*LONG-TERM CROPPING SYSTEMS RESEARCH AT THE RON JIRAVA FARM: YEAR 7

Bill Schillinger, Ron Jirava, Harry Schafer, Tim Paulitz, Doug Young,
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We are in the eighth year of an ongoing cropping systems research project at the Ron Jirava farm near Ritzville, Washington. Annual precipitation was less than the long-term average in six of the first seven years. The 7-year average yield for annually cropped no-till soft white spring wheat (SW) is 33 bu/acre. Rhizoctonia root rot 'bare patch' disease first appeared in 1999 and is an ever-increasing problem. Phase II of the project, which began in the 2001 crop year, includes two 4-year rotations that contain recrop soft white winter wheat (WW). For the first time in three years, 2003 WW yields in rotations were greater than grain yields for SW. Although downy brome heavily infested WW in 2001 and 2002, this winter annual grass weed was only a minor problem in 2003. There is firm evidence of Rhizoctonia suppression in spring wheat (SW) following spring barley (SB) in the SW-SB rotation compared to continuous annual SW. The long-term cropping systems research project at the Jirava farm will continue for the foreseeable future.

EXTRA SURFACE RESIDUE ONLY MARGINALLY INCREASES SEED-ZONE WATER CONTENT IN CHEMICAL SUMMER FALLOW

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A study was initiated at the WSU Dryland Research Station at Lind in 2003 to determine the effect of surface residue on seed-zone water content in chemical summer fallow. Surface residue loads of 1000 (check), 4000, and 8000 lbs/acre were superimposed on chemical summer fallow in April 2003 and water content was measured monthly during the spring and summer. Experimental design was a randomized complete block with four replications of the three residue loads. Although high levels of surface residue helped retard loss of water somewhat during the summer, seed-zone water content in chemical summer fallow was insufficient for early-September planting of winter wheat regardless of surface residue level (Fig. 1). In contrast, seed-zone water was more than adequate for early-September planting of winter wheat in the tilled summer fallow treatment (Fig. 1). This study is being repeated in 2004.

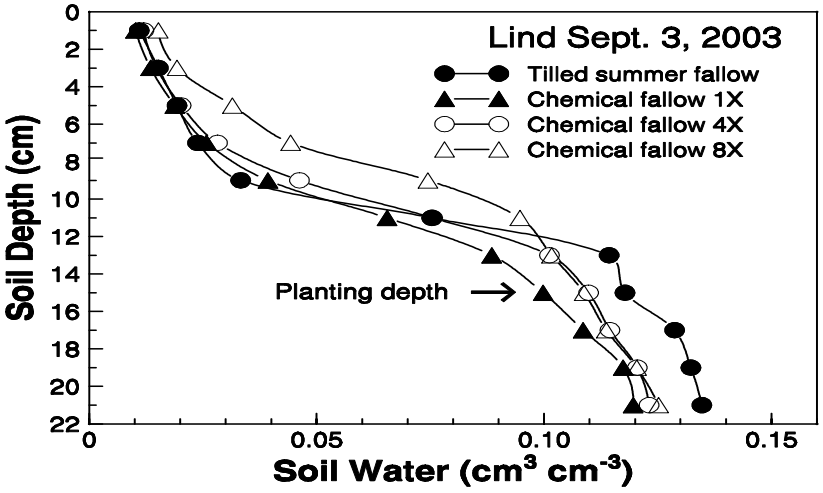

Fig. 1. Seed-zone water content in chemical summer fallow vs. tilled summer fallow in early September. Chemical fallow had three rates of surface residue cover: i) 1x = 1000 lb/acre; ii) 4x = 4000 lb/acre, and; iii 8x = 8000 lb/acre.

*indicates full article available on the Web: http://css.wsu.edu

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Table 1. Previous (1997-2000) and current (2001-2004) crop rotations in the long-term cropping systems study at the Ron Jirava farm in Adams County, Washington. All phases of each rotation are planted every year in 500-ft-long plots, each replicated four times.

Years 1997 through 2000	Years 2001 through 2004
Four-Year Rotations	
1. Safflower-YM-SW-SW	1. WW-WW-SW-SW
	2. WW-SB-YM-SW
Two-Year Rotations	
2. SW-SB	3. WW-SB
	4. HWSW-SB
Continuous Spring Wheat	
3. Continuous SW	5. Continuous SW
	6. Continuous HWSW

Abbreviations: HWSW, hard white spring wheat; SB, spring barley; SW, soft white spring wheat; WW, soft white winter wheat; YM, yellow mustard.

Crop Yields. Crop year (Sept. 1 - Aug. 31) precipitation during the first seven years of the study (1996-2003) ranged 7.86" to 20.11" and averaged 10.90". Grain yield for the first three years of Phase II are presented in Table 2.

Table 2. Crop yields at the Ron Jirava farm during Phase II of the long-term experiment. Phase II began in the 2001 crop year.

Rotation	Units	2001 [u]	2002	2003	7-yr-avg [w]
1. Four year I					
Winter wheat	bu/a	7 cde	21 b	30 ab	
Winter wheat	bu/a	9 bc [v]	21 b	29 ab	
Spring wheat	bu/a	8 bcde [v]	23 ab	19 d	
Spring wheat	bu/a	10 bc	23 ab	25 c	
2. Four year II					
Winter wheat	bu/a	5 e	16 c	28 abc	
Spring barley	ton/a	0.16 [v]	0.65	0.69	
Yellow mustard	lb/a	350	--- [y]	146	
Spring wheat	bu/a	12 ab	21 b	31 a [z]	
3. Two year I					
Spring wheat	bu/a	12 ab	25 a	27 abc	34
Spring barley	ton/a	0.35	0.75	0.83	1.06
4. Two year II					
Hard white spring	bu/a	10 bc	22 ab	27 abc	
Spring barley	ton/a	0.27	0.78	0.83	
5. Cont. spring wheat					
Soft white spring	bu/a	14 a	22 ab	24 c	33
Hard white spring	bu/a	6 cde	21 b	18 d	

u: Within-column wheat yields followed by the same letter are not significantly different at $P < 0.05$.
v: Followed spring wheat, not winter wheat, during the first year (2001) of the 4-yr rotation.
w: Continuous spring wheat and the SW-SB rotation have been ongoing since 1997.
y: Yellow mustard was planted twice and killed twice by cold in 2002. There was no harvest.
z: The 2003 spring wheat after yellow mustard was essentially after chemical fallow since the yellow mustard was killed by frost in the seedling stage in 2002.