

Annual Report - 2015

Breeding and Evaluation of Kentucky Bluegrasses, Tall Fescues, Fine Fescues Perennial Ryegrasses and Bentgrasses for Turf

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Objectives:

1. Collect and evaluate useful turfgrass germplasm and associated endophytes.
2. Continue population improvement programs to develop improved cool-season cultivars and breeding synthetics.
3. Develop and utilize advanced technology to make current breeding programs more effective and efficient.

Start Date: 1982

Project Duration: Continuous

Total Funding: \$10,000 per year

As of October 30, 2015 over 2,256, promising turfgrasses and associated endophytes were collected in Poland, Bosnia, Croatia, Italy, Greece, Norway, Finland, Latvia, Denmark, Lithuania and Norway. These are having seed produced in the Netherlands and will be evaluated in New Jersey. Over 11,948 new turf evaluation plots, 95,995 spaced-plant nurseries and 6,680 mowed single-clone selections were established in 2015.

Over 200,000 seedlings from intra and inter-specific crosses of Kentucky bluegrass were screened for promising hybrids under winter greenhouse conditions and the superior plants were put into spaced-plant nurseries in the spring. Over 12,850 tall fescues, 4,000 Chewings fescues, 6,000 hard fescues, 20,000 perennial ryegrasses and 7,000 bentgrasses were also screened during the winter in greenhouses and superior plants were put in spaced-plant nurseries. Over 90 new inter- and intra-specific Kentucky bluegrasses were harvested in 2015.

The following crossing blocks were moved in the spring of 2015: 8 hard fescues (312 plants), 6 Chewings fescues (253 plants), 18 perennial ryegrasses (1,720 plants), 6 strong creeping red fescues (151 plants), 19 tall fescues (498 plants), 8 creeping bentgrasses (125 plants), 8 velvet bentgrass (182 plants), 9 colonial bentgrasses (248 plants) and 6 *Deschampsia cespitosa* (118 plants).

To enhance our breeding for resistance to gray leaf spot, a July 23, 2015 planting of 2,200 perennial ryegrasses were seeded. Excellent *Pythium* blight control was attained and a good gray leaf spot epidemic occurred. This data will be used to select future varieties of perennial ryegrass. Over 20,000 perennial ryegrasses were planted in the spring of 2015 as spaced-plants. They were allowed to develop seed heads in the late spring and selections were made for stem and crown rust resistance and heat tolerance.

The breeding program continues to make progress breeding for disease resistance and improved turf performance. New Promising varieties named and released in 2015 were Pacific Gem, Benchmark, Stamina, Expedite, Sea Biscuit, Man O War, Metolius and Xcelerator perennial ryegrasses; 4thMillenium, Bizem, Rebounder, Rowdy, Double Take, Firewall, Diablo, Technique, Temple, Avenger II, Thunderstruck, Thor, Raptor III, Dynamite and Bloodhound tall fescues. There was also one creeping red fescue fescue named Marvel and three hard fescues Minimus, Sword and Blue Ray. New Kentucky blugrasses were Legend, Unite, Fargo, Bolt, BlueBank, Malbec and Martha. There was one new creeping bentgrass named Luminary.

Summary Points

- Continued progress was made in obtaining new sources of turfgrass germplasm. These sources are being used to enhance the Rutgers breeding program.
- Modified population backcrossing and continued cycles of phenotypic and genotypic selection combined with increasing sources of genetic diversity in turfgrass germplasm. This has resulted in the continued development and release of top performing varieties in the NTEP
- Five perennial ryegrasses, 15 new tall fescues, 7 Kentucky bluegrasses and 4 fine fescue ,and 1 creeping bentgrass were released in 2015.
- Published or have in press over 2 referred journal articles in 2015

References

Refereed Research Publications:

Honig, J.H., J. Vaicunias, V. Avellero, C. Kubik, W.A. Meyer and S.A. Bonos. 2015. Classification of bentgrass (*Agrostis*) cultivars and accessions based on microsatellite (SSR) markers *Genet Resour Crop Evol*. DOI 10.1007/s10722-015-0307-6.

Koch, M. W. Meyer and S.A. Bonos. 2015. Heritability of salinity tolerance in perennial ryegrass. *Crop Science* 55(4): 1834-1842.

Abstracts:

Meyer, W., S. Bonos, E.N. Weibel, A. Grimshaw, H. Que, R. Bara, M. Mohr, D. Smith and T. Tate. 2015. Overcoming the challenges of breeding cool-season turfgrasses for low-input turf. p. 16. In Proceedings of the 24th Rutgers Turfgrass Symposium. January 16, 2015.

Jespersen, D., F. Belanger, J. Honig, W. Meyer, S. Bonos and B. Huang. 2015. Development and confirmation of candidate gene markers for selection of heat tolerance. p. 19. In Proceedings of the 24th Rutgers Turfgrass Symposium. January 16, 2015.

Grimshaw, A., W. Meyer and S.A. Bonos. 2015. Evaluation of hard fescue (*Festuca brevipila*) for summer patch (*Magnaportheae poae*). p. 35. In Proceedings of the 24th Rutgers Turfgrass Symposium. January 16, 2015.

Non-referred Publications:

Weibel, E.N., T.J. Lawson, J.B. Clarke, J.A. Murphy, B.B. Clarke, W.A. Meyer, and S.A. Bonos. 2015. Performance of bentgrass cultivars and selection in New Jersey turf trials. 2014 Turfgrass Proceedings 46:1-42.

Tate, T.N., A.L. Grimshaw, D.A. Smith, R.F. Bara, M.M. Mohr, E.N. Weibel, S.A. Bonos, and W.A. Meyer. 2015. Performance of fine fescue cultivars and selections in New Jersey turf trials. 2014 Rutgers Turfgrass Proceedings 46:43-68.

Grimshaw, A.L., T.M. Tate, M.M. Mohr, R.F. Bara, D.A. Smith, E.N. Weibel, J.A. Murphy, S.A. Bonos and W.A. Meyer. 2015. Performance of Kentucky bluegrass cultivars and selections in New Jersey turf trials. 2014 Rutgers Turfgrass Proceedings 46:69-129.

Qu, Y., E.D. Koch, M.M. Mohr, R.F. Bara, D.A. Smith, E. Szerszen, S.A. Bonos and W. A. Meyer. 2015. Performance of fine fescue cultivars and selections in New Jersey turf trials. 2014 Rutgers Turfgrass Proceedings 46:131-160.

Tate, T., R.F. Bara, D.A. Smith, M.M. Mohr, S.A. Bonos, and W.A. Meyer. 2015. Performance of tall fescue cultivars and selections in New Jersey turf trials. 2014 Rutgers Turfgrass Proceedings 46:161-188.