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Introduction to the Plant Materials Program

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Natural Resources Conservation Service

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PMC Studies and Conservation Plants

Cover Crop Variety Trial

- Pullman WA – 2017 & 2018 ~20” precipitation
- Final Study Report/Tech Note: Fall/Winter 2019
- Diakon (oilseed) radish
- Crimson Clover
- Red Clover
- Balansa Clover
- Hairy vetch
- Black oats
- Winter pea

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Pacific Northwest Cover Crop Adaptation Trial

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Introduction

Incorporating cover crops into a cropping system improves soil health, conserves energy, and builds resilience and manages climate risk (Lal, 2004; Reicosky and Forcella, 1998; Hargrove, 1986; Reeves, 1994). Leguminous cover crop species provide a nitrogen source for subsequent commodity crops (Singh et al., 2004; Smith et al., 1987). Non-leguminous cover crops, such as small grains, are effective in reducing nitrate leaching and for soil erosion (Meisinger et al., 1991). Utilizing cover crops can provide multiple benefits. While cover crops provide numerous agronomic and environmental benefits, these benefits are not fully achieved unless cover crop varieties/cultivars are planted that meet the objective of the cover crop planting and the producer's expectations.

Objective of the study is to evaluate growth parameters of balansa clover (*Trifolium michelianum*), crimson clover (*Trifolium incarnatum*), and hairy vetch (*Vicia villosa*) in different plant hardiness zones of the Pacific Northwest U.S. (Fig. 1).

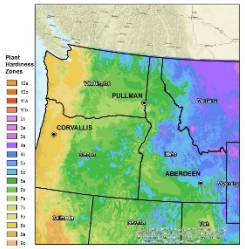

Fig. 1. Locations of Plant Materials Centers at Aberdeen, ID; Corvallis, OR; and Pullman, WA where the trials were conducted with an overlay of the USDA Plant Hardiness Zones.

Fig. 2. 'Purple Bounty' hairy vetch near 50% bloom at the Pullman, WA Plant Materials Center on June 8, 2017.

Materials and Methods

Commercially available varieties of balansa clover, crimson clover, and hairy vetch varieties were planted in '5 x 10' plots arranged in randomized complete block with 4 replications at the USDA-Natural Resources Conservation Service's Plant Materials Centers in Aberdeen, ID; Corvallis, OR; and Pullman, WA in the fall of 2016 (Fig. 1). Crimson clover, hairy vetch and balansa clover were seeded at 18, 18, and 5 lb/acre, respectively. Evaluation parameters consisted of plant height at 50% bloom, winter hardiness, and the days after planting (DAP) to 50% bloom (Fig 2).

References

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Results

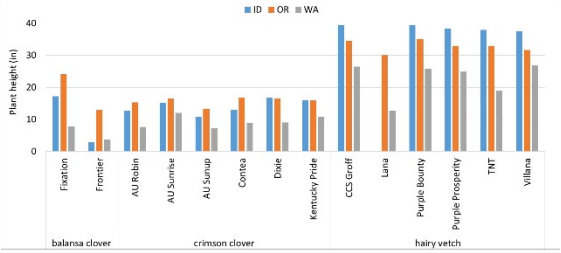


Fig. 3. Plant height at 50% bloom of cover crop species and varieties at Aberdeen, ID, Corvallis, OR, and Pullman, WA, USDA-NRCS 2016-2017.

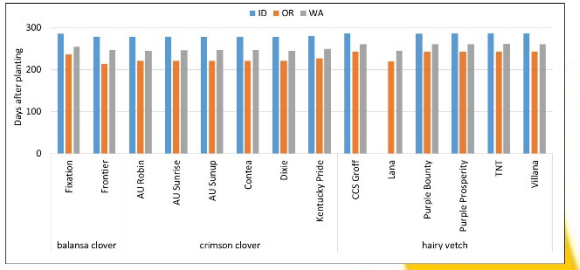


Fig. 4. Days after planting to 50% bloom of cover crop species and varieties at Aberdeen, ID, Corvallis, OR, and Pullman, WA, USDA-NRCS 2016-2017.

