Breeding and Development of Zoysiagrass

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Goals:

- *Develop improved zoysiagrass cultivars with multiple character performance involving low water-use, persistence under drought and temperature stress, and tolerance to poor water quality.*
- *Develop seeded zoysiagrasses that are genetically stable, with improved turf quality, persistence, and competitive ability.*
- *Continue genetic studies involving the heritability and stability of biological traits.*

Cooperators:

Ikuko Yamamoto
Yaling Qian

The Zoysiagrass breeding program was initiated in 1984 and during the past 13 years has enjoyed a long productive relationship with the United States Golf Association. This constitutes the final report for the joint research project between Texas A&M and the United States Golf Association.

The success of the breeding program is measurable. The success of this project is notable because of both the cultivars that were developed and released into the market, and the training and development of young scientists. *DIAMOND, CAVALIER, PALISADES,* and *CROWNE* zoysiagrass were released. The young scientists involved in this program over the years include Dr. Michael Kenna, Research Director, United States Golf Association; Dr. David Huff, Assistant Professor, Pennsylvania State University, Dr. Richard White, Associate Professor, Texas A&M University; Dr. Bridget Ruemmele, Assistant Professor, University of Rhode Island; Dr. Ken Marcum, Assistant Professor University of Arizona; Dr. Ikuko Yamamoto, now married and serving as a foreign language interpreter in Boston Mass; and Dr. Yaling Qian, Assistant Professor, Colorado State University.

Additionally we have enjoyed the interaction and significant contribution of a host of technical support staff including Mr. Sam Riffell, who is now working on his Ph.D. in the Zoology Department, Michigan State University and Ms. Sharon (Morton) Anderson, who is presently pursuing her Ph.D. on zoysiagrass taxonomy at Texas

A&M University. With the close interaction and contribution of each of these individuals, we have successfully developed and released into the industry four unique zoysiagrass cultivars each targeting a niche of the environment.

DIAMOND, a *Z. matrella,* is noted for its fine texture close mowing tolerance, excellent rhizome production, and unsurpassed salinity tolerance and tolerance to low light conditions. *DIAMOND* is targeted for shaded tees, bentgrass green surrounds to reduce bermudagrass encroachment and possible use as a putting surface and sports field. *DIAMOND* will be limited to the gulf coast states under natural environmental conditions.

CAVALIER, a *Z. matrella*, is noted for its fine texture cold hardiness in comparison to *DIAMOND*, excellent shade tolerance, salinity tolerance, and good recuperative ability and high turf quality when maintained under fairway conditions. *CAVALIER* is adapted to turf conditions through Southern Illinois, Missouri and Kansas area southward to the Gulf and eastward through the Carolinas.

PALISADES is a medium coarse textured *Z. japonica* that has excellent turf quality, shade tolerant and low water needs. This cultivar is targeted for use on golf course fairway and rough areas, home lawns, industrial parks and general use areas where a low-maintenance, quality lawn is desired. *PALISADES* is adapted to a region from Central Kansas, Missouri and Illinois southward to the gulf and eastward through the Carolinas.

CROWNE a coarse textured Z. japonica is the most cold hardy of the four grasses with low water use and highly competitive against weed invasion, adapted to low maintenance conditions through the transition zone south.

The success of this program will be judged on the long-term success of the individuals involved and the acceptance of the cultivars into the industry. The USGA's participation and contributions to research are acknowledged and greatly appreciated.

Table 5. Summary of agronomic merits and limitations of four new zoysiagrasses.

New Zoysiagrass	Agronomic merits	Agronomic limitations
DIAMOND (DALZ8502) is a fine textured highly rhizomatous, vegetatively propagated *Z. matrella* noted specifically for its excellent tolerance to low light and high salt conditions, and rapid recuperative ability. Diamond is suitable for use as a warm-season turfgrass for putting greens and tee boxes on golf courses especially in the coastal regions of the southern United States where shade and salinity are a problem.	Excellent salt tolerance Excellent shade tolerance Highly rhizomatous Excellent sod strength Low water requirements Early spring green up Good genetic color Fall color retention Fine leaf texture High shoot density Disease Resistance: *Rhizoctonia* blight resistance Insect Resistance: Fall army worm and tawny mole cricket	Lacks winter hardiness Tropical and sub-tropical climates Susceptible to the tropical sod web worm Susceptible to zoysiagrass mite Tendency to thatch and scalp Will not tolerate overseeding Slow initial establishment from sprigs
CAVALIER (DALZ8507) is a fine-textured, long-leaf, vegetatively propagated Z. *matrella* noted specifically for uniformity in appearance and distinct summer presentation. It is genetically stable, basically self-infertile and vegetatively propagated through weak rhizome and strong stolon growth.	Cold hardy Shade tolerant Salt tolerant High visual quality Fine leaf texture Spreads by stolons Good genetic color Insect resistance: tropical sod web worm, fall army worm, tawny mole cricket Disease resistance: *Pythium* blight and *Rhizoctonia* blight	Requires sharp reel mower Slow rate of establishment Slow rate of recovery Vegetative propagation required Potential tendency of thatch Susceptible to zoysiagrass mite
CROWNE (DALZ8512) is a coarse-textured, vegetatively propagated clone of Z. *japonica* which is suitable for use as warm-season turfgrass for golf course roughs, home lawns, industrial parks, and highway right-of-ways throughout the central mid-western states. Optimum mowing height will range from 5.0 to 7.5 cm; however, it can be mowed as close as 1.5 cm.	Medium-coarse texture High visual quality Rapid establishment and regrowth Good fall color retention Shade tolerant Salt tolerant Cold hardy Heat tolerant Variable mowing height (1.0 to 7.5 cm)	Susceptible to *Rhizoctonia* Tendency to scalp
PALISADES (DALZ8514) is a medium-coarse textured vegetatively propagated clone of Z. *japonica* which is suitable as a warm-season turfgrass throughout the transition zone for golf course fairways and roughs, home lawns, sports fields, industrial parks, and highway medians. Optimum mowing height ranges from 1.0 to 5.0 cm. On tees and fairways, mowing heights of 8 mm is possible with acceptable results.	Medium-coarse texture High visual quality Rapid establishment and regrowth Good fall color retention Shade tolerant Salt tolerant Cold hardy Heat tolerant Variable mowing height 1.0 to 5.0 cm)	Susceptible to fall army worm