

**WSU Cover Crop Field Day
and
PCD No-till Seed Drill Training
FOUR ELEMENTS FARM
September 1, 2021**



Agenda:

- **10:00-10:15 am:** Welcome and sign-in
- **10:15-11:30 am:** Tour of demonstration plots and discussion of cover crop performance
- **11:30-12:00 pm:** PCD no-till drill training

Benefits of Cover Crops and No-till Drill Seeding

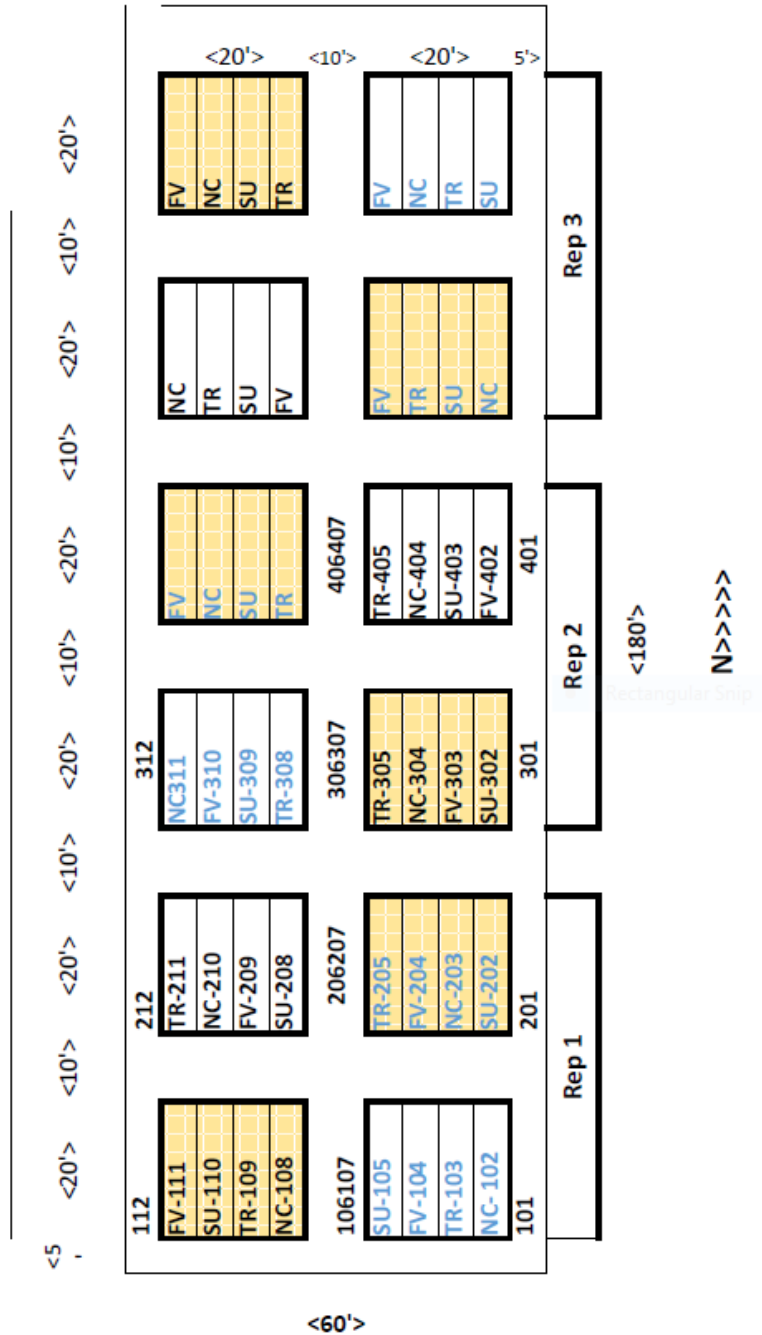
- Cover crops have potential to provide many soil health, crop production and water quality benefits. Effectiveness depends upon selection and use of species and varieties adapted to the local climate and soils, as well as varying production systems.
- Combining cover crops with no-till drill seeding methods can allow farmers to harness the benefits of cover crops without the soil health setbacks introduced by tillage such as soil aggregate breakdown and introducing periods without the presence of living roots or continuous ground cover.
- Summer cover crops are quick growing and are used to build soil health and control weeds during short fallow periods between spring and fall crops.
- Deeply-rooting cover crops may remediate compaction by “bio-drilling” through compacted layers and by providing channels for future crops’ root growth.
- Summer cover crops can also be incorporated into cropping systems as winter kill mulches. Summer cover crops allowed to grow into the fall and winter can provide soil cover in the form of a mulch, without introducing the spring-time challenges of cover crop termination and biomass incorporation that fall-seeded cover crops can present.
- Summer cover crops serve to keep living roots in the soil through fallow periods, cover and protect the soil, retain nutrients that may otherwise be leached, and produce biomass, and potentially nitrogen, to boost soil organic matter and fertility.

