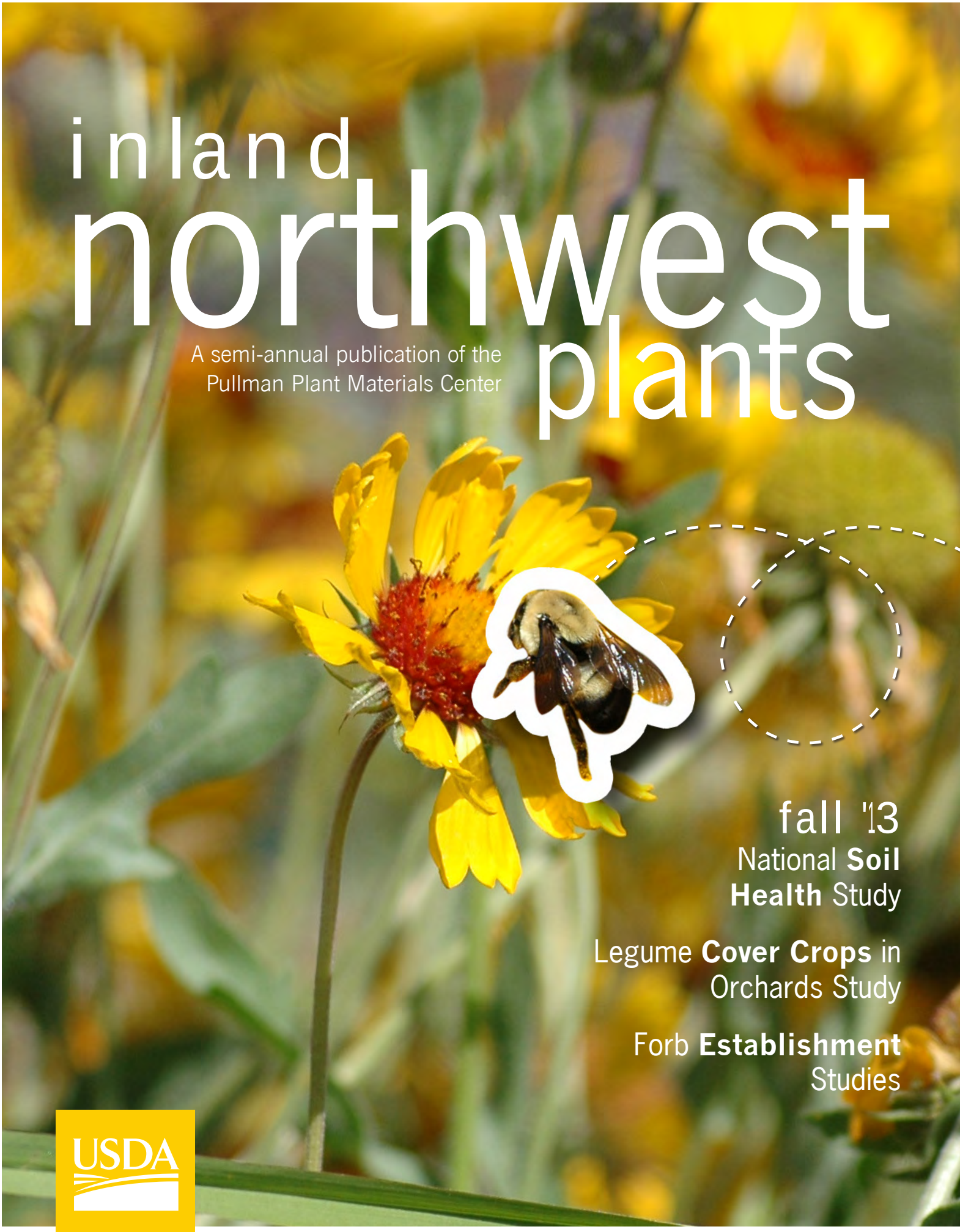
inland northwest plants

A semi-annual publication of the
Pullman Plant Materials Center



fall '13

National **Soil Health** Study

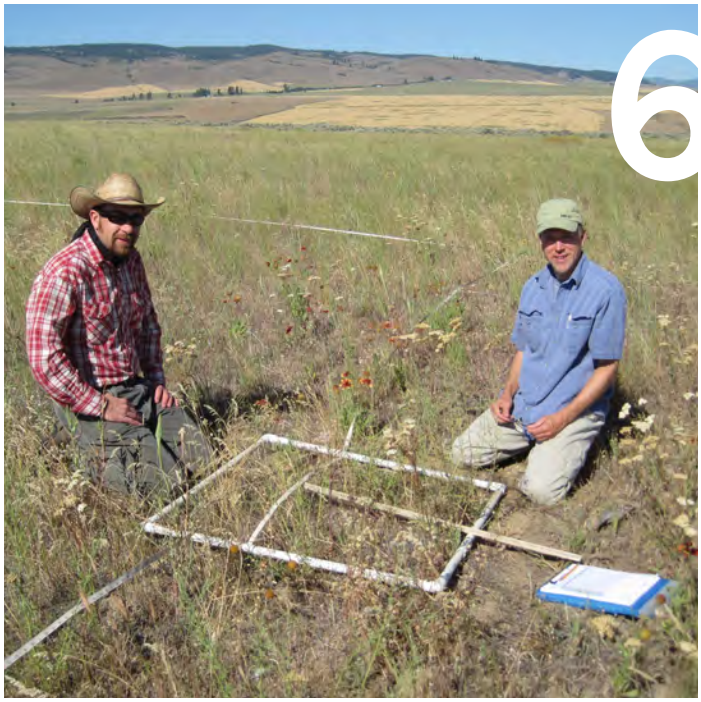
Legume **Cover Crops** in Orchards Study

Forb **Establishment** Studies

USDA

CONTENTS

FALL 2013 Vol. 1 No. 1



NEW PLANT MATERIALS CENTER PUBLICATION

It's been a while since we've had a general newsletter at the Pullman PMC. For the last four years, we focused much of our effort on pollinator habitat, and we produced a newsletter titled The Sweep Net to track our progress on that front. The topic of pollinator habitat is now taking a back seat to other topics such as soil health and cover crops. Therefore, we are retiring The Sweep Net and producing a newsletter that will keep you up to date on ALL of our activities. We will still include pollinator habitat updates when we have important news to share.

National soil health study

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

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 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 grew the cover crops until May 14 of this year, when we terminated them with glyphosate and planted barley as our commodity crop. We will repeat this cycle for two more years. We are monitoring soil indicators such as: moisture, temperature, compaction, nutrients, and microbial diversity, as well as commodity crop performance.

In our plots, oats and red clover did not survive the winter, and very few rapeseed and radishes survived. All of our plots were dominated by triticale and a few vetch plants. The plants had an average height of 16 inches at the time of termination, and we think this would have been lower if we had not had record-high temperatures (above 80 degrees F) during the first two weeks of May.

The number of species planted did not have any effect on soil temperature at time of barley planting, due to winter kill of some of the species. There was no difference in soil moisture among the plots with increasing number of species, however all cover crop plots had lower moisture than the control at the time of barley planting. There was a slight decrease in soil temperature with increasing seeding rate, however no difference from the control. There was also a slight decrease in soil moisture with increasing seeding rate.

We harvested the barley on September 9, 2013, and had average yields of 0.19, 0.13, and 0.11 ton per acre in the 20, 40, and 60 seeds per square foot cover crop plots, respectively. Our control plots yielded 0.57 ton per acre. The control plot yield is lower than the typical barley yield in our area, 2 tons per acre, likely due to our late planting date. We kept the cover crops in the ground as long as possible to maximize growth.

