

Genetic Variation in Ethanol Yield of Lowland Switchgrass



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INTRODUCTION

Switchgrass (*Panicum virgatum* L.) has shown high potential for biofuel production. Switchgrass needs improvement in terms of biofuel yield per unit of area for its sustainable use as a bioenergy feedstock. These objectives can be achieved through improvement in biomass yield and feedstock composition quality. Genetic improvement in biomass yields are in progress. Breeding with priority on feedstock composition quality is now receiving more focus from researchers.

MATERIALS AND METHODS

Initial Genetic Materials:
Four-year-old Alamo sward population

Phenotypic selection
based on visual vigor

200 plants selected (fall 2011), open pollinated seed
harvested from each plant constituted a half-sib (HS) family

Selection based on seed
yield and germination

62 HS families retained for replicated
field evaluation (Fall 2012-2013)

Field evaluation:
HS families

Field evaluation:
Parent genotypes



62 HS evaluated in a replicated trial at Crossville. Each family row in each rep had 9 plants spaced 30cm; space between rows was 90cm.



Parents of HS were evaluated at Knoxville in a space plant nursery, with 90cm x 90cm plant spacing

Estimation of Ethanol yield using NIR and equation developed by Vogel et al. (2011)

RESULTS

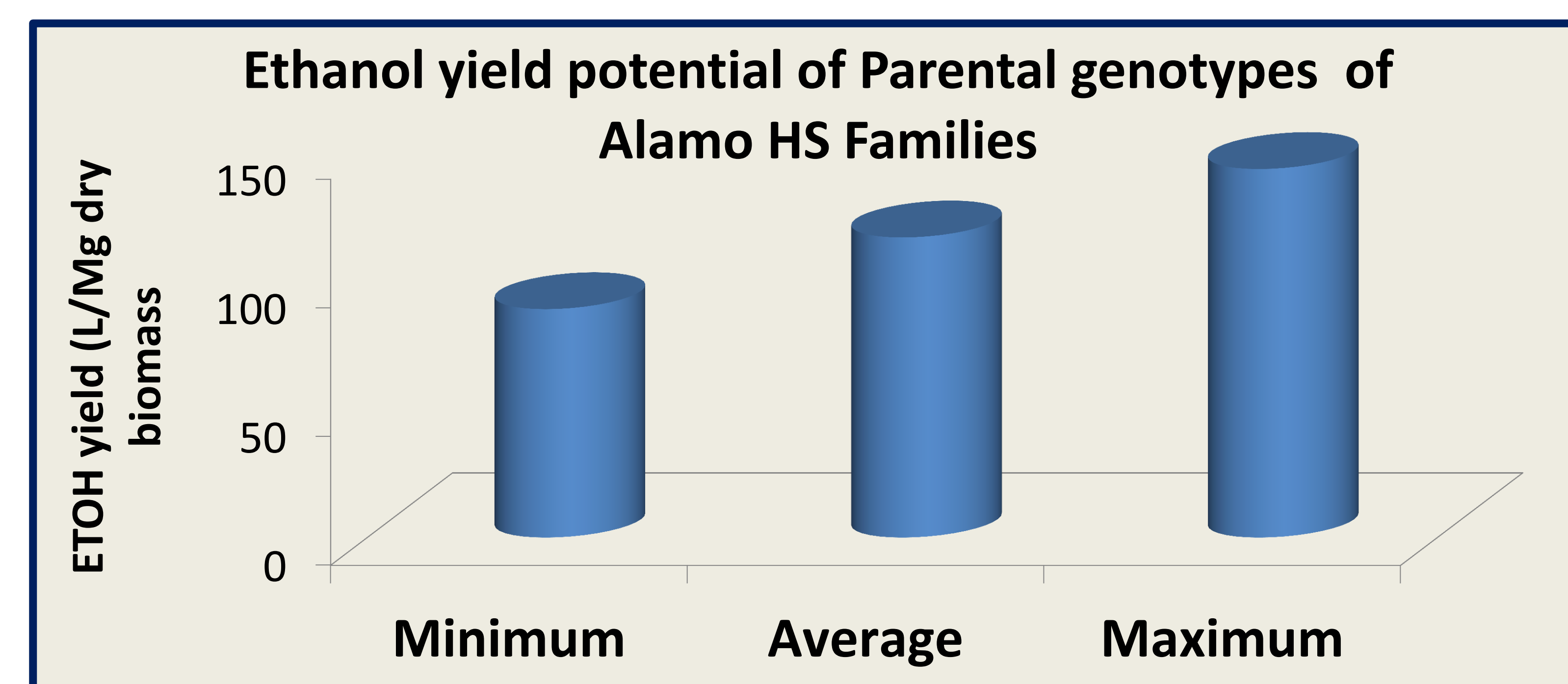


Figure 1. Ethanol yield variation among parent genotypes of half-sib families. Results were significant at $p < 0.01$. As expected Ethanol yield was positively correlated with IVDMD ($r = 0.82$), and negatively correlated with NDF ($r = -0.8$).

