Genotype by Yield*Trait (GYT) Biplot: a novel approach for genotype selection based on multiple traits.

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Summary:
Genotype selection based on multiple traits is a key issue in plant breeding. It has been dependent on setting a weight for each trait in index selection and a truncation point for each trait in independent culling, and the weights and truncation points can be highly subjective. In this paper, a novel approach to genotype selection based on multiple traits is proposed. It is called Genotype by Yield*Trait (GYT) biplot, where "trait" can be any breeding objective other than yield. The GYT biplot ranks genotypes based on how well yield has been combined with each of the other target traits, and, at the same time, shows their trait profiles; i.e., each genotype's strengths and weaknesses. Compared to existing methods, this approach is graphical, objective, effective, and straightforward. Underlying the GYT biplot approach is the paradigm shift that genotypes should be evaluated based on how they combine yield with other target traits, as opposed to how they rank for each trait individually. An oat dataset from multi-year multi-location trials was used to demonstrate the GYT biplot approach.