DRYLAND DIRECT-SEED ANNUAL CROPPING SYSTEMS AT LIND: THE FIRST FOUR YEARS

William Schillinger, Harry Schafer, Bruce Sauer, Ann Kennedy, and Keith Saxton
Department of Crop and Soil Sciences and USDA-ARS, Washington State University

A long-term study was initiated in 1998 to evaluate annual direct-seed cropping at the Washington State University Dryland Research Station at Lind. Cropping systems were (i) a 4-year safflower/oats/spring wheat/spring wheat rotation, (ii) a 2-year winter wheat/spring wheat rotation, and (iii) continuous spring wheat. Individual plots were 500 ft long and all crops were sown with the Cross-slot drill. Measurements obtained each year are soil water use by each crop, weed populations, and grain yield. Safflower provided fairly stable yields (avg. 799 lbs/a), but depleted soil water to a much greater extent than did spring wheat (data not shown). In 2000, recrop winter wheat yielded 40 bu/a compared to 24 bu/a for continuous annual spring wheat.

The 2001 crop year was one of drought that severely affected spring-sown crops in all low-rainfall dryland regions in the inland Pacific Northwest. Grain yield in continuous spring wheat plots was 15 bu/a (Table 1). Recrop winter wheat was hit by a late May frost while in the flowering stage of development and yielded only 13 bu/a (Table 1). Over the past four years (1998-2001) at Lind, average grain yield of continuous direct-seeded soft white spring wheat is 22 bu./a compared to a station average 44 bu./a for soft white winter wheat after fallow (Table 2). Average annual precipitation for the past four crop years at Lind was 9.24 inches compared to the long-term (80-year) average of 9.61 inches.

Table 1. Crop yields in three direct-seeded rotations at Lind: a 4-year safflower/oats/spring wheat/spring wheat rotation; a 2-year winter wheat/spring wheat rotation and; continuous spring wheat.

	Units	1998[x]	1999	2000	2001	4-yr avg.
1. Four-year rotation						
Safflower	lb/a	890	775	1005	525	799
Oats	ton/a	1.23	0.46	0.78	0.09	0.64
1st year wheat	bu/a	---	18	21b[y]	8b	---
2nd year wheat	bu/a	---	---	22b	9b	---
2. Two-year rotation[z]						
Winter wheat	bu/a	---	---	40a	13a	---
Spring wheat	bu/a	---	---	24b	9b	---
3. Continuous wheat	bu/a	28	21	24b	15a	22

x All crops were sown into spring barley stubble in 1998, which was the first year of the study.

y Within column means followed by a different letter indicate significant wheat grain yield differences at the 5% probability level.

z The winter wheat–spring wheat rotation was included beginning in the 2000 crop year.

Table 2. Grain yield comparison of annual direct-seeded soft white spring wheat versus winter wheat after summer fallow during four years at Lind, WA.[x]

Year	Annual Spring Wheat	Winter Wheat After Fallow	Yield Ratio SW/WW	Crop Year Precip. (inches)
1998	28	58	48%	9.45
1999	21	40	52%	9.86
2000	24	48	50%	9.34
2001	15	29	55%	8.30
4-yr avg	22	44	50%	9.24

x Spring wheat yields are from the replicated long-term spring cropping research project whereas winter wheat yields are the average for similarly deep soils at the WSU Dryland Research Station.

As one cycle of the 4-year rotation was completed in 2001, an advisory meeting of growers and scientists will be held in February 2002 to decide future crop rotations for this experiment. See the article entitled "Long-term dryland cropping systems research at Lind: The next six years" in this publication.