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

legume COVER CROPS in orchards study

Orchardists in Washington are interested in finding a plant source of nitrogen for their tree crops, in order to reduce input costs and become more sustainable. Currently, organic orchardists use composted chicken manure as their primary source of nitrogen. This practice has several disadvantages, including the build-up of phosphorus and salts in the soil, which can harm fruit quality, difficulty of transport and application, and expense.

Orchardists would like to find a plant source of nitrogen that they can produce on-farm, such as from a legume cover crop in the orchard drive rows. The cover crop must be able to tolerate traffic, grow quickly to suppress weeds, maintain an appropriate orchard floor temperature and survive 3 to 5 years. It must also not attract an unsustainable number of insect pests and rodents, or deprive trees of nutrients and water.

We designed a study to determine which legume species will thrive in an orchard environment and provide a significant amount of nitrogen.

In September, 2012, we planted 23 legume species and cultivars in three orchard sites representing different orchard ages and architecture:

1. a new conventional apple orchard on a V-trellis system;
2. a mature organic apple orchard;
3. and a new organic almond orchard.

The legumes are being evaluated for emergence, percent cover, durability, biomass, percent nitrogen, disease, insect presence, and longevity.

CONTINUED ON P. 7

forb establishment study updates

This summer we collected third-year data from our Forb Establishment Study in Latah County, Idaho, and second-year data from our Forb Establishment Study in Douglas County, Washington. These studies are providing valuable information for fine-tuning our forb establishment recommendations.

No-Till Forb Establishment in Latah County

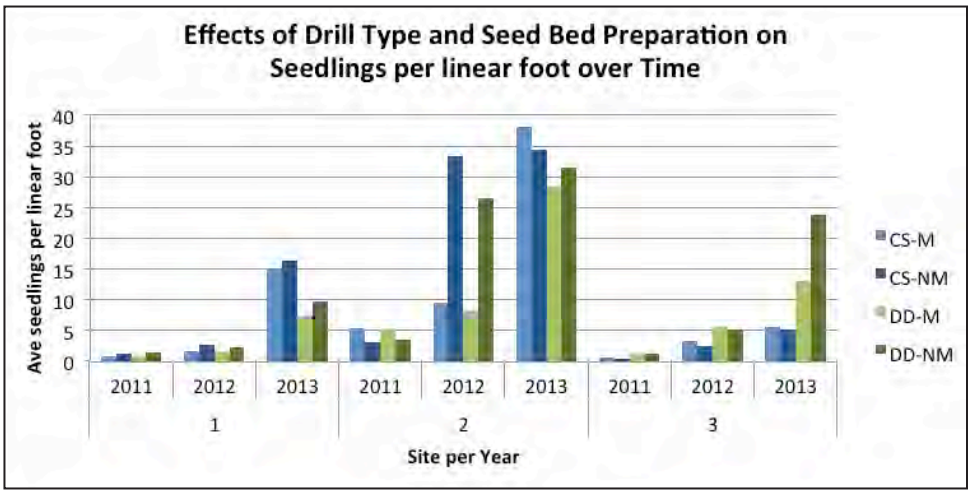
Brenda Erhardt, Latah SWCD, and Hannah Simons, Pullman PMC, prepare to monitor plots where forbs were planted with a double disk no-till drill into native bunch grasses sprayed with glyphosate.

The Latah County study was planted in October, 2010. We compared two seed bed preparation techniques (mowed and un-mowed) and two no-till drills (a Cross-Slot® and a Great Plains® double disk) for the establishment of 16 native forb species in three existing Conservation Reserve Program (CRP) fields. More details about site characteristics, seedbed preparation and species planted are described in previous issues of The Sweep Net newsletter, which can be found out our PMC publications website (http://plant-materials.nrcs.usda.gov/wapmc/publications.html). The three CRP field sites included: Site 1) 7-year-old stand of native bunchgrasses with a level aspect; Site 2) 20-year-old stand of intermediate wheatgrass with an east aspect; and Site 3) 7-year old stand of native bunchgrass with a south aspect.

