ZOYSIAGRASS

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Zoysiagrass (*Zoysia* spp.) was one of the first grasses to be used as turf and is native to several countries including Australia, China, Japan, Korea, New Zealand and the Philippines. Although plants are well rooted, some varieties grow slowly both vertically and laterally. All have energy-rich, aboveground (stolons) and belowground (rhizomes) stems. This warm-season turfgrass generally performs best in full sun or light, open shade (Figure 1). Many varieties produce no seed and must be established from sod, plugs or sprigs (pieces of stems with nodes capable of producing new plants). Depending on the planting date, sprigging rate, or plug diameter and spacing, the vegetatively propagated varieties may require more than a year to totally cover the soil surface.

Identification. Zoysiagrass has rolled vernation, meaning the youngest leaves, inside the leaf sheath and yet to extend, are circular or rolled in the shoot rather than appearing V-shaped or folded (Figure 2). Leaf blades are stiff and have hairs on the upper surface (Figure 3). The leaf tip is sharply pointed or tapered (Figure 4), and the ligule, which is found at the junction of the leaf sheath and leaf blade, is a fringe of hairs (Figure 5). The collar is continuous and has hairs at the edges. The leaf sheath is split with overlapping margins, and a tuft of hairs may be visible at the throat (Figure 6). Plants have no auricles (small outgrowths from the base of the leaf blade at the collar). The inflorescence or seedhead of seed-producing species consist of a flower stalk called a peduncle supporting the entire terminal seedhead to which racemes with ten to fifty spikelets are attached. Each seed is suspended on a short (for example, one-and-one-half to six millimeters) pedicel and alternately attached along the spikelet from base to tip (Figure 7).

Figure 1. *Zoysiagrass forms a durable, uniform turf in full sun and light, open shade. Photo credit: Tom Samples.*

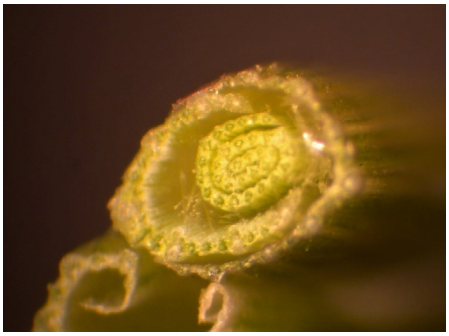

Figure 2. *The youngest leaves inside the leaf sheath are circular or rolled in the shoot. Photo credit Tom Samples.*

Figure 3. *The leaf blade is stiff and has hairs on the upper surface. Photo credit Tom Samples.*

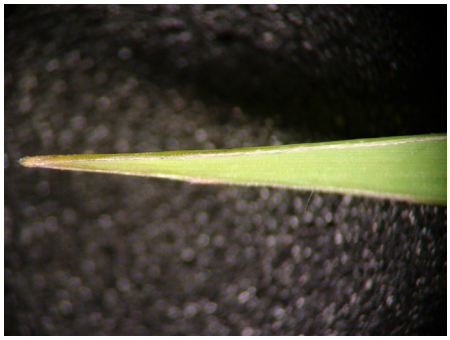

Figure 4. *The leaf tip is tapered or sharply pointed. Photo credit Tom Samples.*

Figure 5. *The ligule is a fringe of hairs. Photo credit Tom Samples.*

Figure 6. *The leaf sheath is split with overlapping margins, and a tuft of hairs may be visible at the throat. Photo credit Tom Samples.*

Figure 7. *Seeds are alternately attached along the spikelets from base to tip. Photo credit Tom Samples.*

Growth Habit. Leaves and stems developing from nodes on stolons and rhizomes usually grow upright at an angle of about ninety degrees (Figure 8), a trait contributing to the very good to excellent stand density of the species. Leaves and stems are very tough due to elevated levels of lignin and hemicellulose. These attributes contribute to the plant's wear tolerance. The rate of growth of lateral stems is slower than that of bermudagrass (*Cynodon* spp.) and St. Augustinegrass (*Stenotaphrum secundatum*). As a result, zoysiagrass turfs may take longer to recover from wear, disease or insect damage. Plants turn golden-brown in color as they enter dormancy in late fall or early winter (Figure 9). Zoysiagrass turfs develop excessive thatch. Thatch is the tightly intermingled layer of living and decaying stems, leaves and roots found at the soil surface (Figure 10). To help ensure that surface water readily moves into the soil and that plants remain firmly rooted, the turf should be dethatched when the thatch layer reaches a depth of one-half inch.