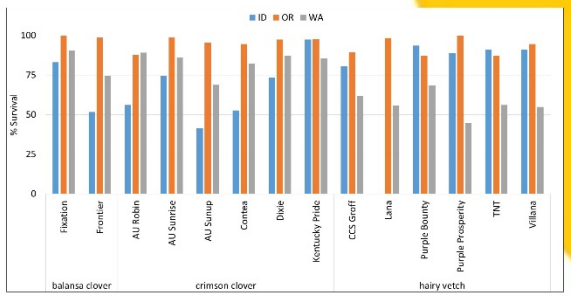


Fig. 5. Percent survival (winter hardiness) of cover crop species and varieties at Aberdeen, ID, Corvallis, OR, and Pullman, WA, USDA-NRCS 2016-2017.

'AU Sunrise' crimson clover (L) and Plant Materials Program staff planting the cover crop variety trial (R)

Discussion

'Fixation' balansa clover had a higher mean plant height than 'Frontier' at all locations (Fig. 3). The crimson clover varieties had similar heights at each location (Fig. 3). The mean heights of hairy vetch cultivar/varieties at Aberdeen, ID and Corvallis, OR were similar at each location. 'Lana' winter-killed at Aberdeen. ID. All three cover crop species generally had a lower mean height at Pullman, WA.

The date of 50% bloom was chosen to coincide with cover crop termination for planting of commodity crop and to maximize N production (Fig. 4). All variety/species combinations were consistent in time of 50% bloom. As expected, the number of days after planting (DAP) to 50% bloom varied across locations with Corvallis, OR at ~229, Pullman, WA at ~251, and Aberdeen, ID at ~282 DAP.

Winter hardiness is crucial in some agronomic rotations. Producers may elect to plant a cover crop that lacks winter hardiness to avoid the expense of terminating the cover crop in the spring. During the winter of 2016-2017, 'Lana' hairy vetch at Aberdeen, ID was the only variety that did not survive the winter (Fig. 5). The survival of other varieties was at least 40% or more for all three locations (Fig. 4). At Corvallis, OR about 90% or more of all of these cover crop species and varieties shown outstanding persistence over the winter (Fig. 4).

Corvallis, OR is in the Willamette Valley of Oregon where much of the cover crop seed for the nation is grown. So it makes sense that the better winter survival rates, earlier bloom time, and generally taller plants would be at Corvallis, OR. The generally "lesser" performance for these species at Pullman, WA is likely due to the colder climate and shorter growing season compared to Idaho and Oregon locations.

Data presented is from 2017 and will be combined with other years for a more comprehensive analyses of the performance of each species and associated variety. Variety trials such as this one provide important data to producers to help them make informed decisions about, not only which cover crop species will fit well into their cropping rotation, but which variety of that species has the best characteristics for their cropping system based on their soils and climate. The data from this study will be compiled and included in NRCS cover crop standards, specifications, and planning tools for use by NRCS field office staff, landowners, and the general public.

'Fixation' balansa clover (L) and 'Dixie' crimson clover (R)

