

Effectiveness of Lespedeza Species as a Bioactive Forage in Ruminant Production Systems

Using *Lespedeza cuneata* (sericea lespedeza) as a tannin-producing bioactive forage for livestock has been increasing in the United States. There are many other *Lespedeza* species that have not been adequately evaluated and compared to *Lespedeza cuneata*. Our objective was to analyze other *Lespedeza* species for condensed tannin production and bioactivity levels in comparison to *Lespedeza cuneata* to identify effective alternatives for binding protein and potentially increasing rumen undegradable protein. We evaluated 12 *Lespedeza* species from the germplasm collection at the USDA Plant Genetic Resources Conservation Unit in Griffin, GA. Plants were reared in a greenhouse and then transplanted to field plots at Fort Valley State University in Fort Valley, GA. Following establishment, plants were harvested, freeze dried, ground, and analyzed for the condensed tannin concentration and bioactivity. The analyses consisted of protein precipitable phenolics (PPP), total phenolics (TP), and protein bound (PB) to PPP. *Lespedeza virginica* ($P < 0.0001$), followed by *L. divaricata*, produced the most PPP, whereas *L. bicolor* and *L. tomentosa* produced the least. *Lespedeza virginica* and *L. divaricata* also had the greatest TP ($P < 0.0001$) concentrations, whereas *L. bicolor* and *L. intermixta* had the least. *Lespedeza virginica*, *L. divaricata*, and *L. virgata* bound the most protein ($P \leq 0.04$), whereas *L. bicolor* and *L. tomentosa* demonstrated the least ability to bind protein. Effectiveness of binding protein by the PPP was expressed as a ratio of PB:PPP. The PB:PPP ratio is an indicator of bioactive potency based on how effectively the protein was bound by PPP from each species. We concluded *Lespedeza cuneata* was the least potent and bioactive of the species evaluated and *L. virgata* was the most potent and bioactive species. Our results suggest there are more potent *Lespedeza* species, compared to *L. cuneata*, that may be used as a bioactive forage for increasing rumen undegradable protein.