

Chemical Summer Fallow to Reduce Dust Emissions in the Horse Heaven Hills

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Blowing dust from excessively tilled summer-fallowed fields in the Horse Heaven Hills is a major air quality concern in the Tri-cities, Washington. The two major goals for this study are to: (i) determine, based on measured soil moisture in early April, the likelihood of having adequate seed-zone moisture for successful late-August planting into tilled summer fallow and; (ii) provide the research-based information needed for USDA-NRCS to implement farm programs to entice wheat farmers to change from traditional tillage fallow to conservation tillage fallow or chemical fallow in the Horse Heaven Hills. Beginning in March 2006, replicated on-farm experiments were established on the David Pearson and Mike Nichols farms. The Pearson farm is located in the central Horse Heavens on deep Ritzville silt loam soil. Average annual precipitation at the Pearson site averages 8.0 inches. The Nichols farm is located in the western Horse Heavens on deep Warden silt loam soil and annual precipitation averages 6.0 inches. Wheat farmers Pearson and Nichols manage all aspects of field operations for the experiments. The experimental design at both sites is a randomized complete block with four replications. Each plot is 200 ft long and 60 ft wide. Total plot area at each site is 9.5 acres. Tillage treatments are (i) traditional tillage summer fallow, (ii) conservation tillage summer fallow, and (iii) chemical summer fallow. We estimate that seed-zone moisture will be adequate for late August – early September deep-furrow planting only about 50% of the time for the traditional-till and conservation-till treatments and likely never possible for the chemical fallow treatment.

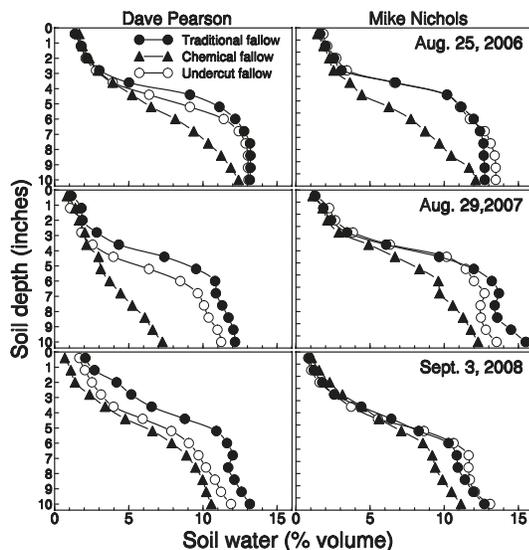


Fig. 1. Seed-zone moisture in late August-early September as affected by three types of summer fallow in 2006, 2007 and 2008 at two farms in the Horse Heaven Hills. The most extensive drying of the seed zone always occurred with chemical summer fallow. At the Pearson farm, the conservation-till retained less seed-zone moisture than traditional-till in two of three years. We suspect that the conservation-till summer fallow was too cloddy in these years and we will adjust the angle of the rotary paddles behind the undercutter implement in 2009 to make smaller soil clods. There have been no differences in seed-zone moisture between conservation-till and traditional-till at the Nichols site.

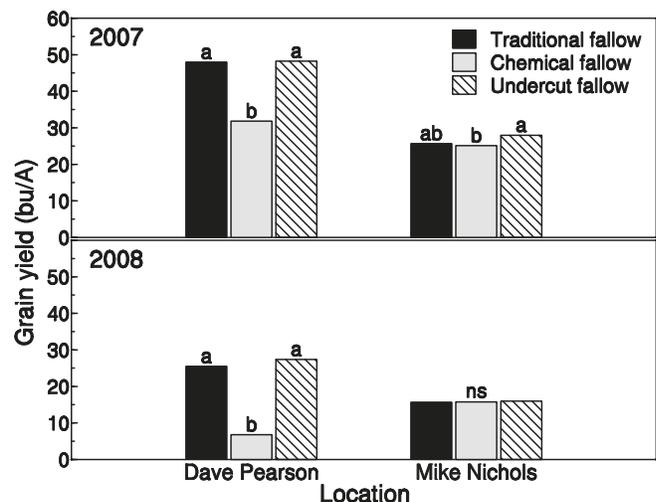


Fig. 2. Grain yield of hard red winter wheat at two farms in Horse Heavens in 2007 and 2008 as affected by method of summer fallow. Early planting was possible during both years at the Pearson site in traditional-till and conservation-till treatments that resulted in significantly higher grain yields compared to late-planted wheat on chemical summer fallow. At the Nichols site, early planting with traditional-till and conservation-till was successful in August 2006 (i.e., 2007 crop year), but late-planted wheat on chemical summer fallow had almost the same grain yield because ample fall rains occurred by October 15. For the 2008 crop year, winter wheat was "dusted in" to all treatments and fall rains did not occur until late November, resulting low grain yields for all treatments.