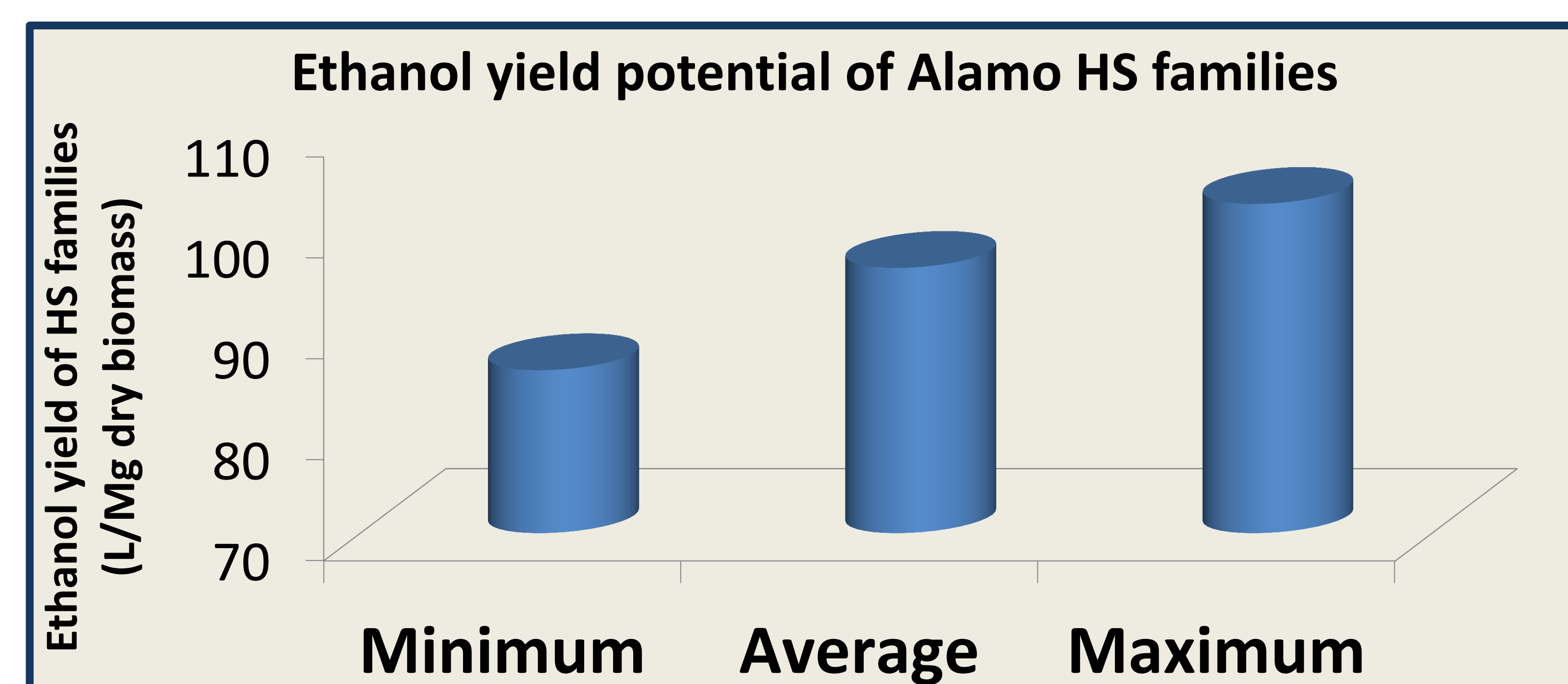


Figure 2. Ethanol yield variation among Alamo half-sib families. Results were significant only at $p < 0.15$, and the range is narrow as compared to parental genotypes.

FUTURE RESEARCH

There was no correspondence between ethanol yields of parent genotypes and their half-sib families. This could be likely due to (i) high genotype x environment interaction, or (ii) due to different plant spacing, parent genotypes spaced 90cm x 90cm and HS family were spaced 30cm x 90cm (i.e., between plants x within row and between rows). It is also possible due to poor reliability of feedstock composition data from the establishment year stands. More detail analysis will be conducted using biomass samples from a mature stand after at the end of fall 2013.

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