

Integrating Weed Management Practices to Enhance Productivity of Grazed Pastures

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As animal grazing has intensified within Kentucky and the surrounding region problematic weeds such as tall ironweed, spiny amaranth, horsenettle, buttercup, common cocklebur, and thistles have been increasing. These weeds become prominent in pastures because they have spines, thorns, or are unpalatable to animals. Animals selectively graze and avoid these weedy plants and with intensive grazing practices their populations are allowed to increase. Livestock producers are seeking ways to increase pasture productivity by minimizing the impact of these and other weeds on grazed lands.

One of the primary means used to fight weeds in pastures has been mowing, a mechanical control method. Pastures are typically mowed only once and occasionally twice per year. Not all fields are mowed in a timely manner to reduce new weed seed production or to limit top growth of unwanted vegetation. Rising gasoline and diesel fuel prices have greatly increased mowing cost. Maintaining optimum soil pH and added fertility is also known to increase pasture productivity. This cultural practice is not always used as extensively as it could be to reduce the impact of weedy plants and increase pasture productivity. Furthermore, livestock and hay producers have also been challenged with rapidly rising fertilizer prices.

Herbicides are another control method available to curtail broadleaf weed problems in pastures. If herbicides are applied at the right time biennial thistles, buttercup, and cocklebur can be easily controlled. In recent years newer herbicide products have been introduced that are more effective on problematic weeds such as tall ironweed, Canada thistle, and horsenettle. In general, herbicides are not widely used. Some of the primary reasons given for limited use are that broadleaf herbicides have the potential to kill clovers, herbicides are too expensive, and the need of spray equipment suitable for use on pastures. Regardless of effectiveness, chemical weed control is seen as an additional expense that producers struggle to justify. A more ideal approach to weed management in grazed pastures could be the use of integrated control tactics that achieve long-term control of problematic weeds and ultimately increase forage productivity. Previous research on tall ironweed indicates that one mid-summer mowing followed by fall herbicide application was highly effective in reducing tall ironweed populations during the next growing season.

Research Objectives

Field research studies were initiated in 2008 to evaluate mechanical (mowing),

chemical (herbicide treatment), and a cultural practice (added fertility) affects on weed populations and forage yield. A total of eight different treatments compared untreated areas with each main factor alone of mowing, herbicide application, and added fertility; and a combination of each of these factors including all three factors combined. Research trials were established on three beef cattle farms located near Lawrenceburg [Anderson county], Tompkinsville [Monroe county], and Richmond [Madison county], Kentucky and continued through the 2010 season. Mowed treatments were performed in July each year, herbicide treatment was applied once in August 2008 [except the Monroe location received an additional herbicide application in 2009], and fertilization added in September. Nitrogen was added in the fall as ammonium nitrate (50 lb N) at all locations. Phosphorus and potash were added based on soil test recommendations. The cost of inputs associated with each treatment and the forage value achieved by these various weed management strategies were used to determine if economic returns justify higher levels of weed management.

The intended outcome of this project was to help determine whether or not mechanical, chemical or cultural control methods or an integrated approach of these management practices provide the most benefit to livestock producers in reducing the impact of weeds on forage production. If a positive net return can be realized with specific weed management practices, producers may be encouraged to implement strategies which decrease weed

populations, and subsequently increase forage productivity.

Weed Populations

Weed species and weed populations varied by location with tall ironweed present at all three sites. Although there were other weed species present, the predominate weeds evaluated in Anderson county were tall ironweed goldenrod, marshelder, and tick clover (*Desmodium* spp.); at Monroe county tall ironweed, common ragweed, marestail, and tick clover; and at Madison county tall ironweed, horsenettle, clammy groundcherry, and common cocklebur. Mowing and/or added fertility did little to reduce the population of most weeds present relative to the untreated areas. Whereas, treatments that included an herbicide application did significantly decrease weed density. In herbicide treated areas a decline in weed population was observed during the first year and continued to be effective into the second year after application.