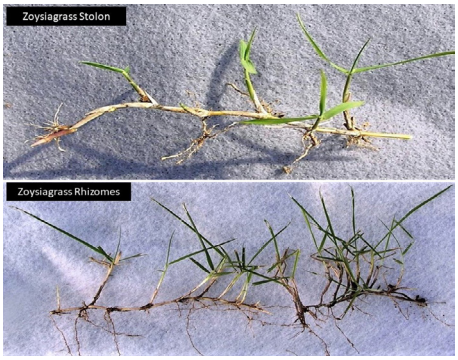

Figure 8. *Leaves and stems develop from nodes on stolons and rhizomes and usually grow upright at an angle of about ninety degrees. Photo credit Tom Samples.*

Figure 9. *Zoysiagrass turfs turn golden-brown in color as they enter dormancy in late fall or early winter. Photo credit Alan Windham.*

Figure 10. *Thatch is the tightly intermingled layer of living and decaying stems, leaves and roots found at the soil surface. Photo credit Tom Samples.*

Adaptation/Fertilizer Requirement. Zoysiagrass grows best in full sun and, although some varieties have much better shade tolerance than that of bermudagrass, often loses density in medium to heavy shade. The species has particularly good drought, heat and salinity tolerance. Plants respond to drought by quickly going dormant, often within a week under typical drought conditions. They may remain dormant for an extended period in the absence of rain or irrigation. Once irrigation or rainfall resume, they transition from dormancy and regain their green color. Zoysiagrass needs less nitrogen (N) than bermudagrass. In Tennessee, an annual N rate of no more than two pounds of N per 1,000 square feet per year is most often recommended in residential turfs maintained at a cutting height of one-and-one-half inches or higher. The first application of N in spring (for example, mid-May to mid-June) is intended to support recovery from winter dormancy. The second N application in summer (for example, mid- to late July) will supply plants with this essential nutrient to sustain growth throughout the remainder of the growing season. Zoysiagrass is adapted to many types of soil. Plants grow best in slightly acidic soil (for example, a pH of 6.0 to 6.9) with, in addition to N, proper amounts of phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), sulfur (S), and the micronutrients boron (B), chlorine (Cl), copper (Cu), iron (Fe), manganese (Mn), molybdenum (Mo), nickel (Ni) and zinc (Zn). Soil samples can be sent to the University of Tennessee Soil Testing Lab in Nashville for nutrient analysis. A standard test includes soil pH, buffer pH, phosphorus, potassium, calcium, magnesium, zinc, manganese, iron, sodium and boron. Fertilizer and limestone recommendations accompany the soil test results. Information about soil sampling and pricing information is available online at Soil Analysis | Soil, Plant and Pest Center (soillab.tennessee.edu).

Figure 11. *Fall armyworm caterpillars damage turfgrasses by chewing leaves and stems. Photo credit Frank Hale.*

Figure 12. *Small, legless hunting billbug larvae feed inside plant stems, often hollowing them out, before moving into the thatch layer where they continue feeding on stolons, rhizomes and roots. Photo credit Frank Hale.*

Figure 13. *Green June beetle larvae burrow to the soil surface at night and feed on turfgrasses. Photo credit Frank Hale.*

Insects/Diseases/Weeds. Insect pests of zoysiagrass include fall armyworm (*Spodoptera frugiperda*) (Figure 11), hunting billbug (*Sphenophorus venatus vestitus*) (Figure 12), and the larvae of several species of Scarab beetles including green June beetle (*Cotinus notida*) (Figure 13), Japanese beetle (*Popillia japonica*), May beetle (Phyllophaga spp.) and southern masked chafer beetle (*Cyclocephala lurida*). The disease large patch caused by the fungus *Rhizoctonia solani*, commonly referred to as *Zoysia*

patch or large patch, may also be problematic (Figure 14). Bermudagrass and nimblewill (*Muhlenbergia schreberi*) (Figure 15) may become persistent grassy weeds in zoysiagrass turfs. Several preemergence herbicides are labelled for the control of winter annual weeds such as annual bluegrass (*Poa annua*), common chickweed (*Stelaria media*), purple deadnettle (*Lamium purpureum*) and henbit (*Lamium amplexicaule*) (Figure 16). These herbicides are effective when applied in late summer before seeds of the winter annual weeds begin germinating. Similarly, the emergence of seedlings of many summer annual and perennial weedy grasses and broadleaf weeds can be prevented by applying an appropriate preemergence herbicide in late winter or early spring. As the name suggests, postemergence herbicides labelled for use in zoysiagrass will control or suppress many species of emerged weeds that are competing with turfgrass plants for water, nutrients, light and space.