Four Elements Summer Cover Crops 2021

Factors being demonstrated:

- Summer Planting Dates
 - July 7
 - August 4
- Irrigated vs No Irrigation
- Three Deep-rooted Cover Crops
 - “Groundhog” tillage radish
 - “Diana” fava bean
 - “Piper” Sudangrass
- Importance of these factors:
 - We included two planting dates because it affects how much biomass may be produced, when the cover crop flowers, and how much water is in the soil.

- We are demonstrating the effects of irrigation because we wanted to showcase where there is a significant difference in biomass. How much better does the crop perform if irrigated?
- We chose these three cover crops because of their deep roots. The radish and fava bean may have taproots that exceed two feet, which would penetrate most compacted layers which occur around one foot down. Since the radish is a brassica, we thought it was important to test other tap-rooted crops that are not brassicas.



PCD Cover Crop Cost Share Programs!

- PCD has cost share funding through the Department of Ecology for no-till drill seedings this fall. The reimbursement is \$28/acre for seeding projects using the PCD no-till drill where no tillage is used to prepare the ground and no additional tillage will be used for an additional two years.
- PCD and the Pierce County Agriculture Program are partnering to offer 75% cost share, up to \$150/acre, for any cover crop seedings in 2021.

Steps to access these programs are:

1. Request a site visit
2. Work together with a farm planner on our team to develop a cover cropping plan that fits your production goals and site conditions.
3. Seed your cover crop based on the recommendations outlined by your farm planner to receive your cost share reimbursement upon completion.
4. Share what you learn and help us to better assist our farming community! Complete a short evaluation form after you terminate your cover crop planting to capture successes and lessons learned.

Cover Crop Resource List

● WSU/OSU

> WSU-CSANR Cover Cropping

csanr.wsu.edu/publications-library/crops/cover-cropping/

> Links to the WSU Cover Crop School video presentations

csanr.wsu.edu/grants/cover-crops-for-weed-management/

> Puyallup Organic Farming Systems and Nutrient Management Program – Cover Crops

puyallup.wsu.edu/soils/organicfarmcovercrops/

> Cover Crops for Home Gardens

s3.wp.wsu.edu/uploads/sites/2079/2015/06/Cover-Crops-for-Home-Gardens-West-of-the-Cascades-WSU.pdf

> Estimating Plant-Available Nitrogen Release from Cover Crops

catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/pnw636.pdf

> Reduced Tillage in Organic Vegetable Systems

www.youtube.com/watch?v=F6AL3xtwogg&feature=youtu.be

> Summer Cover Cropping Research: Buckwheat, Sudangrass, and Clover in Vegetable Rotation

<https://www.youtube.com/watch?v=ttXqoyFCRA8>

> No-Till Cover Crop Seeding in Organic Vegetable Systems

<https://www.youtube.com/watch?v=EFEKrAdGYtU>

> High Residue Cultivation in Organic Strip Till Sweet Corn

<https://www.youtube.com/watch?v=u0MctdHqZYQ>

> WSU Organic Reduced Tillage in the Maritime Pacific Northwest Symposium (February 2021)

<https://puyallup.wsu.edu/soils/event/organic-reduced-tillage-maritime-pacific-northwest-symposium-farmer-engagement/2021-02-24/>

● NRCS

> Cover Crops and Soil Health

www.nrcs.usda.gov/wps/portal/nrcs/detail/national/climatechange/?cid=stelprdb1077238

> Cover Crop (340) in Organic Systems - Western States Implementation Guide

<https://projects.sare.org/wp-content/uploads/1165cover-crop-in-organic-systems.pdf>

> USDA Cover Crop Periodic Table

www.ars.usda.gov/ARSUserFiles/30640000/CCC/CCC_v13_5_2012.pdf

> Cover Crop Seed Vendors for Western States

www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/orpmctn13328.pdf

> Pacific Northwest Cover Crop Selection Tool

www.nrcs.usda.gov/wps/portal/nrcs/detail/plantmaterials/technical/toolsdata/plant/?cid=nrcseprd894840

> Adaptive Management for Conservation Practices, Agronomy Technical Note No. 10

efotg.sc.egov.usda.gov/references/public/TN/190-AGR-10_TN-AdaptiveManagementforConservationPractices_071814.pdf

