Seeding Rates Based on Cultivars

Dr. James B Beard

In the past 100 years the seeding rates of turfgrasses have been based on the individual species. This approach has resulted in acceptable turf establishment for the most part. However, significant changes have occurred that open the door for a new approach in selecting seeding rates.

Numerous turfgrass cultivars are available within a number of turfgrass species. This has resulted in a wide range in the number of seeds per pound among cultivars within certain species (see Table). **For certain species the range in seed number per pound can be two- to three-fold.** Examples include Kentucky bluegrass (*Poa pratensis*), tall fescue (*Festuca arundinacea*), perennial ryegrass (*Lolium perenne*), certain fine-leaf fescues (*Festuca rubra*), and Japanese zoysiagrass (*Zoysia japonica*). **These wide differences emphasize the need to adjust the seeding rate in relation to the specific cultivar of certain turfgrass species.** While favorable moisture and temperature conditions during the seed production period can result in a somewhat higher seed density with a lower number of seeds per pound, this potential variation is not nearly as significant as the variation that now exists among cultivars within certain turfgrass species.

Why the need to adjust the seeding rate in relation to the seed number factor for various turfgrass cultivars? Typically, excessively high seeding rates can create problems. The most successful planting rate in assuring rapid, uniform turfgrass establishment consists of **applying an approximate number of seeds per square inch equal or to slightly lower than the ultimate number of shoots per square inch of the mature turf for the turfgrass species involved.** For many cool-season turfgrasses mowed at a height of 1.5 inch (38 mm) the shoot density usually is in the range of 10 to 25 shoots per square inch. Excessively high seeding rates result in stunted growth, involving a high density of spindly, weak seedlings that tend to remain in a juvenile state for an extended period of time. This means there is a lack of rooting, tillering, and lateral stem development, such as rhizomes and stolons, needed to form a mature sod that has maximum tolerance to traffic, environmental, and pest stresses. Many seedlings will have to die in order to allow adequate space and quantities of light, moisture, and nutrients so a select few of the plants can mature to a fully tillered state with the desired lateral stem development. Thus, **although a very high seeding rate results in a more rapid green appearance, the rate at which a mature, stable turf is formed can be substantially slower than when using a more appropriate, lower seeding rate.**

There also is the question of using seeding rates lower than the norm. This depends on the particular turfgrass species involved. Selecting the appropriate seeding rate is particularly critical for turfgrass species with a bunch-type growth habit, such as tall fescue, Chewings fescue and the ryegrasses, as they do not possess the ability to grow laterally via rhizomes and/or stolons. In contrast, those species with a creeping growth habit via rhizomes or stolons can be planted at much lower seeding rates and in time can still form a quality, dense turf. The principal problem with using the low seeding rates is that a longer establishment period results in a greater likelihood of significant weed problems developing in the interim. Also, a thin turf canopy that allows sunlight to reach the soil surface results in greater temperature extremes and more rapid drying of the soil surface, thereby increasing the amount of environmental stress on the isolated seedlings via either heat kill or desiccation.

The final question is how to calculate the appropriate seeding rate for a cultivar? Assuming you know the seed number per pound for the particular cultivar to be planted and a desired number of seeds per square inch has been determined, the following formula can be used to calculate the seeding rate in pounds per 1,000 square feet:

$$\frac{\text{seed number desired per in.}^2 \times 144{,}000}{\text{seed number per lb}} = \text{seeding rate (lbs per 1,000 ft}^2\text{)}$$

TURFGRASS SEEDING RATE GUIDELINES

Turfgrass Common Name	Number of Seeds per Pound (thousands)		Seeding Rates[a]			
	Cultivar Range[b]	Mean	lb/1,000 ft^2	lb/A[c]	seeds[c] per kg/ha	in.^{2}
Bahiagrass	166 – 272	219	5.5 – 8.0	240 – 348	269 – 389	8.4 – 12.2
Bentgrass:						
colonial	5,000 – 8,720	6,860	0.5 – 1.0	22 – 44	25 – 49	23.8 – 47.6
creeping	4,887 – 7,937	6,412	0.5 – 1.0	22 – 44	25 – 49	22.5 – 45.0
velvet	8,000 – 11,800	9,900	0.3 – 0.7	13 – 30	15 – 34	20.6 – 48.1
Bermudagrass (hulled)	1,400 – 2,200	1,800	1.0 – 1.5	44 – 65	49 – 73	12.6 – 18.7
Bluegrass:						
creeping annual	1,700 – 2,300	1,900	1.0 – 1.5	44 – 65	49 – 73	13.3 – 19.7
Kentucky	800 – 1,900	1,350	1.5 – 2.0	65 – 87	73 – 97	14.0 – 18.7
rough	2,093 – 2,655	2,874	1.0 – 1.3	44 – 56	49 – 63	16.6 – 21.2
Buffalograss, American	40 – 56	48	1.5 – 2.5	65 – 110[d]	73 – 123	0.5 – 0.8
Carpetgrass, common	1,124 – 1,250	1,187	1.5 – 2.0	65 – 87	73 – 97	12.3 – 16.7
Centipedegrass	410 – 876	643	0.5 – 1.0	22 – 44[d]	25 – 49	2.3 – 4.5
Fescue:						
Chewings	365 – 535	450	4.5 – 7.0	196 – 305	219 – 342	14.1 – 21.9
creeping red	270 – 430	350	5.5 – 9.0	240 – 392	269 – 439	13.4 – 21.9
hard and sheep	420 – 930	675	3.0 – 4.5	131 – 196	148 – 220	14.1 – 21.1
meadow	226 – 230	228	7.0 – 9.5	305 – 414	342 – 464	11.1 – 15.0
tall	140 – 238	189	7.5 – 11.0	327 – 479	367 – 536	9.8 – 14.4
Grama, blue	850 – 900	875	1.5 – 2.5	65 – 110	73 – 123	9.1 – 15.3
Ryegrass:						
annual	190 – 230	210	8.0 – 11.0	390 – 479	341 – 536	13.1 – 16.0
perennial	140 – 390	265	7.0 – 10.5	305 – 457	342 – 512	12.9 – 19.3
Wheatgrass, fairway crested	190 – 350	270	4.5 – 5.5	174 – 240	195 – 269	7.5 – 10.3
Zoysiagrass, Japanese	862 – 1,652	1,257	1.5 – 2.5	65 – 109	73 – 122	13.1 – 21.8

[a] Where seed mixtures are utilized, the appropriate adjusted intermediate seeding rate should be used, based on the relative percentages of the various turfgrass species used.
[b] Among cultivars, the seed number can vary depending on the cultivar.
[c] Based on a mean of the two extremes in seed numbers listed in the third column.
[d] The very low seeding rate is due to high seed cost.