Crimson Clover Cover Crop Germplasm Assessment for Agroecological Traits

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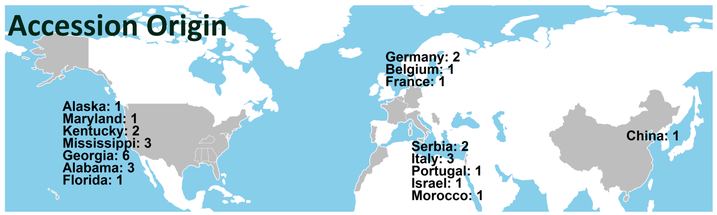
Introduction

Cover crops are multi-functional tools integral to the development of sustainable agricultural systems. However, they have received minimal improvement through breeding. Crimson clover is the most widely used legume cover crop in the United States, yet growers have limited cultivar options; available cultivars are often not regionally adapted. Enhancing cover crop germplasm will improve performance for current users and potentially increase adoption. Therefore, we characterized 30 crimson clover accessions provided from the National Plant Germplasm System for their biomass production and maturity timing over three years at the Beltsville Agricultural Systems Laboratory in Beltsville, Maryland.

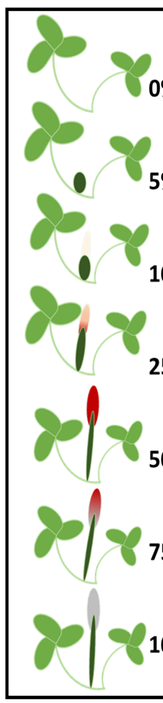
Accession Origin



Methods – 3 Year Trial

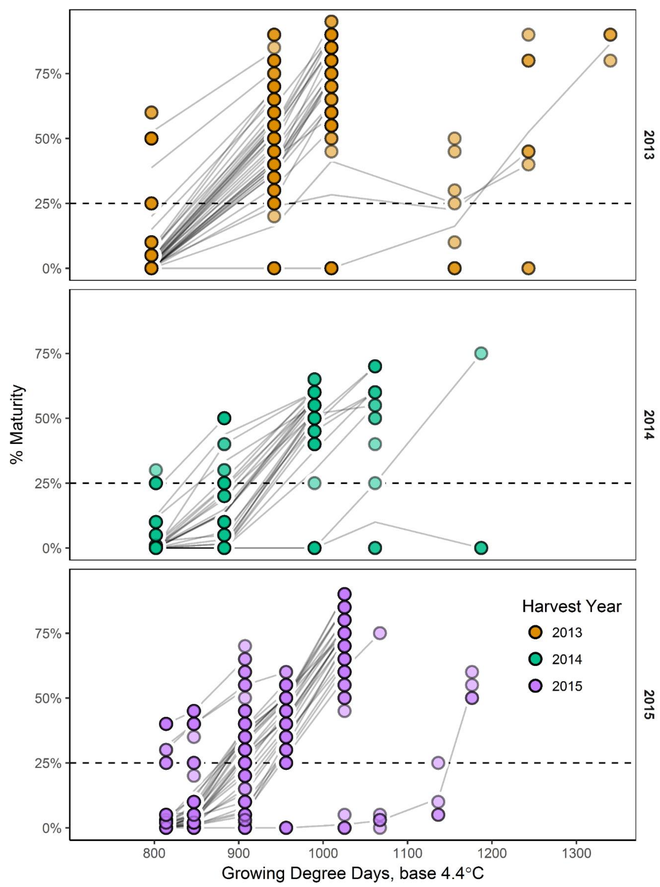
- 4 replicates of 40 seeds per accession were planted in a 2’ row in late September.
- A maturity rating was recorded in the Spring
- Biomass collection was aimed at 50% maturity.

