Soil Water Dynamics with Camelina in a Three-Year Rotation in Washington's Winter Wheat-Fallow Region

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Camelina of the *Brassicaceae* family is a short-season oilseed with tolerance to water stress and frost. Camelina has been promoted as a potential alternative crop for the low-precipitation (<12 inch annual) Mediterranean-like climate region of inland Pacific Northwest where a monoculture 2-yr winter wheat-summer fallow (WW—SF) rotation is practiced by the vast majority of farmers. An 8-yr field experiment was conducted at Lind, WA to compare a 3-yr WW—camelina—SF rotation to the typical 2-yr WW—SF rotation. We conducted a detailed analysis of soil water dynamics of these two crop rotations throughout the experiment. Growing camelina reduced soil water content at the beginning of the fallow period, and this reduction resulted in an average of 0.83 inches less water at the time of WW planting and a 2.5 bushel/acre reduction in grain yield compared to WW—SF. Compared to WW—SF, we found that: (i) the deep-rooted broadleaf weed Russian thistle present in camelina most years was a likely reason for significantly greater in-crop soil water use, and (ii) the limited residue produced by camelina was likely responsible for greater evaporative loss during the spring-through-late-summer segment of fallow. These are the first findings from the Pacific Northwest drylands of greater water use by a cool-season spring crop versus WW as well as greater evaporative loss during the dry summer months due to lack of residue during fallow. In this experiment, extending the crop rotation to include camelina was costly in terms of water use, surface soil residue cover, soil water storage during fallow, and WW grain yield. Read the full article here: https://acsess.onlinelibrary.wiley.com/doi/full/10.2136/sssaj2019.05.0157.