The Horse Heaven Hills (HHH) located in south-central Washington contains the world’s driest rainfed wheat production region where farms receive average annual precipitation as little as 150 mm. Farmers practice a two-year tillage-based winter wheat–summer fallow rotation where one crop is grown every other year on a particular field. Tillage of fallow land during the spring is considered necessary to retain adequate seed-zone water during the dry summer months, but blowing dust from excessively tilled fallow is a major safety, environmental, and soil quality concern. Late-summer establishment of winter wheat into carryover seed-zone water after a year of fallow is essential to achieve the highest grain yield potential.

In the September–October 2014 issue of the *Soil Science Society of America Journal*, researchers report on a five-year study that was conducted to compare the effects of three fallow management systems on soil water dynamics, wheat stand establishment, grain yield, and economic returns on two farms in western and eastern portions of the HHH where long-term annual precipitation averages 153 and 211 mm, respectively. Fallow management treatments were: (i) traditional tillage (TTF), undercutter conservation tillage (UTF), and no-tillage (NTF). Late-summer planting of winter wheat in TTF and UTF was possible in only one year of five at the drier western site due to lack of adequate seed-zone water, whereas late-summer planting was possible every year at the eastern site. There were no significant differences in net economic returns among fallow management treatments at the western site; however, net returns per hectare averaged a positive $101 for TTF and UTF versus a negative $92 for NTF at the eastern site.

Although seed-zone water in late summer was consistently lowest with NTF at both sites, the authors recommend NTF for farmers in the western HHH because achieving adequate seed-zone water for early wheat establishment is generally not possible with any fallow management practice and NTF is economically viable and excellent for wind erosion control. On the other hand, in the eastern HHH, where adequate seed-zone water for early planting can be achieved with tillage most years, farmers should practice UTF. The UTF method, where narrow-pitched sweep blades are used during the spring to slice beneath the soil surface to sever capillary pores with minimum soil lifting, has shown excellent agronomic potential and has been proven to significantly reduce blowing dust emissions compared with TTF.

The purpose of this study was to provide the science-based information needed by the USDA-NRCS to formulate farm programs that provide realistic incentives to wheat farmers to change from TTF to UTF or NTF. A major conclusion is that late-planted winter wheat on NTF was equally profitable as the tilled-fallow treatments at the western site. Widespread adoption of NTF in the western region of the HHH would, without question, sharply reduce wind erosion, blowing dust, and air quality problems. Some of the leading farmers in the western HHH are adopting NTF over large areas of their farms. For the eastern HHH, where precipitation is relatively more abundant and where early planting of winter wheat into adequate seed-zone water in tilled fallow is the norm rather than the exception, the UTF method will generate the same grain yields and economic net return and provide much better wind erosion control compared with TTF.

Adapted from Schillinger, W.F., and D.L. Young. 2014. Best management practices for summer fallow in the world’s driest rainfed wheat region. View the complete article online at http://dx.doi.org/doi:10.2136/sssaj2014.04.0168

Harvesting winter wheat at the western Horse Heaven Hills site.