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High-level yield traits of wheat cultivars across a hydrologically diverse agricultural landscape

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Dryland wheat near Walla Walla, WA, located in the heart of the inland Pacific Northwest. The Blue Mountains are visible in the background. Photo courtesy of Curtis Adams, USDA-ARS.

The inland Pacific Northwest is a unique agricultural landscape that simultaneously contains some of the most arid and productive wheat cropping systems in the country. Wheat breeders, ecophysiologists, and producers are challenged by this diversity in cultivar development, trait study, and selection, yet there has been no evaluation to better understand yield plasticity, adaptation, stability, and performance ranking of existing wheat varieties across the entire water-limited yield potential gradient of the region.

Scientists from the USDA-ARS, Oregon State University, and Washington State University utilized a large variety trial dataset, with site-averaged yields ranging from 1.5 to 12 Mg/ha, to provide this evaluation. They defined the range in wheat yields driven by cultivar performance across the yield potential gradient; compared and contrasted yield plasticity, stability, and environmental adaptation of 45 individual cultivars; and employed a simple, novel approach to rank cultivars for performance across contrasting environments. Select top-performing cultivars were found to have amazingly wide environmental adaptation and yield stability.

This work provides research tools and data useful for conducting regional yield gap analysis, assessing ecophysiological plant traits, performing economic analysis, and informing wheat breeding efforts in the Pacific Northwest and beyond.

Dig deeper

Adams, C. B., Neely, C., & Graebner, R. (2025). Yield variation, plasticity, adaptation, and performance ranking of winter wheat varieties across the environmental gradient of the US Pacific Northwest. *Crop Science*, *65*, e70018. https://doi.org/10.1002/csc2.70018

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