



QTL Mapping for Switchgrass Tillering Related Traits in Two Populations

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Introduction

Switchgrass (*Panicum virgatum*) is a perennial C₄ grass which has been recognized as a promising bioenergy crop. Yield components like tillering related traits are important in switchgrass breeding. Accordingly, the objectives of this project were aimed to: (1) characterize tillering related traits, (2) estimate their broad-sense heritabilities, (3) identify QTLs based on selfed and hybrid switchgrass populations.

Materials and Methods



Hybrid pop.

NL94 (♀) × SL93 (♂)
N = 176

Selfed pop.

NL94 (⊗)
N = 265

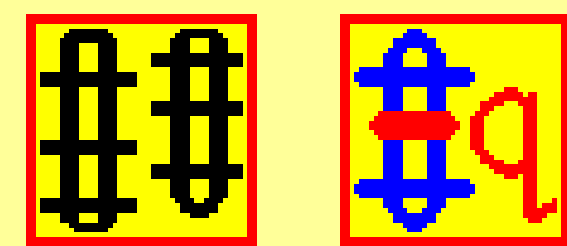
Phenotypic data in 2012 & 2013
Two locations: Stillwater & Perkins, OK



SSR genotyping

Map construction: LOD ≥ 7.0

QTL analysis: Interval mapping & MQM



Results and Cont.

Table 1 Correlation coefficients between tillering related traits and biomass yield in hybrid and selfed populations

Pop.	Tiller ability	Plant girth (cm)	Tiller diameter (mm)	Nodes per tiller	Tiller dry weight (g)	Plant base size (cm)
Hybrid	0.15*	0.18*	0.08*	ns	0.11*	0.34*
Selfed	0.22*	0.29*	0.16*	ns	0.16*	0.37*

*P<0.0001

Table 2 Broad-sense heritabilities for 6 tillering related traits in hybrid and selfed populations

Pop.	Tiller ability	Plant girth (cm)	Tiller diameter (mm)	Nodes per tiller	Tiller dry weight (g)	Plant base size (cm)
Hybrid	0.26	0.17	0.77	0.26	0.75	0.38
Selfed	0.54	0.25	0.68	0.19	0.63	0.29

