United States Department of Agriculture

NRCS Natural Resources Conservation Service

2013
Pullman Plant Materials Center
Progress Report of Activities

Issued Feb, 2014

PO Box 646211 , Pullman, WA 99164-6211 **Website: http://Plant-Materials.nrcs.usda.gov/wapmc**

Pullman Plant Materials Center

Our Mission:

Develop Revegetation Plants and Revegetation Technology for the Inland Pacific Northwest.

Who We Are

The Pullman Plant Material Center (PMC) is one of 27 Plant Materials Centers (PMC) that are scattered across the Nation and are charged with developing cost effective vegetative solutions for land stewardship problems.

The Pullman PMC lies in the Palouse Hills and serves northern Idaho, and Washington & Oregon east of the Cascades.

This report highlights the major activities at the PMC during 2013. For more detailed information, contact the PMC or the Plant Materials Specialist in Spokane.

National Soil Health Study

The Pullman PMC is one of seven PMCs participating in a National Plant Materials Program study to evaluate the effects of cover crops on soil health. The study began in October 2012, when we planted three cover crop mixes (two, four and six species) at three rates (20, 40 and 60 seeds per square foot). The species in our cover crop mixes are triticale, hairy vetch, oats, rapeseed, forage radish and red clover. We terminated the cover crops in mid-May, and two weeks later planted our commodity crop, which is barley. Throughout 2013, we collected cover crop percent cover and biomass data; measured soil bulk density, soil moisture, and soil temperature; collected soil nutrient and biological indicator samples; and assessed commodity crop yield.

We planted the second year of cover crops in the fall of 2013, and are currently tracking changes in percent cover. This cycle will repeat for a third year and end in 2015. Information gathered in this study will help us determine the adaptability of these cover crop species to the Palouse region, and their effects on soil health and crop performance.

Four species mix seeded at the highest seeding rate. May 8, 2013.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).
To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

Legumes in Cover Crops in Orchards

Legumes were historically used as cover crops in orchards to provide ground cover and a nitrogen source. Orchardists in Washington are currently interested in reviving this practice, as a way to reduce input costs and enhance long-term sustainability. Little is known about how current legume cultivars perform in orchard environments, and how water use, tree growth and yield, and fruit quality are affected by the legumes.

Working with the Benton County NRCS Field Office, the Yakima Conservation District, and the Washington State University Center for Sustaining Agriculture and Natural Resources, we evaluated 22 legume species and cultivars in three orchard environments. We collected emergence, percent cover, biomass and nitrogen production data and recorded the presence or absence of damaging insects and rodents. Our data shows some annual legumes have the ability to supply approximately 20 lb/ac plant-available nitrogen (PAN) in a one-time supply, and perennial legumes can supply 20 to 50 lb/ac PAN over the growing season with multiple cuttings. The trees may receive the most nitrogen benefit if the legumes are mown and blown into the tree row.

Crimson clover plot in the mature apple orchard, May 15, 2013.

Cover Crop Biomass Study

The Cover Crop Practice Standard (340) states a cover crop typically needs to produce 4,000 lb/ac of dry matter (DM) biomass to fulfill the intended purpose of the practice. This production level is likely achieved in the Inland Northwest with irrigation and ideal planting dates, and may be achieved when cover crops are substituted for fallow in wheat-fallow rotations. However it is questionable whether cover crops can achieve that production level in the "off" months of continuous-cropping dryland rotations. To evaluate biomass production, we planted approximately 40 species, cultivars and mixes of cover crops on two planting dates with irrigation at the WSU Othello Experiment Station, and on two planting dates at the Pullman PMC (no irrigation) in the fall of 2013. We will plant 50 species, cultivars and mixes of cover crops on two planting dates at each of the locations this spring, and we will measure the biomass of each plot. The biomass measurements will be used to help make cover crop recommendations and to refine RUSLE2 calculations.

Dallas Spellman (Pullman PMC) and Liz Keith (Ephrata FO) collecting cover crop biomass at Othello. October 22, 2013.

Pollinator Habitat

Based on our forb establishment studies and many reports from the field, we have concluded to have a successful pollinator habitat planting, **there must be minimal disturbance to the seed bed**. In other words, the **plantings must be established with no-till practices**. If the planting is treated like any other planting, by requiring/creating a black seed bed, it will be doomed to fail. Native forbs cannot compete with weeds. For situations where a black seed bed has already been created (such as when a field in crop rotation is being enrolled in CRP), we are currently experimenting with the method of establishing a 100% grass stand and controlling weeds with non-residual broadleaf herbicides for at least two years while the grasses establish, then returning to no-till drill forbs into the grass. If you have a landowner who would be interested in experimenting with this method, please contact us.

