

## SUMMER ANNUAL LEGUMES: YIELD POTENTIAL AND WATER USE

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### ABSTRACT

Due to the decline of the Ogalla Aquifer and reduced irrigation capacity, there is a growing interest in more water-efficient cropping systems in the semi-arid central Great Plains. One of the most water-intense crops grown on the semi-arid central Great Plains is alfalfa (*Medicago sativa* L.). Alfalfa is grown for its nutritive value and protein, which is highly desired by cow/calf, feed yards, and dairies of the central and southern Great Plains. The purpose of this study was to evaluate the potential of summer annual legume species to serve as a more water-efficient alternative to alfalfa while retaining high-forage nutritive value and protein levels. This study sought to accomplish this by analyzing the viability, yield potential, nutritive value and water use efficiency (mass of forage/water used) of four summer annual legume species (cowpea [*Vigna unguiculata*], forage soybean [*Glycine max* (L.)], lablab [*Lablab purpureus*], and sunn hemp [*Crotalaria juncea*]) as well as two summer annual grass species (BMR forage sorghum [*Sorghum bicolor* (L.) Moench] and pearl millet [*Pennisetum glaucum*]). This study was conducted in 2022 and 2023 at three locations: Garden City, KS (irrigated), Colby, KS (dryland), and Hays, KS (dryland). In Garden City and Colby, forage sorghum and pearl millet were significantly higher yielding than any of the legume species, but in Hays, while forage sorghum was the highest yielding, there was not a significant difference in yield between cowpea and pearl millet. In Garden City, water use efficiency was as follows forage sorghum > millet > sunn hemp > forage soybean = cowpea. Based on initial results, the potential to incorporate alternative summer annual legumes into Semi-arid Great Plains cropping systems seems limited because the more commonly grown forage grass species both yielded better and used water more efficiently than any of the legume species.