Introduction to the Plant Materials Program

Allen Casey, NRCS
Washington Plant Materials Center
allen.casey@usda.gov

Natural Resources Conservation Service

Sept 2019
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
Pacific Northwest Cover Crop Adaptation Trial

Allen Casey¹, Annie Young-Matheau¹, Terron Pickert¹, Joel Douglas²
¹NRCS Plant Materials Center, Pullman, WA; allen.casey@wa.usda.gov; ²NRCS Plant Materials Center, Corvallis, OR;
²NRCS Plant Materials Center, Aberdeen, ID; ³NRCS Central National Technology Support Center, Fort Worth, TX

Introduction

Incorporating cover crops into a cropping system improves soil health, conserves energy, and builds resilience and manages climate risk (Gol, 2004; Reicosky, 1998; Hagge, 2000; Hwang, 2004). Leguminous cover crop species provide a nitrogen source for succeeding commodity crops (Singh et al., 2004; Smith et al., 1987). Non-leguminous cover crops, such as small grains, are effective in reducing nitrile leaching and for soil erosion (Meisinger et al., 1995). Utilizing cover crops can provide multiple benefits including cover crops provide numerous agronomic and environmental benefits, these benefits are not fully achieved unless cover crop varieties/varieties are planted that meet the objective of the farmer, and the producer’s expectations.

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

Materials and Methods

Commercially available crimson 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 balance 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. 25).

Results

Incorporating cover crops into a cropping system improves soil health, conserves energy, and builds resilience and manages climate risk (Gol, 2004; Reicosky, 1998; Hagge, 2000; Hwang, 2004). Leguminous cover crop species provide a nitrogen source for succeeding commodity crops (Singh et al., 2004; Smith et al., 1987). Non-leguminous cover crops, such as small grains, are effective in reducing nitrile leaching and for soil erosion (Meisinger et al., 1995). Utilizing cover crops can provide multiple benefits including cover crops provide numerous agronomic and environmental benefits, these benefits are not fully achieved unless cover crop varieties/varieties are planted that meet the objective of the farmer, and the producer’s expectations.

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

Materials and Methods

Commercially available crimson 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 balance 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. 25).

Results

Incorporating cover crops into a cropping system improves soil health, conserves energy, and builds resilience and manages climate risk (Gol, 2004; Reicosky, 1998; Hagge, 2000; Hwang, 2004). Leguminous cover crop species provide a nitrogen source for succeeding commodity crops (Singh et al., 2004; Smith et al., 1987). Non-leguminous cover crops, such as small grains, are effective in reducing nitrile leaching and for soil erosion (Meisinger et al., 1995). Utilizing cover crops can provide multiple benefits including cover crops provide numerous agronomic and environmental benefits, these benefits are not fully achieved unless cover crop varieties/varieties are planted that meet the objective of the farmer, and the producer’s expectations.

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

Materials and Methods

Commercially available crimson 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 balance 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. 25).

Discussion

Titation balance clover had a higher mean plant height than ‘Frontier’ at all locations (Fig. 3). The crimson clover varieties had similar mean height at all locations (Fig. 4). The mean height of hairy vetch cultivars/variety at Aberdeen, ID and Corvallis, OR were similar at each location. ‘Luna’ winter wheat failed 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 10% 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 hardness to avoid the expense of terminating the cover crop in the spring. During the winter of 2017-2018, Luna winter wheat at Aberdeen, ID was the only variety that did not survive the winter (Fig. 5). The survival of other varieties was at least 80% or more for all three locations (Fig. 6). At Corvallis, OR about 98% or more of all of these cover crop species and varieties showed outstanding persistence over the winter (Fig. 6). Corvallis, OR is in the Willamette Valley of Oregon where much of the cover crop seed is grown for the nation’s production. So it makes sense that the better winter survival rates, earlier bloom time, and generally taller plants would be at Corvallis, OR. The generally “better” 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 analysis of the performance of each species and associated varieties. Varieties that 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 likely 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.
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 – 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
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 pollutants 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...
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. This practice does not apply on land that is grazed (See 381 Shrub/Grass 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 climate region and soil properties and capabilities. A prescription for any tree/shrub establishment is appropriately prepared sites. Refer to practice standard Tree/Shrub Site Preparation (456).

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

Canopy covers will be maintained/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.)
Agroforestry 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
In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.