Heaven Hills is approximately 7500 acres, with half in winter wheat and half in summer fallow. Given that a farmer can cover about 160 acres per day with a primary tillage implement, it takes approximately 24 days to complete primary spring tillage. If the farmer waits until mid June to begin primary spring tillage, substantial evaporative soil loss may occur on non-tilled ground by mid July.

Data from our study also suggest that farmers in the extreme dry western region of the Horse Heaven Hills should practice NTF in all but very wet years as they rarely have adequate seed-zone water for late-August planting, even with TF. The widespread practice of NTF would dramatically reduce wind erosion and likely save on operating costs compared to TF. In addition, farmers committed to practicing NTF in the long term could receive monetary payments from federal farm programs that reward environmental stewardship.

Residue Protects Emerging Winter Wheat Seedlings from Rain-Induced Soil Crusting

W.F. Schillinger, T.A. Smith, and S.E. Schofstoll; Dept. of Crop and Soil Sciences, WSU Dryland Research Station, Lind

Farmers in the low-precipitation region of the Pacific Northwest practice a 2-year tillage-based winter wheat- summer fallow rotation. Winter wheat is planted deep into moisture in late August or early September and seedlings emerge through 4 to 6 inches of dry soil cover. Rain showers that occur after planting create fragile soil crusts that the emerging first leaf often cannot penetrate. A rainfall simulator was used to conduct a 5 -factor factorial laboratory experiment to evaluate emergence of WW planted deep in pots. Factors were: (i) rainfall intensity and duration (0.05 inch per for 3 hours, and 0.10 inch per hour for 2 hours); (ii) timing of rainfall after planting (1, 3, and 5 days after planting + controls); (iii) variety (standard-height vs. semi-dwarf), (iv) residue on the soil surface (0, 750, and 1500 lbs/acre); and v) air temperature (70^0 and 86^0F). The high-intensity rain caused a 2.3-fold reduction in emergence compared to the low-intensity rain. Emergence improved proportionally with increasing quantities of surface residue (Fig. 1). The standard-height cultivar had four times greater emergence than the semi-dwarf. Air temperature and timing of rainfall had no significant effect on WW emergence. Results show that planting a WW cultivar with long coleoptile and first leaf as well as maintaining high quantities of surface residue to intercept rain drops will enhance WW stand establishment after rain showers to benefit both farmers and the environment.

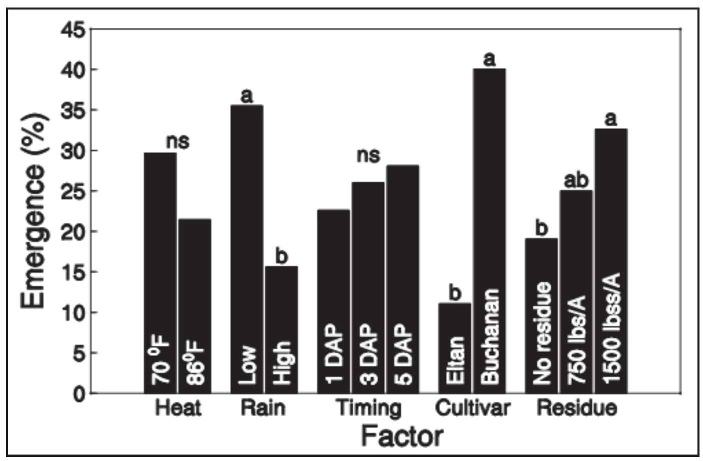

Fig 1. Percent emergence of Eltan and Buchanan winter wheat varieties planted deep into pots as affected by rainfall intensity and duration, residue cover, timing of rainfall, and heat. Data are the average from three runs. Data are combined for the two varieties. DAP = days after planting

No-till Summer Fallow is a Good Fit in the Western Horse Heaven Hills

Bill Schillinger[1], Tim Smith[1], Steve Schofstoll[1], John Jacobsen[1], Mike Nichols[2], David Pearson[2], Brenton Sharratt[3], and Markus Flury[1]; [1]Dept. of Crop and Soil Sciences, WSU; [2]Horse Heaven wheat growers; [3]USDA-ARS, Pullman

Blowing dust from excessively tilled summer-fallowed fields in the Horse Heaven Hills (HHH) is a major air quality concern in the Tri-cities, Washington. We conduct a 5-year on-farm field experiment at two HHH sites to determine the effects of no-till summer fallow, conservation tillage summer fallow, and traditional tillage summer fallow on: i) seed-zone moisture in late August, ii) wheat plant establishment, iii) wheat grain yield, and iv) dust emissions.

