
SEEDING RATE CONSIDERATIONS

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Proper seeding rate during establishment is critical to the establishment of a functional turfgrass stand that will develop to maturity as quickly as possible. High quality seed is relatively inexpensive on a cost per acre basis. Seeding at rates that are less than optimum will result in an open turfgrass stand of low shoot density which will encourage weed invasion and increase herbicide use and chemical cost. Therefore seeding at less than the recommended rate is not an effective cost saving strategy because it will add more cost in the long term. Seeding at rates in excess of those recommended in **Tables 1** and **2** will result in a stand containing a high number of small, young, immature (juvenile) plants. These will be slow to develop into mature and robust adult plants which are more tolerant of environmental stresses such as heat, drought, cold, and wear. Therefore it is important to avoid the temptation to seed at excessively high rates which can delay or postpone turfgrass stand development. The optimum seeding rate ranges given in **Table 1** (by mixture) and **Table 2** (by species) take into account several factors such as seed size and number, growth habit, and minimum purity and germination differences that exist among species.

SEED SIZE AND NUMBER

Large seed varieties such as ryegrass and tall fescue require higher seeding rates than small seed varieties like bentgrass and bluegrass. There are fewer seeds per pound with large seed varieties requiring higher rates to achieve a sufficient number of plants in the stand (which is ideally 7 to 14 plants per square inch).

GROWTH HABIT

Species with a spreading type growth habit (stoloniferous or rhizomatous, **Table 2**) such as creeping bentgrass and Kentucky bluegrass have a greater capacity to spread laterally than bunch type grasses such as tall fescue and ryegrass. For example, seeding spreading type grasses at less than recommended rates can over time develop a uniform, dense turf but will take a longer period of time to achieve, while bunch type grasses will develop a clumpy, non-uniform, and open appearance that will generally require overseeding to improve density. Therefore the minimum acceptable seeding rate is more important when seeding bunch type grasses.

PURITY AND GERMINATION (PLS)

Seed of lower purity and germination has to be seeded at higher rates to compensate for lower Pure Live Seed (PLS) content. If we wanted to sow Kentucky bluegrass which was determined to be 76% by weight PLS at the recommended rate of 2 lb. per 1,000 ft² (from **Table 2**) the following adjustment could be made to account for PLS using the example on next page. No seed is 100% Pure Live Seed (100% purity and germination) but normally is measurably less than 100% depending on the species minimum purity and germination (see

Table 2). Some adjustment in seeding rate using PLS as described in **Example 1** may be needed, especially if seed quality is low or when germination rate is expected to be low because of age and poor seed storage conditions.

Example 1

Calculating Percent Pure Live Seed

$$\text{Amount of seed needed per 1,000 ft}^2 = \frac{\text{Recommended seeding rate (lb. per 1,000 ft}^2) \times 100}{\% \text{PLS}}$$

Example 1: Kentucky bluegrass seed with 76 % PLS.

$$\text{Amount of seed needed per 1,000 ft}^2 = \frac{2 \text{ lb. per 1,000 ft}^2 \text{ (from Table 2)} \times 100}{76 \% \text{PLS (from Example 1)}} = 2.6 \text{ lb.}$$

Hence: 2.6 lbs. of Kentucky bluegrass seed would be needed per 1,000 ft² to deliver the recommended rate of 2 lbs. of viable seed per 1,000 ft².

EXPECTED FIELD SURVIVAL

It is important to understand that not all pure live seed which is capable of germinating is necessarily expected to survive the less than ideal germinating environment in the field. Any factors that contribute to high seedling mortality (death rate) would be expected to reduce the numbers of plants that will survive to maturity in a turfgrass stand. Actual field germination and survival may range from 50 to 95%. Under ideal field conditions for germination 95% survival can be expected, but with good field conditions a 70% survival rate may be expected. Therefore if seedling survival rates are expected to be low because of poor conditions for germination, higher seeding rates will be required to compensate. Seeding rates in **Tables 1** and **2** are given as ranges to allow for such conditions. For example, if seed bed preparation and post planting care are expected to be near ideal, then lower rates can be used. If good or less than ideal conditions are expected, then the high end of the seeding rate range is recommended.

If poor conditions for germination and seedling survival are expected, then seeding rates should be adjusted above those rates given in **Tables 1** and **2**. As a general rule increase the seeding rate by 50% to compensate for poor conditions. Factors or conditions that contribute to poor germination and seedling survival include:

- poor soil: drainage (excessive, poor), pH, nutrient deficiency, compaction, salinity.
- improper seedbed: inadequate or excessive soil firming, excessive tilling, rocks and debris at soil surface, poor seed/soil contact or coverage, inadequate or excessive mulch, steep grades (slopes) that contribute to soil erosion.

- less than ideal seeding time: late spring/early summer mortality (drought and heat stress, weed competition, and disease); late fall/ early winter mortality (winter desiccation, frost heaves, unfavorable temperatures).
- incorrect post-planting care: inadequate or excessive soil moisture (irrigation), improper mowing and fertilization practices.

Generally, the better the conditions for seeding (soil type, seedbed, time of year) the less seed will be required. Late summer and early fall is the preferred period for turfgrass establishment because warm soils promote rapid germination and turfgrass development, and the long favorable time for growth (2 to 3 months) that is expected before the onset of winter stress is a time of reduced weed competition.

Table I.
Recommended turfgrass mixtures (and uses) for Massachusetts.

Use	Species (% by weight)	Rate (lbs/1000 ft ²)
Athletic fields	80% Kentucky bluegrass* 20% perennial ryegrass* <i>(new fields)</i>	3 to 4
	100% perennial ryegrass* <i>(overseeding key wear areas)</i>	6 to 8**
Lawns-sun Med. to high maint.	65 to 75% Kentucky bluegrass* 10 to 20% perennial ryegrass* 15% fine fescue***	3 to 4
Lawns-sun Low maint.	65% fine fescue* 10-20% perennial ryegrass* remainder Kentucky bluegrass	4 to 6
Lawns-shade Well drained	80 to 90% fine fescue* 10 to 20% perennial ryegrass*	4 to 6
	80% shade tolerant K. bluegrass* 20% perennial ryegrass*	3 to 4
Lawns-shade Wet	70% 'Sabre' rough bluegrass 30% shade tolerant K. bluegrass*	2 to 3

*Two to three improved cultivars recommended.

**Recommended rate when more than 50% of the area is bare soil.

*** One or more improved cultivars recommended.

Table 2.

Seed quality of cool-season turfgrasses and related information.

Species	Growth Habit	Seeds per/lb	Seeding Rate lb/1000 ft ²	Minimum Purity %	Minimum Germination %	Pure Live Seed %
Bentgrass						
colonial	stolons	8,723,000	0.5 to 1.0	95	85	80.75
creeping	stolons	7,890,000	0.5 to 1.0	95	85	80.75
Bluegrass						
kentucky	rhizomes	2,177,000	1.0 to 2.0	90	75	67.5
rough	stolons	2,540,000	1.0 to 2.0	90	80	72.0
Fescue						
red	various	546,000	4.0 to 6.0	95	80	76.0
tall	bunch	227,000	7.0 to 9.0	95	85	80.75
Ryegrass						
annual	bunch	227,000	7.0 to 9.0	95	90	85.5
perennial	bunch	227,000	7.0 to 9.0	95	90	85.5

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