> Guide Sheet – Implementing Adaptive Management

efotg.sc.egov.usda.gov/references/public/NC/340_Adaptive_Management_GuideSheet.pdf

- Corvallis Plant Material Center

> Irrigated Warm Season Cover Crops for Western Oregon – Corvallis PMC

www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/orpmcsr13158.pdf

> Adaptation of 59 Cover Crop Cultivars in Western Oregon – Corvallis PMC

https://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/orpmcsr13456.pdf

Seeding Rates for Legume-Grain Cover Crop Mixes in Western Oregon

www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/orpmcsr13282.pdf

> Adaptation of Dryland and Irrigated Warm Season Cover Crops in Western Oregon – 2017 Progress Report – Corvallis PMC

www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/orpmcot13293.pdf

- Pullman Plant Material Center

> Green Manure and Cover Crops for the Pacific Northwest

www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/wapmcpo9184.pdf

● Regional Cover Crop Councils

> Western Cover Crop Council

<https://westerncovercrops.org/>

<https://www.facebook.com/westerncovercropcouncil>

> SARE grant project description for the Developing the Western Cover Crop Council and Promoting the Regenerative Agriculture Movement through Cover Crops and Human Health

https://projects.sare.org/sare_project/wesp19-01/

www.no-tillfarmer.com/articles/7907-new-cover-crop-council-taking-shape-in-western-us

> Midwest Cover Crops Council

mccc.msu.edu/selector-tool/

> Northeast Cover Crops Council

northeastcovercrops.com/

> Southern Cover Crops Council

southerncovercrops.org/

● SARE

> Cover Crops Topic Room, www.sare.org/Learning-Center/Topic-Rooms/Cover-Crops

> Managing Cover Crops Profitably, www.sare.org/Learning-Center/Books/Managing-Cover-Crops-Profitably-3rd-Edition

> Cover Cropping for Pollinators and Beneficial Insects,

www.sare.org/Learning-Center/Bulletins/Cover-Cropping-for-Pollinators-and-Beneficial-Insects

● ATTRA

> Overview of Cover Crops and Green Manures

attra.ncat.org/product/overview-of-cover-crops-and-green-manures/

● eXtension

> Cover Cropping in Organic Farming Systems – list of articles and videos

articles.extension.org/pages/59454/cover-cropping-in-organic-farming-systems

- **UCDavis Cover Crops**

asi.ucdavis.edu/programs/ucsarep/about/what-is-sustainable-agriculture/practices/cover-crops

- **Cornell Cover Crops for Vegetable Growers**, covercrops.cals.cornell.edu/

- **Johnnys Seed – Cover crop decision making steps**

<https://www.johnnyseeds.com/growers-library/farm-seed-cover-crops/cover-crop-decision-making-5-steps.html>

- **Green Cover Seed**

<https://greencoverseed.com/>

- **Cover Cropping in Orchards and Vineyards**

> Legume Cover in Orchard Drive Alleys

www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/wapmcsr12864.pdf

> The Potential for Legume Cover Crops in Washington Apple Orchards

www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/wapmctn12149.pdf

Cover Crops as a Floor Management Strategy for Pacific Northwest Vineyards

cru.cahe.wsu.edu/CEPublications/eb2010/eb2010.pdf

> Legume Cover in Orchard Drive Alleys

www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/wapmcsr12864.pdf

> The Potential for Legume Cover Crops in Washington Apple Orchards

www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/wapmctn12149.pdf

Cover Crops for Walnut Orchards

anrcatalog.ucanr.edu/pdf/21627e.pdf

> Cover Cropping in Vineyards, UC Davis (book)

- **Grazing and Cover Crops**

> The Pasture Project

pastureproject.org/resources-2/articles-studies/grazing-cover-crops/

> No-Till Case Study, Miller Farm: Restoring Grazing Land with Cover Crops

attra.ncat.org/attra-pub-summaries/?pub=422

> No-Till Case Study, Richter Farm: Cover Crop Cocktails in a Forage-Based System

attra.ncat.org/attra-pub-summaries/?pub=417

- **Pierce Conservation District**

> Pierce Conservation Cover Cropping Assistance

<https://pierced.org/610/Cover-Crop-Management>

Info on PCD's no-till seed drill

<https://pierced.org/611/Farm-SERVICES-AND-EQUIPMENT>

PCD NO-TILL SEED DRILL TRAINING
September 1, 2021
FOUR ELEMENTS FARM

Why No-Till?? Manage more by disturbing soil less...

What are the disadvantages to tillage?

