A simple cultivar suitability index for low-pH agricultural soils

Abstract

Planting wheat (*Triticum aestivum* L.) cultivars that carry the aluminum (Al) resistance gene *TaAlmt1* is a potentially lower cost alternative to lime applications in acidic agricultural soils. However, the relative importance of *TaAlmt1* expression and adaptedness (to regional environmental conditions) for preserving grain yield in acidic soils is not well understood. Adaptation trials were established in low-pH soils to compare lime-amended (Y_L) and unamended grain yield (Y_U) among regionally adapted spring wheat cultivars with and without *TaAlmt1*. Averaged across Y_L and Y_U (Y_{AVG}), yield of adapted *TaAlmt1* carriers was similar to adapted noncarriers (p = .939) but greater than nonadapted noncarriers (p = .024). Soil pH-driven spatial heterogeneity appears to inflate yield coefficients of variation and the probability of committing type II errors in cultivar yield comparisons. Our results support the use of Y_{AVG} as a suitability index and decision support tool for cultivar selection in acid-affected soils.

Abbreviations

- Al_{KCl}
  - KCl-extractable aluminum
- Al_{sat}
  - aluminum saturation
- CVs
  - coefficients of variation
- Y_{AVG}
  - grain yield averaged across lime-amended and unamended low-pH soils
- Y_L
  - grain yield in lime-amended soils
- Y_U
  - grain yield in unamended, low-pH soils.

Fordyce, S., Jones, C. A., Dahlhausen, S. J., Lachowiec, J., Eberly, J. O., Sherman, J. D., McPhee, K. E., & Carr, P. M. (2020). A simple cultivar suitability index for low-pH agricultural soils. *Agricultural & Environmental Letters*, *5*(1). https://doi.org/10.1002/ael2.20036