United States Hairy Vetch (*Vicia Villosa*) Germplasm Contains Two Subpopulations

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Hairy vetch (*Vicia villosa* L.) is a promising legume cover crop for the northern United States. Recent genomic data and a subsequent literature review indicates that two morphologically similar but agronomically distinct subpopulations exist within hairy vetch germplasm. We used a panel of single sequence repeat (SSR) markers to assign hairy vetch cultivars and breeding materials to two subpopulations and found that many commercial cultivars are distinct from commonly accepted *V. villosa*. Based on an elastic net model trained with multi-site trial results from over 55 site-years, the outlier subpopulation (smooth vetch, below) has superior biomass accumulation in the south-central United States and regions of the Pacific Northwest where cover crop seed production occurs. Specifically, smooth vetch has superior biomass relative to hairy vetch at sites with mild winters, cool spring temperatures, high sand, or low clay soils. Smooth vetch has poor winter survival and reduced biomass in the northern United States. Differentiating these subpopulations will greatly improve agronomic outcomes and accelerate ongoing breeding efforts for *V. villosa* as a cover crop.