



# HERITAGE

seedlings, inc.

Unusual Deciduous Species

## SEEDING RATES AND METHODS

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### Timing

Willamette Valley native seed should be sown in the fall to allow for seed stratification needs. However, many of our native grasses and forbs can be sown as late as early-March. These species should be those that need only a very short period (two weeks) of moisture in conjunction with cold. Our "Disturbed Ground / Late-Seeding" mixes are appropriate for this situation.

### Seeding Rate

Seeding rates vary depending on seeds/lb (e.g. species with many seeds/lb should be sown at a lower rate) as well as the desired results. They also vary depending upon site conditions, seeding method, and precipitation.

Lower rates can be used for drilled seed because seed has very good contact with the soil and protection from predation. Many native species need light to germinate so the seed should be drilled no more than ¼ inch deep.

You should set a target number of seeds/sq. ft. depending on the site conditions and sowing method. Assume you need to almost double your sowing rate for seed that is broadcast. If you broadcast the seed, pressing the seed into the soil with a water drum or cement roller will help you lower your sowing rate and increase seed-soil contact. However, if the site is very clean, it is best not to disturb the soil too much. Sufficient establishment will occur without rolling.

### Calculating Seeding Rate for a Single Species (PLS = Pure Live Seed)

$$\frac{\text{Target \# of seeds}}{\text{sq. ft.}} \times \frac{43,560 \text{ sq. ft.}}{\text{acre}} \times \frac{1 \text{ lb}}{\text{Known \# of seeds per lb}} = \frac{\text{lbs PLS}}{\text{Acre}}$$

PLS defined:

<b>Formula</b>	<b>Calculation</b>
The percent Purity is multiplied by the percent of Germination and divided by 100 to give the percent Pure Live Seed in a given lot of bulk seed. To determine how much bulk seed is needed to equal one PLS pound, one is divided by the PLS percent.	Potentilla glandulosa 2012 lot. 98% Purity x 69% Germination divided by 100 = 67.6%PLS in one bulk pound. One divided by 0.676 = 1.47. Therefore, 1.47 bulk pounds of Potentilla glandulosa seed is equal to one PLS pound.

### Actual Seeding Rate vs. Calculated Seeding Rate

Since seed sold on a PLS pound basis will weigh more than an actual pound you will need to convert the seeding rate in PLS lbs/acre to the actual or bulk seeding rate to ensure the desired number of seeds/sq. ft. are applied. This can be calculated two different ways:

- 1) Divide the PLS rate by both the % Purity and the % Germination (TZ) expressed in a decimal fraction (these are found on the seed tag).

OR

- 2) Use the following formula:

$$\frac{\text{Bulk Wt (lb)}}{1} \times \frac{\text{Desired PLS lbs}}{\text{ac}} \times \frac{1}{\text{PLS lbs purchased}} = \frac{\text{actual lb}}{\text{ac}}$$

### Target sowing rate and seeding rate calculations

EX: *Sidalcea campestris* has 100, 000 seeds/lb and you want 3 seeds/ft = 1.3 PLS lb/ac

You have 7.5 acres to seed so you order 10 lbs of seed (rounded)

The seed lot has a PLS value of 84% so  $1/84\% = 1.2$  bulk lbs = 1 lb PLS.

You get 12 bulk pounds delivered ( $10 \times 1.2 = 12$ )

To seed at the desired rate of 1.3 PLS/ac you would need to seed at 1.6 lbs/ac.

### Target Seeding Rates

A common target seeding rate for the Willamette Valley is **30 – 60 seeds/sq. ft.** On a very clean site (sprayed with herbicide two seasons) I achieved good establishment in some areas with a broadcast rate as low as 24 seeds/ft.

It is probably better to err on the side of more seeds/sq. ft. If the soil is poor and the sowing rate too low, the stand will be inadequate, encouraging weeds. However, if the sowing rate is too high, you can create native “lawn” and the forbs will not flower due to high competition for resources.

