

# **Wheat Stubble Height Effects on Soil Water Capture and Retention During Long Fallow**

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## **OVERVIEW**

A 4-year study was conducted on the Derek Schafer farm near Ritzville, WA to measure winter wheat stubble height and orientation effects on overwinter precipitation capture in the soil and subsequent water retention during ensuing dry summer months. The stubble was left standing and undisturbed during the 13-month fallow periods. Stubble-height treatments were: (i) short (3 inches), (ii) medium (10 inches), and (iii) tall (30 inches). An additional treatment: (iv) mow tall stubble in mid-June, was included in the final two years. Soil water measurements were obtained at the beginning, middle, and end of fallow in 6-inch increments to a depth of six feet. Additionally, seed-zone water content was measured at the end of fallow in 1-inch increments to a depth of 13 inches. Near-surface soil temperature was measured from June-August.

On average, tall- and medium-height stubble captured 1.34 and 1.26 inches more overwinter precipitation, respectively, than short stubble and these values were particularly pronounced (3.58 and 3.11 inches greater than short stubble) during a winter of heavy snow drifting. However, from mid-April until late August, the tall stubble lost an average of 3.58 inches soil water compared to 2.75 and 2.32 inches in the

medium and short stubble treatments. Mowing tall stubble in mid-June before the hot, dry summer did not improved water retention.

Continuous soil temperatures at 1, 3, 6, 10 and 16-inch depths measured electronically from June-August were coolest with the short, mowed, medium, and tall stubble, respectively, with frequent significant differences of  $>3$  °F among treatments. We speculate that soil in the tall treatment was warmest and lost the most over-summer water because all stubble was standing and offered less soil shading than the other treatments. At the end of fallow, medium and tall stubble averaged 0.55 and 0.31 inches greater soil water, respectively, than the short treatment. Short stubble was a disadvantage for overwinter precipitation capture but was equal or better than the other treatments for retaining soil water from April to late August; presumably because this treatment had the most residue lying flat on the soil surface for shading.

These findings offer opportunity to improve current models for soil water dynamics during fallow by incorporating stubble height. For combined soil water retention and farm management factors, medium-height winter wheat stubble is the best fallow option for farmers in the Pacific Northwest drylands.