 28 days after planting. (Blacksburg, Virginia – June, 2008).

Figure 4. Animals grazing Teff (Willow Bend , West Virginia, 2007). Teff hayed in the background

RESEARCH UPDATE

In 2008, various Teff experiments were conducted at Kentland farm near Blacksburg, VA, to determine effects of cutting height, planting date and fertilization on biomass yield and nutritive value of Teff. Tiffany Teff was established on May 23rd and harvested on June 30th, August 10th and September 26th at the cutting heights of 2, 4 and 6 inches from the ground. A second experiment was also established on May 23rd to determine the effect of nitrogen fertilization and planting date on biomass yield and nutritive value.

Effect of cutting height on biomass yield

The effect of cutting height on biomass yield was obvious. At the initial harvest, yields from plots harvested at the 2 inch height exceeded the yields from plots harvested at the 4 and 6 inch heights (Figure 5). However, in subsequent harvests, Teff cut at 2 inch and 6 inch heights yielded sharply less forage than Teff cut at the 4 inch height. The influence of cutting height on yield was more pronounced for the second and third cutting dates (August and September) compared to the first (June

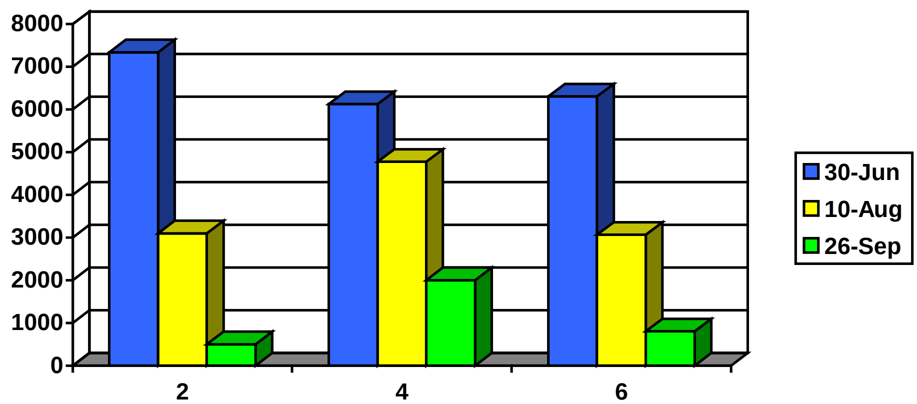

Figure 5. Effect of cutting height on biomass yield of Teff planted May 23 and harvested on June 30, August 10, and September the 26.

The effect planting dates and nitrogen fertilization on the developmental stages of Teff

There was no difference in biomass yield at first harvest between Teff planted in June vs July (Figure 6). Similarly, there was no nitrogen effect on the biomass yield of Teff. The Korean lespedeza that was planted with Teff, established successfully, although this legume was not expected to have impacted the nitrogen status of the plots by the time of the first harvest. Teff planted in June reached maturity and headed out in 38 days vs Teff planted in July (45 days). The 1st planting date, potentially would result in an earlier first harvest and more subsequent harvests, which translates into overall more yield for the grower. There was no effect of nitrogen fertilization on nutritive value of Teff. However, crude protein (Figure 7) and fiber content (data not shown) of Teff was affected by plant maturity. As the plant progressed from 3-leaf stage to late boot/head stages, crude protein declined (25-15%) while fiber increased.

CONCLUSION

The results of our experiments showed that Teff re-growth is affected by cutting height. The 2 inch cutting height initially resulted in higher biomass but subsequent yield and stand density was compromised. Based on our first year results, and previous work, the 4 inch cutting height will result in a favorable yield without affecting subsequent harvests and stand density. Teff reached its final stage in 38 and 45 days for June and July planting dates, respectively. The 1st planting date should result in multiple subsequent harvests and overall more biomass yield. Including summer annual grasses such as Teff increases crop diversity in farming systems and makes them more resilient to environmental stresses and more sustainable in the long-run.

