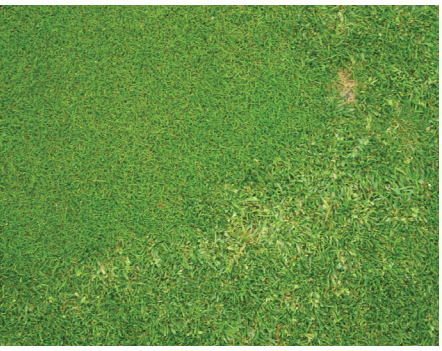
Bentgrass Cultivars for Golf Course Turf

Bulletin E324



Cooperative Extension

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With all the new and old bentgrass cultivars that are now on the market, how does a golf course superintendent/manager know which bentgrass species or cultivar(s) to choose? Selection depends on climate (location), resources of the facility, expected management practices and other factors including the adaptation and agronomic traits of the species and cultivar(s). The tables in this fact sheet categorize many popular bentgrass cultivars with respect to tiller density, leaf texture, disease resistance and traffic tolerance. Data for these tables was obtained from turf performance and disease evaluations of bentgrass cultivars tested in New Jersey and throughout the United States via the National Turfgrass Evaluation Program (NTEP; www.ntep.org).

Three bentgrass species are used for golf courses. The most widely used is creeping bentgrass *(Agrostis stolonifera)*. Creeping bentgrass has a prostrate growth habit and produces vigorous spreading stolons which allow it to tolerate low cutting heights and quickly recover from damage. These characteristics make creeping bentgrass a good choice for golf course putting greens in the cool-temperate and, in some cases, the warm-humid climates. Colonial bentgrass *(Agrostis capillaris)*, also known as brown top, has traditionally been used as a lawn and golf course grass in areas of Northern Europe and New Zealand that have mild (cool-humid) summers. Compared to creeping bentgrass, colonial bentgrass has a more upright growth habit and does not spread aggressively. It is generally better adapted for tees and/or fairways in the warmer summer climates of the United States. Velvet bentgrass *(Agrostis canina)* forms the finest textured and most dense turf of the bentgrasses and can nearly resemble green velvet when managed properly. It produces erect tillers and spreads with short stolons. Velvet bentgrass spreads more aggressively than colonial bentgrass but not as vigorously as creeping bentgrass.

In addition to growth habit differences, the three bentgrass species also vary in genetic color. Creeping bentgrasses typically range from medium green to a dark blue-green color, while colonial bentgrasses range from light to medium green. Velvet bentgrasses are the lightest of the bentgrasses and typically have a bright, apple green color (Figure 2). Genetic color is important to consider when blending cultivars or mixing species; blends and mixtures containing cultivars with dissimilar colors will form a segregated, mottled appearance over time. Table 1 categorizes the bentgrass cultivars for color. The creeping bentgrasses, 'Alpha', 'Benchmark DSR', 'Kingpin', 'SR 1119' and 'T-1' exhibit darker blue-green color. Medium green cultivars include '13M', 'Princeville' and 'SR 1150'. Velvet bentgrasses exhibit the lightest green color; 'SR 7200' is slightly darker green than most of the velvet bentgrasses currently available.

Tiller density (turf density) is one important trait affecting bentgrass performance on golf courses. Cultivars producing higher turf density are better able to resist invasion and spread of annual bluegrass *(Poa annua)* than cultivars with low shoot density (Cashel et al., 2005). However, cultivars with high turf density may be prone to thatch accumulation and therefore may require adjustments in management practices including fertilization, topdressing and cultivation (aeration, verticutting

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and grooming). Colonial bentgrass does not typically accumulate thatch as aggressively as creeping and velvet bentgrass.

