



Pollinator Habitat in Vineyard Rows, Polk County, Oregon

Field Planting Case Study Report

December 2018

Objective: Pollinator habitat

County: Polk, OR

Average Annual Precipitation: 45 inches

MLRA: 2 – Willamette & Puget Sound Valleys

Dominant Soil Type: Jory silty clay loam

Slope: 12-20 %

Aspect: south

Elevation: 350 ft

Site Preparation: till, full year of herbicide, then till before seeding

Seedbed Condition: very clumpy dry soil at time of first seeding

Seeding Date: September 27 and November 10, 2016

Seeding Rate: about 8-9 bulk lb/ac

Seed Cost: estimated at \$1200.

Seeding Method: broadcast Truax seeder pulled by ATV, with sprocket roller

Acres Seeded or Plot Design: Two blocks: Each block had the two mixes planted in every other row at two different planting dates (total of about 1 ac seeded)

Previous Site History: grass in between rows, mostly bentgrass and subterranean clover

Fertilizer: none

Irrigation: none

Grazing: none

Monitoring Date: May 2017, July 2017, May 2018



Figure 1. Experimental pollinator mixes blooming between vineyard rows, planted by Corvallis Plant Materials Center staff. May 23, 2018.

Introduction:

Many vineyards in the Willamette Valley participate in the LIVE certification program (<https://livecertified.org/>). This third-party certification program promotes sustainable production practices and preservation of biodiversity. Illahee Vineyard, a LIVE certified vineyard, was inspired by NRCS programs in the Midwest promoting prairie conservation strips (IA State Extension, 2013). They learned that strategically planting small patches and strips of native prairie plants into farmland provides multi-functional benefits to the land, such as:

- Increasing soil organic matter
- Bolstering biodiversity
- Slowing surface water runoff
- Reducing soil erosion
- Protecting water quality
- Controlling pests naturally via beneficial insects.

They wanted to try planting “prairie strips” in between the vineyard rows to obtain these benefits,

create pollinator habitat, and meet LIVE certification goals. They received technical assistance and financial incentives for the project through NRCS's Conservation Stewardship Program (CStP).

Staff at the NRCS Plant Materials Center have been working on creating pollinator mixes for working lands since 2010, including mixes tailored to vineyards. Vineyard-specific pollinator mix specifications included using plants that: are native species that were

low in stature (to avoid interfering with air flow through the vines), do not fix nitrogen (as excess N could affect grape quality), and combine a balance of annuals and perennials to provide season-long bloom and plant cover for multiple years. PMC staff wanted to test the experimental mix they'd created for a working vineyard and Sue Reams, Soil Conservationist in Polk County, suggested Illahee Vineyard.



Figure 2. PMC staff member Tyler Ross uses a small Truax broadcast seeder to seed in between the vineyard rows. September 27, 2016.

Site preparation began in 2015, by rototilling every other row two times (spring and fall) to kill existing sod and spraying with Rely (glufosinate-ammonium),¹ a nonselective herbicide to kill weeds that germinated after rototilling. In 2016, the rows were kept weed-free by spraying Rely, and the site was rototilled again in August/September prior to seeding. This fall-season tillage would generally not be recommended; however, it was thought necessary to loosen the soil surface to create a better seedbed. The ground was very hard, and the soil was very chunky/cloddy after tilling. Originally, PMC staff had two sowing dates in mind:

- An early sowing date, just prior to the first rain (usually mid-September). Native plants germinate very well in the warm, moist days of early fall. Also, slugs, which can decimate seedlings, are not as active in the first weeks of fall. This gives the seedlings a chance to grow before the slugs become active.
- A late sowing date, after grape harvest (late October). Vineyards are busy with harvest and pressing and often do not have time or resources to devote to seeding in September. Late October or early November is a much more practical time to install pollinator habitat. A later sowing date can also allow for another spray/kill of weeds that germinate with the first rains of fall.

The PMC created two mixes to trial (Table 1). The “Economy mix” contained ten of the most reliable and

¹ Herbicide trade names and control measures appear in this document only to provide specific information. USDA NRCS does not guarantee or warranty the products and control methods named, and other products may be equally effective.

cheapest species that are commercially available. The “Diversity mix” contained 15 species and included some specialty species that can be costly to add.

Table 1. Species composition of two pollinator mixes trialed at a vineyard in Polk Co., Oregon seeded on September 27 and November 10, 2016.

