germination at wheat harvest and after killing frost in the fall; and spring wheat grain yield. Experimental design is a randomized complete block with four replications.

To date, results show that tillage with a low-disturbance undercutter V-sweep is more effective than herbicide for post-harvest control of Russian thistle. The check (no control) is by far the least desirable of the three treatments. Use of the undercutter V-sweep results in a complete kill of all Russian thistle with absolutely no subsequent seed production (Table 1). With contact herbicide, some Russian thistle grow-back and/or escapes generally occur and seed production averaged over 4 years is more than 300 seeds per square meter (Table 1). The check treatment had a 4-year average of more than 5000 seeds produced per square meter. The check treatment had a significantly greater number of viable Russian thistle seeds (59%) compared to the herbicide treatment (35%) (Table 1).

Table 1. Soil water dynamics, Russian thistle growth and seed production, and subsequent spring wheat grain yield as affected by method of post-harvest Russian thistle control during four years at Lind, Washington.

		Soil Water (inches)			Russian Thistle				
Crop Year	Post-harvest control method	After harvest	After frost	Early spring	After harvest biomass (g/ m^2)	After frost biomass (g/ m^2)	Seeds (per m^2)	Germination (%)	Grain yield (bu./ac.)
1999-2000	Check	2.76	2.37 b	4.91	77	135 a	8857 a	56.0 a	17.2
	Herbicide	3.09	3.06 a	5.04	32	7 b	0 b	0 b	21.5
	Tillage	3.06	3.06 a	4.90	21	5 b	0 b	0 b	19.0
2000-2001	Check	2.35 b	2.50 b	3.32 b	161	174	1548 a	76.7 a	2.8 b
	Herbicide	3.40 a	3.20 a	3.20 b	243	189	148 b	55.2 a	7.8 a
	Tillage	3.66 a	3.16 a	4.50 a	244	180	0 b	0 b	12.0 a
2001-2002	Check	2.83 ab	2.28 b	5.54	102	---	---	---	8.6
	Herbicide	2.52 b	2.30 b	5.11	75	---	---	---	9.7
	Tillage	2.98 a	2.97 a	6.02	58	---	---	---	9.1
2002-2003	Check	2.18 c	2.23 c	6.84	133 a	162 a	5662 a	45.3 a	11.1 b
	Herbicide	2.47 b	2.64 b	6.93	124 a	108 b	785 b	49.5 a	11.6 b
	Tillage	2.89 a	3.09 a	7.20	71 b	43 c	0 b	0 b	14.8 a
Average	Check	2.53 c	2.35 c	5.15 b	118	157 a	5356 a	59 a	9.9 b
	Herbicide	2.87 b	2.80 b	5.07 b	119	101 b	311 b	35 b	12.6 a
	Tillage	3.17 a	3.07 a	5.66 a	99	76 b	0 b	0 c	13.7 a

Method of post-harvest Russian thistle control has had a significant effect on soil water status. Use of the undercutter V-sweep resulted in significantly more water in the 6-ft soil profile at time of wheat harvest, after killing frost in October, and in mid-March compared to the herbicide and check treatments (Table 1). Spring wheat grain yield averaged over 4 years was significantly less in the check (9.9 bu/ac) compared to the herbicide (12.6 bu/ac) and undercutter V-sweep (13.7 bu/ac) treatments (Table 1). This study will continue for at least two more years.

GREENHOUSE STUDIES OF RHIZOCTONIA BARE PATCH DISEASE IN SOILCORES FROM DIRECT-SEEDED FIELDS

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Rhizoctonia bare patch, caused by the soilborne fungus *Rhizoctonia solani* AG-8, can be a problem in direct-seeded small grains in rainfed areas of the inland Pacific Northwest. Plants within patches are extremely stunted. The purpose of this work was to 1) compare *Rhizoctonia* populations at different positions within the patch and at different soil depths and 2) to see if patches would be maintained in the *R. solani*-infested cores over successive plantings in the greenhouse. Eight patches were sampled at two locations near Ritzville and Starbuck, WA. Soil cores (6 x 10 inches) were removed from the four positions within each patch- center, inside edge of the patch boundary, outside edge, and outside (healthy plants). Cores were planted with

five crops of spring barley (*Hordeum vulgare* L.) over an 11-month period in a greenhouse at 60°F. Relative activity of *R. solani* AG-8 was monitored with a toothpick baiting technique. At the first planting, activity of *R. solani* was higher in the center and inside edge, but after the second planting, there were no differences among the patch positions. Based on plant height, patches were maintained in only 6 out of 16 sets of cores. *R. solani* activity was similar at all soil depths from 1 to 8 inches. These results indicate that a natural suppression may develop with monocropping of a susceptible crop, and may explain why patches disappear over time in a field.

SOIL QUALITY AND WATER INTAKE IN CONVENTIONAL-TILL VS. NO-TILL PAIRED FARMS IN WASHINGTON'S PALOUSE REGION

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Many farmers in the steeply-sloped Palouse region of eastern Washington and northern Idaho practice no-till (NT) farming because water erosion on partially frozen soils is often severe when residue cover is lacking. Several soil quality and water intake parameters were assessed in standing wheat stubble along summit, back, and toe slope positions in a 2-year study at three paired-farm sites under conventional-till (CT) vs. NT management. Paired sites had similar south-facing slope and aspect and NT fields had not been tilled from 2- to 20 years. Soil organic carbon in NT was greater than in CT, especially in the 0-to 2-inch surface depth. Two sites had calcium carbonate (caliche) evident at the back-slope position of CT and pH was higher in CT compared to NT. Soil microbial activity, measured as dehydrogenase enzyme activity, was stimulated with CT, mainly due to the exposed caliche layer and higher pH; not due to higher organic carbon, indicating the necessity to use several quality parameters to evaluate soils. Differences in time in NT at the three sites altered the composition of the microbial communities as seen by fatty acid methyl ester analysis and phospholipid fatty acid analysis. Microbial communities in CT at back-slope and toe-slope positions were different from those in NT, while differences in the soil microbial communities from the summit were not as apparent. There were no differences in over-winter soil water storage or in ponded water infiltration rate in undisturbed standing wheat stubble between CT and NT within any paired farm or when averaged across farms and years, indicating that soils with equivalent quantity of standing stubble have similar over-winter soil water storage and ponded water infiltration rate regardless of tillage history. However, significant over-winter soil water storage differences were measured among slope positions with toe > back > summit. These data represent an important step to further quantify soil quality and soil water dynamics as affected by long-term tillage management on cropland in the Palouse.