Velvet bentgrass produces the highest tiller density of all the bentgrass species, and there are now a number of commercially available velvet bentgrass cultivars including 'Greenwich', 'Legendary', SR 7200, 'Venus', 'Vesper', and 'Villa' (Table 2). Creeping bentgrass cultivars vary widely in turf density ranging from high to very low. 'Century', 'Penn A-1', 'Penn A-4' and 'Penn G-2' are well known examples of high density creeping bentgrass cultivars, while 'Alpha', 'Authority', 'Declaration', 'Mackenzie' and 'Tyee' are examples of recently released high density creeping bentgrass cultivars. 'Seaside' is an example of an older cultivar with very low turf density and 'Penncross' and 'Cobra' are representative of cultivars that produce low density turf (Table 2). Colonial bentgrass can produce a turf density ranging from moderate ('Allister', "Glory' and 'Tiger II') to low ('Bardot').

Tiller density and leaf texture are typically correlated; cultivars with high turf density normally produce a turf with finer leaf texture. Therefore it is not surprising that the velvet bentgrass cultivars have a very fine leaf texture while cultivars with lower turf density such as 'Penncross', 'Putter' and 'Seaside' have coarse to very coarse leaf texture (Table 3).

The ability of a turf stand to handle wear is an important trait affecting the long term quality and playability of the surface. Wear damage is a result of repeated golf cart, maintenance equipment and foot traffic on the turf surface. Wear was simulated on evaluation trials during 2006 and 2007 using a novel wear simulator (Bonos, et al., 2001), which is an engine driven device with rotating rubber paddles that repeatedly hit the turf. Plots of different cultivars were rated for their ability to remain green and dense under these conditions. Other pests were controlled in these trials to reduce their influence on wear tolerance. Table 4 represents data collected over two years from three fairway trials established at North Brunswick, NJ in 2002, 2003 and 2004. Velvet bentgrass cultivars exhibited the best performance under these conditions compared to most creeping and colonial bentgrasses. Creeping bentgrass cultivars Authority, Declaration, 'Independence', MacKenzie, 'Penneagle II', 'Shark', and 'Tyee' had good performance while cultivars such as '18th Green', 'Bengal', 'Brighton', Penncross, 'Providence', 'Sandhill', 'Southshore', and 'Trueline' had poor performance. Colonial bentgrass cultivars typically had fair to good performance. Research data on traffic tolerance and recovery is limited, yet the available data indicates that newer cultivars of all bentgrass species are more durable. Generally, the denser cultivars tolerate wear much better than older, less dense cultivars. Ball marking is often thought to be severe on newer cultivars, but these observations are typically confused with the fact that the more severe ball marking is actually due to the lack of mature, resilient mat layer (age of the turf). New putting greens with immature turf will suffer more severe ball marking regardless of the species or cultivar. When properly maintained, dense cultivars will suffer less from ball marking and will recover better. Also note that ball marks are more visible on new, highly uniform putting green turf.

Bentgrass cultivars have varying degrees of genetic tolerance to plant pathogens. The relative tolerance among cultivars is important to consider in regions (climates) such as the northeastern and mid-Atlantic U.S. where disease pressure is high throughout the growing season. Cultivars with improved disease tolerance will perform better with lower and/or less frequent pesticide inputs. Tables 5 and 6 categorize bentgrass cultivars based on disease tolerance/susceptibility data from turf trials in New Jersey and across the U.S. (National Turfgrass Evaluation Program - NTEP). Golf course superintendents outside of New Jersey are encouraged to review data on disease tolerance from a local NTEP trial site because a particular cultivar's disease tolerance also depends on environmental conditions. Disease pressure may vary considerably across locations (environments) and may influence cultivar expression of disease tolerance.