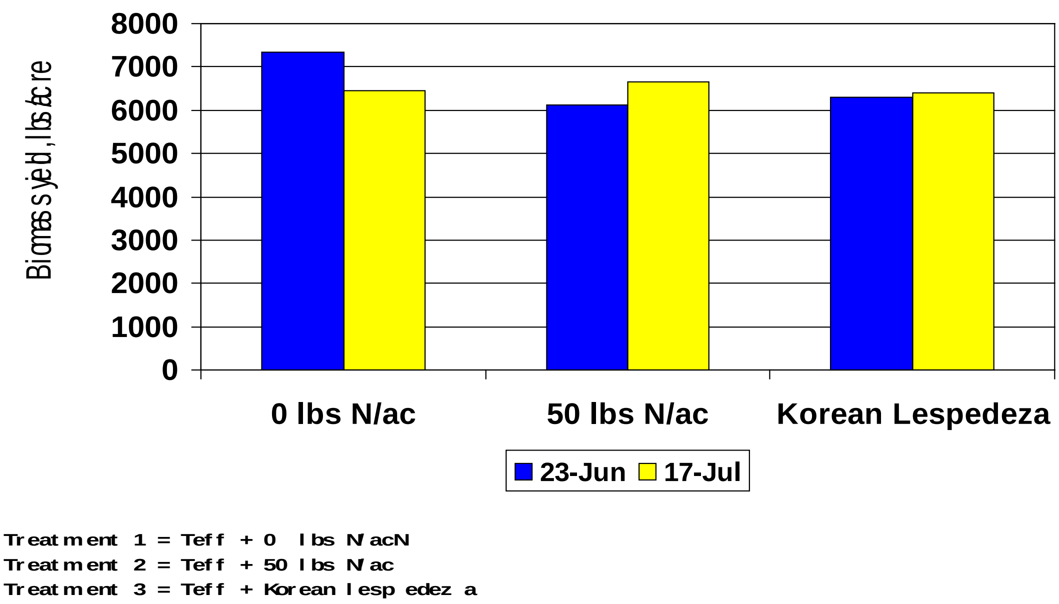

Figure 6. Effect of nitrogen treatments and planting date on the biomass yield on Teff - 2008

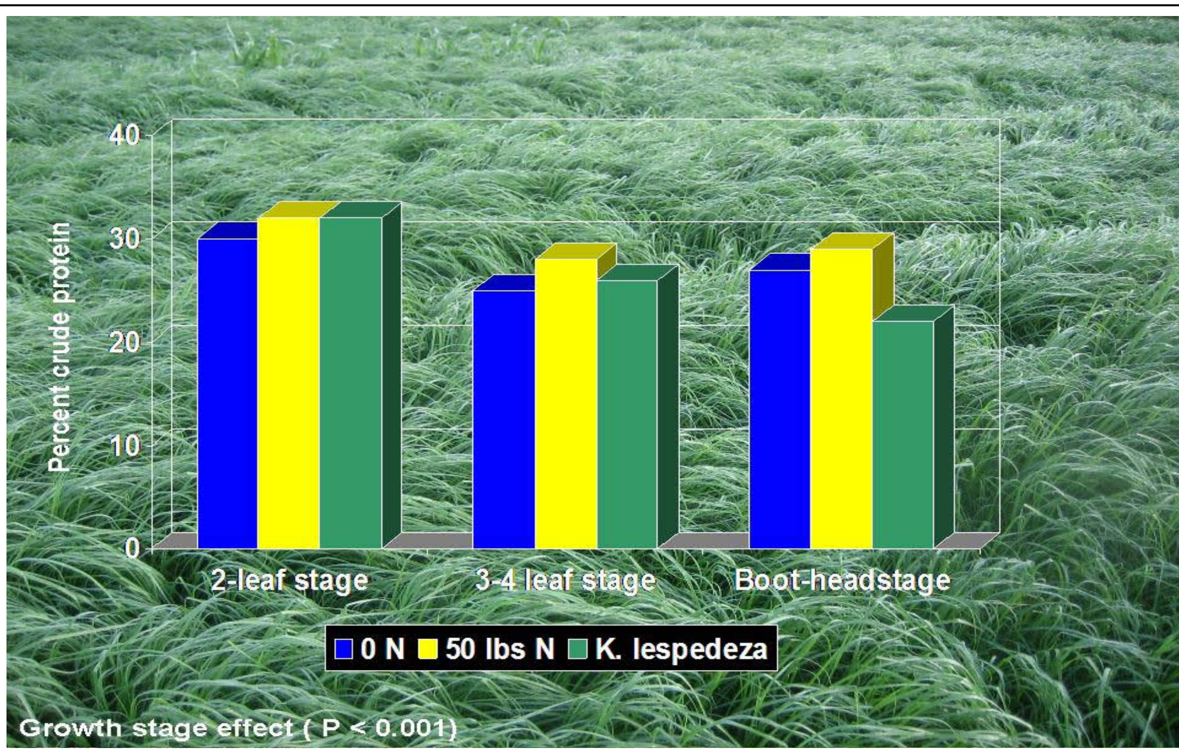

Figure 7. Effect of growth stages and nitrogen fertilization on percent crude protein - 2008

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