Species	Common Name	Percent of mix	Bulk Seeding Rate seeds/ft ²	Seeding rate lb/ac
Economy Mix				
<i>Achillea millefolium</i>	western yarrow	9.8%	10	0.2
<i>Clarkia amoena</i> ssp. <i>lindleyi</i>	farewell to spring	4.9%	5	0.3
<i>Danthonia californica</i>	California oatgrass	2.0%	2	0.9
<i>Eriophyllum lanatum</i>	Oregon sunshine	9.8%	10	0.4
<i>Eschscholzia californica</i>	California poppy	9.8%	10	1.5
<i>Plectritis congesta</i>	seablush	14.7%	15	0.5
<i>Prunella vulgaris</i> ssp. <i>lanceolata</i>	lanceleaf selfheal	10.0%	10	1.1
<i>Sidalcea virgata</i>	rose checkermallow	4.9%	5	1.7
<i>Solidago elongata</i>	goldenrod	19.6%	20	0.2
<i>Symphyotrichum chilense</i>	Pacific aster	14.7%	15	0.5
TOTALS:		100%	102	7.3
Diversity Mix				
<i>Achillea millefolium</i>	western yarrow	4.6%	7	0.12
<i>Anaphalis margaritacea</i>	pearly everlasting	32.7%	50	0.3
<i>Danthonia californica</i>	California oatgrass	1.3%	2	0.9
<i>Eriophyllum lanatum</i>	Oregon sunshine	6.5%	10	0.4
<i>Eschscholzia californica</i>	California poppy	3.3%	5	0.73
<i>Gilia capitata</i>	blue gilla	3.3%	5	0.2
<i>Lotus micranthus</i>	Small-flowered deer vetch	6.5%	10	0.3
<i>Nemophila maculata</i>	fivespot	1.3%	2	0.21
<i>Nemophila menziesii</i>	baby blue eyes	2.0%	3	0.66
<i>Plectritis congesta</i>	seablush	9.8%	15	0.5
<i>Prunella vulgaris</i> ssp. <i>lanceolata</i>	lanceleaf selfheal	4.6%	7	0.8
<i>Ranunculus occidentalis</i>	western buttercup	3.3%	5	1.1
<i>Sidalcea virgata</i>	rose checkermallow	3.3%	5	1.7
<i>Solidago elongata</i>	goldenrod	13.1%	20	0.2
<i>Symphyotrichum chilense</i>	Pacific aster	4.6%	7	0.24
TOTALS:		100%	153	8.36

Two vineyard blocks were chosen to be seeded. With every other row planted (leaving other drive rows

intact for equipment access during establishment), the total area seeded was just under an acre. Each vineyard block was divided into four sections and each mix was seeded into a section of both blocks on each of the seeding dates. The PMC has a 3-ft wide Truax broadcast seeder pulled by an ATV that fits nicely in between the vineyard rows. During the first seeding, the soil was very hard, and the sprocket roller was not very effective at breaking up clumps or covering the seed. The later seeding was delayed due to never-ending rain in October and early November, finally occurring on Nov. 10th. The later seeding was a bit more difficult because it was very foggy, and the seed kept sticking to the broadcasting plate on the seeder. But the sprocket roller did a wonderful job of busting up clods and lightly covering the seeds.

Results and Discussion

Timing of seeding:

Timing of seeding had a significant effect on



Figure 3. The early seeding had a two-month head start on the later seeding. This picture shows the size of seedlings in the early-sown plots at the time of the later seeding. November 10, 2016.



Figure 4. Farewell to spring (Clarkia amoena) was a favorite of the vineyard owner and visitors. July 10, 2017.

establishment of native cover. The germination and growth on the September seeding looked excellent! This was surprising based on the soil conditions at the time of seeding. We were concerned that the seed was either lying on the surface or fell between deep cracks in the clods. The earlier seeding had greater native cover throughout the monitoring period. Native seedlings can grow a fair amount in the fall if they are planted early enough when temperatures are mild and rain/moisture is usually consistent enough to support plant growth. Slugs are slower to emerge in early fall and can only feed during moist, cloudy times. Later in the fall, when moisture is plentiful, slugs can feed and breed all day and night and plant growth slows down. Small, newly emerged seedlings are easily damaged by slugs. We think that slug damage was an issue in the later seeding. By the time it was noticed, it was too late for slug bait to be effective. In the later seeding, the slugs wiped out many of the fall germinating seedlings, but in spring there were a fair number of aster and goldenrod plants establishing.