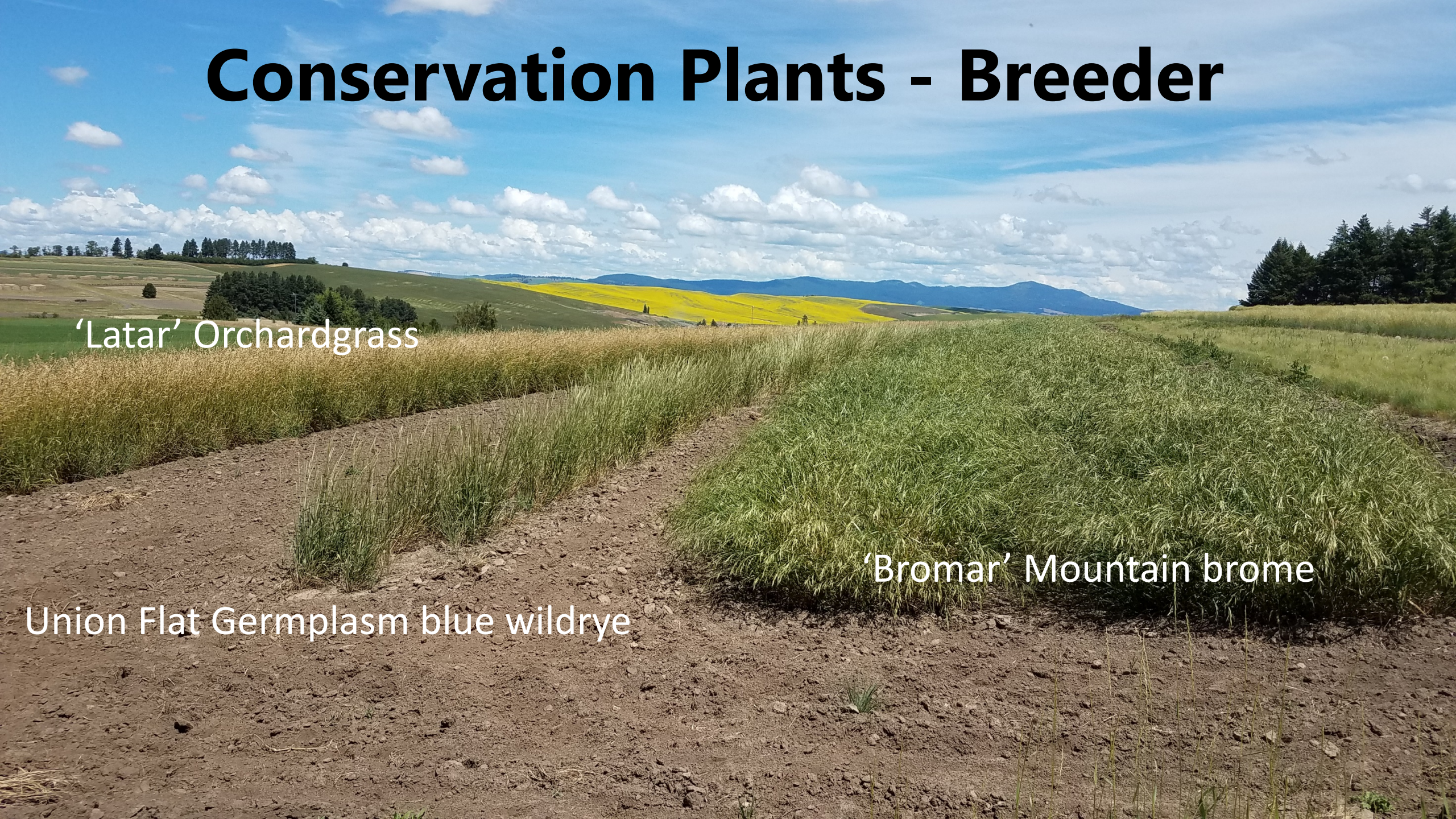
Cover Crop Below Ground

- Pullman WA – 2019-2021+ ~20" precipitation
- With University of Idaho
- Soil Organic Carbon, pH, micronutrients, plant uptake of carbon
- Does the number or type of cover crop functional group matter in carbon sequestration and other soil health properties

Conservation Plants - Breeder

- ‘Bromar’ mountain brome
- ‘Latar’ orchardgrass
- White Pass Germplasm blue wildrye
- Union Flat Germplasm blue wildrye
- ‘Secar’ Snake River wheatgrass
- ‘Durar’ hard fescue
- ‘Covar’ sheep fescue
- ‘Canbar’ Canby bluegrass
- ‘Sherman’ big bluegrass
- ‘Whitmar’ bluebunch wheatgrass
- ‘Alkar’ tall wheatgrass

Conservation Plants - Breeder



Conservation Plants – Ponderosa Pine

- Orchard for germplasm
- Maintained at the PMC
- Joint project with Inland Empire Tree Improvement Cooperative, NRCS, FS, & BLM

Conservation Demonstrations

- Hedgerows
- Windbreaks
- Riparian Plantings

Resources

Washington Plant Materials Website

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Highlights

- Publications by Topic
- Regional Newsletters

WAPMC

Pullman Plant Materials Center (WAPMC)

Serving areas in the States of Idaho, Oregon, and Washington

Established: 1935
Size: 156.5 acres
PMC Operation: NRCS
Land Ownership: NRCS and Washington State University

> Contact WAPMC Staff
> Location Map

The Pullman Plant Materials Center (WAPMC) in Pullman, Washington provides conservation plant solutions for North Idaho, Eastern Washington, and Eastern Oregon. The Center focuses on providing vegetative technologies for conservation and soil health in cropland, orchards & vineyards, rugged scablands, forests, and native rangelands to NRCS field staff.

