

What Grasses Work Best with Alfalfa?

Tim Phillips, Associate Professor
Tall Fescue Genetics and Breeding Project
Department of Agronomy
University of Kentucky

Alfalfa is the "queen" of forages, but many situations exist where it is desirable or necessary to grow alfalfa in a mixture with a forage grass rather in monoculture. Some of the reasons to grow grass with alfalfa are: improved yield (in terms of tons of dry matter produced), better seasonal yield distribution, better weed control, potential pest reduction, erosion prevention, bloat risk reduction, and accelerated hay-drying rates. Conversely, there are some factors that favor alfalfa monoculture. These include: lower forage quality, especially in terms of protein content; more difficult management requirements (herbicide use, fertilization, and harvest timing); and, lower yields in mixtures in practice than with alfalfa alone.

Many grasses have been used in mixtures with alfalfa. From the range of forage grasses used by producers in Kentucky, most have some potential as companions to alfalfa. Several grasses have been use successfully in mixtures with alfalfa and other forage legumes, particularly red clover.

This paper will cover some of the results from studies involving grass/alfalfa mixtures. I will also discuss a number of grasses that might be considered for use with alfalfa, giving the relative merits and weaknesses of each species.

In a four-year study, Hoveland, Durham, and Bouton (1997 Agronomy Journal vol.89(1), p. 119-125) looked at cool season grasses with no-till alfalfa interseeded into them. The primary focus of their work was to look at the endophyte effect in tall fescue, but because a number of grass species was used, the paper is relevant to this discussion. The cool season grasses that were used included: reed canarygrass, orchardgrass, Kentucky bluegrass, and tall fescue. Only tall fescue was represented by more than one cultivar. Both E+ and E- Kentucky 31 and E- AU Triumph were used. Their study also included a pure alfalfa treatment. Yields were given as the alfalfa and grass components. They found that alfalfa yields in sods of reed canarygrass, orchardgrass, Kentucky bluegrass, and E+ Kentucky 31- were similar to alfalfa monocultures. They found no difference between E+ and E- KY31, but alfalfa yields in AU triumph were the lowest. The first year study produced no differences among treatments for total

alfalfa-grass yield. The second planting showed total alfalfa-grass yield to be highest for reed canarygrass. They measured alfalfa plant density in December each year. They found lowest stands with the three tall fescue sods, with the other grasses allowing higher alfalfa populations. The authors concluded from their studies that tall fescue was more competitive than orchardgrass and that reed canarygrass and Kentucky bluegrass were less competitive than tall fescue. They speculated that the reason tall fescue was so competitive with alfalfa has to do with plant morphology (or architecture) and seasonal growth characteristics. In Georgia, tall fescue begins growth much earlier in late winter than orchardgrass or Kentucky bluegrass, and 'Palaton' reed canarygrass comes out of its winter dormancy last. AU-Triumph tall fescue grows the most of all their treatments early in the season, and it was the treatment with the lowest alfalfa stands.

Chamblee and Collins wrote a chapter in the Agronomy Monograph 29, Alfalfa and Alfalfa Improvement (1988) titled "relationships with Other Species in a Mixture". They reviewed the literature about alfalfa-grass mixtures. Many of the papers are from many decades ago, before more intensive alfalfa production practices (more cuts per season), and before more disease-resistant varieties of alfalfa were available. The species that are reported in this chapter as being used in mixture with alfalfa include timothy, orchardgrass, tall fescue, smooth brome grass, ryegrasses, Kentucky bluegrass, redtop, reed canarygrass, meadow fescue, prairie brome grass, crested wheatgrass, Russian wildrye, and bermudagrass. Part of their chapter focuses on the specific competitive effects of factors like light, moisture, and nutrients. They also discussed the competition above and below ground in alfalfa-grass mixtures. In their summary, they note that if any yield increases are produced with alfalfa-grass mixtures, they generally are in the range of 10 to 15% over pure alfalfa. The desired balance of alfalfa and grass can be achieved and maintained by adjusting the grass used, date and rate of seeding, fertility, and time and height of defoliation.

