

***YIELD TRENDS IN A LONG-TERM CONTINUOUS DIRECT-SEED WINTER
WHEAT/SPRING CEREAL CROPPING SYSTEM**

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A study was undertaken the fall of 1987 on the Palouse Conservation Field Station near Pullman to evaluate yield trends and root diseases with continuous direct-seeded cereals. The 2002 planting of spring wheat represented the 21st consecutive year where the only tillage has been with the drill equipped to plant and fertilize as one-pass. The 2002 spring wheat represents the 19th cereal crop and the 18th wheat crop in 21 years. In addition to chem fallow in 1987 the plot was planted to spring barley in 1993 and spring peas in 1994. The study site has never been burned, yet the only crop residue present at the time of planting is that of the most recent crop.

The highest yield of winter wheat (Daws, at 128 bu/A in 1988) and spring wheat (Penawawa, at 99 bu/A in 1995) followed the chemical fallow and peas, respectively. This confirms the value in the Palouse of a break to either fallow or a broadleaf crop before planting wheat. The lowest yields of winter and spring wheat were in the second (Hill-81 at 57 bu/A in 1989) and third (Penawawa at 49 bu/A in 1990) years, respectively, due largely to root diseases. Over the past 5 years (17th to 21st consecutive years of direct seeding), the 2-year yield for one winter and one spring wheat year combined has averaged about 150 bu/A.

After years of chronic *Rhizoctonia* root rot, typical of the disease in the Palouse region, severe bare patches developed in this site for the first time in 2002. Approximately 15% of the site showed the bare patch form of this disease. In spite of the scattered patches Alpowa produced an average yield in four replicate plots of 69 bu/A. Undoubtedly this yield was still only about three-fourths of the potential yield for spring wheat at this site in 2002.

***ROOT DISEASES IN THE IRRIGATED CROP RESIDUE MANAGEMENT STUDY,
LIND, 2002**

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In 2000, an irrigated study was initiated at Lind to test alternative tillage and crop rotations for production of winter wheat under irrigation. The conventional treatment was continuous winter wheat, using moldboard plowing and stubble burning. The three direct-seeded treatments are 1) mechanical stubble removal, 2) burning residue and 3) standing residue left on surface. For each direct-seed treatment, there are three rotation crops- winter wheat, spring barley, and winter canola. Previous research has shown that tillage or lack of tillage, burning and crop rotation may affect root pathogens, including *Rhizoctonia* (caused of root rot and bare patch), *Gaeumannomyces graminis* var. *tritici* (cause of take-all), and *Fusarium pseudograminearum* and *F. culmorum* (cause of crown or dryland foot rot). Lesion nematode (*Pratylenchus neglectus*) can also damage cereal roots. In 2002, we measured both disease on roots and quantified pathogens with DNA tests. Overall, the disease levels on the cereals in 2002 were low. However, most of the winter canola direct seeded into standing barley stubble was killed in late Sept. by *R. solani*, probably 'greenbridged' from killing a heavy stand of barley volunteer within the crop two weeks previously. There was generally no effect of treatments on spring barley. On winter wheat, the risk of take-all and lesion nematodes were highest in the burn/plow treatment. This treatment also had the lowest yield in 2002. Conversely, the risk of *Rhizoctonia* was lower in the burn/plow, and the risk of *Fusarium* was highest in the standing stubble and mechanical

stubble removed treatment. However, in irrigated wheat, even though the pathogen is present, *Fusarium* may not cause much disease because of the adequate water and lack of plant water stress. Adequate water may also compensate for root damage caused by these pathogens.

RALSTON PROJECT CONTINUES ON!

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The Integrated Spring Cropping Systems Project, better known as the 'The Ralston Project', began in the fall of 1995. The project, collectively conceived and designed by regional growers and scientists, aimed to reduce the risks associated with no-till, annual, and spring cropping systems in areas of low rainfall. Researchers from ten disciplines annually evaluated each cropping system on: a) weed population dynamics; b) soil fertility and nutrient cycling; c) varietal resistance to insects and disease; d) no-till and reduced tillage operation; e) stubble management for soil moisture and erosion control; f) pest populations and chemical inputs for control, and g) economic profitability and risk. Recently, investigators expanded and modified main plots and satellite studies to comply with the requests of interested growers and scientists. The major objectives however, remain consistent.

Two consecutive years of extreme drought hit several crop rotations in Phase II (2000-2002) hard, affecting their overall performance. Now in Phase III, investigators have split the plots to modify treatments and test new rotations. This allows researchers to test decisions related to crop selection, planting date, herbicide requirements, and marketing *based upon prevailing environmental and biological conditions*. These refined treatments include: reduced-till winter wheat or winter canola – fallow; 2) no-till soft white spring wheat (flex crop) or chemical fallow – facultative spring wheat; 3) no-till hard red spring wheat with normal or reduced herbicide applications; 4) no-till spring oats (for forage or seed) – spring triticale, and 5) no-till hard white spring wheat – one-pass till spring barley or no-till spring barley.

In Phase II, an additional researcher conducted a survey to determine if and how the project's innovative research approach and design impacted visiting growers. The survey revealed that growers overwhelmingly viewed the project as a valuable learning tool to control soil moisture, reduce wind erosion, and manage the risk of converting to and sustaining alternative cropping systems. Growers' input from the survey along with researcher input and regional drought during Phase II contributed significantly to redesigning treatments in Phase III.

The field tour featuring Phase III is scheduled for Tuesday, June 1, 2004.