The service area of the Center faces many resource challenges. Winter winds strip unprotected topsoil and create dust clouds that degrade air quality for people living downwind. Melting snow erodes unprotected soil that pollutes receiving waters. Many of the region's streams are important for salmon and steelhead trout spawning and rearing.

Highlights

Soil Health

> *Pacific Northwest Cover Crop Selection Tool for Idaho, Oregon, and Washington* is intended as a guide to help growers and conservation planners select cover crop species adapted to their climate, soils, and production system.
> *Cover Crop Resources and Seed Vendors for Oregon and Washington* to facilitate the use of cover crops in Oregon and Washington by providing a list of cover crop seed vendors for the Pacific Northwest, including

FIELD OFFICE TECHNICAL GUIDE

Welcome to NRCS Field Office Technical Guide (FOTG)

Select a state for documents.

State: Washington SUBMIT

Document Tree | Document Search | Recently Changed

Keyboard navigation instructions

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- Section III
- Section IV
  - Old Section IV
    - Archive Materials - Section IV
    - Washington Conservation Practices
      - Access Control (AC) (472)
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      - Agrichemical Handling Facility (NO) (309)
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      - Alley Cropping (AC) (311)
      - Amending Soil Properties with Gypsum Products (Ac.) (333)
      - Amendments for Treatment of Agricultural Waste (AU) (591)
      - Anaerobic Digester (NO) (366)

Multi-Story Cropping (AC) (379)

Documents (4)

Document Title	Type	Pu
Multi-Story Cropping (379) Job Sheet and Documentation Requirements		20
Multi-Story Cropping (379) Planners Guide		20
Multi-Story Cropping (379) Statement of Work		20
Multi-Story Cropping (379) STANDARD		20

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

MULTI-STORY CROPPING

(Ac.)

CODE 379

DEFINITION

Existing or planted stands of trees or shrubs that are managed as an overstory with an understory of woody and/or non-woody plants that are grown for a variety of products.

PURPOSE

- Improve crop diversity by growing mixed but compatible crops having different heights on the same area.
- Improve soil quality by increasing utilization and cycling of nutrients and maintaining or increasing soil organic matter.
- Increase net carbon storage in plant biomass and soil.

CONDITIONS WHERE PRACTICE APPLIES

On all lands where trees, shrubs, woody or non-woody crops can be grown in combination. The practice does not apply on land that is grazed *(See 381 Silvopasture Establishment for grazed lands).*

CRITERIA

General Criteria Applicable to All Purposes

Combinations of overstory and understory woody and/or non-woody plant species shall be compatible and complementary.

Plants shall be selected based on their adaptation to the climatic region and soil properties and capabilities. A precondition for any tree/shrub establishment is appropriately prepared sites. Refer to practice standard Tree/Shrub Site Preparation (490).

The planting and care of selected tree and shrub species will comply with Tree/Shrub Establishment, 612.

Canopy covers will be balanced/managed to optimize health and growth of plants in each story or level as determined by client objectives for each story of vegetation.

Plants selected for purposes of protection, growth and production will, at a minimum, maintain soil organic matter content.

Moisture conservation or supplemental watering shall be provided for plant establishment and growth where natural precipitation is too low for one or more of the selected species.

Select pest-resistant plant varieties.

Select species that enhance habitat for beneficial insects including pollinators.

Avoid selecting tree or shrub species, which provide habitat to pests of the accompanying crop or forage. *(i.e. Current or gooseberry (Ribes) bushes are in the life cycle of White Pine Blister Rust, so you would not plant Current or Gooseberry bushes under Western White Pines.)*

The overstory canopy density will be determined by the following tree or shrub management objectives:

- Light requirements and growth period of the managed crops dispersed in the understory.
- Erosion control needs.
- Machinery widths and turning areas.

Agroforesty Planning Tools

PM Tools and Technical Notes

- Tech Note 10: Riparian Revegetation Plants
- Tech Note 11: Riparian Vegetation Technology
- Tech Note 13: Windbreak, Shelterbelt, and Landscaping Technology
- Bio Tech Note 24: Plants for Pollinators in the Inland Pacific Northwest
- Trees and Shrubs for Riparian Plantings

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