The most successful site is Site 2, with the previous 20-year-old stand of intermediate wheatgrass. Forb numbers have increased during the three years of growth at this site, and plots now have approximately 30 native forbs per linear foot (45 forbs per square foot). These numbers include the native annual grand collomia, and Oregon sunshine, which may be an annual, biennial or short-lived perennial. Lupines, yarrow, Oregon sunshine, and gaillardia are establishing outside of the plot area.

Sites 1 and 3, with previous 7-year-old stands of native grasses, were dominated by weeds during the first two years of growth, but now have an acceptable level of plants by CRP standards. These sites now have between 5 and 23 native forbs per linear foot (between 6 and 35 forbs per square foot). All sites had minimal weed pressure in 2013.

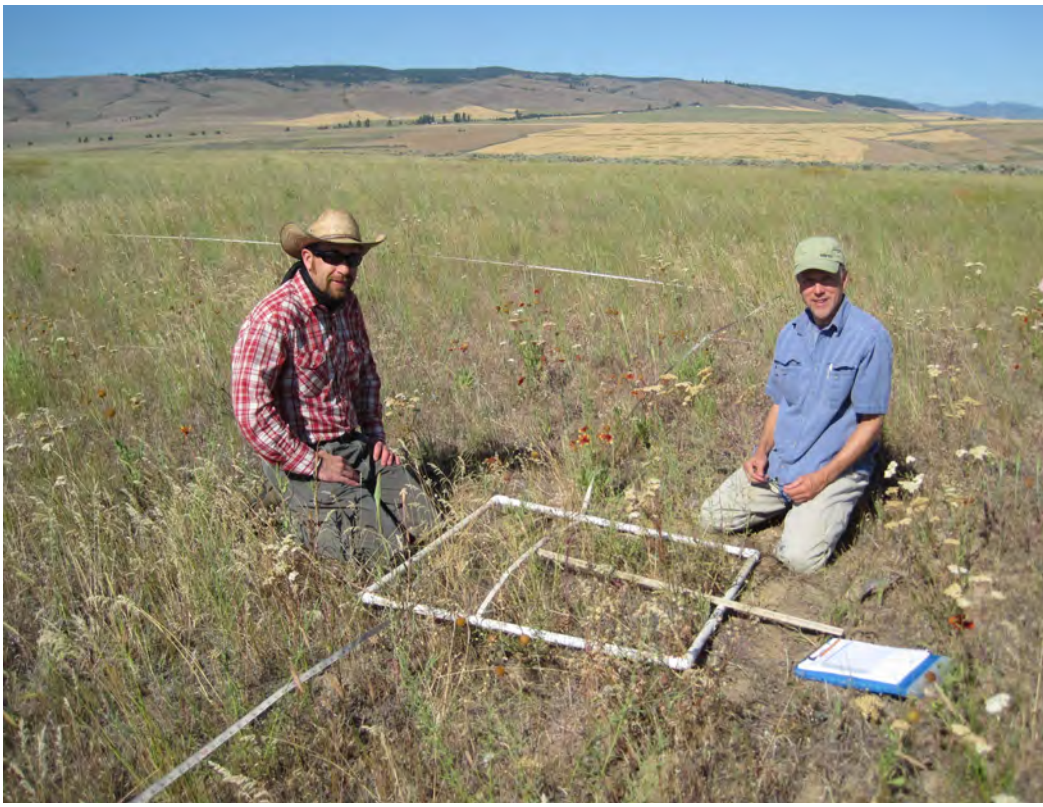
We plan to analyze the data from this study and present it in a Technical Note. So far, the results reveal native forbs can be successfully established using no-till techniques. However, a few years of weed management may be necessary, and patience is required when certifying native forb stands.