Weed Biomass and Forage Yields

Weed biomass and forage yields were determined at all locations during the spring in 2009 and 2010. During the fall of 2009 an additional harvest was taken at the Anderson and Madison county sites. For determining relative biomass yields (dry weight produced with each treatment) three sub-samples were harvested from individual plots and separated into weeds, forage grasses, and clover (present at 2 of 3 sites).

At Anderson County approximately 4300 lb of dry matter (total biomass) was produced from the untreated areas (Figure 1). However, 45% of this yield was the result of weeds and 55% of this

biomass was due to desirable grasses. Fertility alone provided a higher total biomass yield by increasing forage grasses, but the weed biomass remained the same as the untreated. The mowing treatment and herbicide alone provided a similar total yield as the untreated areas, but provided a higher percentage of forage grasses

with lower weed biomass. Combinations of added fertility with mowing or with herbicide provided the highest total yields. Combinations of herbicide + fertility, mowing + herbicide, and mowing + herbicide + fertility resulted in the lowest level of weed biomass indicating fewer weeds.

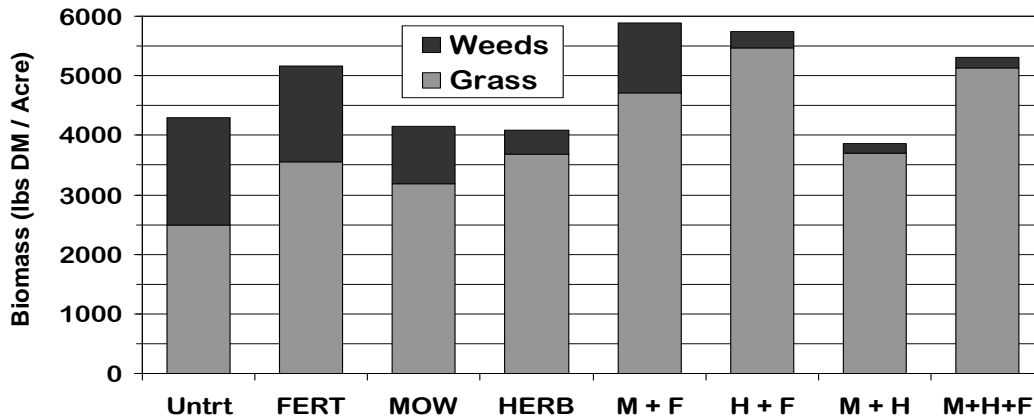


Figure 1. Forage yield and total biomass at Anderson County 2009-2010 (3 harvests)

Monroe County had similar trends in total biomass yield as observed with treatments in Anderson County (Figure 2). Approximately 30% of biomass produced was due to weeds in the untreated areas. Added fertility increased grass yield, but clover yield and weed biomass remained the same as the untreated areas. Mowing alone increased clover yield and resulted in a decrease in weed biomass. However,

mowing + fertility resulted in a similar level of weeds produced as the untreated. All treatments that included a herbicide provided higher forage grass yields compared to the untreated areas and had the lowest level of weed biomass. While clover was killed in all herbicide treated areas since this location received an herbicide application both in 2008 and 2009.

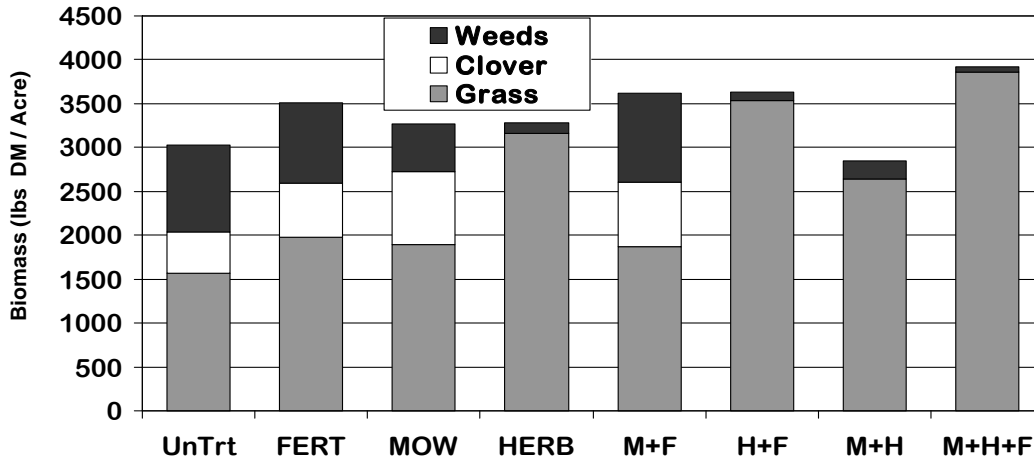


Figure 2. Forage yield and total biomass at Monroe County 2009-2010 (2 harvests)

Relative biomass yields between treatments at Madison County were somewhat different than yields observed at the other two sites. Furthermore, a lower percentage of weeds were present at this site relative to desirable grasses and clover as illustrated by the untreated areas. At this site hay is cut in the spring followed by grazing in late summer. Except for the fertility treatment the untreated area had a total biomass that exceeded the yields of the other treatments. The response to added fertility was an increase in forage

grass yields with no effect on weed biomass as observed at the other two locations. Mowing resulted in lower grass yields, but the percentage of clover present increased. Mowing alone had little affect on decreasing weed biomass. Herbicide treatments significantly decreased weed biomass. Clover was not present the first year after herbicide treatment in 2008 (results for 2009 not shown), however, volunteer clover did germinate in the early spring of 2010 and provided measurable yields.

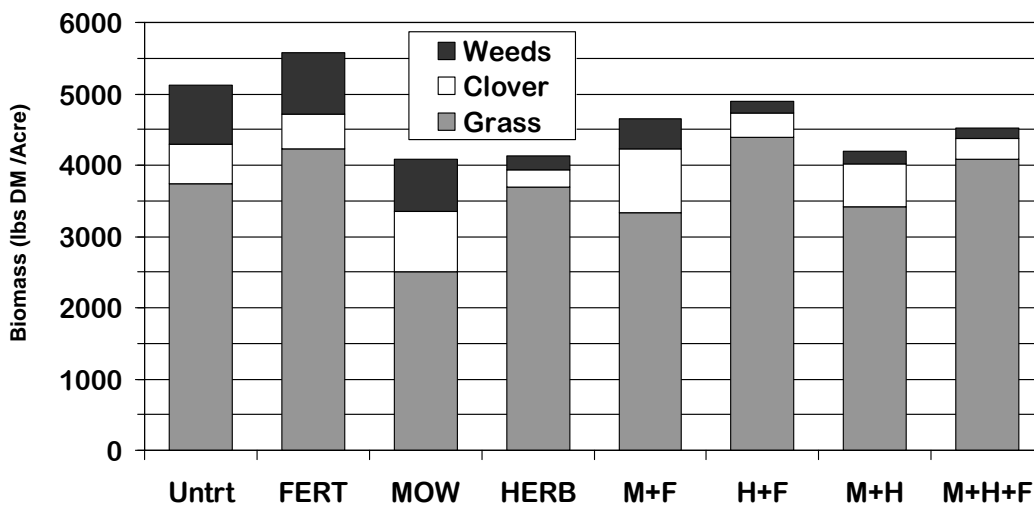


Figure 3. Forage yield and total biomass at Madison County 2009-2010 (3 harvests)

Economic Assessment

Best economic returns were obtained with the herbicide treatment alone at all three locations as determined by the value of the desirable forages produced (grasses and clover) relative to the cost of herbicide treatment, particularly since input cost can be prorated over a two year period. Net returns to the cost of mowing were equivalent to the forage value obtained from the untreated areas at Anderson and Monroe counties, but not in Madison. Treatment combinations of mowing + herbicide, which had fewer weeds, provided a partial economic benefit at Anderson and Madison counties. Increasing forage yields with added fertility did not result in a net return in forage profitability due to the high cost associated with added nitrogen and other nutrients.

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