

*Proposal for 2005 - 2006
Northwest Columbia Plateau PM₁₀ Project*

Objective 5: Wind Erosion and PM₁₀ Emission Control Methods

Title: Cover and Wind Break Crop Management in Irrigated Systems of the Columbia Plateau

Personnel: **Principal Investigators:** William Pan, Soil Scientist, WSU Pullman, Bob Stevens, Soil Scientist, WSU, Prosser;
Co-investigators: Mark Stannard, USDA-NRCS Plant Materials Center; Jim Dobrowolski, WSU, Pullman; Andy McGuire, WSU, Ephrata; Bob Papendick, Hans Kok, WSU, Pullman; Bill McKean, Mark Lewis, UW, Seattle; Rick Rupp, Ron Bolton, Eric Harwood, WSU Research Technologists.

Objectives

1. Develop growing degree day/GIS models for cover crop prediction and planning and evaluate late-season options in cover crop selection and management.
2. Evaluate post-incorporation of green manure effects on soil erodibility.
3. Determine efficacy of straw-based soil amendment for controlling road dust emissions of farm roads.
4. Define agronomic requirements for growing and controlling Giant Reed (*Arundo donax* L.) for a fiber producing wind break crop as a fast-growing, marketable alternative to poplar trees.

1. Develop growing degree-day models to predict canopy cover, N and biomass accumulation.

Methods

Growing Degree Day models of wheat and triticale cover crops constructed by Kunch (2001) have been tested and refined using additional cover crop biomass and N data provided by late-season cover crop field experiments near Quincy, WA. A manuscript on growing degree day models will be published in *Agronomy Journal* by Pan, Stevens, Pan and graduate students. A web-based predictive model has been constructed by R. Bolton and extension bulletin will be produced to help growers make cover crop planting decisions by location and planting window, in cooperation with Hans Kok and Bob Papendick.

Recent Accomplishments

Integration of growth and cover models with GIS interpolations of temperature variations among years across the Columbia Basin suggested the following:

1. All 5 cover crops require < 500 kg_{DW}/ha for 50% cover
2. Extreme year to year temperature variations can cause 2,500+ kg/ha differences in biomass
3. Brassicas provide excellent cover and scavenge N when planted by Sept 1 in the North Basin and Sept 15 in the South Basin
4. Triticale provides more cover per unit of biomass than all other cover crops

5. Triticale and rye will provide > 50% cover in the south Basin even when planting as late as Oct 15.

A prototype web-based GDD model has been developed for growers to predict soil cover and biomass, N accumulation by location and planting date.

2. Evaluate post-incorporation of green manure effects on soil erodibility.

Methods

We are facilitating wind erodibility measurements of A. McGuire's post-incorporation cover crop plots with J. Dobrowolski's portable wind simulator. (see McGuire's proposal). R. Bolton and E. Harwood have been the principal technologists on this effort.

Recent Accomplishments

Preliminary results suggests incorporation of green manured-cover crops has residual soil stabilizing effects that help to reduce wind erodibility of the soil surface.

3. Determine efficacy of straw-based soil amendment for controlling road dust emissions of farm roads.

Methods

Bill McKean and Mark Lewis at U. Washington will develop on-farm process for pulping straw for producing fiber and black liquor soil amendment for soil stabilization. Batch samples of fiber and black liquor will be applied to farm roads for evaluation of soil stabilization. Dobrowolski's portable wind simulator will be used to test stabilization. Soil aggregation and aggregate stability will be measured.

Recent Accomplishments

Fine fiber and black liquor from wheat and bluegrass straw has been shown to improve soil aggregation of Quincy loamy sand. High rates of application need to be tested to evaluate potential of this material for road stabilization.

4. Define agronomic requirements for growing and controlling Giant Reed (*Arundo donax* L.) for a fiber producing wind break crop.

Methods

Arundo Donax rhizomes and stems are planted at WSU IAREC, Prosser to evaluate growth potential (plant height, biomass, nutrient accumulation) and fiber quality for paper making (W. McKean and M. Lewis, UW) over several growing seasons. Grower cooperators will be sought to establish on farm trials, perhaps starting with pivot irrigation corners.

Recent Accomplishments

This crop has excellent potential as a perennial wind break crop due to its ability to reach heights of 15-18 ft tall and dense stands. A small planting was established in 2003 by B. Stevens at WSU IAREC. It produces 10-12 dry tons/acre/year and has reached heights of 12-17 ft annually. Its fiber has been found to be desirable to the pulp and paper industry. The crop can be harvested each year at different time intervals throughout the annual year, providing a potential wind break.