Effects of drill type and mowed seed bed preparation on seedlings per linear foot over time. CS = cross slot drill; DD = double disk drill; M = mowed seed bed; NM = non-mowed seed bed.

more forb establishment study updates

Forb establishment in Douglas County



Bryce Krueger and Richard Fleenor, NRCS, count forbs planted with a hoe drill in existing CRP sprayed with glyphosate. Douglas County, WA, July 16, 2013.

The Douglas County study was planted in November, 2011. We compared different drills for seeding 12 native forbs and two native grasses at two sites, one a new Conservation Reserve Program (CRP) site that had previously been in wheat-fallow rotation, and the other, an existing CRP field sprayed with glyphosate.

At the new CRP site, two drills were compared: a John Deere double disk drill and a Truax Flex II double disk drill. In 2012, we counted an average of 1.4 forbs per square foot in the plots seeded with the John Deere drill and 0.6 forbs in the plots seeded with the Truax. This year however, very few plants were visible and the plots were determined to be failures. The site is very harsh, near the top of a hill that experiences extreme wind events. Also at this site, weed pressure was very high.

At the existing CRP site, we compared three drills: a John Deere hoe drill (with tubes pulled and duct taped above the openers), a Truax Flex II double disk drill and a Concord no-till air seeder. The air seeder was determined to be ineffective at the time of planting; the seed was too light to fall into the blower. Forbs were counted in the plots seeded with the other two drills only.

In 2012, the plots seeded with the Truax drill had an average of 1.2 forbs per square foot and the plots seeded with the hoe drill had an average of 2.3 forbs per square foot.

In 2013, these numbers remained somewhat constant; they were 1.3 and 2.1, respectively. Both forb counts are still below 3 seedlings per square foot, the standard for certifying new CRP plantings in Douglas County. The seeding rate was adequate, with 40 pure live seeds per square foot, however the mixture included several species that failed to establish. If the mix would have been comprised of more reliable species, the plots at this site would most likely meet specifications.

LEGUME COVER CROPS IN ORCHARDS STUDY

continued from page 4:

Our preliminary data shows among the perennials, the large-leafed white clovers such as 'Kopu II', 'Alice' and 'Jumbo Ladino' performed very well, producing approximately 20 to 40 lb N/ac in the first cutting. 'Dominion' red clover and 'Perfect' alfalfa, a forage alfalfa bred for winter-hardiness and disease resistance, also performed very well. In the new apple orchard, irrigation was switched from microsprinkler to drip, and the drought-tolerant types of alfalfa such as falcata and creeping, and the variety 'Upper Edge' were the best performers.

Among the annuals, hairy vetch produced the most biomass and the most nitrogen, with almost 50 lb N/ac in one cutting. It also tolerates mowing and traffic better than the other annuals.

The best way to optimize nitrogen contribution from the legume cover crops may be with a "mow and blow" method, in which a mower cuts the drive row cover and blows it through a side shoot into the tree row, where it breaks down and releases nutrients into the tree root zone. The mulch provides an additional benefit – a physical barrier to weed growth.

We will continue to collect data from these plots this year and next, and we have plans to advance the best performing legumes to trials to evaluate cover crop management methods, timing of nitrogen release and uptake by orchard trees.

2013 PMC Publications

TECHNICAL NOTES

- Biology Tech Note 24: Plants for Pollinators of the Inland Northwest (Revised)
- Plant Materials Tech Note 21: Roses of the Inland Pacific Northwest

PLANT GUIDES

- Sweetbriar rose (Rosa rubiginosa)
- Dog rose (Rosa canina)
- Baldhip rose (Rosa gymnocarpa)
- Nootka rose (Rosa nutkana)
- Woods' rose (Rosa woodsii)
- Ground ivy (Glechoma hederacea)

MISSION STATEMENT & CONTACT INFO

The Pullman Plant Materials Center develops vegetative tools for solving conservation problems. The Center was established in 1935 and serves the Inland Northwest region, including eastern Washington, northeastern Oregon and northern Idaho.

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