My own experience and the data of others give the following ranges for seeding rates:

**Drilled Seed: Larger** seeded grass species 5 – 10 PLS lbs/acre (lower rates will leave room for forbs); smaller seeded grasses (such as *Deschampsia*, *Koeleria*, or *Poa*) can be sown at a very low rate of 0.5-2 lbs/acre, and forbs 0.5 – 8lb/acre. It is best not to mix grasses and forbs together. Early germinating grasses will take up space needed by later germinating forbs.

Note: If the site is going to be used to promote Streaked horned-lark habitat, the grasses should be sown at a very low rate to provide the needed bare patches used for nesting (but be ready to combat weeds).

**Broadcast Seed (see below for cutting agent suggestions):** grasses 10 – 15 lb/acre; forbs 4 – 11 lbs/acre. To increase seed/soil contact, press seed firmly into soil.

**Seed Mixes** of both grasses and forbs: 6 – 12 lbs/acres drilled; doubled to tripled for broadcast, depending on starting conditions.

### How Much Seed Do I Need?

$$\frac{\text{sq. ft. to sow}}{1} \times \frac{1 \text{ acre}}{43,560 \text{ sq. ft}} = \text{acres} \times \frac{\text{PLS lbs}}{\text{Acre}} = \text{lbs of seed}$$

### Seeding Sedges, Rushes and Saxifrage – A Special Case

Sedges and rushes need four things to germinate: 1) good soil contact; 2) high soil temperatures; 3) water; and 4) light. Given these criteria, sedges, rushes, and Saxifrage species should be broadcast sown *only*. The West Eugene Wetlands Project Ecologist also notes that soil fertility is a factor. They sow in the fall due to the inaccessibility of the sites during the winter. They also recommend sowing at a very high rate and over a period of two years if possible. If there is still sufficient rain and the site is accessible, a late winter seeding is also possible (most sedges need 1 month of cold-moist stratification). This ensures the seed is on a wet soil surface when the daytime temperatures heat the soil. Pressing the seed into the soil will help improve seed/soil contact.

### SUGGESTED BROADCAST SOWING METHODS FOR NATIVE SEED

NOTE: For drilling suggestions, please see “Native Willamette Valley Oak Habitat and Prairie Restoration Site-Preparation and Seeding Information” on our Stewardship, *Site Preparation Page*.

### Sowing Success Criteria:

- Reduce weeds.
- Ensure good soil contact.
- Time the seeding to allow the appropriate amount of cold/moist treatment for germination (2 – 12 weeks depending on species, but a few only need heat).
- Do not bury the seed too deeply.
- Mulch (straw, compost, or sawdust) is ok if applied **very lightly**.

### Sowing Rates for Small Areas:

On clean site: 1 oz/250 sq. ft. (approximately 11 lb/acre). However, seed mixes vary and a mix with a lot of small seeded species can be sown at a lower rate than a mix with larger seeded species.

On site not clean of existing vegetation and/or weed seed: 1.5 – 2 oz/250 sq. ft.

