

Supplying Native Plant Diversity across an Eco-region:

No-tech, Low-tech, and Old-tech
Seed Production Methods

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<http://www.heritageseedlings.com/native-seed>

[PLEASE SIGN UP FOR TOURS!]

The Need for Native Seed is Growing

roadsides, reclamation, and restoration



Photos by: US Forest Service

Conservation in Oregon – renewed focus

- **2022 - U.S. Fish and Wildlife Service Center for Pollinator Conservation - *working collaboratively with partners such as agencies, policy makers and scientists to implement conservation that benefits pollinator species.***
- **Oregon Senator Jeff Merkley - *recently secured funding for western Monarch Butterfly conservation. “We really have an ‘insect Armageddon’ in America. And it’s having a huge impact on our pollinators; and that’s everything from bees to butterflies, if you will.”***
- **2020 - Willamette Valley Oak and Prairie Cooperative Strategic Action Plan – *provided the framework for creating larger tracts of prairie and oak habitat in the Willamette Valley***
- **2023 - U.S. Fish and Wildlife Willamette Valley Core Conservation Area Plan – *a partnership with the Willamette Valley Oak and Prairie Cooperative to help support their mission to permanently protect and maintain a functional, resilient network of oak and prairie habitats in Oregon’s Willamette Valley delivering perpetual protection, in the form of conservation easements and fee title acquisitions.***

Heritage Seedlings Jefferson Farm Conservation Easement –

230 acres of restored oak and prairie protected in perpetuity
(now over 4,000 acres of protected land near Salem)



Restoration starts with plants – year round use by critters of all kind! – bugs are my favs!



Early - April -
mining bee on
*Barbarea
orthoceras*



Early - May -
solitary bee on
*Camassia
quamash*



Early - May-social
bumblebee on
Plectritis congesta



June – hover fly
on *Ligusticum
apiifolium*

July - swallowtail on
Asclepias speciosa



August – queen
bumblebees on
*Asclepias
fascicularis*



Cobwebs on tall meadowrue

Scaffolding and housing for spiders summer-fall



Yellow garden spider on prairie grass



Crab spider on milkweed

Which provides FOOD FOR BIRDS!

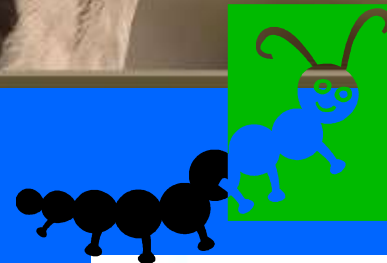
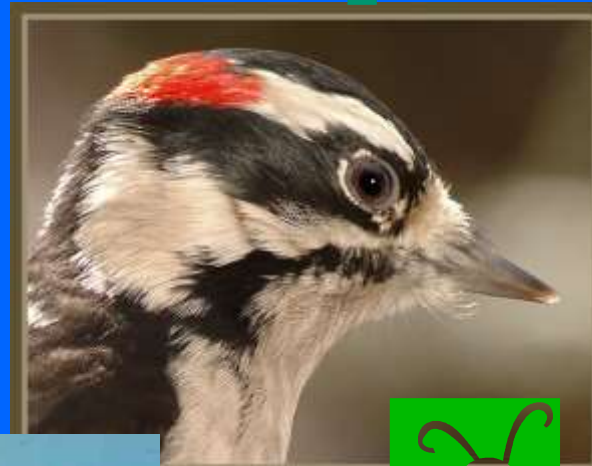
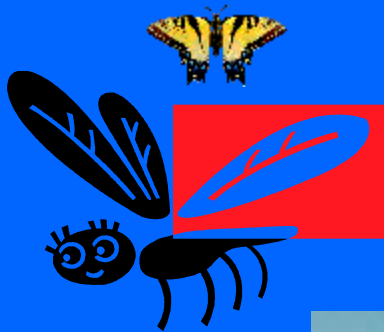
96% of terrestrial birds rear young on insects



↑ Native Plant Diversity

↑ Insect Diversity

↑ Bird Diversity



U.S. Fish and Wildlife

So - dedicated growers are
needed to fill that need



Growers who like new opportunities & challenges



Whether species such as native fescue – that can be harvested traditionally.....