Beginning in March 2006, replicated experiments were established on the David Pearson and Mike Nichols farms. The Pearson farm is located in the central HHH on deep Ritzville silt loam soil. Annual precipitation at the Pearson site averages 8.0 inches. The Nichols farm is located in the western HHH on deep Warden silt loam soil and annual precipitation averages 6.0 inches. Both sites are representative of the wind-erosion prone winter wheat–summer fallow Horse Heaven region.

Wheat growers Nichols and Pearson managed all aspects of field operations. The experimental design at both sites was a randomized complete block with four replications. Individual plots were 200 ft long and 60 ft wide. Total plot area at each site is 9.5 acres.

Tillage treatments were:

i) Traditional tillage summer fallow with primary tillage in April with a tandem disk to a depth of five inches followed by a shanking aqua NH_3-N in May and rodweeding only as needed to control Russian thistle and other weeds.
ii) Conservation tillage summer fallow with primary tillage in April with an undercutter sweep + injection of aqua NH_3-N at a depth of five inches, followed by rodweeding only as needed to control weeds.
iii) No-till summer fallow where the stubble from the previous wheat crop is left standing and undisturbed and weeds are controlled with application of glyphosate and other herbicides. Nitrogen fertilizer was delivered at the time of planting with a no-till drill.

We collected numerous data from the two sites, but here we concentrate only on seed-zone water content of summer fallow measured late August and 'Finley' hard red winter wheat grain yield. Seed-zone water content was always lowest in no-till fallow compared to conservation tillage and traditional tillage at both sites all five years (data not shown). At the Pearson site, seed-zone water content in tilled fallow was adequate for late-summer planting in all five years, but replanting was required in 2009 due to crusting rain showers that prevented emergence from the first planting. However, at the drier Nichols site, seed-zone water was adequate for late-summer planting in only one year (2006) out of five. Seed-zone water in no-till fallow was never adequate for late-summer planting at either site.

Wheat grain yield at the Pearson site was significantly higher with conservation tillage and traditional tillage (i.e., early seeding) compared to no-till fallow (i.e., late planting) in four out of five years as well as the five-year average (Fig. 1). Therefore, growers in the central HHH will likely want to continue the practice of conservation tillage summer fallow. However, at the extremely dry Nichols site, where planting of winter wheat was delayed until mid-to-late October in all tillage treatments in all but one year, there was no real grain yield advantage of one system over the other. We do not know why there were considerable within-year grain yield differences among tillage treatments at the Nichols site (Fig. 1) when all plots were planted on the same day, but the bottom line is there was no clear advantage of one system over the other. Since it was not possible to maintain adequate seed-zone water even with tillage-based fallow 80% of the time at the Nichols site, we feel that growers in the western HHH would be better off practicing no-till summer fallow except when over-winter precipitation is exceptionally plentiful (see related article on predicting seed-zone water content by Singh et al. in this booklet). The practice of no-till summer fallow in the western HHH will: i) certainly reduce dust emissions, ii) likely prove economically attractive due to elimination of costly tillage operations, and iii) result in equivalent wheat grain yields compared to tillage-based fallow.

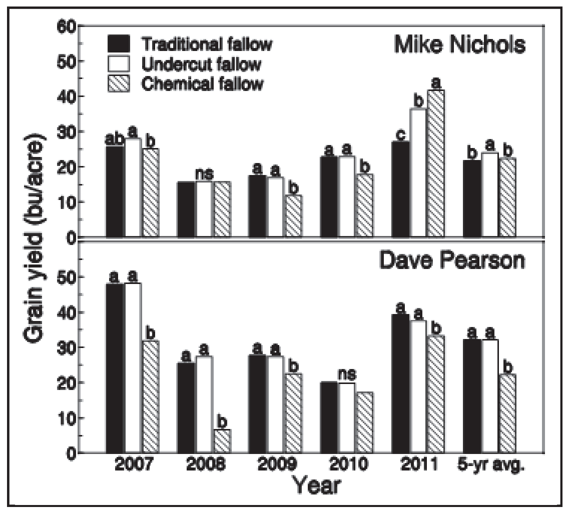

Fig. 1. Hard red winter wheat 'Finley' grain yields with three fallow systems at two sites over five years in the Horse Heaven Hills region of Benton County, WA. Within-year and 5-year average grain yield values followed by a different letter are significantly different at the 5% probability level. ns = no significant difference.

Row Spacing Experiments for Deep-furrow Seeding of Winter Wheat

Bill Schillinger[1], John Jacobsen[1], Steve Schofstoll[1], Derek Schafer[2], and Bill Heinemann[2]
[1]Dept. of Crop and Soil Sciences, WSU, Lind; [2]Wheat producers, Ritzville

Row spacing experiments were conducted at Lind and Ritzville during the 2011 crop year. The purpose of these experiments is to determine if row spacing can be extended beyond the traditional 16 and 18 inches without detrimental effects on winter wheat