radius), 6 ft within a patch, 4 ft within a patch, 2 ft within a patch, at the border of the patch and healthy wheat, and 10 ft into healthy wheat (i.e., no bare patch within a 10-ft radius.

Results strongly suggest that wheat roots do not extract soil water from within Rhizoctonia bare patches (Fig. 1). Healthy spring wheat growing 10 ft from the nearest bare patch had used significantly more soil water than wheat on the border of a patch on both June 7 and July 16 measurement dates. Similarly, soil water content at the border of patches was significantly lower than from within the patch. Water content within patches was the same regardless of location of the access tube within the patch. Note that wheat did not extract soil water even from just 2 ft inside the border (Fig. 1). This experiment is being repeated in 2004.

*MAPPING RHIZOCTONIA BARE PATCH DISEASE IN DIRECT-SEEDED CROPPING SYSTEMS

Bill Schillinger, Harry Schafer, Tim Paulitz, and Jim Cook
WSU and USDA-ARS

The soil-borne fungus *Rhizoctonia solani* AG-8 is a major concern for farmers who practice direct seeding (i.e., no-till) in the inland Pacific Northwest. Bare patches caused by Rhizoctonia first appeared in 1999 during year 3 of a long-term direct-seed cropping systems experiment on the Ron Jirava farm near Ritzville, Washington (11.5 inch annual precipitation). The extent and pattern of patches were mapped each year from 1999-2003 at the 20-acre study site with a backpack-mounted global positioning system equipped with mapping software. The average percentage area of bare patches ranged from 7.5% in 1999 to 11.7% in 2002. Comparison of patterns over years show that some patches increased in size, new patches formed, and some patches disappeared. Bare patches appeared each year in winter and spring wheat, spring barley, yellow mustard, and safflower. Crop rotation had no effect on the occurrence of bare patches caused by Rhizoctonia during the first five years of the experiment, but continuous annual spring wheat had significantly greater area with bare patches compared to spring wheat following spring barley in a 2-yr rotation in 2002 and 2003. Research is underway or planned to determine why some bare patches disappear with time and on management practices to help alleviate the severity of the disease.

*HOW CAN I MISS YOU WHEN YOU WON'T GO AWAY? POST-HARVEST MANAGEMENT OF RUSSIAN THISTLE IN SPRING WHEAT

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We have completed four years of research at the WSU Dryland Research Station at Lind on post-harvest management of Russian thistle in continuous annual spring wheat. Our study compares three post-harvest Russian thistle control treatments. These treatments are: 1) Surefire herbicide (paraquat + diuron) at 24 to 32 ounces/acre applied 7-10 days after wheat harvest; 2) tillage with overlapping adjustable-pitch 32-inch-wide V-blade undercutter sweeps on 28-inch centers conducted 7-10 days after wheat harvest, and; 3) check (do nothing, let the Russian thistles grow). Measurements are: Soil water to a depth of six feet at wheat harvest, after killing frost in the fall, and again in early spring; above-ground Russian thistle dry matter, seed production, and

MAPPING RHIZOCTONIA BARE PATCH DISEASE IN DIRECT-SEEDED CROPPING SYSTEMS

Bill Schillinger, Harry Schafer, Tim Paulitz, and Jim Cook
Washington State University and USDA-ARS

The soil-borne fungus *Rhizoctonia solani* AG-8 is a major concern for farmers who practice direct seeding (i.e., no-till) in the inland Pacific Northwest. Bare patches caused by Rhizoctonia first appeared in 1999 during year 3 of a long-term direct-seed cropping systems experiment on the Ron Jirava farm near Ritzville, Washington (11.5 inch annual precipitation). The extent and pattern of patches were mapped each year from 1999-2003 at the 20-acre study site with a backpack-mounted global positioning system equipped with mapping software. The average percentage area of bare patches ranged from 7.5% in 1999 to 11.7% in 2002. Comparison of patterns over years show that some patches increased in size, new patches formed, and some patches disappeared. Bare patches appeared each year in winter and spring wheat, spring barley, yellow mustard, and safflower. Crop rotation had no effect on the occurrence of bare patches caused by Rhizoctonia during the first five years of the experiment, but continuous annual spring wheat had significantly greater area with bare patches compared to spring wheat following spring barley in a 2-yr rotation in 2002 and 2003. Research is underway or planned to determine why some bare patches disappear with time and on management practices to help alleviate the severity of the disease.

