Forage Mixtures Affected Productivity and Profitability

Grass–legume mixtures have long been considered viable alternatives to nitrogen-fertilized grass monocultures. There is little information on effects of seed mass ratios on productivity and economic returns. Identifying seed mass ratios that produce high forage accumulation and nutritive value and increase farm profitability will increase income for farmers and reduce nitrogen fertilizers use.

In an article recently published in Crop Science, researchers evaluated how forage accumulation, nutritional value, and profitability will be affected by different seed mass ratios of three forage legumes (alfalfa, sainfoin, and birdsfoot trefoil) and meadow bromegrass compared with a meadow bromegrass monoculture with nitrogen fertilizer applications.

The two-year average annual forage accumulation of meadow bromegrass monoculture receiving 112 kg N ha⁻¹ was 6.89 Mg ha⁻¹ yr⁻¹, which was similar to the 30% alfalfa + 70% meadow bromegrass, 30% birdsfoot trefoil + 70% meadow bromegrass, 25% alfalfa + 25% birdsfoot trefoil + 50% meadow bromegrass, and 16.7% alfalfa + 16.7% sainfoin + 16.7% birdsfoot trefoil + 50% meadow bromegrass mixture treatments. Nutritive value was relatively greater in mixtures than nitrogen-fertilized meadow bromegrass monoculture.

Based on forage accumulation, nutritive value, and profitability, the 30% alfalfa + 70% meadow bromegrass, and 30% birdsfoot trefoil + 70% meadow bromegrass seed mass ratios are simple mixtures which may be viable alternatives to 100% alfalfa and nitrogen-fertilized meadow bromegrass monoculture.

Leaf rust response on flag leaves of (A) Thatcher wheat (susceptible) and (B) Thatcher*2/Santa Fe F₄ line (resistant).

Leaf rust caused by *Puccinia triticina* occurs regularly in the Great Plains and can cause significant losses in wheat in years that are favorable for the rust fungus to increase quickly. Leaf rust resistance genes derived from lower ploidy wheat relatives such as *Lr21, Lr24, Lr26, Lr37,* and *Lr39* have been deployed in hard red winter wheat cultivars in the past 20 years. However, cultivars with these genes have selected virulent races of *P. triticina* and have lost resistance within a few years of release.

In a study recently published in Crop Science, the genetics of leaf rust resistance in the hard red winter wheat cultivars Santa Fe and Duster, which have had good durable resistance to leaf rust, was examined. Santa Fe was determined to have the resistance genes *Lr3a* and *Lr37* as well as an unknown adult plant resistance gene that was highly effective in field plot tests.

Duster was determined to have genes *Lr3a, Lr11,* the durably resistant adult plant resistance gene *Lr34,* and an unknown adult plant resistance gene that was highly effective in field plots. The cultivars Santa Fe and Duster are excellent sources of leaf rust resistance for wheat breeding projects in the Southern Great Plains.