

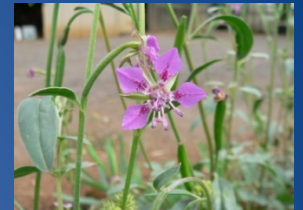
Predators and Pathogens in
Native Seed Production –
*the consequences of growing a high
diversity buffet of plants and seeds*

Lynda Boyer
CPOP Oct 2015

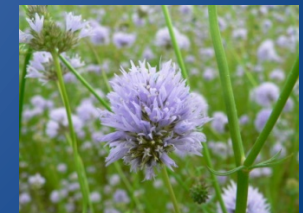
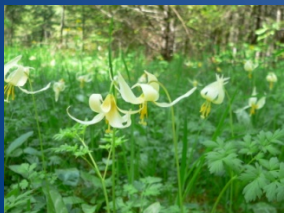
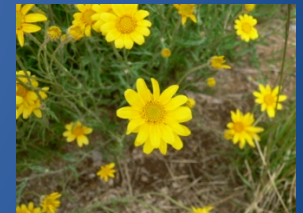
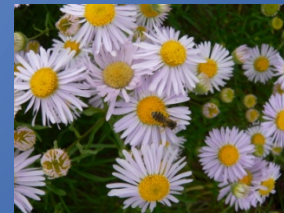
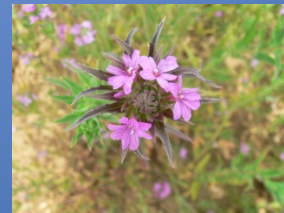
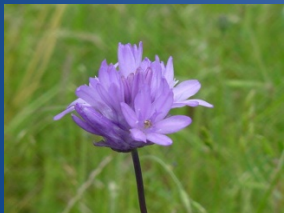
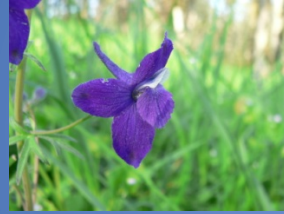
Native Plant and Restoration Information at:
www.heritageseedlings.com

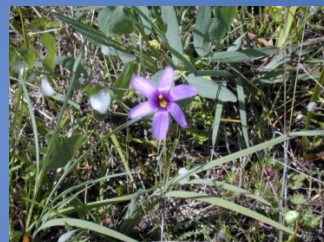
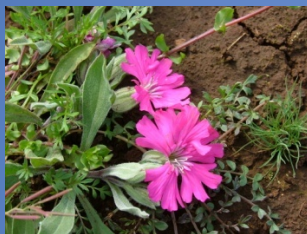
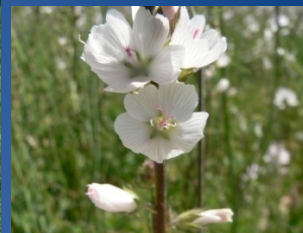
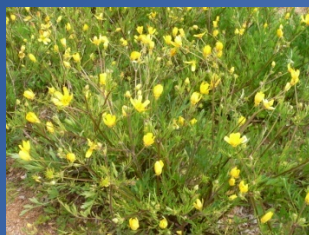
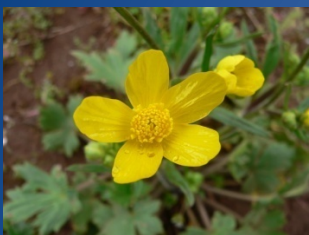
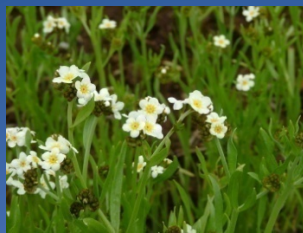


