considered available. For both winter wheat and spring wheat, 2.5 inches of available moisture was required just for vegetative growth (Fig. 1).

For winter wheat, each inch of available soil moisture in fallow at time of planting provided 6.7 bushels of grain. For each inch of water stored in the soil during the winter (beyond what was present at time of planting), 7.9 bushels of grain was produced. Each inch of rain in April, May, and June accounted for 4.4, 7.6, and 12.2 bushels of grain, respectively (Fig. 1). Each inch of available soil moisture at the time of planting recrop spring wheat provided 5.4 bushels of grain whereas April, May, and June rainfall generated another 1.4, 6.4, and 5.7 bushels, respectively (Fig 1).

Our analysis shows that winter wheat makes much more efficient use of both stored soil moisture and growing season rainfall than does spring wheat. April rainfall is less beneficial to both winter wheat and spring wheat grain yield compared to rain in May and June. The main objective of this work is to provide farmers a decision tool, based on available soil moisture in the spring and historic growing-season rainfall, to determine when to plant spring wheat, or instead make summer fallow. This tool may also be useful for farmers who produce hard red winter wheat to help determine the quantity of nitrogen to topdress in the spring to meet grain protein requirements. A full write up of our findings will be published and available to farmers in the near future.

On-Farm Testing to Adopt No-Till Fallow Winter Wheat Production in the Dryland Cropping Region of Eastern Washington

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WSU Lincoln-Adams Extension on-farm testing helps improve farm profitability in a manner that reduces erosion and improves air quality. Winter wheat (WW) (*Triticum aestivum* L.) production on tillage based summer fallow systems has been a standard practice in the dryland cropping region (14 inches precipitation annually) of eastern Washington for generations. This has been profitable; but it comes at a cost, including soil loss through wind and water erosion. Producers have examined alternative methods including no-till systems for increasing profitability and reducing soil erosion. An on-farm test was established in 2003 examining WW established under three treatments; ‘conventional’ tillage fallow system, ‘no-till early’, or seeded at the same time as the conventional treatment, and ‘no-till late’, or planting was delayed one month. Conventional tillage fallow methods include a chisel sweep and cultiweeding for weed control. No-till fallow methods include chemical applications for weed control. The test is a RCBD with 5-replication. Plots are one acre in size, and seeded, maintained, and harvested by the producer. No difference in soil moisture has been detected between treatments. Grain yield differences were not detected between conventional and no-till early treatments averaging 79-bu/acre, but the no-till late treatment reduced yield 19%. Economic return above variable costs were greater with the no-till early and conventional treatments averaging $143 and $137/acre respectively, compared to only $104/acre with the no-till late treatment. Overall larger agronomic and economic differences were detected between the two no-till treatments, and little differences were detected between conventional and no-till early treatments.

Fall Fertilization for Spring Wheat Production in the Dryland Cropping Region of Washington

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Producers throughout the dryland cropping region (8-14 inches precipitation) of Washington continue to adopt conservation tillage leading to increased spring wheat (SW) (*Triticum aestivum* L.) production. Fall applied nitrogen for SW production is of interest to manage workload, capture historically lower fertilizer prices, and improve grain protein in hard wheat. At risk is leaching nitrogen lower in the soil profile below the root zone costing producers and the environment. A series of on-farm tests were completed examining ‘fall’ vs. ‘spring’ applied nitrogen for SW production. Aqua nitrogen was applied with a low disturbance coulter applicator. Fall applied nitrogen was applied after soil temperatures fell below 50°F to inhibit movement. Seeding was completed in one-pass with starter fertilizer being applied. The tests were carried out over three years at two sites in a RCBD with four replications. Fall applied nitrogen remained in the top foot of the soil profile at the time of seeding.