Figure 14. *The fungus Rhizoctonia solani may damage zoysiagrass and cause diseased patches with orange-bronze borders. Photo credit Alan Windham.*

Figure 15. *Nimblewill may invade zoysiagrass turfs. Photo credit Greg Breeden.*

Figure 16. *The winter annual broadleaf weed henbit is especially visible in dormant zoysiagrass. Photo credit Tom Samples.*

SPECIES

Zoysiagrass, named in honor of the 18th century botanist Karl von Zois from Australia, was introduced into the United States from East Asia and the Pacific Islands. It has been previously reported that in the mid-1890s *Z. japonica,* sometimes called Japanese or Korean lawn grass, was introduced from the Manchurian region of China. *Zoysia matrella* is believed to have been introduced from the Philippines in 1912 by the United States Department of Agriculture (USDA) botanist, C. V. Piper. As a result, this species is occasionally referred to as Manilagrass. Recent research about the history of zoysiagrass suggests that *Z. matrella* may have been introduced from Japan in 1892, and that *Z. japonica* was introduced from Korea in 1894. A third species, Korean velvet grass or Mascarene grass, most likely came from the Mascarene Islands which are located in the Indian Ocean east of Madagascar or from a plant collection (listed as plant introduction 9299) of USDA explorer David Fairchild in 1902 from Yokohama, Japan. Originally referred to as *Z. tenuifolia*, this fine textured species is now recognized as *Z. pacifica*. Rankings of low-temperature hardiness, leaf width and rate of growth by species are *Z. japonica*, followed by *Z. matrella*, and finally *Z. pacifica* (Table 1). These three species are recognized as turfgrasses in the United States, however eleven different zoysiagrass species exist worldwide. Including, *Z. minima* which has been crossed with *Z. matrella* to develop fine textured grasses tolerant to low mowing heights for putting greens.

VARIETIES

Vegetative, Clonal Types. Several vegetatively established zoysiagrass varieties are marketed or being maintained in Tennessee.

- Cavalier, released for production in 1996, has long and slender leaves, good salt and traffic tolerance, and like Palisades, improved shade tolerance. It is also resistant to fall armyworms and large patch.
- El Toro, released in 1986, resembles Meyer. However, El Toro is more shade tolerant, faster growing, has slightly wider leaves, is less dense and produces less thatch.
- 'Emerald', released in 1955 by the USDA, is a hybrid between *Z. japonica* and *Z. pacifica*. A goal of crossing the two species was to combine the darker green color, fine texture and excellent stand density of the *Z. pacifica* parent from Guam with the cold hardiness and more rapid growth rate of the *Z. japonica* parent from Korea. Although less tolerant of extreme low temperatures, it is denser, finer textured and more shade tolerant than Meyer.
- 'Innovation,' a cross between the *Z. matrella* variety Cavalier and an ecotype of *Z. japonica* named 'Anderson 1', a derivative of Chinese Common, is a joint release by Texas A&M AgriLife Research and Kansas State University. Cold tolerance, fall color retention and spring transition are equivalent to Meyer, and plants have a finer leaf texture and are more resistant to bluegrass billbug (*Sphenophorus parvulus*).
- 'Lobo' (formerly experimental designation XZ 14069), released for commercial production and marketing by North Carolina State University in 2021, was selected based in part on its stress tolerance and aggressive rate of establishment. It is medium-fine textured and well adapted for infrequently managed turf areas (for example, golf course roughs and roadsides) as well as on golf course fairways and in residential and commercial landscapes.
- Meyer, also referred to as 'Z-52', is an improved selection of *Z. japonica* with medium-coarse leaf blades, good cold tolerance and a faster rate of lateral growth compared to several other varieties. Released in 1951, it is one of the oldest varieties in the marketplace and is still widely maintained throughout the state.
- Palisades (Figure 17), released in 1996 by Texas A&M University, is noted for good winter hardiness and recuperative ability and improved shade tolerance. Its texture is medium-coarse and the length of rhizomes and stolons between nodes and the stem diameter resemble Meyer.
- Royal, released by Texas A&M University in 2001, has dense rhizomes and tillers, excellent salt tolerance, improved shade tolerance and recovers more rapidly from injury than several other varieties. It may also transition from winter dormancy earlier than other varieties.
- 'Stadium', trademarked by Bladerunner Farms Inc., Poteet, Texas, is dark green, dense and has a rapid lateral growth rate. It is currently being evaluated for performance at several management intensity levels at the East Tennessee AgResearch and Education Center Plant Sciences Unit in Knoxville.
- Zeon (Figure 18), released in 1996 by Bladerunner Farms, is very tolerant of extended periods of drought, is adapted to both clay and sandy soils, and develops a dense turf at a cutting height of one-half inch, one reason the variety is maintained on golf course fairways. Zeon has good insect resistance and better shade tolerance than Meyer.
- Zorro, released by Texas A&M University in 2001 has improved shade tolerance, excellent salt tolerance, and resists several diseases and insect pests. It has limited cold hardiness.