A diversity of plant material is goal of many of our restoration efforts

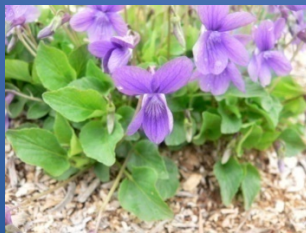
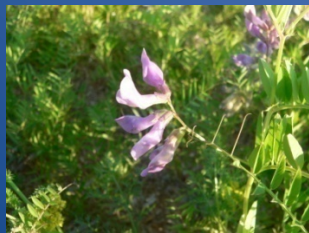
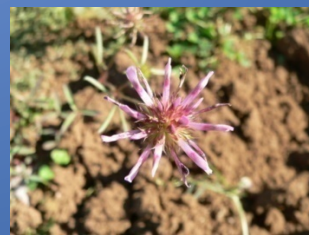
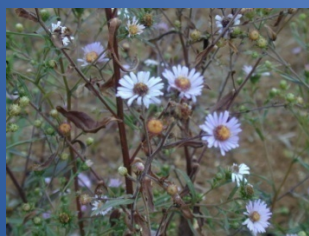


FORB DIVERSITY IS ESPECIALLY CRITICAL FOR OPTIMAL HABITAT





BUT, MAINTAINING LONG-TERM FIELDS FOR NATIVE SEED PRODUCTION





**HAS BROUGHT WITH IT EXTREME CHALLENGES WHICH AFFECT
RELIABLE SEED YIELDS AND GERMINATION RESULTS**

Currently, we have 120 species on 26 production acres
(38 with staging areas, aisles, and ends)
in 210 plots (sized 0.05-0.2 acres)
and produced 4,200 lbs per year



Open field production
and harvest





Ground cloth production
and harvest





Labor intensive harvest methods:

- *Weed whacker (Osmorhiza)

- *Shop vac (Microseris, Aster, Pyrocomma)

- *Hand harvest (Wyethia, Camas, Zigadenus)



Yampah field when gophers controlled weekly – yield good



#1 PREDATOR – GOPHERS!

They seek and destroy: Agoseris. Camas, Brodiaea sp, Cow parsnip, Licorice root, Lomatium sp. Microseris, Sanicula, Ranunculus, Yampah and **will burrow under ground cloth making a MESS!**



Yampah field when gophers stop being controlled and yield tanks

Bare-stem Lomatium field year 4 when field young and gophers controlled



Long-lived crop so must protect!!!!

Good years 1200 lb/acre;

2015 50% field lost to inadequate gopher control and yield reduced to 400 lb/acre



STRATEGY – Cinch trap (medium-sized).

Would need a dedicated person all day for 2 weeks 2-3x per season to manage for gophers ☹



Oregon Sunshine

PREDATOR! VOLES AND MICE
HUGE yield losses in 2012



Buttercup



Plectritis

STRATEGY- remove habitat such as grass greenways between fields (ground cloth also good cover).

Keep on top of them with bait in holes (not on ground)