Growers who like new opportunities & challenges



Or species such as native milkweed— that must be harvested daily by hand before it flies away

Heritage Seedlings' Owners Stewardship Ethic – *the main driver of our program*

<http://www.heritageseedlings.com/stewardship>

- Needed seed for our own restoration projects (little on the market)
- Had the unique opportunity to use the product and provide information to restoration public so they could, eventually, feel confident seed was available to initiate new projects (created our own market)



In 2002, Heritage Seedlings seized the opportunity to strive for diversity



Main Goal of Seed Production Program: keep production blocks small

- Allows us to add new species each year
- Allows us to gauge the seed needs of a small, emergent market before large inputs of labor and capital
- Allows for small inventory and less loss in storage (some forb seed loses viability quickly)



Each year, adding more diversity



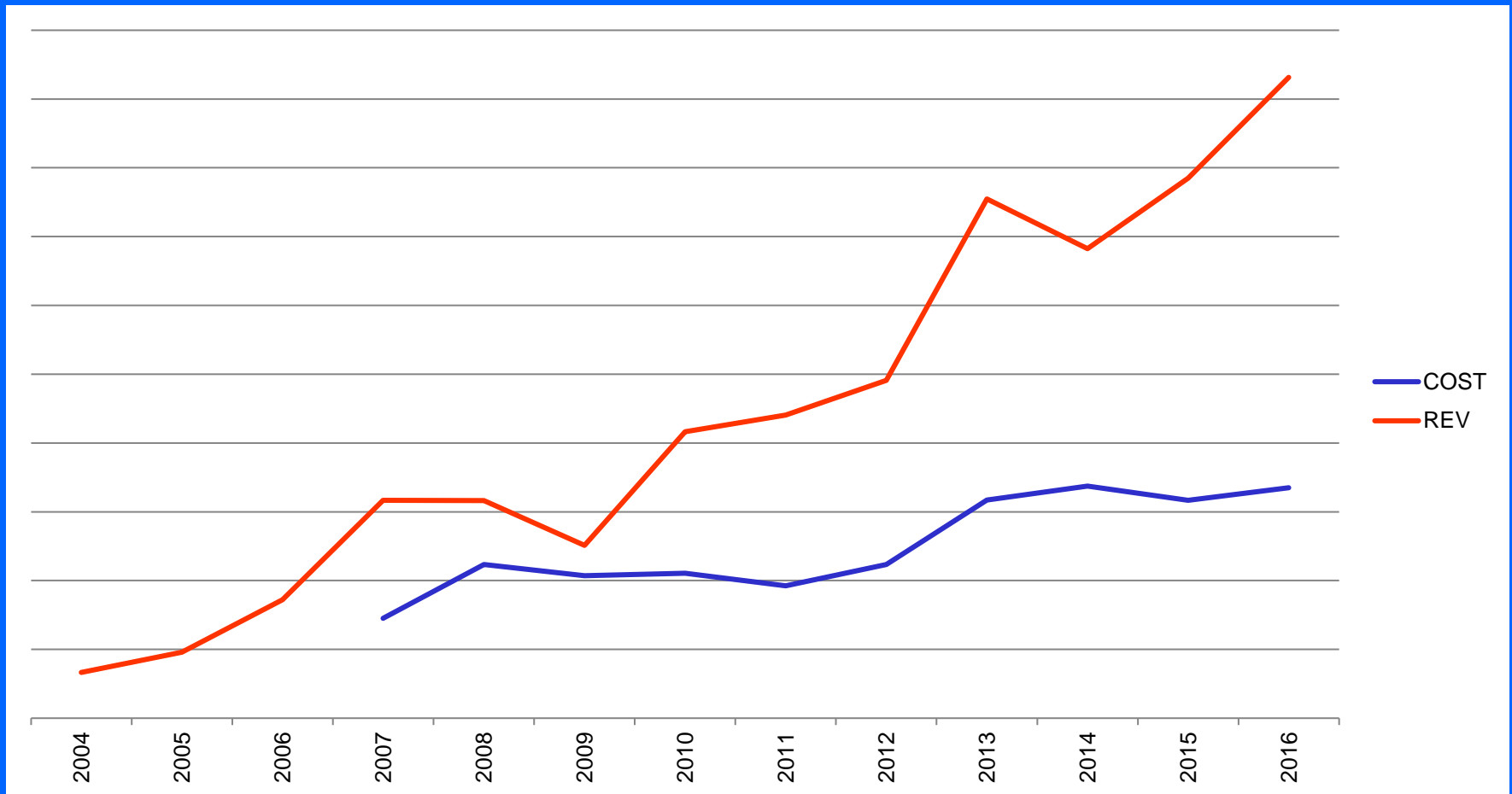


We now have over 100 species in 231 plots on 40 acres producing 4,000 lb/year



Cost vs. Revenue Trends

As our efficiency has increased;
our profit margin has increased – vital to know costs!



Ornamental woody nursery product needed to subsidize efforts first 4 years

Challenges to Diversity Seed Production in Small Plots (0.05-0.2 acres)

Seed Germination Requirements

Sow Directly

vs.

Start as Plugs



Challenges to Diversity Seed Production

