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Dr. Alistair Hetherington

Editor-in-Chief

*New Phytologist*

Date XXX

Dear Editor,

Please consider our original research article entitled “QTL x environment interactions underlie ionome divergence in switchgrass” for publication in *New Phytologist.* Our manuscript should be of particular interest to both the plant ionomics community and to researchers studying plant adaptation to the environment, because it makes use of a plant ionome dataset in a large, outbred, perennial switchgrass mapping population grown across three different environments to provide insight into the genetic basis of the switchgrass ionome. Specifically, our answers to the three covering letter questions are as follows:

**What hypotheses or questions does this work address?**

What are the genetic patterns – the reaction norms – of the elemental concentrations that make up the switchgrass ionome in three environments spanning 12 degrees of latitude? What are the differences in allelic responses from two deeply diverged switchgrass ecotypes, and what are the candidate loci that may underlie these differences?

**How does this work advance our current understanding of plant science?**

This is the first genetic study of the ionome of switchgrass which we conduct in three environments across the species’ range. This work advances our understanding of genotype-by-environment interactions in plants; in particular, we find antagonistic pleiotropy at a much higher frequency for ionomic phenotypes than for previously mapped traits.

**Why is this work important and timely?**

Ionomics captures elemental concentrations of organisms in different conditions and provides essential readouts to identify plant adaptations to soils that vary widely in chemical composition. To grow switchgrass as a biofuel crop in variable, marginal soils, it is essential to identify genes that can promote nutrient-efficient growth in multiple environments.

This manuscript has not been published and is not under consideration for publication elsewhere.

Thank you for your time and consideration.

Sincerely,



Li Zhang, Ph.D. Alice MacQueen, Ph.D.

Postdoctoral Research Fellow Research Associate

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