Rutgers University - Summary

# Breeding and Evaluation of Kentucky Bluegrass, Tall Fescue, Fine Fescue, Perennial Ryegrass, and Bentgrass for Turf

C. Reed Funk, James Murphy, James White, William K. Dickson, Ronald Bara, Suichang Sun, Dirk Smith, Randy Prostak, and Pedro Perdomo

1. Promising turfgrass germplasm and associated endophytes were collected from old turfs in New Jersey, Colorado, France, and Spain. New sources of endophytes were found in Poa species native to Colorado and the mountains between France and Spain.

2. Severe turf loss was observed on all endophyte-free fine fescues in the 1989 National Fine Fescue Tests at both Adelphia and North Brunswick, NJ. Damage on endophyte-free fine fescues initially appeared as a summer patch disease with many root systems colonized by ectotrophic fungi. High populations of chinch bugs subsequently increased turf damage and slowed recovery. Studies are in progress to determine whether some endophytes in fine fescue might be associated with enhanced resistance to the summer patch disease.

3. Acremonium endophyte enhanced resistance to the dollar spot disease was again observed in field trials of fine fescue. Both mycelial growth and damage by the dollar spot fungus was greatly reduced on fine fescues containing an endophyte.

4. A few experimental selections of Kentucky bluegrass are performing well in low-maintenance turf trials receiving limited fertilizer, no irrigation, and no fungicides or insecticides. Most of the entries showing the best recovery from severe summer stress have been classified as mid Atlantic ecotypes. They have deep extensive rhizomes, an ability to develop a deep root system during hot weather, medium broad leaves, and a growth habit intermediate to the tall narrow-leaved midwest common types and the lower-growing turf types. They are much more vigorous in spaced-plant nurseries than most turf-types. They generally show improved resistance to billbugs and better tolerance of some other insect pests.

5. BVMG (Baron, Victa, Merit, Gnome) types of Kentucky bluegrass are showing increasing damage from stripe smut and other turfgrass maladies. The widespread use of these similar and probably closely related bluegrasses appears to promote an increasing abundance of pathogens adapted to these host genotypes.

6. Seed production was initiated on Elf and APM perennial ryegrasses. Germplasm developed at the New Jersey Agricultural Experiment Station was used in the breeding of these varieties.

Rutgers University

# Breeding and Evaluation of Kentucky Bluegrass, Tall Fescue, Fine Fescue, Perennial Ryegrass, and Bentgrass for Turf

C. Reed Funk, James Murphy, James White, William K. Dickson, Ronald Bara, Suichang Sun, Dirk Smith, Randy Prostak, and Pedro Perdomo

1. Promising turfgrass germplasm and associated endophytes were collected from old turfs in New Jersey, Colorado, France, and Spain. New sources of endophytes were found in Poa species native to Colorado and the mountains between France and Spain.

2. Over 6,900 new turf evaluation plots and over 7 acres of spaced-plant nurseries were established in 1993.

3. Field and greenhouse research is continuing on a herbicide management program to selectively remove rough bluegrass from Kentucky bluegrass turfs.

4. An additional 175 turf-type tall fescue progenies were sent to Dr. Ronny Duncan at the Georgia Agricultural Experiment Station at Griffin, GA for evaluation on very acid soils (pH 4.0) in an area which also receives severe stress from summer heat, drought, and many diseases, insects, and nematodes. A few attractive, dark green, turf-type plants survived the severe summer of 1993 in tests established in 1991 and 1992. They are being selected for additional evaluation and breeding studies. This study was also designed to assess the role of various Acremonium endophytes on various aspects of turf performance under these conditions.

5. Severe turf loss was observed on all endophyte-free fine fescues in the 1989 National Fine Fescue Tests at both Adelphia and North Brunswick, NJ. Damage on endophyte-free fine fescues initially appeared as a summer patch disease with many root systems colonized by ectotrophic fungi. High populations of chinch bugs subsequently increased turf damage and slowed recovery. Studies are in progress to determine whether some endophytes in fine fescue might be associated with enhanced resistance to the summer patch disease.