- Detrimental to soil structure → effects soil water holding capacity, resistance to erosion
- Disruptive to soil microorganisms → destructive to their habitat and need for living roots and symbiotic plant partnerships, disrupts balance between fungi and bacteria
- Results in breakdown of organic matter and carbon stores—short term gains for long term losses
- Weeds seeds brought to surface of the soil to germinate
- Tillage takes time and fuel

No-till or reduced till can be a tool for increasing the capacity of the soil to function optimally and reduce the need for tillage—healthy soils allow water to infiltrate, retain and cycle nutrients and carbon, regulate pest and disease populations, and can save time and energy!

Step-by-step instructions to seed like a pro with the Land Pride 606NT no-till seed drill...

- 1.)** Rephase drill cylinders by lifting to maximum height, hold for about 10 seconds.
- 2.)** Remove transport locks—note the upside-down position of locks and remember to put the locks back on in this orientation to avoid damage to the cylinder stops.
- 3.)** Lower the drill completely.
- 4.)** Optimize coulter depth.
 - > measurement between ground and the bottom of the frame tube should be at 24 3/4 inches
 - > make adjustment by adjusting the position of the cylinder stop plate
- 5.)** Check that drill is running at level—check tongue and seed box level.
 - > drill will come adjusted to run on level by submitting your tractor drawbar height to PCD when filling out your paperwork
 - > adjust seed box level using turnbuckle to level the seed box separate from the tongue
- 6.)** Adjust double disc openers so your seed is placed at the proper depth. This is done via T-handles on the press wheel.
 - > all the way forward is shallowest position, all the way back is deepest position
 - > each increment will adjust depth by about ¼ inch, or walking the handle side to side will adjust depth by about 1/8 inch

7.) Setting the seed rate and calibrating → The following example is for seeding 60 lb/acre of barley

a.) Set drive type gearbox (when using the main seed box only).

> Find the row on the seed chart where your desired rate is closest to 50 on the seed rate handle setting scale

> Note the drive type for the chosen row and set the gearbox handle to the appropriate drive (drive type 2 for our example)

b.) Set initial seed rate handle.

> Set the main box seed rate handle to setting corresponding to your desired rate (47 for our example)

> Loosen wing nut under handle → Move indicator to about 10 higher than desired from the Seed Rate Chart, then back to the desired value → tighten wing nut.c.) Position seed cup doors.

Rate Charts, Main Seed Box

Charts in U.S. customary units.
Metric charts begin on page 32.

Alfalfa (*Medicago sativa*)

		Seed Rate Handle Setting																				
		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
Rows	Drive Type: 1	Seed Rate in Pounds Per Acre (based on 60 pounds/bushel)																				
7.5 in		0	4.6	6.7	9.1	12	15	18	21	25	28	32	36	39	43	47	50	54	57	61	64	66
	Drive Type: 2	Seed Rate in Pounds Per Acre																				
7.5 in		0	9.5	14	19	24	30	37	44	51	58	66	73	81	89	96	104	111	118	125	131	136
	Drive Type: 3	Seed Rate in Pounds Per Acre																				
7.5 in		0	15	22	29	37	46	55	65	75	86	97	108	119	130	141	151	162	171	180	189	196
	Drive Type: 4	Seed Rate in Pounds Per Acre																				
7.5 in		0	25	35	47	60	75	90	106	123	140	158	176	194	212	230	247	264	279	294	308	320

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Bahia Grass (*Paspalum notatum*)

		Seed Rate Handle Setting																				
		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
Rows	Drive Type: 1	Seed Rate in Pounds Per Acre (based on 40 pounds/bushel)																				
7.5 in		0	2.2	3.1	4.5	6.3	8.5	11	14	17	20	23	27	30	33	37	40	43	46	48	50	52
	Drive Type: 2	Seed Rate in Pounds Per Acre																				
7.5 in		0	4.4	6.4	9.3	13	18	23	28	35	41	48	55	62	69	76	82	88	94	99	104	107
	Drive Type: 3	Seed Rate in Pounds Per Acre																				
7.5 in		0	6.6	10	14	20	26	34	43	52	62	72	82	93	103	113	123	132	141	149	156	161
	Drive Type: 4	Seed Rate in Pounds Per Acre																				
7.5 in		0	11	16	23	32	43	56	70	85	101	117	134	151	168	185	201	216	230	243	254	263

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Barley (*Hordeum vulgare*)

