

Phenotypic Selection Improves Biomass Yields of an Alamo Population of Switchgrass

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INTRODUCTION

Switchgrass (*Panicum virgatum* L.) is a warm-season, polyploid, perennial, C4 grass used for forage, soil conservation, and bioenergy production. At the University of Tennessee, Knoxville, switchgrass cultivar breeding is focused on biomass yield improvement for use as a bioenergy feedstock. Using four-year-old sward plots of 'Alamo' population established at the Holston unit of East Tennessee Research and Education Center, over 230 individual plants were selected based on phenotypic evaluation in the fall of 2011.

MATERIALS AND METHODS

Initial population:
Four-year-old sward plots of Alamo



Phenotypic selection
based on visual evaluation

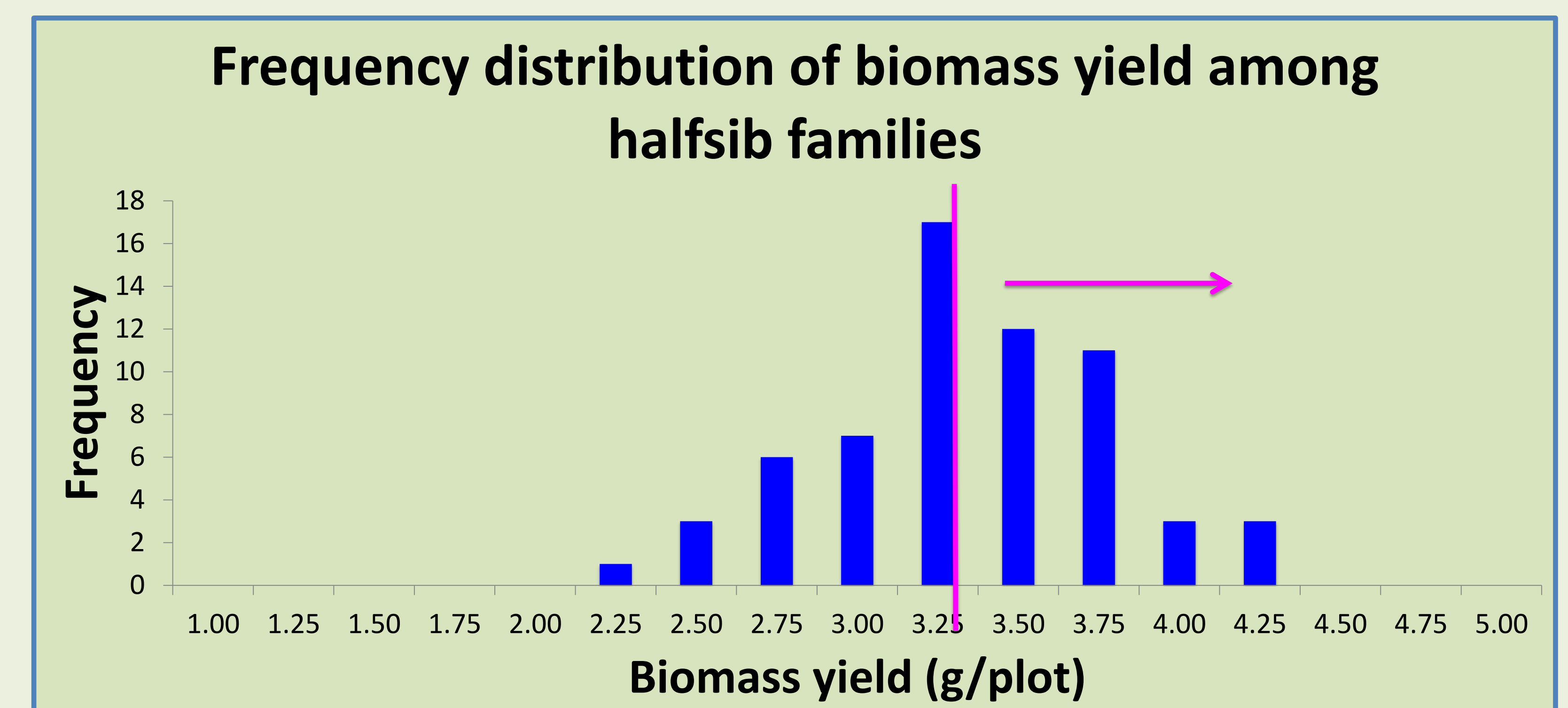
230 individual plants (Fall of 2011), open pollinated seeds
harvested from each selected plant that constituted a
halfsib (HS) family