Seeded Types. Seed of 'Chinese Common' *Z. japonica* imported from China, Japan and/or Korea is marketed in the Southeastern United States. The color and leaf blade width of 'Zenith' (Figure 19) a seed-producing *Z. japonica* variety released in 2000 by Patten Seed Company are comparable to Meyer. 'Compadre' (formerly named 'Companion') is another *Z. japonica* variety that yields seed. It also resembles Meyer and may transition from winter dormancy slightly earlier than Zenith. Chinese Common, Compadre and Zenith are not intended to be maintained in moderate to heavy shade. Zoysiagrass seeds are often pre-treated (primed or scarified) and may be coated before packaging to improve the uniformity of seed germination and rate of seedling growth and protect seedlings from certain fungal pathogens. There are approximately 601,440 uncoated zoysiagrass seeds per pound.

Figure 17. *Palisades zoysiagrass is a medium-coarse, low-temperature hardy variety. Photo credit Tom Samples*

Figure 18. *Zeon is a dense, fine-textured and relatively low-growing zoysiagrass variety. Photo credit Tom Samples*

Figure 19. *The color and leaf blade width of Zenith zoysiagrass resemble the variety Meyer. Photo credit Tom Samples.*

CLASSIFICATION OF SPECIES/VARIETIES

Historically, and based on morphological characteristics such as leaf blade width, inflorescence and shade tolerance, individual varieties have been categorized as being *japonica, matrella or pacifica* species or types within the genus *Zoysia*.

Recent genetic research conducted at North Carolina State University in collaboration with the University of Florida, the USDA Agricultural Research Service in Tifton, Georgia, and Blue Moon Farms, LLC reveals that an interconnectedness exists among species. Because zoysiagrasses are cross fertile, plant breeders can develop improved varieties with traits of keen interest from each species as well as valued and overlapping traits that both species share. A total of sixty-two varieties and collections from five different zoysiagrass species (*Z. japonica, Z. matrella, Z. machrostachya, Z. minima and Z. sinica*) were included in this study from which a zoysiagrass family tree was developed. DNA markers were used to investigate the genetic makeup of each variety which fell into one of three categories named by the researchers as clusters (Table 2). Cluster I includes *Z. japonica* varieties and both *Z. machrostachya* and *Z. sinica*. Cluster III contains the *Z. matrella* varieties. Cluster II consists of hybrids between *Z. japonica* and *Z. matrella* and is divided into two subgroups. The researchers labelled the subgroups Hybrid I and Hybrid II. Hybrid I has *Z. japonica* x *Z. matrella* hybrids with a higher concentration of genetic material from *Z. japonica*. Hybrid II has *Z. japonica* x *Z. matrella* hybrids with a higher concentration of genetic material from *Z. matrella*. In addition to helping turfgrass breeders, this information helps sod farmers and turf managers develop effective production and maintenance plans according to variety-specific requirements.