Dollar spot disease, caused by the fungus *Sclerotinia homoecarpa*, is probably the most common disease on golf course turf in the northeastern U.S. Breeding efforts have produced new creeping bentgrass cultivars with improved tolerance to this common disease problem. Examples of newly released cultivars that exhibit improved tolerance include 'Benchmark DSR', Declaration, 'Kingpin', 'Memorial' and 'Pennlinks II' (Table 5) (Figure 3). Although these cultivars exhibit higher tolerance and can produce good turf quality with less fungicides, they are not completely resistant and can be damaged under high disease pressure, albeit much less than more susceptible cultivars. Cultivars that are highly susceptible to dollar spot disease include 'Century', 'Crenshaw', 'Imperial' and 'Independence'. The well known cultivar, Penncross, has moderate tolerance to dollar spot disease. Velvet bentgrass and colonial bentgrass cultivars generally have better tolerance of dollar spot disease than creeping bentgrass cultivars.

Brown patch disease, incited by the fungus R*hizoctonia solani*, can cause some loss of turf density on creeping and velvet bentgrass grown in the northeastern U.S. mainly during the months of July and August. Severe damage from brown patch disease is unusual on these species in the northeastern U.S. Colonial bentgrass cultivars, however, are quite susceptible to brown patch disease and loss of turf density (damage) can be evident during the months of June through September. Creeping bentgrass cultivars that are most tolerant of brown patch include Mackenzie, Penneagle II, 'Penn G-6' and 'Shark'; susceptible cultivars include 'Mariner', 'Penn A-1', Penncross and Pennlinks II (Table 6). Velvet bentgrass cultivars typically have very good tolerance to brown patch disease compared to creeping bentgrass (Table 6).

Plant breeding has produced marked improvements of many agronomic traits in newer cultivars of bentgrass compared to older cultivars. New construction and renovation of golf courses are obvious opportunities to use these improved cultivars but overseeding programs can be effective as well, particularly on fairways and tees. Trial data and experience on golf courses indicate that use of cultivars with low tiller density (thus non-competitive with annual bluegrass) or greater disease susceptibility should be discouraged in the northeastern U.S. New velvet bentgrass cultivars have performed well in recent NTEP trials in the Northeast US and indicate their usefulness for putting greens in the northeastern U.S. However, management of velvet bentgrass is quite different from creeping bentgrass; N fertilization and irrigation needs are lower and topdressing for thatch management is essential. Several improved colonial bentgrass cultivars are now available for fairways and tees in the cooler temperate climates of the northeastern U.S., however, superintendents need to be aware of this species sensitivity to a number of herbicides (consult herbicide labels for specific recommendations). Cultivar choice can also be influenced by the availability of maintenance equipment, labor and budgetary resources, which are different at every golf course.

Superintendents are encouraged to study the NTEP bentgrass evaluation trials (www.ntep.org) and Rutgers Turfgrass Proceedings (www.turf.rutgers.edu) for data on other strengths and weaknesses of cultivars that may be important for a specific use or location.

Literature Cited

Bonos, S.A., E. Watkins, J. A. Honig, M. Sosa, T. Molnar, J.A. Murphy and W.A. Meyer. 2001 Breeding cool-season turfgrasses for wear tolerance using a wear simulator. International Turfgrass Society Research Journal, Vol. 9:137-145.

Cashel, R. H., H. Samaranayake, T.J. Lawson, J.A. Honig, and J.A. Murphy. 2005 International Turfgrass Society Research Journal, 10(Part 1):531-537.

Figure Captions

Page 1, left figure: Density differences of bentgrass species.
Page 1, center figure: Color differences of bentgrass cultivars.
Page 1, right figure: Dollar spot differences between bentgrass cultivars.

Table 1. Genetic Color of Bentgrass Cultivars

Dark Green†	Medium Dark Green	Medium Green	Light Green
Alpha	007	13M	Seaside
Benchmark DSR	Authority	Princeville	
Kingpin	Bengal	SR 1150	
SR 1119	Declaration		
T-1	Independence		
	L-93	***SR 7200***	***Greenwich***
	MacKenzie		***Legendary***
	Memorial		***Venus***
	Penneagle II		***Vesper***
	Penncross		***Villa***
	Pennlinks II		
	Shark		
	Tyee		
		Glory	**Bardot**
	SR 7150	**Tiger II**	**SR 7100**

†Data for classification was based on data from the 2003 NTEP and 2001 through 2004 bentgrass trials at Rutgers University and presented in Rutgers Turfgrass Proceedings 2004/Vol. 36, 2005/Vol. 37, 2006/Vol. 38, 2007/Vol. 39, (www.turfgrass.rutgers.edu).