Maturity Rating Scale

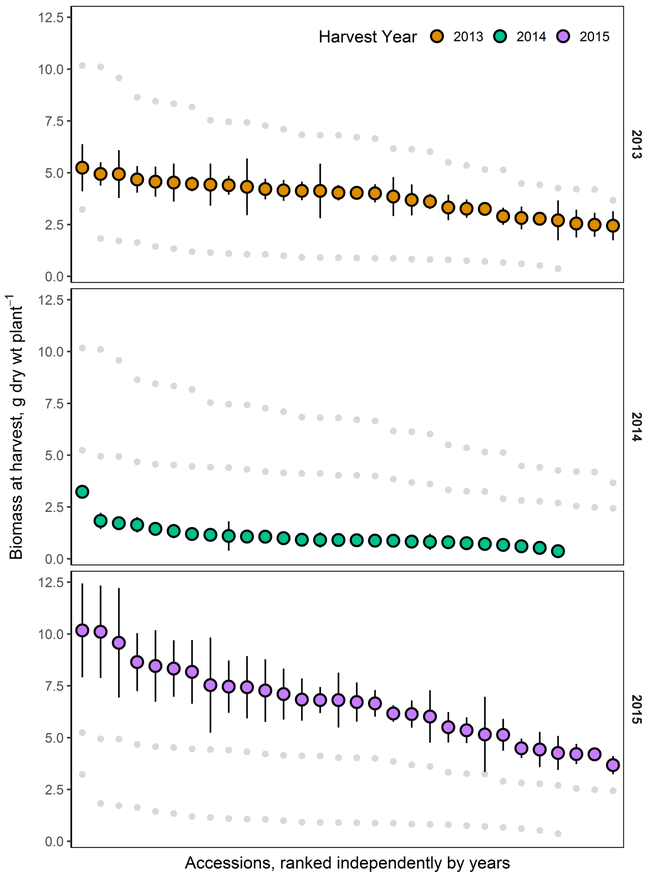


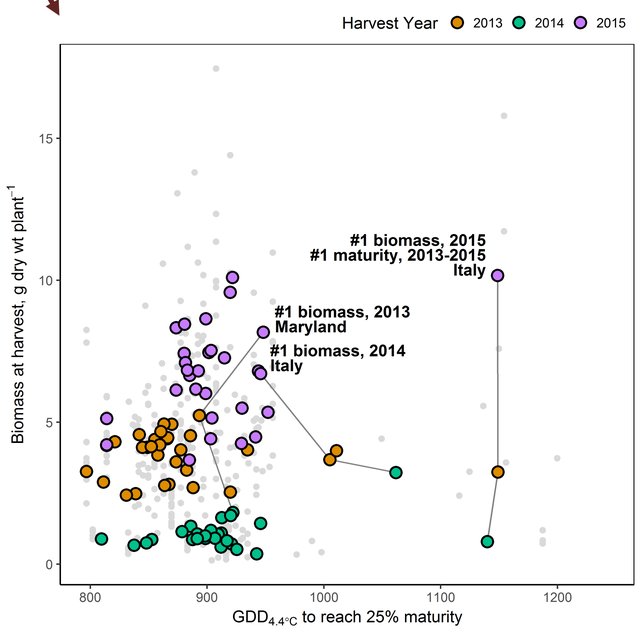
Results

Maturity Timing



Biomass Production





This figure shows how the accessions covary between maturity timing and biomass production.

Maturity:

- All accessions are graphed based on their percent maturity over 3 years in the scatterplot the right
- A threshold is drawn at 25% maturity because it represents the initiation of flowering, a trait of interest to regional farmers

Biomass:

- Per plant biomass production per accession is shown in the scatterplot to the left
- Accessions are ranked from highest producing to lowest producing each year with the an outline of the other years on each graph for comparison

Conclusions

Climatic factors have a bigger effect on biomass than maturity.

The high variability among accessions in both biomass production and maturity timing demonstrates that the genetic material available will be sufficient to target traits of interest.

Top biomass performers varied by year, but maturity timing did not.
When The graph to the right shows that the top biomass performer varied between years, but the top performer for maturity (which we set at longest GDD to reach 25% maturity) did not.

Future Work

Future work will focus on quantifying the biological nitrogen fixation and winter hardiness among these accessions. In addition, we will conduct a metagenomic sequencing on differences in the nodule symbiotic bacterial community among each accession. Finally, this work served as the preliminary data for a national legume cover crop breeding program for crimson clover *Trifolium incarnatum*, hairy vetch *Vicia villosa*, and winter pea *Pisum sativum*.