



Optimizing Best Management Practices and Cultivar Selection for Midwest Hops Production



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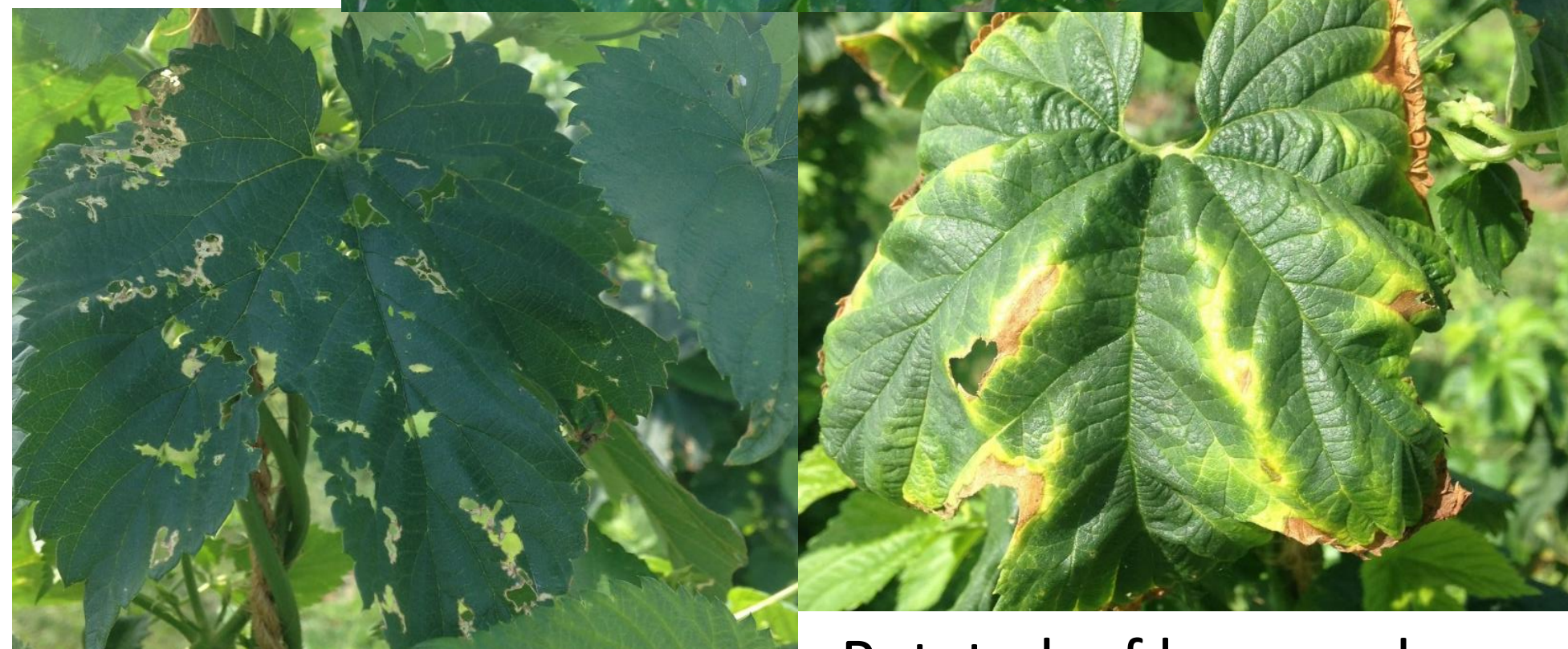
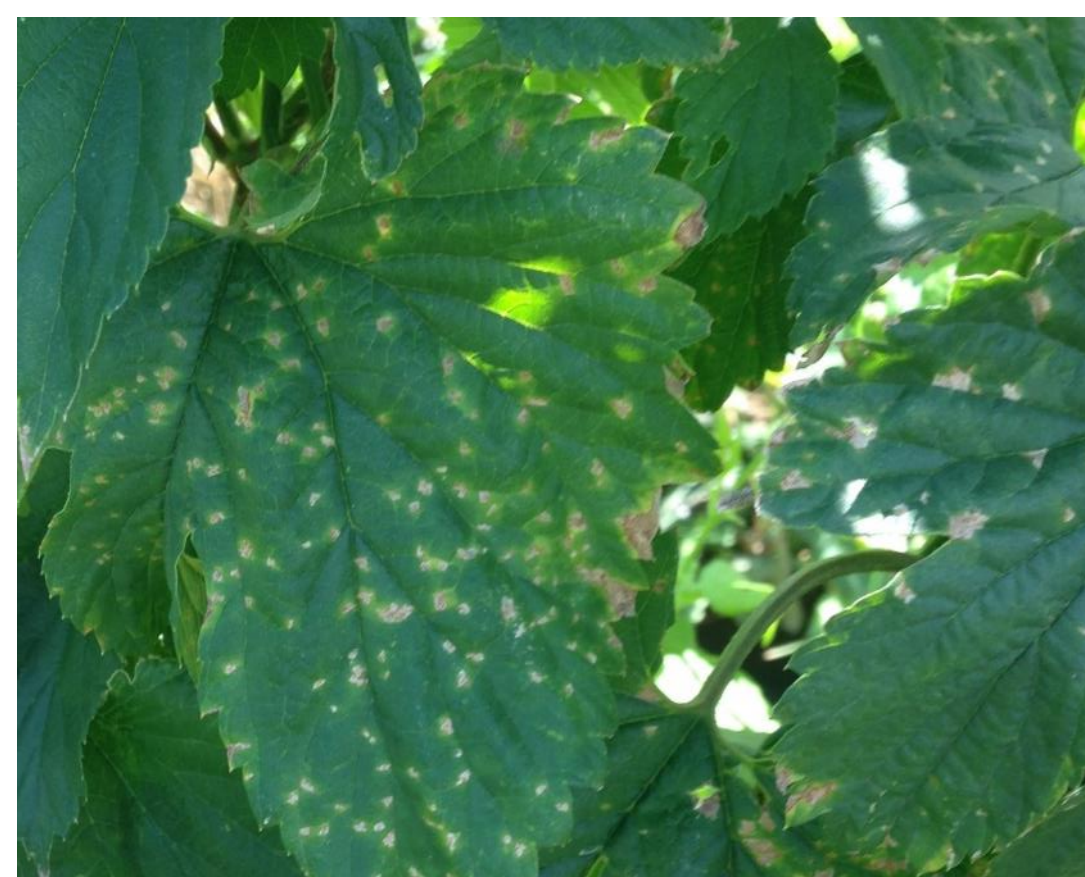
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INTRODUCTION

Our SBIR Phase I project is directed to the development of a sustainable, economically viable and vibrant hops production industry in the Midwest. We are addressing our goal, by identifying and genetically characterizing hops germplasm and cultivars suitable for Midwest production, and developing best management practices for growing hops in the region.

As hops production increases in the Midwest, there is a need for regionally adapted hops cultivars with resistance to the common pests in the region.

Early downy mildew damage

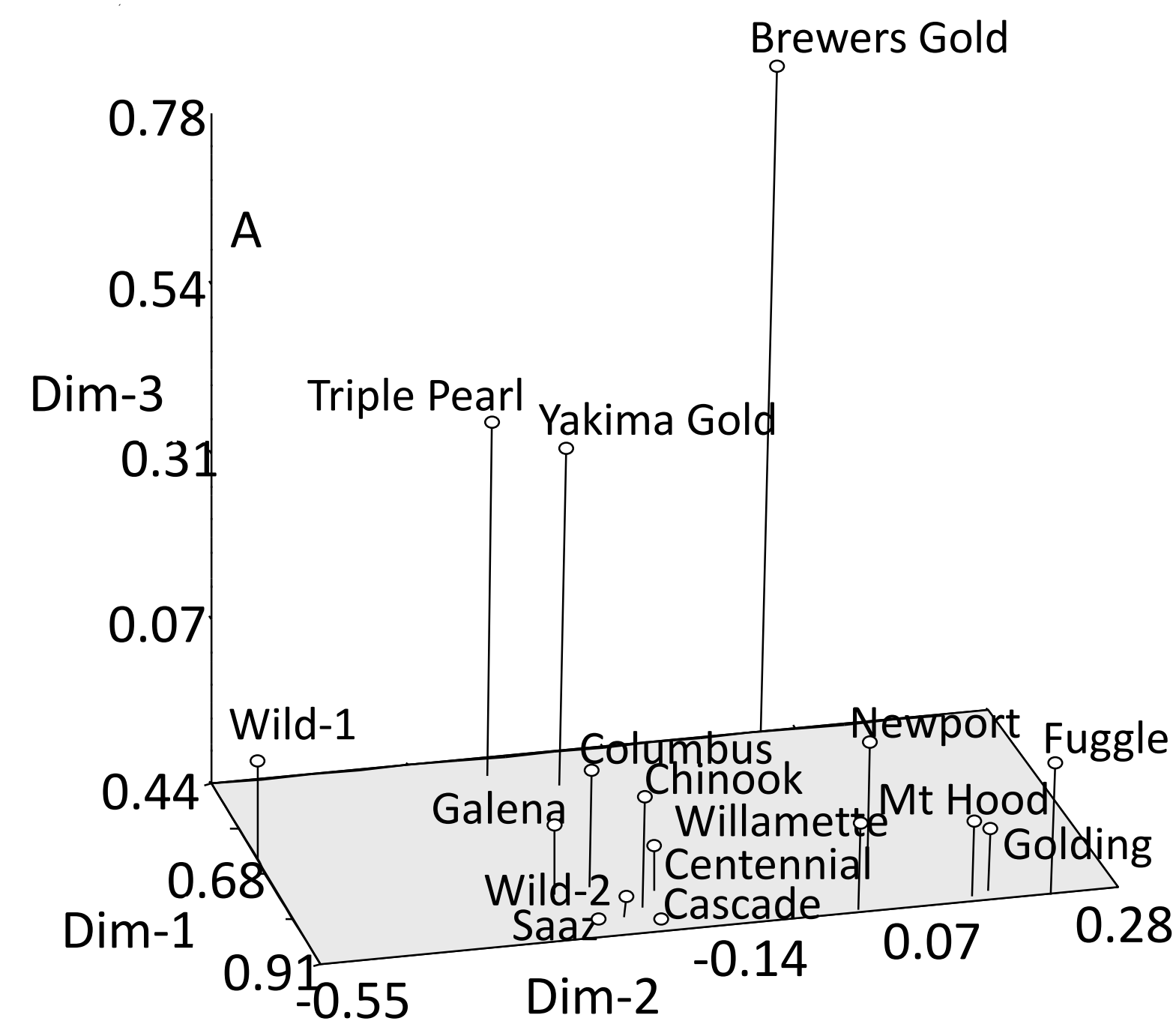


Japanese beetle damage

Potato leaf hopper damage

Objective 1: Identify and genetically characterize Midwest adapted hops germplasm and cultivars.

Leaf tissue was collected for DNA extraction from greenhouse and field grown hops. The collection included 20 cultivars and 26 wild or unimproved hops from the National Plant Germplasm System. Total genomic DNA was extracted using a Plant DNeasy Kit (Qiagen, Valencia, CA). Amplified fragment length polymorphic markers are being applied to characterize genetic relationships among the collection entries.



In a preliminary study, genetic relationships of 18 commercial and 2 wild hops based on 808 AFLP genetic markers were characterized. Principal coordinate analysis (A) and phylogenetic analysis (B) demonstrate unique genetics for Wild-1, a locally collected wild hop.

By combining field performance and genetic marker data, genetic signatures were identified that are associated with field performance in Nebraska. The information can be used to direct future breeding efforts and direct variety selection for growers.

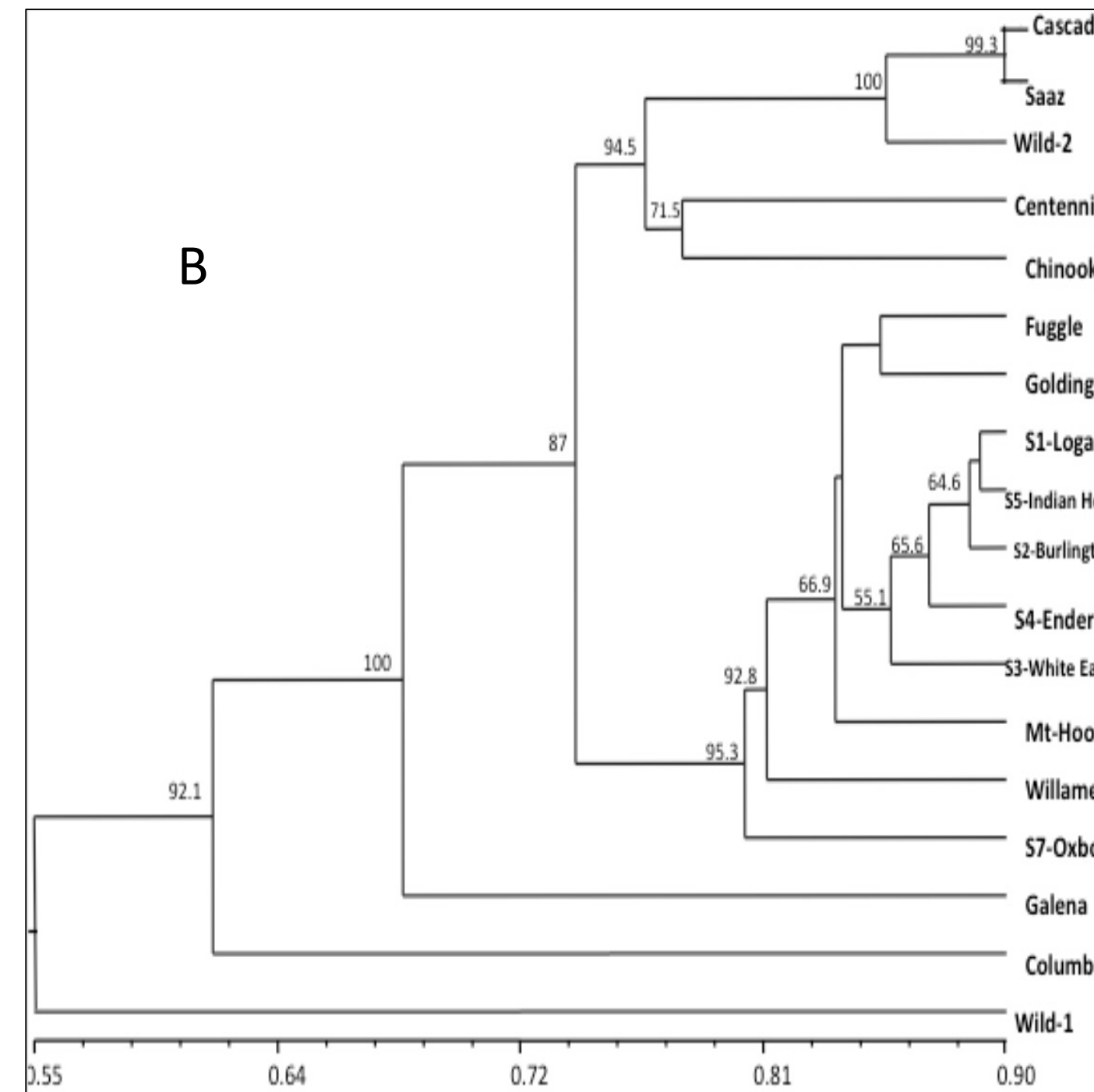
Novel genetics of wild hops could be used to introduce new genetics to commercial varieties for developing regionally adapted hops varieties.

Objective 2: Develop best management practices for growing hops in the Midwest region.

We have compiled data from three growing seasons and have identified management practices for conserving resources while maximizing yields. We compared two different management levels on five locally collected wild hops and the commercial cultivars Cascade, Chinook, Columbus, Galena, Nugget, and Triple Pearl.

The trials examined resistance to pests, flowering and harvest dates, alpha/beta content, and yield for first year plants.

- The highest yield and quality was achieved when nitrogen was applied at 75 lbs./A, phosphorous at 20 lbs./A, and potassium at 35 lbs./A.
- Fungicide applications were made every 7-14 days depending on weather conditions.
- Young plants were hilled after reaching 5 foot tall and again at sidearm development.



Field trials revealed that many wild collected hops lack the disease resistance, specifically downy mildew, and agronomic characteristics of commercial cultivars. However, all wild hops began flowering at a later date than commercial cultivars. This may suggest that local hops have adapted to the shorter photoperiod that is experienced in some parts of the Midwest, which may aid future breeding efforts.

2017 OUTREACH

- Presented our research to 10 organizations to educate and promote the hops production industry in the Midwest.
- In total, 57 current and potential hop growers attended our spring and fall hop educational workshops.
- Additionally, 30 individuals participated in a scouting workshop, where we demonstrated common pest problems and discussed appropriate strategies for integrated pest management.
- Presented our research at the Nebraska Grower and Brewer conference to more than 200 participants.
- Future release of Formulation Control Programs.

FUTURE DIRECTIONS

- **Develop and refine growth potential models to optimize pruning, training and harvest dates in the Midwest region.**
- **Establish breeding program to develop regionally adapted hops, useful for brewers.**
- **Collect data to further refine best management practices for growing hops in the Midwest region.**
- **Promote our research by sharing knowledge with commercial and hobbyist hop growers throughout the Midwest.**

CONTACT FOR MORE INFORMATION

University of Nebraska-Lincoln
<https://agronomy.unl.edu/nebraska-hops>

Midwest Hop Producers
<http://midwesthopproducers.com/>