GOLF GREENS

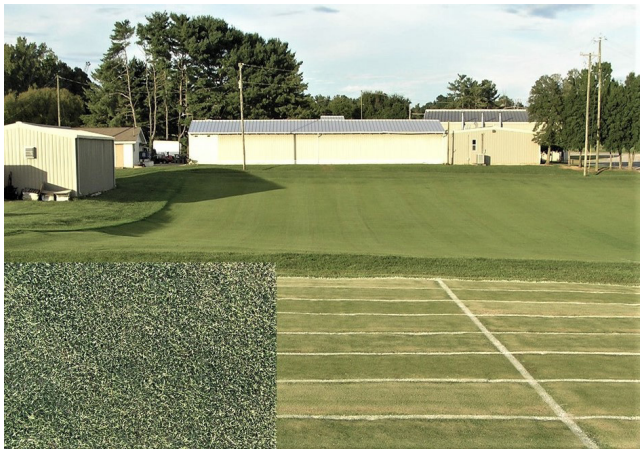

Figure 20. *Research green at the Plant Sciences Unit of the East Tennessee AgResearch and Education Center in Knoxville where several zoysiagrasses are being evaluated for use on golf greens. Photo credit Tom Samples.*

Interest in breeding, producing and marketing zoysiagrasses for use on golf greens is growing (Figure 20). Presently, 'Diamond', a variety of *Z. matrella* with fine to dwarf leaf texture, resistance to large patch and fall armyworm and excellent stand density released by Texas A&M University in 1996 is being maintained on golf greens in the United States. Breeders and researchers are developing and evaluating new zoysiagrasses for suitability as sustainable golf green surfaces (Table 3). In 2011, 'Prizm' (originally designated 'M60') was identified as a distinctly different vegetative or clonal plant with fine leaf texture and a deeper green color compared to other zoysiagrasses growing under cultivated conditions near Poteet, Texas. Prizm originated from crosses among Zeon, Trinity, and two unpatented plants '29-2 B9' and '380-1'. The variety 'M85' was also developed from the same collection. It, too, produced a vegetative patch or clonal plant much different than surrounding plants. M85 produced fewer seedheads compared to Diamond and when evaluated in the fall, lower numbers of dollar spot (*Clarireedia spp.*) lesions than the surrounding grasses. 'Lazer,' formerly designated as DALZ1308, is a new ultra-dwarf zoysiagrass developed at Texas A&M University specifically for putting greens and first produced by controlled hand pollination in 2004 in Dallas, Texas. It is a hybrid between *Z. minima* and the variety Diamond with very fine leaf texture, high aerial shoot density and improved winter color retention. The species *Z. minima* is native to New Zealand where it grows along the coast to about 2,000 feet above sea level on sand dunes and in sandy and gravelly soils.

COMPARING VARIETIES

National Turfgrass Evaluation Program (NTEP). The results of the NTEP Zoysiagrass Tests help turfgrass breeders and others decide if a particular variety of interest is adapted to a local area or region and a specific level of maintenance. To date, there have been six National Zoysiagrass Tests. The first test, started in 1991, contained twenty-four entries of which four were seeded. Entries were evaluated from 1992 to 1995 by university researchers at twenty-one locations in eighteen states. Evaluators in each state used the same standard procedures to determine such traits as overall quality, color, leaf texture, spring transition, establishment/seedling vigor, drought tolerance, frost tolerance/winter kill, and insect and disease resistance. Several of these varieties are still being produced as sod and managed in Tennessee landscapes. Eight of the entries in the 1996 National Zoysiagrass Test conducted in fifteen states were seeded types and included the variety Zenith. Eight of the twenty entries evaluated in the 2002 National Zoysiagrass Test in sixteen states were seeded types and included both Zenith and Compadre. Ten of the eleven entries in the 2007 National Zoysiagrass Test were vegetative types, and the test was conducted in seven states. Thirty-five named and experimental varieties in the 2013 National Zoysiagrass Test were evaluated in twelve states, including Tennessee. For the first time, the zoysiagrass entries were evaluated for traffic and drought tolerance; traffic tolerance in Fayetteville, Arkansas, and Raleigh, North Carolina, and drought tolerance in College Station, Texas. There are thirty-nine entries in the most recent test, planted in 2019 in twelve states including Tennessee. All entries are vegetative types. Annual progress reports and final reports have been published and are available online at National Turfgrass Evaluation Program - Previous Data2 (ntep.org). Information regarding the performance of eleven zoysiagrasses entered in the 2013 NTEP National Warm-season Putting Green Test along with fifteen bermudagrass and two seashore paspalum (*Paspalum vaginatum*) species is also available online at 2013 National Warm-Season Putting Green Test (ntep.org).