‡Cultivars in ***bold italic*** are velvet bentgrasses and cultivars in **bold** are colonial bentgrasses; cultivars in normal text are creeping bentgrasses.

Table 2. Relative Turf Density Among Creeping, Colonial and Velvet Bentgrass Cultivars

Very High†	High	Moderately High	Moderate	Moderately Low	Low	Very Low
Greenwich‡	007	Benchmark DSR	13M	Brighton	Cobra	Seaside
Legendary	Alpha	Imperial	Backspin	Cato	Mariner	
SR 7200	Authority	Independence	Bengal	Penneagle	Penncross	
Venus	Century	Kingpin	Crenshaw	Pennlinks	Putter	
Vesper	Declaration	Memorial	Grand Prix	Pennlinks II	Trueline	
Villa	MacKenzie	Penneagle II	L-93	Princeville	Viper	
	Penn A-1	SR 1150	Sandhill	Providence		
	Penn A-2		Seaside II	Southshore		
	Penn A-4		SR 1119			
	Penn G-1					
	Penn G-2					
	Penn G-6					
	Shark					
	T-1					
	Tyee					
			Allister‡	**SR 1700**	**Bardot**	
			Glory	**SR 7150**		
			Tiger II			

†Data for bentgrass cultivar classification was obtained from the 1998 and 2003 National Turfgrass Evaluation Program's National Bentgrass Trials (www.ntep.org) and trials conducted at Rutgers University from 2001 through 2004 and published in the Rutgers Turfgrass Proceedings 2004/Vol. 36, 2005/Vol. 37, 2006/Vol. 38, 2007/Vol. 39 (www.turf.rutgers.edu).

‡Cultivars in ***bold italic*** are velvet bentgrasses and cultivars in **bold** are colonial bentgrasses; cultivars in normal text are creeping bentgrasses.

Table 3. Leaf Texture of Bentgrass Cultivars

Very Fine†	Fine	Medium-Fine	Medium-Coarse	Coarse	Very Coarse
Greenwich‡	007	13M	Backspin	Penncross	Seaside
Legendary	Authority	Alpha	Crenshaw	Pennlinks	
SR 7200	Century	Benchmark DSR	L-93	Putter	
Vesper	Declaration	Bengal	Pennlinks II	Trueline	
Venus	MacKenzie	Grand Prix	Princeville		
Villa	Penn A-1	Imperial	Providence		
	Penn A-2	Independence	SR 1119		
	Penn A-4	Memorial			
	Penn G-1	Kingpin			
	Penn G-2	Penneagle II			
	Penn G-6	Sandhill			
	Shark	Seaside II			
	T-1	Southshore			
	Tyee	SR 1150			
		SR 7150‡			
		SR 7100	**Glory**		
		Allister	**Bardot**		
		Tiger II			

†Data for classification was obtained from the 1998 and 2003 National Turfgrass Evaluation Program's National Bentgrass Trials (www.ntep.org) and trials conducted at Rutgers University from 2001 through 2004 and published in the Rutgers Turfgrass Proceedings 2004/Vol. 36, 2005/Vol. 37, 2006/Vol. 38, 2007/Vol. 39 (www.turf.rutgers.edu).