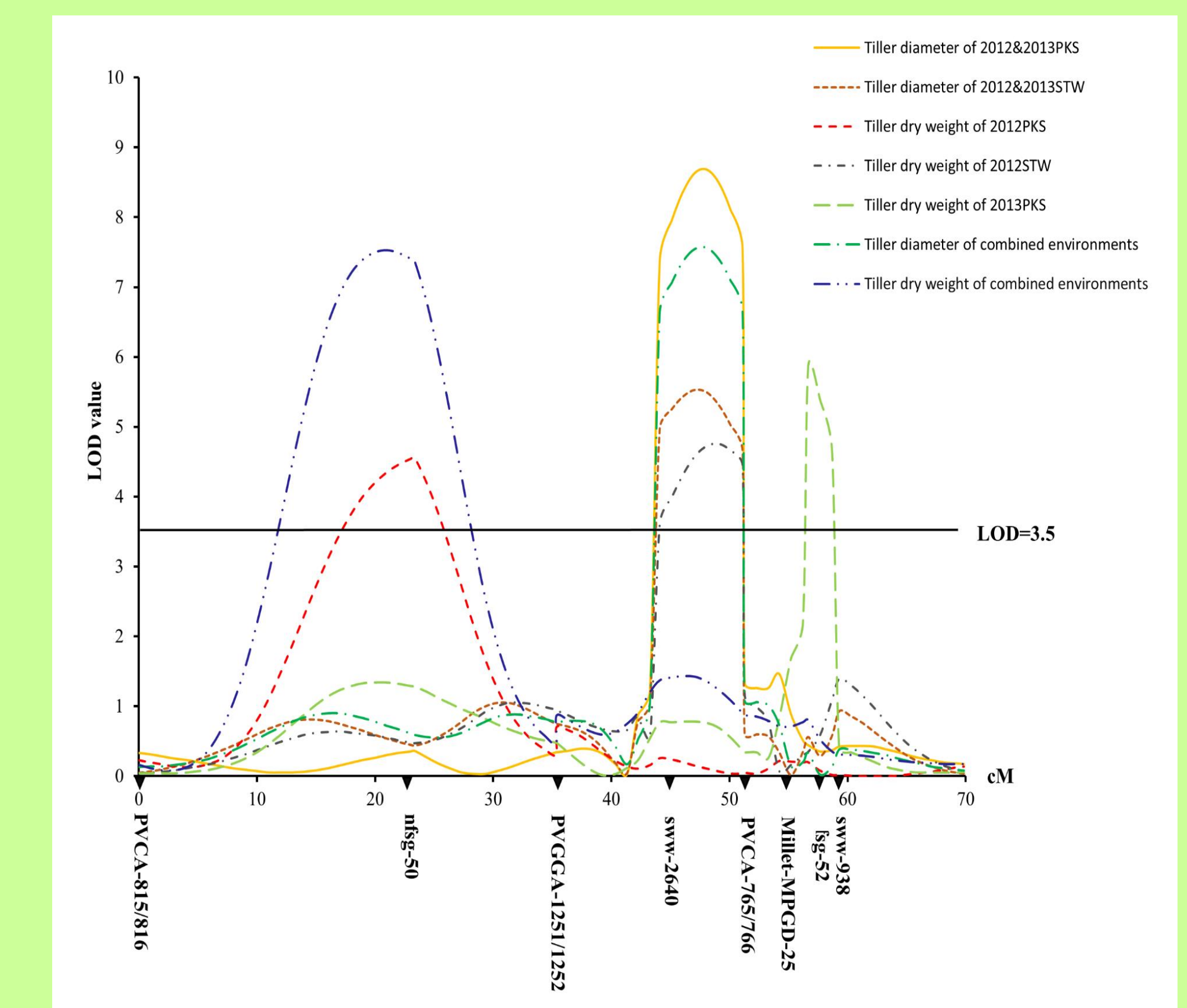
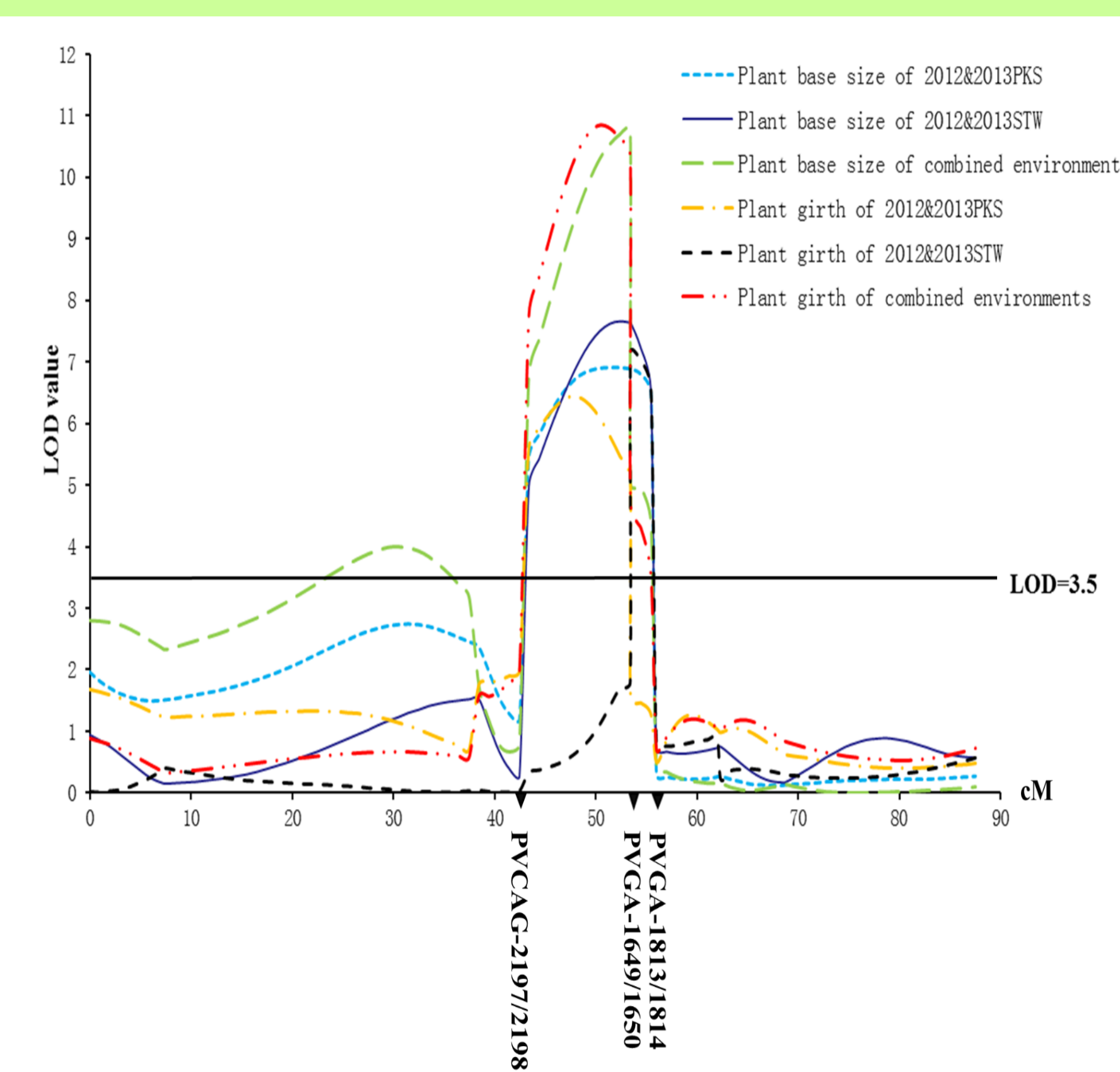


Fig. 1 QTLs on LG 5a in the hybrid pop. Fig. 2 QTLs on LG 2a in the selfed pop.

Results

- Six tillering related traits except nodes per tiller have significant positive correlation with biomass yield in joint environment (Table 1).
- Based on the two populations, tiller ability, plant girth, nodes per tiller, and plant base size have low to moderate broad-sense heritabilities while tiller diameter, and tiller dry weight have moderate to high broad-sense heritabilities (Table 2).
- A total of 17 and 25 QTLs in the hybrid and selfed populations for the tillering related traits were detected, respectively (examples in Fig. 1 & 2).

References

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- Dong, H.X., S.Y. Thames, L.L. Liu, M.W. Smith, L.L. Yan, and Y.Q. Wu. 2015. QTL mapping for reproductive maturity in lowland switchgrass populations. *Bioenergy Research* DOI 10.1007/s12155-015-9651-9.

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