		Seed Rate Handle Setting																				
		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
Rows	Drive Type: 1	Seed Rate in Pounds Per Acre (based on 51 pounds/bushel)																				
7.5 in		0	4.7	6.3	8.4	11	14	17	20	24	27	31	35	39	42	45	49	51	54	56	57	58
	Drive Type: 2	Seed Rate in Pounds Per Acre																				
7.5 in		0	10	13	17	22	28	35	42	49	56	64	72	79	86	93	100	105	110	115	118	120
	Drive Type: 3	Seed Rate in Pounds Per Acre																				
7.5 in		0	14	19	26	34	43	52	62	72	83	94	105	116	126	137	147	156	165	173	180	186
	Drive Type: 4	Seed Rate in Pounds Per Acre																				
7.5 in		0	22	32	43	56	70	85	101	118	135	153	171	189	206	223	239	255	269	282	293	303

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> Seed cup doors have four positions

- top setting (1 in manual) is for the smallest seeds → wheat and similar small seeds.
- middle (2) setting is for larger seeds → soybeans and similar larger seeds.
- bottom (3) setting is for oversized seed or this is the setting to use if you experience excessive cracking with setting 2.

d.) Calibrate: checking predicted seeding rate.

> Disengage the lock out hub for the calibration, remove the calibration crank from its storage stop

> Calibrate your seeding rate by simulating seeding on 1/10th acre

d1.) Calculate your target rate.

- Rate for 1/10 acre → 60 lb/10 → 6.0 lb (*Rate Sample*)
- The drill has 9 rows → 6.0 lb/9 rows → 0.67 lb/row (*Sample Per Row*)
- Three rows are used for the sample—disconnect three seed hoses off the top of three opener seed tubes and place into calibration container → 0.67 lb x 3 rows → 2.0 lb (*Target Rate*)
- Rotate the calibration crank several times and check that drives and seed cups are engaged and working properly. Empty your calibration container and reposition. Rotate the calibration crank 99 ½ times → When you subtract the calibration container weight the measured sample weighs 1.73 lb

d2.) Calculate your measured rate.

- 1.73 lb/3 rows x 9 rows x 10 → 52 lb (*Measured Rate*)

d3.) Calculate a new seed rate handle setting.

- *Target Rate/Measured Rate x Initial Seed Rate Handle Setting* → 60 lb/52 lb x 47 → 55 is your *New Seed Rate Handle Setting*

8.) Engage lock out hub and seed away!! (After reviewing field rules below...)

Field Rules:

- You must lift the drill out of the ground for turns or coulters will bend. This is a non-contouring drill.
- Do not back up with the drill in the down position. Backing up will put stress on components and plug up seed chutes.

Checklist for returning the drill:

- Clear out the seed boxes, seed cups, hoses of seed—**Please do not use water!**
- Set the seed cup doors to 1 position.
- Clean the drill to standard at which it was delivered to you—clean off dirt from coulters, tires, etc.
- Make sure all manuals are back in the case on the drill.

Other helpful links:

Links to PCD's 606NT drill training video, Landpride's 606NT drill training video and the 606NT Operator Manual and Seed Rate Manual can be found at PCD's seed drill webpage,

<https://pierced.org/423/Seed-Drill>



PIERCE CONSERVATION DISTRICT

Conserving Pierce County's Natural Resources Since 1949

NO-TILL SEED DRILL LOAN PROGRAM

Pierce Conservation District now has a Land Pride 606NT pull-type, no-till drill, available to borrow in 2019.

At a 6 ft. working width with optional capacities for native grass and small seeds, the drill is ideal for any cover crop or pasture renovation application.

Requirements:

- 40 HP tractor with rear remote hydraulics
- Borrowers must attend a free training before borrowing the seed drill.

No pick-up required, PCD will deliver the drill directly to your property via Jennings Equipment.

To sign up for a free seed drill training and to learn more about Pierce Conservation District's cover crop and pasture renovation programs, visit our website at www.piercecountycd.org

Visit the [Landpride](http://www.landpride.com) website for more information on using the seed drill. www.landpride.com

For more information visit <http://piercecd.org/423/Seed-Drill> or contact Alison Nichols at AlisonN@piercecd.org



Dimensions and Specifications

Drill Model	606NT820975
Row Count	9
Row Spacing	7.5 in
Swath	67.5 in
Transport Width	8 ft 10 in
Length	11 ft 5 in
Working Height	5 ft 1 in
Empty Weight	2700 lbs
Main Seed Box Capacity	12 bu
Native Grass Box Capacity	6 bu
Small Seeds Box Capacity	1 bu
Minimum Tractor HP Req.	40 hp
Hitch Type	Clevis
Tire Size	7.00-15 LT
Operating Depth	0 to 3.5 in

Pierce Conservation District • 308 W Stewart Ave • Puyallup WA 98371