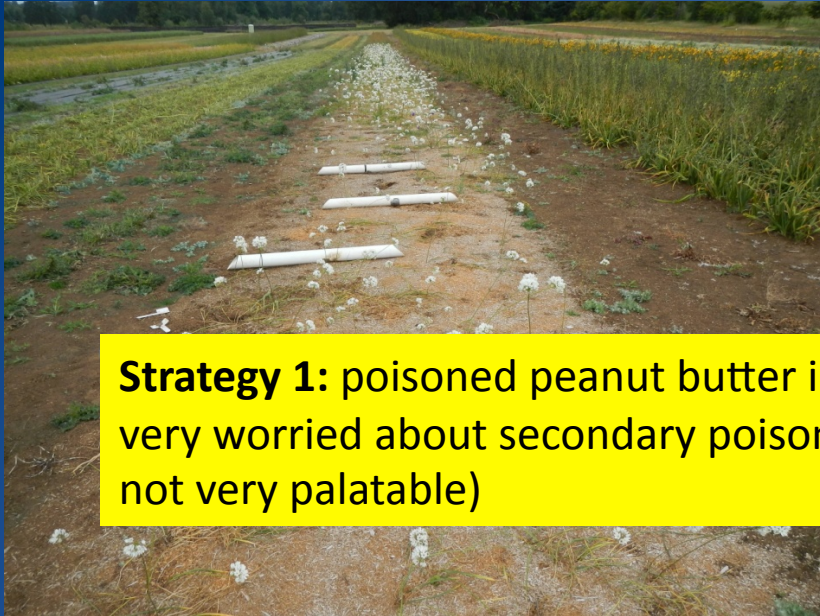
PREDATOR! –GROUND SQUIRRELS

They seek and destroy bulbs AND seed:

Yampah, Brodiaea sp (LEFT). Mules ear (BELOW), and Blue-eyed grass.

Mules-ear year 6 – second seed year - field should have produced about 20 lbs and got 1 lb (and fat squirrels)!!!!





Strategy 1: poisoned peanut butter in pvc tubes – but very worried about secondary poisoning so stopped (also not very palatable)



Strategy 2 (WORKS WELL): Oneida Victor Conibear Trap. Population reduction and timely harvest resulted in 25# Wyethia 2015



PREDATOR! SLUGS IN GROUND CLOTH AREAS



PREY – ANNUALS IN GROUND CLOTH AREAS



Small-flowered lupine with
yummy seed leaves

**STRATEGY- use 1-row seeder
with slug bait**



DEAD PREDATOR! 😊

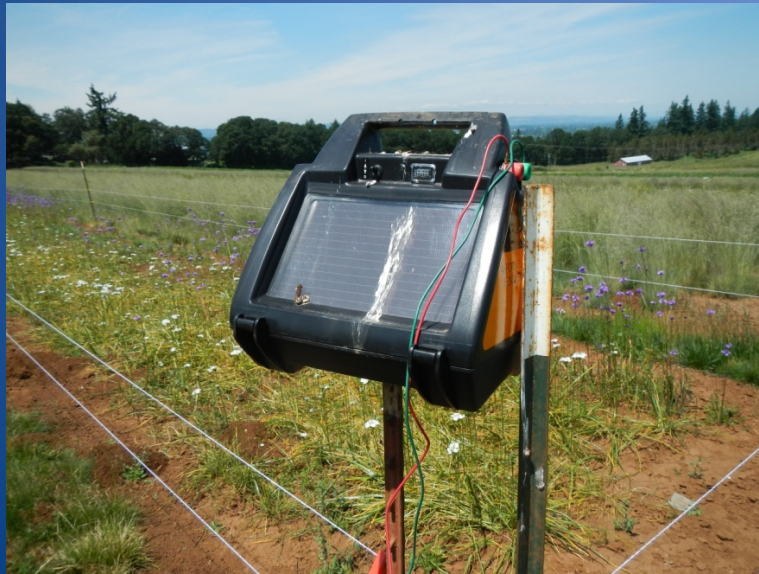


PREDATOR! DEER



PREY – YUMMY EARLY FLOWERS –

They Seek and Destroy: Brodiaea sp, camas sp,, columbine, fawn lily, Microseris, saxifrage, tall checkermallow, shooting star, Western sweetroot



