

The Distribution of Legume Species Across the Precipitation Gradient of Kansas

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Legume species are important for fixing atmospheric nitrogen, facilitating nutrient cycling, and increasing plant and habitat diversity, yet the distribution of legumes is not well understood. To examine the distribution of legume species across the precipitation gradient of Kansas, we used the USDA database to quantify how legume species richness varied across the state. Specifically, we related legume species occurrences in each of the 105 counties in Kansas to annual precipitation data and also assessed whether these patterns varied for native and non-native legume species.

Legume diversity was strongly correlated with annual precipitation ($r^2=0.56$), as species richness more than doubled across Kansas, increasing from 23 to 54 species. However, this change in legume diversity varied depending on whether legumes were historically native or non-native. We found a sharp increase in the proportion of non-native species as precipitation increased, from 8 to 22%. The significant correlation between the proportion of non-native legume species and precipitation was remarkably high ($r^2=0.7$), suggesting that this pattern is highly reliable across counties in Kansas.

These strong patterns suggest that the number and presence of both native and non-native legume species are linked with precipitation regimes in the Great Plains, most likely due to variance in drought tolerance among species. However, additional observational and experimental work is needed to clearly distinguish between the importance of soil properties, land management, and plant community composition on legume distributions across the precipitation gradient of Kansas.