Stature and Seed Maturation

Machine Harvest

vs.

Manual Harvest



vs.



Ground Cloth Harvest



Challenges to Diversity Seed Production

Seed Yield

91 lbs/acre by year 3 ☹️

300-600 lbs/acre by year 2 😊



Balsamorhiza



Achillea

Direct Sowing with a 10ft Wide Seed Drill



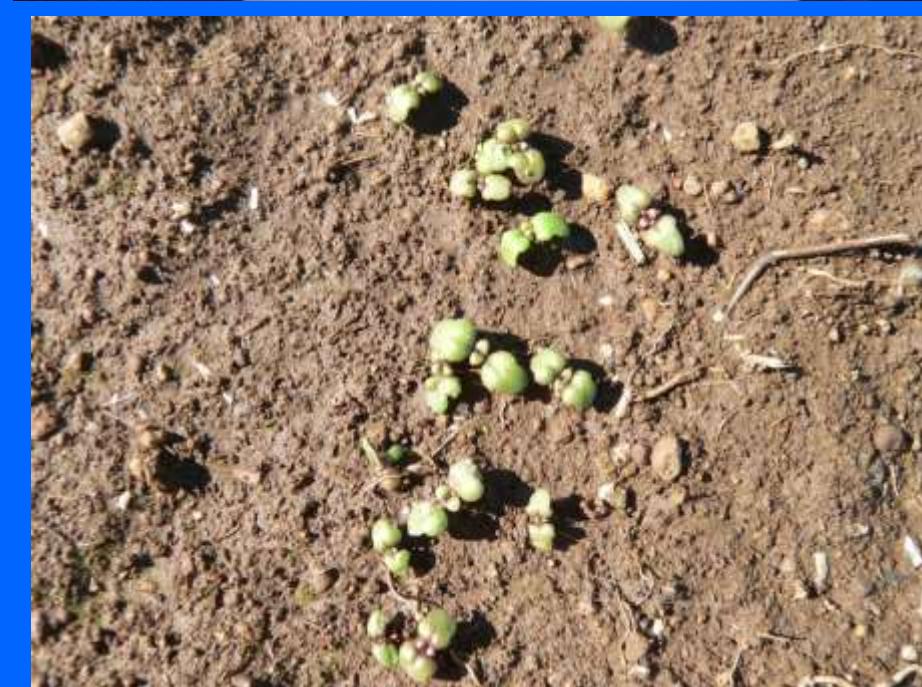
7 rows, 14 inches apart

(perfect for our 12 ft wide swather)



“Speed” Drilling Recipe

- 1) Small seed lot (ounces of seed) + vermiculite
- 2) Mix well
- 3) Measure evenly



- 4) Place in cut jug funnel
- 5) Hold on for your life!
- 6) Watch the baby plants grow



Direct Sowing

- PROS

- Good choice for annuals & short-lived perennials if have enough land for crop rotation
- Less labor especially for larger fields [2 crew 15 min for 0.1 acre field]
- Annuals in perfect growing conditions can have high yields
- Species that germinate late-winter do better

- CONS

- Loss of crop due to weather (erosion, freezing, and frost heaves)
- More difficult weed control
- Stale seed beds (chemical fallow) hard to achieve with forb dominant production
- Need wider spacing if using cultivation for weed control so loose land
- Annuals in poor soil may yield low

PLUGS

greenhouse grown
plugs makes the
most of *precious*
wild seed



Sidalcea campestris
Tall checkerbloom

3 row transplanter
12"x14" spacing



Apply Preemergent (fertilizer & sawdust if no chemical alternative available for that species) –
Planting Mantra - START CLEAN KEEP IT CLEAN!!!