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Table 1. Leaf width and relative shoot density, shade tolerance and cold hardiness of zoysiagrass species maintained as turf in the United States.[a]

Species	Leaf Width	Shoot Density	Shade Tolerance	Cold Hardiness
Z. japonica	Greater than 2.5[b]	Medium	Fair to Good	Moderate
Z. matrella	1.5 – 2.5	Medium	Good	Poor
Z. pacifica	Less than 1.5	High	Good to Excellent	Very Poor

[a] Source: Patton, A., B. M. Schwartz and K. E. Kenworthy. 2017. Zoysiagrass (Zoysia spp.) History, Utilization, and Improvement in the United States: A Review. Crop Sci. (57) July–Aug. Zoysiagrass (Zoysia spp.) History, Utilization, and Improvement in the United States: A Review (wiley.com).

[b] Varieties of Z. japonica can be grouped based on leaf width. Varieties in one group (for example, 'Carrizo,' 'Chisholm,' 'Crowne,' 'El Toro,' 'Empire,' 'Palisades' and 'Zenith') usually have a leaf width > 3.5 mm, and rhizomes and stolons with much longer internodes compared to those in the second group. Leaves of varieties in the second group (for example, 'Cutlass,' 'DeAnza' and 'Meyer') are usually narrower than those in the first group. Cutlass and DeAnza are often referred to as Meyer types.

Table 2. Zoysiagrass variety accession, registration and patent numbers, date of release by agency, company or university, and species designation based on morphology or genetic research conducted at North Carolina State University.

Variety, Accession (AN), Registration, Plant Production & Patent Protection (PP) #s	Year of Introduction, Agency, Institution or Company	Species/Morphology	Species/Genetic Markers[a]
Vegetative Types			
BA-189 PP23716	2005, University of Florida	*Z. japonica*	*Z. matrella*
Belair AN R52-25, RN 104	1985, USDA	*Z. japonica*	*Z. japonica*
Cashmere (P1) PP6529	1989, Pursley Turf Farms	*Z. matrella*	*Z. matrella*
Cavalier (DALZ8507) PP10788	1996, Texas A&M University	*Z. matrella*	Hybrid II
Crowne (DALZ8512) PP11570	1996, Texas A&M University	*Z. japonica*	Hybrid I
DeAnza (Z88-8) PP9127	1995, University of California	*Z. japonica*	Hybrid I
Diamond (DALZ8502) PP10636	1996, Texas A&M University	*Z. matrella*	*Z. matrella*
El Toro (UCR#1) PP5845	1984, Univ. of California, Riverside	*Z. japonica*	Hybrid I
Emerald (RN 7)	1955, USDA & U. S. Golf Assoc.	*Z. japonica x Z. pacifica*	Hybrid II
Empire (SS-500) PP11466	1999, Sod Solutions	*Z. japonica*	Hybrid I
Empress (SS300) PP11495	2000, Sod Solutions	*Z. japonica*	Hybrid I
GNZ, OakZ (ZT-11) PP7074	1989, Greg Norman Turf	*Z. japonica*	Hybrid II
GS90-18 PP9089	1995, Japan	*Z. matrella*	
Himeno PP13267	2002, Zoysian Japan Co., Ltd.	*Z. japonica*	*Z. japonica*
JaMur PP13178	1996, Bladerunner Farms	*Z. japonica*	Hybrid I
Marion PP14147	2008, Heritage Turf	*Z. japonica*	Hybrid I
Matrella (FC 13521) PI 48574	1941, Alabama AES	*Z. matrella*	Hybrid I
Meyer, Amazoy (RN 12, Z-52)	1951, USDA/ U. S. Golf Assoc.	*Z. japonica*	*Z. japonica*
Midwest	1963, Indiana Agric. Expt. Sta.	*Z. japonica*	*Z. japonica*
Miyako, PP10187	1998, Japan	*Z. japonica*	
Palisades (DALZ8514) PP11515	1996, Texas A&M University	*Z. japonica*	Hybrid I
Rollmaster	2008, Winrock Grass Farm	Unknown	Hybrid II
Royal (DALZ9006) PP14395	2001, Texas A&M	*Z. matrella*	Hybrid II
Serene PP14175	2008, Heritage Turf	*Z. japonica*	Hybrid I
Shadowturf (Ivey-1) PP20266	2007, Ivey Gardens Greenhouses	Unknown	*Z. matrella*
Southern Gem PP15218	2008, Heritage Turf	*Z. japonica*	Hybrid I
Toccoa Green (BA305) PP18415	2005, University of Florida	*Z. matrella*	*Z. matrella*
Trinity L1F PP25203	2014, Bladerunner Farms	*Z. matrella*	*Z. matrella*
Victoria (Z88-14) PP9135	1995, University of California	*Z. japonica*	Hybrid I
Leisure Time Zoysia/ LTZ (Y2) PP17824P2	2006, Bladerunner Farms and Patten Seed	*Z. japonica*	Hybrid II
Zeon PP13166	1996, Bladerunner Farms	*Z. matrella*	Hybrid II
Zorro (DALZ8510, 9601) PP14130	2001, Texas A&M University	*Z. matrella*	Hybrid II
Seeded Types			
Chinese Common		*Z. japonica*	*Z. japonica*
Compadre (ZMB-2)	1993, Seed Research of Oregon	*Z. japonica*	*Z. japonica*
Zenith (ZNW-1)	1993, Patten Seed	*Z. japonica*	*Z. japonica*

