

PLANT MATERIALS TECHNICAL NOTE

Calculating Seeding Rates When Using Alternate-Row and Cross-Hatch Planting Techniques

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Figure 1. Cross hatching of Russian wildrye and alfalfa

Introduction

Certain plant species emerge and establish better, are more productive, and persist longer when planted as a single species within a row. Using alternate-row and cross-hatch seeding techniques can be beneficial with plants that are slow to emerge, or are not highly competitive, at least during early establishment, with other species. Some potential uses might include establishment of slow developing species for forage production, or forb establishment in pollinator plantings when grasses are also needed for site stabilization. Unfortunately, there has been only limited testing of these techniques with conservation species adapted to Montana and Wyoming. Species testing to date will be summarized in an upcoming Technical Note. Alternate-row plantings of Russian wildrye (*Psathyrostachys juncea*) and alfalfa (*Medicago sativa*) or sainfoin (*Onobrychis viciifolia*) have proven successful, the additional growing space allowing the slow Russian wildrye time to establish and become competitive with the alfalfa. This Technical Note provides guidance and clarification on determining seeding rates with these techniques using Russian wildrye and alfalfa as examples. It should be noted that equipment availability may influence actual seeding method and rate.

Calculating Seeding Rate

When calculating seeding rates (Pure Live Seed [PLS] pounds per acre) for an alternate-row or cross-hatch planting, begin with the full seeding rate for the species specified in Montana Plant Materials Technical Note MT-46 (revised) and adjust accordingly. **Keep in mind landowners may have equipment that will not plant exactly the row spacing used as the basis for the calculations. In some cases, blocking off feeder tubes or other equipment modifications should be suggested in order to meet species requirements and to obtain the targeted number of seeds per linear foot.** Use the following examples to help determine seeding rates for the species you are working with:

Alternate-Row Method

Example – Although Russian wildrye is highly competitive once the stand becomes established, it is initially slow to emerge and establish, and is therefore out-competed by many species when sown in a mix. To avoid this problem, it is recommended this species be planted alone in its own row, alternating with rows of other crops, such as alfalfa. When referencing Plant Materials Technical Note MT-46, the recommended full stand seeding rate for Russian wildrye is 5.0 PLS pounds per acre (based on 20 PLS seeds per linear foot at 12-inch row spacing). A footnote recommends a minimum of 18 inches between rows because Russian wildrye is highly competitive once established (it needs more room to grow). **Please note Plant Materials Technical Note MT-46 provides conversion factors for calculating amount of seed needed per acre for various between-row spacing.** The following calculations demonstrate the basis for those factors.

- a. For a solid stand planted on 18-inch rows – When sown in a solid stand with 18 inches between rows, the total amount of PLS seed of Russian wildrye needed is 3.42 PLS pounds per acre. Since an acre equals 43,560 square feet, a square acre would measure 208.7 feet by 208.7 feet. The calculation for determining the amount of seed needed is: $([208.7\text{-foot long rows} \times 139 \text{ rows per acre @ 18 inches apart}] \times [\sim 20 \text{ seeds per foot}] \div 170,000 \text{ seeds per pound} = 3.42 \text{ PLS pounds per acre})$.
- b. For 18-inch alternate rows with alfalfa – An 18-inch alternate-row planting of Russian wildrye and alfalfa is a seeding with 18 inches between a Russian wildrye row and the adjacent alfalfa row. **It does not mean there are 18 inches between Russian wildrye rows. There are now 36 inches between rows of Russian wildrye and between rows of alfalfa.** Since the number of rows of Russian wildrye will now only be half of a full stand on 18-inch rows, only half the seed or 1.7 PLS pounds per acre is needed $([208.7\text{-foot long rows} \times 69.57 \text{ rows per acre at 36 inches apart between Russian wildrye rows}] \times [20 \text{ seeds per foot}] \div 170,000 \text{ seeds per pound} = 1.7 \text{ PLS pounds per acre of Russian wildrye})$. Similarly, the recommended seeding rate in Plant Materials Technical Note MT-46 for alfalfa is 5 PLS pounds per acre for a full seeding on 12-inch rows. In an 18-inch, alternate- row scenario, the amount of alfalfa needed would be approximately 1.6 PLS pounds per acre $([208.7\text{-foot long rows} \times 69.57 \text{ rows per acre at 36 inches apart between alfalfa rows}] \times [\sim 25 \text{ seeds per foot}] \div 225,00 \text{ seeds per pound} = 1.6 \text{ PLS pounds per acre of alfalfa})$.
- c. For 36-inch alternate rows with alfalfa – A 36-inch alternate-row planting of Russian wildrye and alfalfa is a seeding with 36 inches between a Russian wildrye row and the adjacent alfalfa row. **It does not mean there are 36 inches between Russian wildrye rows. There are now 72 inches between rows of Russian wildrye and rows of alfalfa.** Since the number of rows of Russian wildrye will now only be $\frac{1}{4}$ of a full 18-inch