Tall fescue is the most widely adapted cool season forage in the southeastern USA, but it has not been used as extensively in association with alfalfa. Earlier forage researchers suggested that tall fescue was too aggressive for alfalfa, but newer alfalfa cultivars with better disease resistance, persistence, and higher yield potentials might be too competitive for tall fescue. Tall fescue certainly is compatible with red clover for forage production.

Kentucky bluegrass is not as competitive as tall fescue or orchardgrass, but could be desired for its grazing tolerance.

Timothy has been used for many decades in combination with alfalfa for hay production. It is not generally productive in mid-summer, lacks grazing tolerance, and is suffers from heat and drought stress. Traditionally, most timothy cultivars

mature much later than tall fescue or orchardgrass and at the time of first cutting for alfalfa they may be too immature. Newer cultivars of timothy with earlier maturity and greater aftermath production may be more suitable for companion cropping with alfalfa for hay production.

Orchardgrass seems to be the grass of choice in Kentucky for growing with alfalfa. Orchardgrass forage quality generally is acceptable, but many cultivars mature too early and are of low quality at the time of first cutting of alfalfa.

Reed canarygrass is the most tolerant of our cool season grasses to flooding, but it is slow to establish, and has very small seeds. Some varieties of reed canarygrass have alkaloids (not related to an endophyte) which lowers their palatability and intake, but new, improved cultivars are available (Palaton and Venture, for example). The use of reed canarygrass in Kentucky is limited.

Smooth brome grass has been used in combination with alfalfa for many years in the North Central area of the USA, where smooth brome grass is the predominant cool season forage grass. In Kentucky, smooth brome grass, like timothy, is at or beyond the range of its adaptation zone. Smooth brome grass suffers from foliar diseases in the humid, warm climate found across much of Kentucky. The breeding programs that are developing new cultivars of smooth brome grass are located far to the north and west of Kentucky, so this species likely will remain of minor importance here.

Perennial ryegrass and the intermediate or hybrid ryegrasses have some potential for use in mixtures with alfalfa in Kentucky. These grasses have excellent seeding vigor and forage quality, and can persist for several years, unlike annual ryegrass or the small grains. These grasses are not as persistent as tall fescue and orchardgrass in Kentucky, but perhaps increased effort should be directed toward developing adapted varieties in Kentucky.

Annual ryegrass is not used as frequently in Kentucky as it is in the Deep South and Gulf Coast regions. More winter hardiness is required in Kentucky than most annual ryegrass varieties have. The benefits of annual ryegrass grown with alfalfa are the excellent seedling vigor and forage quality of most annual ryegrass varieties. It has some late fall production and has heavy yields in the spring. Little if any regrowth occurs.

Small grains (wheat, oats, barley, rye and triticale) can be used in combination with alfalfa for a one-time increase in forage production. The attributes of the small grains include excellent seedling vigor and good forage quality if harvested before head emergence. The grains are generally seeded in October and harvested in the following spring. For stored forage, small grains and

alfalfa likely would be ideal for silage more than for hay. The heavy yields of small grains and alfalfa would require more rain-free days for curing at a time of the year when such dry, sunny weather is rare.

Warm-season grasses such as bermudagrass and crabgrass can be used with alfalfa, but it seems that cool season grasses more adequately distribute yield during the year. Forage production of cool season grasses complements that of alfalfa, whereas warm season grasses would produce yields during the same time as alfalfa.

Conclusions

Several grasses can be grown with alfalfa in Kentucky. Which one is best depends on the objectives of the producer. It is likely that different cultivars or different species will perform drastically differently under grazing management than under hay management. More studies should be conducted to determine what grass species and cultivars are best suited for mixed stands with alfalfa, and what management practices best maintain a desired balance between the grass and the alfalfa. With the rise of grazing tolerant alfalfa cultivars during the past decade, plus the increased vigor, disease resistance, and improved persistence in modern alfalfa varieties, new grass cultivars should be developed for compatibility with alfalfa. Direct selection for improved grasses to persist in stands with alfalfa could produce more stable mixtures of grasses and alfalfa.