Methods. A long-term study of continuous annual no-till cropping systems involving small grain and broadleaf crops grown in 4-year and 2-year rotations and in monoculture has been ongoing near Ritzville, WA since 1997. Soil is a deep silt loam with no restrictive layers. The experimental design is a randomized complete block with four replications with all phases of all rotations present each year. Rhizoctonia patches first appeared in 1999 (year three of the experiment) and have been present each year since. A global positioning system (GPS) equipped with mapping software was used to determine the location, size, and area of these patches. Complete GPS mapping of all Rhizoctonia bare patches was conducted in 1999, 2000, 2002, and 2003, but not in 2001 when near crop failure occurred due to drought making bare patches difficult to delineate.

Results. Patches of plants stunted by Rhizoctonia were found in wheat, barley, safflower, and yellow mustard plots. Total percentage of land area with patches of stunted plants was: 1999 - 7.5%; 2000 – 8.4%; 2002 – 11.7% and; 2003 – 10.7% (Fig. 1). There were no significant differences in the percentage area of patches as affected by crop or crop rotation in 1999 and 2000. Beginning in 2002, both soft white and hard white spring wheat following barley in 2-yr rotations had less ($P < 0.10$) Rhizoctonia bare patch area the either continuous soft white or hard white spring wheat. By 2003, the greater bare patch area in continuous spring wheat vs. spring wheat after barley was much more pronounced ($P < 0.001$). Rhizoctonia bare patch was also low in spring wheat in 2003 following chemical summer fallow (i.e., failed yellow mustard in 2002), possibly due to greater soil water availability. Over seven years, there have been no grain yield differences between continuous spring wheat compared with spring wheat after barley in the 2-yr rotation.

An overlay of patched areas in 1999, 2000, 2002, and 2003 show that some patches grow, some new patches appear, and other patches disappear (data not shown). Collaborative field, greenhouse, and laboratory experiments are underway to gain further understanding of the

Rhizoctonia bare patch phenomenon in direct-seeded dryland crops in the inland Pacific Northwest.

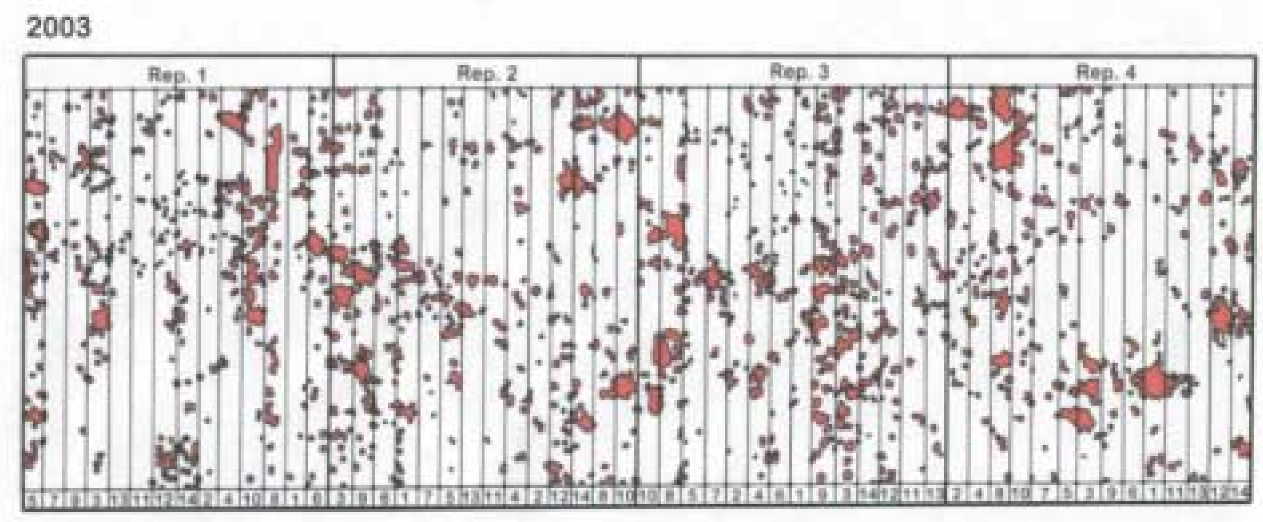

Figure 1. Rhizoctonia bare patches covered 10.7% of total land area in 2003 in the 20-acre cropping systems study near Ritzville, WA. Rhizoctonia-infected area was mapped using a portable GPS unit.