Eriophyllum lanatum Oregon sunshine

I am a plug convert!

Oregon
sunshine





Species such as *Prunella* (Self-Heal)-
we use fertilizer
and Sawdust at
planting

Follow-up weed
control:

Cutting off weeds prior
to seed set, spot
spraying, and inter-row
use of a burn-down
herbicide



PLUGS

- PROS

- Weed control less of an issue (preemergent for most at transplanting)
- Better spacing produces higher yielding plants (some short-lived perennials even give a 3rd -4th seed year!)
- Can use cover crops just before tilling and planting
- Optimize precious G0 (wild seed)
- Great for species with complicated germination requirements (Iris, Heracleum, Sidalcea, Geranium)

- CONS

- Loss of fall planted crops due to weather (erosion and frost heaves) – we use sawdust to help keep plants in place
- Increased cost of starting field since need to greenhouse grow plants & much more labor to plant than seed [crew of 5 four hours for 0.1 acre field]
- Limited in size of field due to time and expense

Heracleum lanatum (Cow parsnip) new crop summer of 2022 –
plugs planted fall 2021 in hydric soil



For adequate germination; calcium oxalate and other inhibitors present in the seed coat and must be leached out (this would happen naturally in a wetland). Soak in water 6 days, change water every 24 hours to flush out toxins. Flush if water starts to turn brown (don't want seed to imbibe the toxins). Change often then Cold strat 70 days. Germination rate still only 50%

Maximizing Seed Yields

*ground cloth production capture all the seed
annuals (volunteer crops consecutive years)*



Collinsia in furrows year 1
2011 ground cloth 68 lb



Collinsia year 5
2016 14 lb
☹️ - I'm pooped!!!!



Same field 2019 – just add fertilizer!! Fall and spring applications into furrows – ahhhhh happy plants and 50 lb!!!



Madia elegans
(showy tarweed)



Plectritis congesta
(seablush)



- *Seed furrows fall using an EarthWay Precision Garden Seeder into soil on just on top depending on weed issues)
- *Watch for winter kill
- *Watch for winter winds
- Watch for predation by mice, voles, and slugs
- OR - PLANT PLUGS USING DRILL PLANTING AUGUR



Year 3 - *Ranunculus occidentalis* (Western buttercup)

Perennials –

some work others don't

DO

- *Aquilegia formosa*
- *Iris tenax*
- *Geum macrophyllum* (short-lived perennial)
- *Grindelia integrifolia* (short-lived perennial)
- *Lotus pinnatus*
- *Phacelia nemoralis* (short-lived perennial)
- *Ranunculus* spp.
- *Rupertia physodes*
- *Viola praemorsa*

DON'T (disease or predation issues)

- *Allium amplectens*
- *Delphinium oreganum*
- *Geranium oreganum*
- *Lupinus albicaulis*
- *Sanicula bipinnatifida*
- *Sisyrinchium idahoense*



“DON’T”
CROPS NOW
GROWN OPEN
FIELD

AND IN SOME
CASES, GET
<20 % OF SEED



Harvest seed by sweeping
after cutting - best method
so far due to plant debris
(shop vac light seed w/no
debris in piles ok too)
¼ day 4 crew for 0.15 ac



Seed Yields 2-4x
traditional
methods!
From 15 lbs to 75
lbs on less
acreage



Viola

← HOLES
OK for small statured perennial plants but may have to cut holes bigger as crown expands

VS



Columbine

FURROWS →
Better for long-lived perennials since can switch out cloth when starts to degrade or cut up from harvest (ca. 6 years)

Ground Cloth

• PROS

- Weed control less of an issue
- Do not need to rotate annual fields if yields can be maintained
- Get all the seed produced
- Black cloth ok for early or tough species (use white over black to reduce heat affect)
- Some perennials do great (Columbine) 40-50 lb 0.1 ac & some annuals have consistent yields

