

Development of Seeded Zoysiagrass Cultivars with Improved Turf Quality and High Seed Yields

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Objectives:

1. *Develop seeded type zoysiagrass germplasm/cultivar(s) with high seed yields that offer an economical alternative to vegetative types with the potential for rapid turf establishment.*
2. *Breed to improve characteristics such as turf quality, competitive ability and persistence under biotic and abiotic stresses.*

Zoysiagrass is most often vegetatively/clonally propagated since it produces a higher quality turf. Marketing and distribution are, however, easier with seeded cultivars. The breeding program in Dallas has a zoysiagrass germplasm collection of over 850 accessions that were made by Milt Engelke and Jack Murray in the early '80's. Seven of eleven zoysia species are represented in the collection. All species are sexually cross compatible. Genetic diversity is present in the collection for heat, drought and salinity tolerance and insect and disease resistance.

Species crosses were made with seeded type *Zoysia japonicas* ('Zenith' and 'Compadre') and finer textured types such as *Z. matrella* ('Diamond', 'Cavalier', 'Royal', 'Emerald' and DALZ 8501). We also used a little utilized species, *Z. macrantha*, to broaden the genetic base and enhance hybrid vigor which could impact seed yields.

Seed was harvested from isolation blocks in 2010 for seed germination testing and spaced plant nursery development in 2011. In order to minimize inbreeding depression and maximize hybrid vigor we are striving to develop a multiclonal synthetic. When selecting the parents for a multiclonal synthetic, attention to flowering time is important to ensure and enable cross pollination. Seed head height needs to exert 3" to 4" above the canopy to facilitate seed harvest.

We are using the classical plant breeding technique called recurrent selection in order to make population improvements. This has proven to be a useful approach when the trait of interest is influenced by many genes. We will use recurrent selection to improve for seed yields and seedling vigor while maintaining good turf

Figure 1. 2011 Seeded Zoysia Spaced Plant Nursery one year after planting.



quality by stacking genes for yield and thus moving the population mean by selecting for those individuals with higher seed yields.

Following chemical scarification seed viability was tested both on filter paper and in the soil in order to evaluate % germination and seedling vigor. A total of 300 seeds from each family were used as the sample size. The resulting progeny population was taken to the field and planted in a spaced plant nursery. We also included new germplasm selections identified in some of our other nurseries that have the potential for good

seed yields to be grown along side the progeny derived from germination testing to determine if they flower at the same time as the best recurrent selection derived progeny.

In the 2011 Seeded Zoysia Spaced Plant Nursery we planted a total of 766 progeny. Notes were collected on the SPN for TQ, % cover, genetic color, green up, leaf texture and seed head quantity. Data analysis for the one year data set enabled us to identify the top 10% or 64 entries and they were found to represent 16 out of 24 families with one to 10 progeny per family represented. The plan of work for 2013 is to make selections from the 2011 Spaced Plant Nursery and plant a 2013 Isolation Block as we continue with the next cycle of recurrent selection.

We also planted a field trial using the 15 seeded families and included Zorro and Zenith as checks. Seeding rate was 1 lb / 1000 sq. ft. or approximately 2g / 4 sq. ft. A bulk amount of 6 g / entry was weighed out for scarification using 40% KOH for 20 min. It should be noted that once the seed lots were scarified and allowed to dry that it was found that they had lost weight. The remaining amount was divided into 3 equal parts for planting of each rep. What had been 2g lots ranged from 1.3 to 1.8 g. Soil native to the area to be planted was used as a carrier for the seed lots with approximately 80 ml of soil per seed packet. Seed plus soil was distributed in a 2' x 2' area in the middle of the

plot. Following planting, the area was covered with Reemay cloth to hold seed in place while germinating. Water sprinklers were placed on a timer to be applied 3 times per day initially. Notes were taken on the plot over the last year. SAS analysis of data for TQ, density, genetic color, leaf texture and seed head numbers was conducted for the 2011 Seeded Zoysia Field Trial. Ten of 15 families were in the top statistical group.

Summary Points

- 15 fine textured parental lines with the potential for good seed production were allowed to open pollinate in isolation blocks (planted in 2009) and seed harvested in 2010.
- Seed lots were tested from each open pollinated seed parent to determine % germination and seedling vigor and the resulting progeny (684) were planted in 2011 in a SPN for the next cycle of seed parent selection. Zenith was included as a check. Notes for TQ, Genetic Color, % Cover, Texture and Seed head were taken.
- A Field trial was also planted in 2011 using the experimental seed lots of fine textured zoysias in order to evaluate turf quality and data was collected.