## Sowing Methods: – SEED MUST BE CUT WITH A CUTTING AGENT (see list below)

- 1) **Mechanical:** A fertilizer (spinner) spreader can be rented at farm stores. Mix the seed with a cutting agent such as **medium-grade vermiculite** (Note: this is my favorite but all medium-grades are not created alike; look at a sample at the vendor of choice; the bag should weigh about 20 lbs for 3.5 cu ft; if it weighs more, then it will have too many fines and you should get their “coarse”). Always err on the side of more cutting agent, and then go over the area more times. *Example:* For vermiculite in a spinner spreader; **3 bags of 3.5 cu ft mixed with seed on a setting of 2 will cover 5-6 acres covering the area twice (about 1/2 bag/acre). The amount of seed depends on your desired sowing rate.** Make sure to seed in different direction the second time to ensure good coverage. The amount of cutting agent depends on the type of mix. Mixes with bulky, large seeds do not flow as fast as mixes with small seeds. Use the spreader at a non-windy time perhaps early in the morning. Be sure to wear a dust mask when mixing the seed with the cutting agent. While seeding, make sure the mix is flowing regularly and not bridging. Adjust the opening as necessary to make sure the seed goes the distance. Press seed into soil with a drum roller if possible (harrowing can dredge up weed seed). As noted above, if the site is really clean, establishment rates are good even without pressing the seed in with a roller.
- 2) **Hand:** I prefer using a five-gallon bucket over a hand-cranked seeder since it needs to be filled up too often and can bridge. First, you should calibrate how many square feet you can cover with a given amount of cutting agent. The seed won't factor in that much so just calibrate for the cutting agent. *Example:* I can do about 1800 ft<sup>2</sup> with a 3/4 bucket of vermiculite (around 4 lbs). I double that so you I can do **2 passes** (so 8 lbs for 1800 ft<sup>2</sup>). Put all the seed you want to sow in a given area in a large bin with the calibrated amount of cutting agent. I use Therm-O-Rock™ brand and the “coarse” is more medium in size. A 3.5cu ft bag weighs 20#. This means I can seed around 0.1 acre with 1 bag of vermiculite. Again, err on the side of cutting more, and then go over the area a few times in different directions. Press seed into the soil if possible.

Note: for small areas, if you have the ability to apply the seed/cutting agent mix to top soil or mulch this works really nicely especially if applying seed later in the winter. This ensures good soil contact for germination and establishment.

### Cutting Agents:

- 1) **Medium-grade vermiculite (might be a coarse-grade for some brands)** 3.5 cu ft bag \$25 or so (Growers Nursery Supply or other Nursery Supply store). *Slightly moisten before use to reduce the dust.* It can also be found on-line at [http://www.uline.com/BL\\_3801/Vermiculite?keywords=Vermiculite](http://www.uline.com/BL_3801/Vermiculite?keywords=Vermiculite)
- 2) **Natural Corn Cobs** Bird and Small Animal Litter/Bedding 27 lb (farm stores or the website below)  
Natural Corn Cob animal litter/bedding by PureLite™, <http://www.amazon.com/Natural-Small-Animal-Litter-Bedding/dp/B001VIY7J0>
- 3) **Fertilizer:** 0-45-0 (to avoid fertilizing weeds)
- 4) **Sifted sawdust:** OK to use this if hand-seeding and some seed drills. It will bridge in fertilizer spreaders
- 5) **Floor Dry:** 50 lb bag (automotive stores)  
<http://www.cepsorbents.com/search.asp?pg=1&stext=floor+dry+clay+based&sprice=&stype=&scat=>
- 6) **Rice Hulls:** <http://www.ricehull.com/>

- 7) **Cracked Wheat** (chicken feed): Winco bulk section – ask someone in the department for 50# bags (may want to try some first to see if it will work for your needs). Rate: One user suggests ½ bag/acre mixed with the desired amount of seed mix. However, calibration is a must since the spreader opening determines how much cutting agent is applied.
- 8) **Native grass seed with low viability**: check with local native seed vendors for old seed.

#### Small Garden Areas:

It is OK to cover seed with a light dusting of soil (I sift potting soil through a sieve to dust the seeded area with fine soil). Cover only until you can barely see the cutting agent. This will hasten germination and help avoid predation.

#### Legumes:

Legumes have a hard seed coat. If planted in the fall, most legumes will germinate by spring. However, if you're planting late-winter or early-spring they will benefit from a light scarification before sowing. Use fine sandpaper (150 grit). Tape one piece of sandpaper into a bin with sides and rub small amounts of seed on it with an additional piece of sandpaper. Thirty seconds should do it (the seed coat should look dull).

#### VERMICULITE USED:

