Choice of summer fallow replacement crops impacts subsequent winter wheat

Winter wheat (Triticum aestivum L.) is the foundation of dryland cropping systems in the Central Great Plains. The objective of this study was to quantify the effects of four short-season spring-planted crops used to replace summer fallow on the subsequent winter wheat crop. Wheat was seeded into four crop stubbles [spring triticale (× Triticosecale Wittmack), dry pea (Pisum sativum L.), foxtail millet (Setaria italica L. Beauv.), and proso millet (Panicum miliaceum L.)] at sites near Akron, CO, and Sidney, NE, in the fall of 2004 and 2005. These summer fallow replacement crops were planted into silt loam soils at three different soil water levels at planting (low, medium, and high). Winter wheat water use was 3.6 cm greater, and grain yield was 662 kg ha\(^{-1}\) greater in the high water treatment compared with the low water treatment averaged across all sites and years. Winter wheat used an average of 4.3 cm more water following early planted summer crops (triticale and dry pea) than after late planted summer crops (foxtail and proso millet), but this increased water use did not consistently translate into increased grain yield as a result of terminal drought at Sidney in 2006. The high water treatment always had a positive net return. The high cost of pea seed ($3.30 kg\(^{-1}\), USD) strongly reduced profitability. The flexible summer fallow cropping system appears to be most applicable when using short-duration summer annual forage crops such as triticale and foxtail millet.

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Crop rotation is the oldest, and perhaps the best cultural practice for reducing the risk of take-all. The effects of crops sown before wheat in a rotation are known in detail, but we know little... We investigated the effects on take-all of five summer fallow crops, two soil tillage treatments and a fungicide seed treatment, in a five site-year experiment. We tested the effects of oats, oilseed rape, mustard, ryegrass and volunteer wheat crops. Bare-soil plots were also included. Take-all epidemics varied with year and site. Summer fallow crops had a greater effect on tilled plots. The incidence and severity of take-all were significantly higher in the wheat volunteer plots, whereas maintaining bare soil provided the lowest level of disease. The wheat rusts have a long history of causing considerable loss in productivity and quality of wheat crops. Much work has been undertaken to address this problem and many successes have been achieved. Sustainable rust resistance has been achieved in a number of situations and has provided valuable guidance for future initiatives where this level of protection has not been achieved. The achievements include understanding the impact of the sexual stage in the rust life cycle in facilitating resistance breakdown and providing inoculum in close proximity to the developing wheat crop, resulting in Hence, a winter wheat-summer fallow cropping system has been adopted to obtain adequate moisture for winter wheat production. Current tilled fallow systems are exposed to significant soil degradation from wind and water erosion. As a result, late-planted no-till fallow systems are being evaluated to mitigate erosion concerns.