

Evaluation of minor food and forage cool-season legume germplasm as overwintering cover crop green manures

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Introduction

The Plant Germplasm Introduction Testing and Research Unit (PGITRU) collection of 4,810 annual and perennial species is one of the most diverse and well characterized within the National Plant Germplasm System (NPGS). Characterization of minor crop species remains generally limited however. With a recurring interest in cover crops, screening underutilized accessions within minor food and forage legume germplasm species may turn up desirable germplasm with multi-purpose cover, green manure, and forage cropping potential. Descriptive data are needed to characterize germplasm accessions in support of cover crop and forage breeders. Specifically, which accessions thrive over winter when most cover crops are used. Key traits to screen for include rapid stand establishment, winterhardiness, early spring regrowth, vegetative biomass and high feed values where forage is desired.

Materials and methods

This study evaluated 597 accessions of 60 cool-season forage legume taxa over one season. Traits measured were overwinter survival, C:N ratios and biomass production (dry weight and area based on canopy width and height) at the PGITRU's Central Ferry research station in southeastern Washington. Ten seeds were sown in replicate on black plastic and irrigated as necessary.

Results

Although air temperature remained above -10°C over the 2015-16 winter, 141 of the accessions did not survive. *Lathyrus ochrus*, *Vicia ervilia*, *V. benghalensis*, and *V. narbonensis* were generally less hardy than *L. sativus*, *V. sativa* and *V. villosa*, yet intraspecific variability blurred any definitive line. Simple screening of winter hardiness under field conditions and measurement of canopy height and width at flowering was enough to identify promising accessions with a large biomass production (>500 g DW). The top 30 largest biomass producing accessions were either *V. villosa*, *V. sativa*, *L. tingitanus* or *L. clymenum*. A handful of forage legume accessions had an area at flower $>5,000$ cm^2 , but this was accompanied by scant ground coverage over winter and rather late flowering (late May) compared to annual food legume germplasm (April-early May). All accessions that were tested for C:N at flowering were well under 20:1, suggesting that any of these accessions would be excellent green manures that quickly release inorganic nitrogen as they decompose.

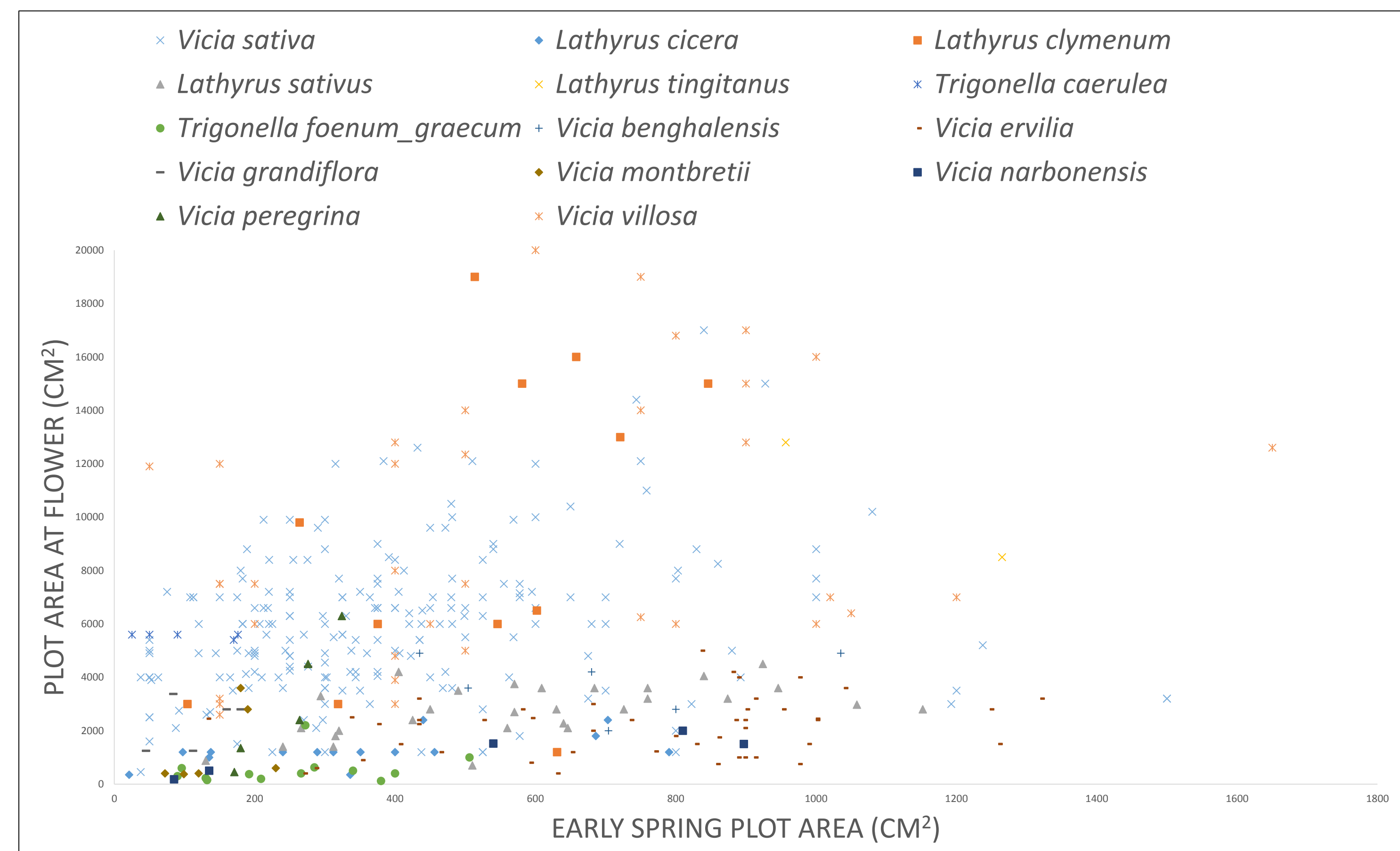


Figure 2. Relationship between early spring biomass (measured 19 Feb.) and at flowering (between mid-April and early-March) as measured by plot height x width. Each data point represents a single accession from 14 cool-season food legume germplasm species.



Conclusions

Further screening of both food and forage legume germplasm is necessary to accurately characterize each species trait value distribution within a given environment. Field screening for overwintering is relatively inexpensive and simple but inherently unpredictable. Therefore, it is advisable for interested researchers to screen these selections within their intended production environment and share their characterization data with PGITRU Curators for posting on GRIN Global database.

<https://npgsweb.ars-grin.gov/gringlobal/search.aspx>

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