[a] Source: Milla-Lewis, S. and J.A. Kimball. 2018. Rooted in research. Genetic research shines light into Zoysia's 4family tree. C. Reynolds (ed.) Turf News. Turfgrass Producers International. May/June, Pp. 48-51

Table 3. Accession/registration number or experimental designation, year of introduction by agency, institution or company, and species of several zoysiagrass varieties presently or formerly commercially available in the United States.[a]

Variety, Accession (AN), Registration (RN) & Patent Protection (PP) #s	Year of Introduction, Agency, Institution or Company	Species
Aloyzia PP22168	2011, Aloyzia Blue	*Z. japonica*
BK-7	1987, Craft Turf Farms	*Z. japonica*
Carrizo (6136) PP17808	2006, Bladerunner Farms	*Z. japonica*
Chisholm (DALZ 0102) P1666039	2012, Texas A&M University & Kansas State University	*Z. japonica*
Cutlass (LR-1) PP25380	2013, Bladerunner Farms	*Z. japonica*
Geo (BK-9) PP20150020273 P1	2010, Sod Solutions	*Z. japonica x Z. pacifica*
Icon (MAC03)	2011, DIG Plant Company	*Z. macrantha*
Innovation (KSUZ 0802) PP31464	2015, Kansas State University & Texas A&M AgriLife Research / Sod Solutions	*Z. japonica x Z. matrella*
Marquis (TC 2033)	1991, Turf Center	*Z.* spp.
Lazer[b] (DALZ1308) PP32805	2018, Texas A&M University/ Bladerunner Farms	*Z. minima x Z. matrella*
Lobo (XZ14069)	2021, North Carolina State University/ Sod Solutions	
Prizm (M60) PP29143	2017, Bladerunner Farms	*Z. matrella*
M85 PP27289 P2	2016, Bladerunner Farms	*Z. matrella*
Omni (CD2013)	1991, Bladerunner Farms	*Z. matrella*
Sunburst (Z-73)	1952, USDA	*Z. japonica*
ZoyBoy (Z-3) PP8553	1994, Quality Turfgrass	*Z. japonica x Z. matrella*

[a] Source: Patton, A., B. M. Schwartz and K. E. Kenworthy. 2017. Zoysiagrass (Zoysia spp.) History, Utilization, and Improvement in the United States: A Review. Crop Sci. (57) July–Aug. Zoysiagrass (Zoysia spp.) History, Utilization, and Improvement in the United States: A Review (wiley.com).

[b] Source: Saldana, G. 2018. Texas A&M AgriLife Research licenses DALZ 1308 for production. January. New zoysia grass performs as ideal putting surface - AgriLife Today (tamu.edu).

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