Objective 5: Wind Erosion and PM$_{10}$ Emission Control Methods

Personnel:

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Objectives

The project is new and has two phases. Phase I is the preparatory phase where a grower advisory group is established and the site selected and characterized. Phase II is the implementation phase where plots are established to evaluate different cropping systems. Phase I objectives are:

- Establish a grower advisory committee that represents growers in all aspects of the proposed long-term experiments, the main objective of which is to develop sustainable cropping systems for north-central Oregon and south-central Washington.

- Select a representative site for the proposed long-term research and characterize the site to establish base-line data from which inferences about sustainability can actually be drawn.

The project is now in the implementation phase. The objectives of this phase is to establish and maintain long-term experiments that compare conventional wheat/fallow system with alternate cropping systems with potential crop management practices such as direct seeding that reduce wind and water erosion. Specific objectives include determining systems that

- increase residue cover,
- increase soil OM,
- increase available soil moisture,
- reduce wind and water erosion,
- reduce soil water evaporation,
- improve and sustain soil productivity.

Accomplishments

Phase I.

- **Grower advisory committee:** After three meetings, a grower advisory committee was formed. The committee members are Ernie Moore (Sherman County), Tom McCoy (Sherman County), Walter Powell (Gilliam County), John Hilderbrand (Sherman County), Chris Kaseberg (Sherman County), and David Brewer (Wasco County). The committee members will participate fully in all aspects of the long-term research including choosing of treatments and the management of the plots.

- After further meetings with the growers cropping systems to be evaluated were selected. The systems include:

  1. Winter wheat-Conventional fallow (Disk, chisel, sweep)
  2. Winter wheat-Chemical fallow (Direct Seeding)
  3. Continuous winter wheat (Direct Seeding)
4. Continuous spring wheat (Direct Seeding)
5. Continuous spring barley (Direct Seeding)
6. Winter wheat-spring barley-chemical fallow (Direct Seeding)
7. Winter wheat-winter pea (Direct Seeding)
8. Flex crop (crop choices and tillage decisions made every year based soil conditions and market trends)

- **Site selection and characterization:** Because of the long-term nature of the experiment, the Oregon State University, Columbia Basin Agricultural Center (CBARC) at Moro, Oregon was chosen as the site for the experiment. A 27.2 acre-site was chosen and characterized. Soil was sampled at one-foot intervals to a depth of 5 ft or to restricting layer at 126 geo-referenced locations on a 100 ft grid. The soil was archived for future chemical analyses to obtain baseline information. Another site was identified at Bill Jepsen’s farm near Heppner, OR. The farm is home to the Monsanto Center of Sustainability study that was initiated in 1999 and terminated in 2003. Because the treatments are fairly similar to treatments at Moro, the same plots have been maintained with minor modifications.

Phase II.

- The project is in the initiation phase. After characterization, the Moro site was solid seeded with spring in 2003 to homogenize the soil and the plots were established in the fall of 2003. Soil analysis results taken before seeding indicate that there were no significant differences in pH and in the levels of OM, P, K, NO₃, NH₄, and SO₄ between the plots indicating that the plots were of fairly uniform fertility. The first yields of the experiment were obtained in 2004. There were no significant differences in grain yield between plots seeded to winter wheat and between the plots seeded to spring wheat (Fig 1). However, grain yields of plots seeded to spring crops were significantly lower than grain yields of winter wheat seeded plots. The uniform grain yields in winter and spring wheat plots indicate that plot productivity was fairly uniform at the initiation of this experiment. This supports soil analysis data that showed that nutrient levels were fairly uniform between the plots. Future differences in grain yield will be directly attributed to cropping system treatments.

- These experiments are long-term and focus not only on grain yield, but also track soil physical and chemical factors to determine sustainability of the proposed systems. It will take at least six years to have minimum data sets required to start making inferences about the sustainability of proposed cropping systems.