Three-year-old stand of native forbs established with no-till drills in Latah County. July, 2013.

Caragana Study

The Pullman PMC initiated a project a number of years ago in an effort to identify trees and shrubs that could be used for dryland windbreaks. The initial test planting was established south of Prosser, Washington in an area that receives less than 7" MAP. Big sage, rabbitbrush, and saltbush did not acquire much height and were removed from further consideration. Caragana (purchased from the Montana State Forest Nursery) exhibited the most promise with the Caragana growing more rapidly than all the species tested. The Caragana originated from seed collected in Mongolia over 80 years ago.

In 2008, the PMC established an advanced evaluation planting south of Prosser to compare the 'State Nursery' Caragana with seed stocks recently collected in the former Soviet Union. The "new" Caragana seed stocks were specifically collected in harsh, dryland locations, and we anticipated that one or more of these new dryland seed collections would be superior to the 80+ year old germplasm.

Caragana plants were grown from seeds in the PMC greenhouse, hardened-off and transplanted in spring 2008. Caragana bare-root plants were purchased from the Montana State Forestry Nursery and were used for comparison.

The advanced evaluation planting has been in stand for 6 growing seasons. Two major outcomes of this study are noteworthy:

1) The newly collected seed stocks from the former Soviet Union were no better than the seed stock collected over 80 years ago.
2) The planting made in 2003 grew 60% FASTER than the planting made in 2008. The 2003 planting was made with 12-feet of weed barrier. The 2008 planting was made with 6-feet of weed barrier. It is very evident that wider weed barrier is better in very arid upland sites.

Two meter tall Caragana growing with the aid of 12-feet of weed barrier. Notice the size of the Rocky Mountain junipers (left) for comparison. Both species were planted the same date.

Western Clematis Study

Western clematis is a native vine that is surprisingly drought tolerant. Test plantings made in Adams, Klickitat, Benton, and Garfield counties have revealed that western clematis will perform well in upland areas that receive as little as 7-inches of annual precipitation. A native stand of western clematis is typically comprised of a single plant, either male or female, which has spread vegetatively on the site. It is not uncommon to find a plant growing alone with no others within several miles.

The Pullman PMC developed and released 'Trailar' western clematis in 1992. 'Trailar' is comprised of a male plant that originates from Benton County and a female plant from Walla Walla County. 'Trailar' never caught on with the nursery trade because it was vegetatively reproduced from softwood cuttings.

Approximately 15 years ago we grew the male and female plants next to each other at the Pullman PMC. We noticed that the female produced large amounts of high quality seed, and the seed in turn produced very robust plants. In comparison, seed of western clematis collected in the wild is notoriously poor quality and likely due to inbreeding depression. Our seed from male and female plants that occur 50 miles apart appears to overcome inbreeding depression.

Seedhead of western clematis.

In 2007, plants from seed of 'Trailar' western clematis were grown at the Pullman PMC. Western clematis plants were purchased from a local restoration nursery for comparison. Equal numbers from each source were planted on an upland site that receives 10-inches of mean annual precipitation. The planting was visited annually and in 2013, none of the plants originating from the restoration nursery were alive. Over 86% of the plants originating from 'Trailar' seed were alive and flourishing.

Seed of 'Trailar' western clematis was collected in August 2013 and 100 grams were provided to 2 restoration nurseries for testing. We anticipate that the nurseries will find the seed valuable and promote the use of western clematis for wildland plantings.

Flowers of western clematis

2013 Technical Documents

- Plants for Pollinators (revised), Technical Note #24
- Roses of the Inland Northwest, Technical Note #18
- Baldhip Rose, Plant Guide
- Nootka Rose, Plant Guide, Wood's Rose, Plant Guide
- Ground Ivy, Plant Guide
- Spring Cover Crop Seeding Guidelines for Eastern Washington, WA Cons. Practice Guidelines
- Pollinator Habitat Plan (CAP 146) webinar and example plan
- Rare plants lists, by habitat, for Washington State Counties
- Conservation Reserve Program (CRP) Guide to Grasslands Posters: NC Washington, Adams & Lincoln Cos., East Area WA, SC Washington