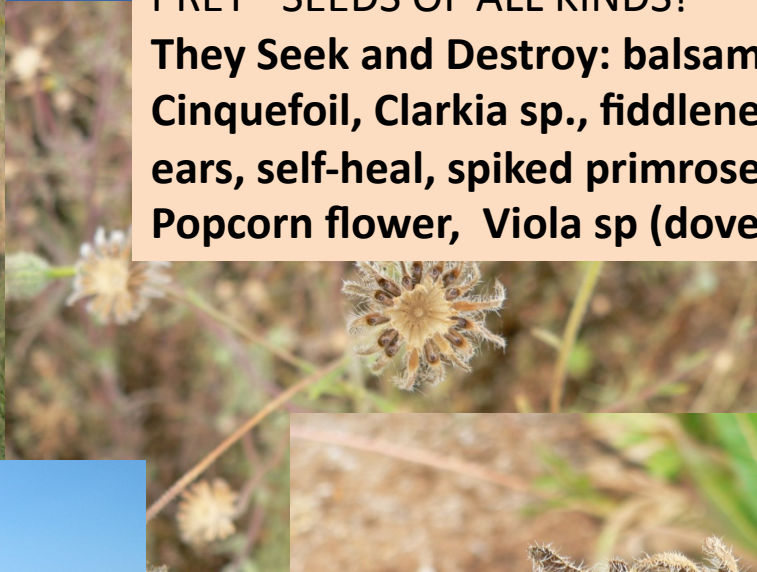
STRATEGY: deer fence farm or solar powered deer fence – bigger the better for bigger areas – double wire (for low-tech can also use fishing wires and bells)

PREDATOR! GOLDFINCHES AND MORNING DOVES



PREY –SEEDS OF ALL KINDS!–

They Seek and Destroy: balsamroot, Cinquefoil, Clarkia sp., fiddleneck, mules-ears, self-heal, spiked primrose, Madia sp. Popcorn flower, Viola sp (doves).



STRATEGY: bird netting (from New Zealand ☹) 32x100 16 mm mesh [most bees through]

Cover at start of seed set if can. Only do a few crops this way

PREDATOR! *Lygus hesperus*



PREY –SEEDS OF ALL KINDS! – seed is junk
Fernleaved Lomatium – TZ went from 49%
to 23% in two years

Oregon Yampah – TZ went from 50% to 0%!
In two years

Oregon Sunshine – TZ went from 75% to
33% in two years.





STRATEGIES

WHAT0	Comments
Lace-wing eggs	time-consuming to apply
Grandivo	Bacterial – Bees avoid flowers - apply multiple times – did not see results
Preferal	Fungal – field conditions not optimal for application needs (high humidity and no wind)
Bifenthrin	Pyrethroid more toxic to bees – decided not to use even –pre-bloom
Mavrik	fluvalinate is active ingredient, studies show least toxic pyrethroid to honeybees (low carry over). Now apply to a few crops –prebloom only. Monitor post-bloom (usually lots of ladybugs!)

SUCCESS 2015! – Yampah (TZ 69%) and Oregon sunshine (TZ 84%) great yields too! [new biocontrol just suggested called BotaniGard – stay tuned.....]

PREDATOR! Sidalcea seed weevil



STRATEGIES – No “optimal” application window for insecticides (bloom period prolonged and weevil multi-generational)
Hard shell make insecticides difficult to kill adults

Just use a low-tech method of sweeping the insects into a bucket with a soft brush then into insecticide soap.
Most fields not treated due to labor – TZ for untreated Rose Checkermallow fields very poor 40-50%

PATHOGENS : rust, mildew, stem-curving,
smut, root-rot, blight



Year 8 - Marvelous
stands of Licorice root
become mush before my
eyes – 250 #/acre to 0#/
acre ☹️





Year 8 - Stellar stands of
Checkermallow become
skeletons before my eyes
– 500 #/acre to 160#/acre
☹️



Year 2 – Sickle-keeled lupine withered before my eyes in ground cloth production –almost no seed from field 😞

In 2012 Created Master Predator and Pathogen Maintenance Document for Each Species to Track:

- Pest issue: mice, voles, moles, gophers, squirrels, slugs, deer, hares, finches, seed weevils, caterpillars, aphids, and seed bugs (native and non-native), rusts and mildews.
- Control method: fungicides, insecticides, biocontrols, manual control, trapping and baiting.
- Spray schedules for fungicides (3 applications/season) – Mildew (21 species; Rust 26 species; and lower-impact insecticides (pre-bloom)



Stephanie Hazen



THANK YOU