Weeds were consistent between the two seeding dates. Block 1 was fairly weed-free; common weeds

were bentgrass, wild carrot, and cat's ear. Unfortunately, Block 2 had a major weed seed bank of subterranean clover. It wasn't a huge problem in year 1, but it was so tall and thick in year 2 that it swamped out the native species. It is unclear at this time how this weed will persist/fall out. Since it is one of the first seeds to germinate in the fall, it may be possible to provide some control with an extremely early herbicide spray.

Different mixes:

The two experimental seed mixes performed as they were designed to; the diversity mix appeared to be a more diverse version of the economy mix. All species in the economy mix showed up on the site. Everything except pearly everlasting appeared in the diversity mix, but blue gilia was only seen in very low numbers. We were hesitant to use farewell to spring all over the vineyard since we were trying to keep the mix under 30 inches tall and this species can get taller than that under favorable growing conditions. However, the landowner (and vineyard visitors) loved the farewell to spring and did not think it was too tall for use in between their vines. The landowner also appreciated the annuals that are not typically included in native Willamette Valley prairie plantings, such as California poppy, baby blue eyes, and fivespot. These species are native to western Oregon and California and have become popular in the flower seed trade. They are not considered to be the "wild type" that you would find native to our area, yet they are reliable, affordable, and retain enough of their wild traits that bees and other pollinators still find them attractive. Costs of native seed vary by vendor and year. The economy mix would most likely cost around \$130/lb or \$950/ac compared with the diversity mix at \$180/lb or \$1500/ac.



Figure 5. California poppies and seablush were some of the longest blooming species in the planting.

We did not do any formal insect surveys on the plantings. In our general observations, the rows that were planted with native plants attracted many different types of insects. In our visits we often saw bumblebees, syrphid flies, crab spiders, honey bees, and various small native bees. The existing rows of grass appeared to attract no insects. There was a noticeable difference in the numbers of insects between a grass row and native plant row even though they were only separated by a 2ft wide section of grapes.

Summary

In this study we found early seeding to be very beneficial to native plant establishment. The best time to seed in between rows would be immediately after grape harvest (mid-September to early Oct). The weedy subterranean clover was a major problem in the biggest block that we seeded and will continue to be an issue if not addressed; it is smothering the native plants and is releasing undesirable amounts of nitrogen that can affect grape quality.

Based on the results of this study, we created a

revised recommended pollinator mix for vineyards that is a combination of the two mixes (Table 2). We believe this mix would reliably provide high quality pollinator habitat for around \$150/lb or \$930/ac.

Table 2. Recommended Pollinator Mix for Vineyards in the Western Oregon and Washington.

Species	Common name	Target seeds/ft ²	Seeding rate lb/ac	Growth habit
<i>Achillea millefolium</i> ssp. <i>occidentalis</i>	western yarrow	5	0.10	Perennial
<i>Clarkia amoena</i> ssp. <i>lindleyi</i>	farewell to spring	5	0.21	Annual
<i>Danthonia californica</i>	California oatgrass	3	0.93	Grass
<i>Eriophyllum lanatum</i>	Oregon sunshine	7	0.26	Perennial
<i>Eschscholzia californica</i>	California poppy	3	0.44	Annual
<i>Gilia capitata</i>	blue gilia	3	0.13	Annual
<i>Nemophila menziesii</i>	baby blue eyes	3	0.52	Annual
<i>Plectritis congesta</i>	rosy plectritis	7	0.34	Annual
<i>Prunella vulgaris</i> ssp. <i>lanceolata</i>	lanceleaf selfheal	7	0.57	Perennial
<i>Ranunculus occidentalis</i> var. <i>occidentalis</i>	western buttercup	5	1.09	Perennial
<i>Sidalcea virgata</i>	rose checkermallow	3	1.45	Perennial
<i>Solidago canadensis</i>	goldenrod	15	0.14	Perennial
TOTALS:		66	6.20	

References

IA State Extension. 2013. A Landowner's Guide to Prairie Conservation Strips.

<https://www.extension.iastate.edu/alternativeag/info/Landowners%20Guide%20to%20Prairie%20Conservation%20Strips.pdf>

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.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at How to File a Program Discrimination Complaint and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov.

USDA is an equal opportunity provider, employer, and lender.