• CONS

- Yield losses due to crowding (annuals)
- Need to do black under white (or makes a greenhouse)
- Phlox family stick to cloth when wet!!!!
- Fungus control needed
- Weather related maintenance issues
- Slugs & mice live under cloth and eat seed and plants!
- Gophers tunnel

Machine Harvest – Indeterminate Maturation Dictates Innovations



Swath onto tarp
2004/2005

OK but still labor
intensive



Modified swather cuts
onto conveyor belt and
into trailer 2006/2007

labor saving
2-6 labor hrs/seed lot

Dumping Innovations



2005 to 2007 – hands and pitchforks do the dumping



2008 – tarp and tractor do the dumping



2009 - hydraulic lift does the dumping!

Improving efficiency and less stress on employees our

#1 company goal

Drying Seed Outside



Drying Seed Outside

- PROS

- Less expensive than building drying facility
- Many species are not harmed by getting wet in the occasional summer rains (viability of dry vs wet consistent)

- CONS

- Some species such as graminoids difficult to dry if get wet
- Need to drag into greenhouses or cover just before rain (and uncover when sun comes out)
- Need to turn them often if they get wet or will mold ☹️

Threshing the Seed



Use Allis-Chalmer All-Crops (circa 1950) – good size for our material (we now have 5)

- PTO driven
- Stationary combine
- Straw dumped onto tarp and checked for seed



- Material augured into bag (no loss)
- Can combine 2-4 lots/day/machine
- 2023 – 150 lots processed



Other Methods of Harvest and Processing Seed

Vacuuming before cutting
(or vacuuming only)



Microsteris & Aster



Other Methods of Harvest and Processing Seed

Hand Harvesting crops due to predation pressure or early shatter



Wyethia - Mules-ear (among others) is goldfinch food!!!!

Bird Netting crops due to predation pressure



Hole size is small-medium bee friendly

Weed-eater for awkward fields (shade plant under tree)





Oregon Sunshine

Rolling seed before
combining

Some seed heads need
an extra push (or roll)
before combining



OTHER OPTIONS FOR SMALLER PLOT DIRECT COMBINE HARVEST

Almaco Spc-20 with 60"
platform header – cut close to
shatter and all material bagged



Center for Natural Lands
Management, Olympia WA

Bagged material laid to dry in sheds



OTHER OPTIONS FOR SMALLER PLOT DIRECT COMBINE HARVEST

Wintersteiger Classic: threshes swathed material and spits out residue to the side— new for only \$180,000!!!!





Corvallis Plant Material
Center (NRCS)

**WOODWARD FLAIL-VAC
SEED STRIPPERS:**
grasses and fluffy seed
before debearding
\$15,000 new \$1,500 used



We clean all our own seed

Hammermill modified with horse-hair brushed (debearder)

Crippen seed cleaner
Micro Pro model 318-
RH

Crippen seed cleaner w/ball
deck; model # 334-A-R

Syntron Magnetic
Feeder (air column
cleaner)

FRUITS (LITERALLY) OF OUR LABOR 😊



SEED PRODUCTION SORROWS

Note: they are *agricultural crops*
(and yummy too!)

- Crowding (lowers yield)
- Stand longevity (short-lived perennials and just poop out)
- Gophers/voles/mice (love seeds and plants)
- Fungus (mildew/rust)
- Bugs (seed weevils/caterpillars)
- Deer (love flowers)
- Birds and Squirrels (love seed)
- Moles (make weeds)
- Weeds (contaminate crop)



Perideridia oregana
(yampah) 2/3 of field
destroyed in 2020 by
ground squirrels [\$7,000
loss of revenue 😞]

Fencing other 1/3
and trapping got a
whopping 16lb
[heavy critter
control for 2 years
now 62 lb!]



SEED PRODUCTION JOYS

(I am a restoration biologist as well as a farmer)

Rare Plant Seed Increase



Erigeron decumbens
Willamette daisy



Lomatium bradshawii
Bradshaw's lomatium –
candidate for delisting!

New emphasis on recovery of
Species of Concern
LYNDA RECOVERY PLAN



Delphinium oreganum
Willamette Valley
larkspur (my thesis plant)



I just secured agreements with
USFW and Greenbelt Landtrust to
reintroduce on protected sites

THANK YOU!