6. Acremonium endophyte enhanced resistance to the dollar spot disease was again observed in field trials of fine fescue. Both mycelial growth and damage by the dollar spot fungus was greatly reduced on fine fescues containing an endophyte.

7. Kentucky bluegrass cultivars and selections showed significant differences in degree of wilting under heat and drought stress. Striking differences were also noted in amount of turf loss following summer stress in a hot, dry environment receiving

limited air circulation. Bluegrasses showing reduced wilting and better fall recovery generally showed an ability to remove moisture at a greater depth during heat stress.

8. A few experimental selections of Kentucky bluegrass are performing well in low-maintenance turf trials receiving limited fertilizer, no irrigation, and no fungicides or insecticides. Most of the entries showing the best recovery from severe summer stress have been classified as mid Atlantic ecotypes. They have deep extensive rhizomes, an ability to develop a deep root system during hot weather, medium broad leaves, and a growth habit intermediate to the tall narrow-leaved midwest common types and the lower-growing turf types. They are much more vigorous in spaced-plant nurseries than most turf-types. They generally show improved resistance to billbugs and better tolerance of some other insect pests.

9. BVMG (Baron, Victa, Merit, Gnome) types of Kentucky bluegrass are showing increasing damage from stripe smut and other turfgrass maladies. The widespread use of these similar and probably closely related bluegrasses appears to promote an increasing abundance of pathogens adapted to these host genotypes.

10. Seed production was initiated on Elf and APM perennial ryegrasses. Germplasm developed at the New Jersey Agricultural Experiment Station was used in the breeding of these varieties.

11. Damage by four species of billbugs (bluegrass, little, uneven, and hunting) continues to be the greatest cause of turf loss in older, low-maintenance Kentucky bluegrass trials at both Adelphia and North Brunswick, New Jersey. Genetic resistance to these insect pests is being stressed in our turfgrass breeding program.

## Publications


1. Hurley, R.H., Mary Beth Clarke-Ruh, John Morrissey, R.F. Bara, W.K. Dickson, and C.R. Funk. 1992. United States Plant Variety Protection Certificate No. 8800230. Lofts 1757 Kentucky bluegrass. Issued September 30, 1992.

2. Funk, C.R., R.H. White, and J.P. Breen. 1993. Importance of Acremonium endophytes in turfgrass breeding and management. Agric. Ecosystems Environ. 44:215-232.

3. Dickson, W.K., J.A. Murphy, R.F. Bara, S. Sun, D.A. Smith, J.B. Clark, B.B. Clarke, and C.R. Funk. 1993. Performance of bentgrass cultivars and selections in NJ turf trials. Rutgers Turfgrass Proceedings 24:61-67.

4. Smith, D.A., R.F. Bara, W.K. Dickson, R.W. Duell, L.L. Betts, S. Sun, B.B. Clarke, and C.R. Funk. 1993. Performance of fine fescue cultivars and selections in New Jersey turf trials. Rutgers Turfgrass Proceedings 24:68-87.

5. Murphy, J.A., R.F. Bara, W.K. Dickson, D.A. Smith, S. Sun, B.B. Clarke, and C.R. Funk. 1993. Performance of Kentucky bluegrass cultivars and selections in New Jersey turf trials. Rutgers Turfgrass Proceedings 24:88-126.

6. Bara, R.F, W.K. Dickson, D.A. Smith, and C.R. Funk. 1993. Performance of perennial ryegrass cultivars and selections in turf trials at Adelphia and North Brunswick. Rutgers Turfgrass Proceedings 24:134-146.

7. Perdomo, P., J.A. Murphy, R.F. Bara, D. A. Smith, W.K. Dickson, S. Sun, L.L. Betts, B.B. Clarke, and C.R. Funk. 1993. Performance of tall fescue cultivars and selections in New Jersey turf trials. Rutgers Turfgrass Proceedings 24:147-164.

8. Funk, C.R., J.A. Murphy, and D.R. Huff. 1993. Turfgrass germplasm - diversity and vulnerability of perennial ryegrass, tall fescue, and Kentucky bluegrass. Agronomy Abstracts page 188.