Selection based
germination and seed
yield

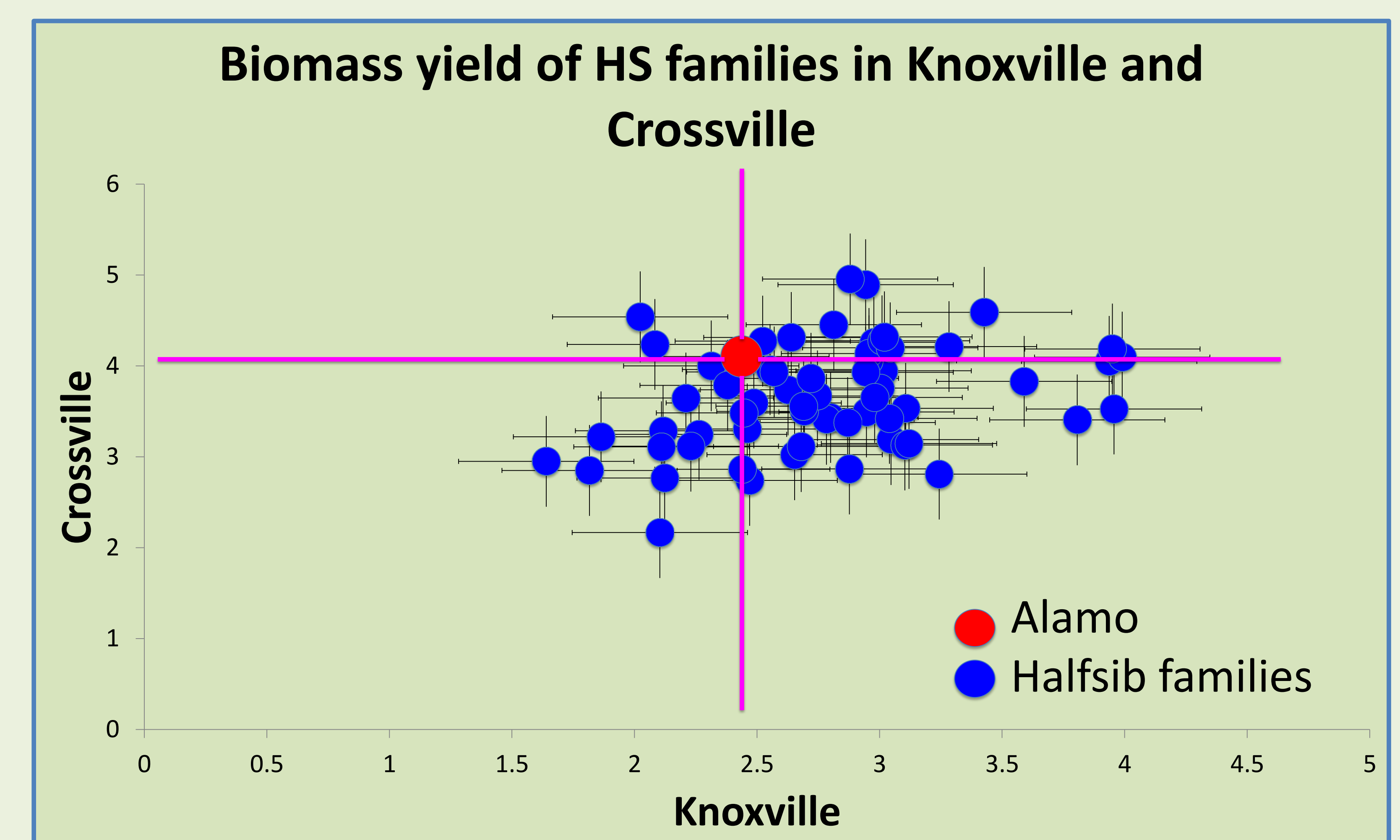
62 halfsib families were retained for evaluation at
two Tennessee locations, Knoxville and Crossville

- HS family evaluation trial was established in spring 2012
- Design is RCBD with 3 replications
- Each replication planted in a single-row-plot of 9 plants 30cm apart, and 90cm between rows
- Biomass yield recorded from Fall 2013
- Analysis of variance was done with mixed model methods (SAS v9.3, Cary, NC), and least square means separated with LSD ($P < 0.05$).

RESULTS



The halfsib families showed significant variation in the mean biomass yield ($P < 0.0001$). Mean biomass yield ranged from 2.14 to 4.07 g/plot with the Alamo check having 3.27 g/plot.



Halfsib families at Knoxville have 14% higher mean biomass yield than original population indicating potential yield gain that could be made using phenotypic selection. Crossville location on the other hand was 10% below the original population, indicating the potential hurdle attributable to the genotype by environment interaction.

A few of the halfsib families have shown superior performance at each locations as well as in both locations as shown in the graph above. This indicates that phenotypic selections could be made for development of varieties with stable performance in a broader range of environment.

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