row stand, only half the seed or 0.85 PLS pounds per acre is needed ($[208.7\text{-foot long rows} \times 34.8 \text{ rows per acre} @ 72 \text{ inches apart between Russian wildrye rows} \times 20 \text{ seeds per foot}] \div 170,000 \text{ seeds per pound} = 0.85 \text{ PLS pounds per acre of Russian wildrye}$). In Plant Materials Technical Note MT-46, the recommended seeding rate for alfalfa is 5 PLS pounds per acre for a full seeding on 12-inch rows. In a 36-inch row scenario, the amount of alfalfa needed would be approximately 0.80 PLS pounds/acre ($[208.7\text{-foot long rows} \times 34.8 \text{ rows per acre} @ 72 \text{ inches apart between alfalfa rows}] \times [\sim 25 \text{ seeds per foot}] \div 225,000 \text{ seeds per pound} = 0.80 \text{ PLS pounds per acre of alfalfa}$).

Cross-Hatch Method

The cross-hatch method involves sowing seeds of different species perpendicular to each other. For instance, one species such as Russian wildrye is sown north:south, while a second species, such as alfalfa, is sown east:west. This technique, like the alternate-row method, reduces within-row competition among sown species. The practice typically involves a single species in one direction and a single species in the other, but some variations may include a mix of compatible species in one of the directions. The drawback to this technique, in comparison to alternate rows, is it requires two trips across a field.

- a. Example – Using the Russian wildrye and alfalfa example again, let us say we want to design a cross-hatch planting with 18 inches between parallel and perpendicular rows (note this row spacing may be too close for many low precipitation locations). Since we have two species each sown on 18-inch between-row spacing, we will need half the seed calculated from Plant Materials Technical Note MT-46 for a full seeding of each species in 18-inch rows to obtain ~20 seeds per square foot. As noted above, a full seeding of Russian wildrye on 18-inch rows requires 3.42 PLS pounds per acre. Similarly, a full seeding of alfalfa on the same spacing requires 3.22 PLS pounds per acre ($[208.7\text{-foot long rows} \times 139 \text{ rows per acre} @ 18 \text{ inches apart}] \times [\sim 25 \text{ seeds per foot}] \div 225,000 \text{ seeds per pound} = 3.22 \text{ PLS pounds per acre}$). Since seed is planted in two directions, we have twice the seed per unit area as in a conventional planting, and therefore can reduce the seed required for each species to half (1.71 and 1.61 PLS pounds per acre for Russian wildrye and alfalfa, respectively).

References and Additional Information

Majerus, M. 2009. Forage and Reclamation Grasses of the Northern Great Plains and Rocky Mountains. Valley Printers, Bridger, MT. 161 pages.

Montana Plant Materials Technical Note MT-46 (Rev. 3). 2010. Seeding Rates and Recommended Cultivars. Bozeman, MT available at:

<http://www.mt.nrcs.usda.gov/technical/ecs/plants/technotes/pmtechnoteMT46.html>