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Identifying Biomass Yield Potential of Tetra, Hexa, and Octoploid Prairie Cordgrass Populations Grown on Marginal Lands

Background/Objective

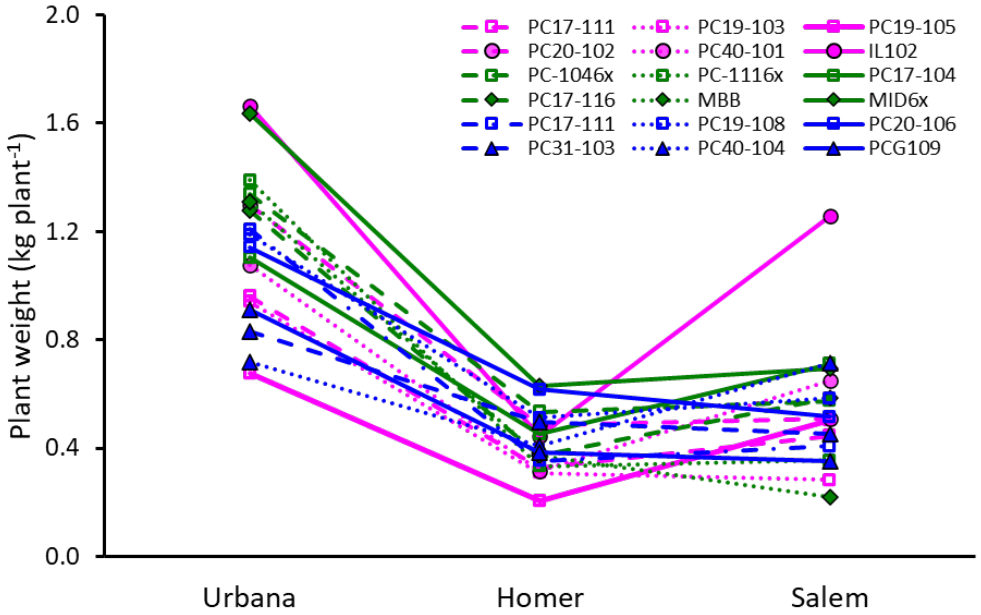
- Marginal land, which is biophysically unsuitable for conventional crop production, has been identified as a potential resource for cultivation of bioenergy crops.
- The ploidy level of prairie cordgrass, a perennial bioenergy feedstock candidate, has been found to correspond to variation in agronomic traits.
- This study investigated the effect of ploidy on biomass yield of prairie cordgrass, grown on different types of marginal land sites.

Approach

Six each of tetra, hexa, and octoploid prairie cordgrass populations were grown on three marginal land sites in central Illinois, USA: waterlogged (Urbana), saline (Salem), and a low-nutrient limestone mine reclamation site (Homer). Biomass yield was monitored for three years.

Results

Prairie cordgrass became well established on the wet marginal site, with average biomass yield of 18 Mg ha^{-1}. Biomass yield decreased at both the saline site and low-nutrient gravelly soil site. Biomass yield of the 18 populations was variable across all three marginal sites, but there was not a relationship between yield and ploidy.



Performance comparison of 18 prairie cordgrass populations in three marginal soils associated with different stress conditions. (Magenta = tetraploid, green = hexaploid, blue = octoploid)

Significance/Impacts

This work highlights that suitability of marginal land for bioenergy crop cultivation is impacted by the specific abiotic stressors present on that marginal land. Additionally, the varied biomass yield of the populations across the different marginal land types indicates potential genetic resources for developing breeding targets for tolerance to these abiotic stressors.

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