Cool-Season Success

Native western, tall wheatgrass perform well in west-central Kansas trial.

by ***Micky Wilson***

"Grazing animal-pasture interactions are especially important in environments where high temperatures and drought conditions may lead to reduced forage growth and overutilization if stocking rates are not adjusted accordingly," said Keith Harmoney, range and forage scientist for the Kansas State University Agricultural Research Center–Hays. "Grass survival under these conditions is important for future production and environmental sustainability."

During the April 2006 K-State Research Roundup at the center, Harmoney shared results of a field trial evaluating production and stand responses of 10 native and introduced cool-season grass varieties selected for adaptation to the Great Plains. The varieties were evaluated while undergoing and following severe defoliation stress in the variable climate of west-central Kansas. Grasses in the trial included Lincoln smooth bromegrass, Bozoisky Russian wild rye, Luna and Manska pubescent wheatgrass, Alkar and Jose tall wheatgrass, Slate and Oahe intermediate wheatgrass, and native grasses Barton and Flintlock western wheatgrass.

PHOTO BY MICKY WILSON

►"The two western wheatgrass varieties and the tall wheatgrass varieties tended to have greater tiller numbers, yield and persistence," reports K-State range and forage scientist Keith Harmoney.

Cool-season circumstances

Cool-season grasses are a great complement to warm-season grasses because they extend the grazing season, Harmoney said. The typical growing season of cool-season grasses starts in March, with peak production occurring at the end of May and first of June. A summer slump occurs in July and August, and an increase in production is seen again when temperatures cool down in the fall.

"The cool-season grasses typically are easier to establish than warm-season grasses," Harmoney explained. "If we have perennial cool-season grass growing out on old cropland it also helps provide ground cover to conserve soil and water."

In earlier studies on cool-season grasses at the research center, Harmoney said, he found a strong relationship between tiller density and forage yields. As tiller density increased in the stands, forage yield increased as well.

"The relationships were especially good in years when we had normal to below normal precipitation, and plants were moisture stressed," Harmoney said. The worst relationship between yield and density, he added, was recorded in 2001, when the station received just more than 29 inches — well above normal precipitation levels. This relationship occurred on both lowland and upland locations.

Harmoney noted many points on why tiller density is so important.

- ► It helps provide ground cover and hold the soil;
- ► It stops wind, soil and water erosion;
- ► It helps increase water infiltration by stopping the impact of rain on the soil surface (rain impact can create a crust on the soil surface, making a barrier for water infiltration);
- ► A thick, full stand works to intercept light more efficiently than a thinner stand; and
- ► It can help increase grazed or harvested yield under stress — especially moisture stress.

Pasture performance

The health of a plant is determined by leaf growth, Harmoney said. "As we increase leaf growth, we also increase carbohydrate production and storage, which is used for tiller and bud initiation. At the same time we have leaf growth, we also stimulate root growth, nutrient uptake and water uptake."

In the field trial, Harmoney wanted to know how plants would respond if they were defoliated extensively.

Table 1: Fall plant frequency of 10 cool-season grass varieties following extensive defoliation in 2003 and 2004 on upland and lowland soils near Hays, Kan.

Grass	Upland frequency (plants per 30 units)	Lowland frequency (plants per 30 units)
Alkar tall wheatgrass	28.5[a]	27.6[e]
Barton western wheatgrass	30.0[a]	30.0[a]
Bozoisky Russian wild rye	25.4[b]	29.3[b,c]
Flintlock western wheatgrass	30.0[a]	30.0[a]
Jose tall wheatgrass	29.0[a]	28.4[d]
Lincoln smooth bromegrass	23.0[c]	29.0[c,d]
Luna pubescent wheatgrass	28.1[a]	29.1[c]
Manska pubescent wheatgrass	29.2[a]	29.5[a,b,c]
Oahe intermediate wheatgrass	29.0[a]	29.5[a,b,c]
Slate intermediate wheatgrass	29.5[a]	29.8[a,b]

[a-e]Values in columns with the same letter are statistically equal.

Source: Keith Harmoney, 2006. "Grazing Persistence of Perennial Cool-Season Grasses," K-State Agricultural Research Center–Hays.

"In two consecutive years, I had 436 and 337 steer grazing days per acre on these plot areas. I initially mob-grazed these for two days with 15 steers in order to make sure the plots were going to be at a 2-inch height or less," Harmoney explained. "I left two to three animals on for the remainder of the growing season in order to make sure that those plants were going to be stressed hard during the growing season."

At the conclusion of the trial, the cool-season grasses that consistently performed the best were Alkar tall wheatgrass, Barton western wheatgrass, Jose tall wheatgrass and Flintlock western wheatgrass. "At the end of the stacked season of grazing, those grasses really separated themselves out as great ones that were better able to handle this extensive defoliation," Harmoney observed.

These results occurred at the upland location. At the lowland location a similar separation in grass varieties occurred. "The two western wheatgrasses and Jose tall wheatgrass were the ones that tended to do best," Harmoney noted.

"The conclusions that I've drawn from this are that plant survival and persistence were better with these cool-season grasses than what I was expecting," Harmoney noted. "Even though plant survival was better, the real story was in the tiller density and the yield of these grasses after recovering from that extensive defoliation. The two western wheatgrass varieties and the tall wheatgrass varieties tended to have greater tiller numbers, yield and persistence."

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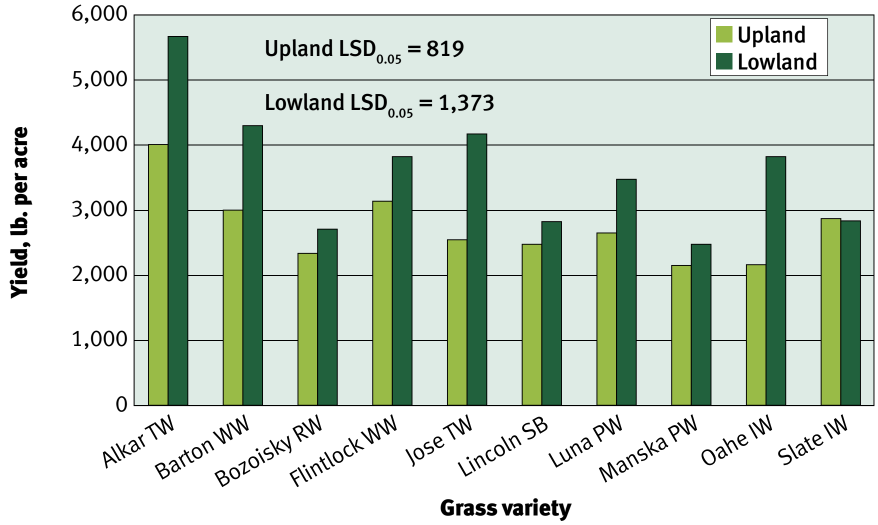
Fig. 1: Upland and lowland peak yield of 10 perennial cool-season grass varieties the summer following two consecutive seasons of extensive defoliation near Hays, Kan.



Source: Keith Harmoney, 2006. "Grazing Persistence of Perennial Cool-Season Grasses," K-State Agricultural Research Center–Hays.

Rotational grazing

Many producers have incorporated a rotational grazing system into their management practices. Advantages of rotational grazing, says to Hugh Aljoe, forage specialist for the Samuel Roberts Noble Foundation of Ardmore, Okla., include herd management, ease of observing livestock, better pasture management, easier assessment of forage reserves, greater grazing efficiencies, improved livestock distribution within pastures, and improved production per acre.

It's been observed that native grasses require longer recovery periods than introduced grasses, which affects planning in rotational grazing management. "In the Southern Plains region of the U.S., grazing cycles in the spring could be as short as 21 to 30 days, and later in the growing season as long as 45 days for introduced forages to 90 days or more for native range pastures," Aljoe says.

To start a rotational grazing system that incorporates both warm-season and cool-season grasses, focus on pastures that have the greatest cool-season components and try to fully use those forages early in the growing season, Aljoe says. If cool-season annual grasses are in short supply, Aljoe recommends allowing "the perennial pastures to accumulate about 6 inches of new growth before initiating grazing in the spring. This allows the perennial grasses to accumulate surplus leaf material before being grazed."

When the grazing season has moved along and mostly warm-season grasses are being utilized as forage, Aljoe recommends managing introduced grasses to maintain appropriate quantity and quality within the forage stand. He also recommends "simultaneously, [allowing] the native range pastures to accumulate excess growth to be utilized later in the growing season."

PHOTO COURTESY OF USDA NCRS

►Barton western wheatgrass