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Table 4. Relative Performance of Bentgrass Cultivars Subjected to Simulated Wear

Very Good†	Good	Fair	Poor
Greenwich‡	***SR 7200***	Alpha	18th Green
Venus		Backspin	Bengal
Villa	Authority	Benchmark DSR§	Brighton
	Declaration	Crenshaw	Penncross
	Independence	Crystal BlueLinks	Providence
	MacKenzie	L-93	Sandhill
	Penneagle II	Kingpin§	Southshore
	Shark	Penneagle	Trueline
	SR 1150	Penn A-4	
	Tyee	Penn G-2	
		Penn G-6	
		SR 1119	
	Allister	**Glory§**	
	Bardot	**Tiger II**	

†Data for classification was based on data collected in 2006 and 2007 from bentgrass fairway evaluation trials and conducted at Rutgers University from 2002 through 2004 and presented in Rutgers Turfgrass Proceedings 2006/Vol. 38, and 2007/Vol. 39 (www.turf.rutgers.edu). The fairway evaluation trials were subjected to simulated wear using a novel wear simulator and pests were controlled.

‡Cultivars in ***bold italic*** are velvet bentgrasses and cultivars in **bold** are colonial bentgrasses; cultivars in normal text are creeping bentgrasses.

§Represent cultivars that exhibited varying levels of performance.

Table 5. Tolerance/Susceptibility of Bentgrass Cultivars to Dollar Spot Disease

Most Tolerant†	Moderately Tolerant	Moderately Susceptible	Highly Susceptible
007	Authority	Alpha	Century
13M	L-93	Bengal	Crenshaw
Benchmark DSR	Penn A-1	Backspin	Imperial
Declaration	Penn A-2	Grand Prix	Independence
Kingpin	Penncross	MacKenzie	
Memorial	Pennlinks	Penn A-4	
Pennlinks II	Seaside	Penneagle II	
	Seaside II	Penn G-1	
Greenwich‡	SR 1150	Penn G-2	
Legendary		Penn G-6	
SR 7200		Princeville	
Venus		Providence	
Vesper		Sandhill	
Villa		Shark	
		Southshore	
Allister‡	**Glory**	SR 1119	
Bardot		T-1	
SR 7100		Tyee	
SR 7150			
Tiger II			

†Data for bentgrass cultivar classification was obtained from the 1998 and 2003 National Turfgrass Evaluation Program's National Bentgrass Trials (www.ntep.org) and trials conducted at Rutgers University from 2001 through 2004 and published in the Rutgers Turfgrass Proceedings 2004/Vol. 36, 2005/Vol. 37, 2006/Vol. 38, 2007/Vol. 39 (www.turf.rutgers.edu).

‡Cultivars in ***bold italic*** are velvet bentgrass and cultivars in **bold** are colonial bentgrass; cultivars in normal text are creeping bentgrass.

Table 6. Tolerance/Susceptibility of Bentgrass Cultivars to Brown Patch Disease

Most Tolerant†	Moderately Tolerant	Moderately Susceptible	Highly Susceptible
MacKenzie	007	Alpha	Bengal
Penneagle II	13M	Backspin	Mariner
Penn G-6	Authority	Benchmark DSR	Penncross
Shark	Century	Brighton	Penn A-1
	Crenshaw	Kingpin	Pennlinks II
	Declaration	L-93	Providence
Greenwich‡	Grand Prix	Penn A-2	Seaside
Legendary	Imperial	Penn A-4	
Venus	Independence	Penn G-2	
Vesper	Memorial	Princeville	
Villa	Penn G-1	SR 1119	
SR 7200	Pennlinks		
	Sandhill	**Allister‡**	**Bardot**
	Southshore	**Tiger II**	**SR 7100**
	SR 1150		**SR 7150**
	T-1		
	Tyee		

†Data or classification was obtained from the 1998 and 2003 National Turfgrass Evaluation Program's National Bentgrass Trials (www.ntep.org) and bentgrass evaluation trials conducted at Rutgers University 2001 through 2004 and presented in Rutgers Turfgrass Proceedings 2004/Vol. 36, 2005/Vol. 37, 2006/Vol. 38, 2007/Vol. 39 (www.turf.rutgers.edu).

‡Cultivars in ***bold italic*** are velvet bentgrasses and cultivars in **bold** are colonial bentgrasses; cultivars in normal text are creeping bentgrasses.

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