

Selecting for Improved Perennial Ryegrass Cultivars

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There is a large team effort to develop improved cultivars of perennial ryegrass with improved winter hardiness, turf quality, disease resistance and herbicide tolerance. Developing elite turf-type perennial ryegrass varieties would expand Minnesota's grass seed producer's options, extend the range of adaptation, and improve persistence in the turf environment. Initially, elite perennial ryegrass varieties and experimental lines were crossed with NK200, an older variety with acceptable winter hardiness but poor turf quality including coarse leaf texture and crown rust susceptibility.

Progeny from the crosses were evaluated and plants which combined winter hardiness and turf quality were selected for further evaluation and breeding activities. Turf plots were established in 2002 of experimental populations selected for excellent turf quality and increased winter hardiness (Table 1 and 2).

Our evaluations indicate that winter hardiness can be improved to levels higher than is currently available in ryegrass cultivars. To date, we have two populations of perennial ryegrass with superior winter hardiness that are currently being released by the University of Minnesota and seed should be commercially available to turf managers in 2005.

Research has also focused on developing herbicide tolerant perennial ryegrass using a naturally occurring, herbicide resistant

gene identified in annual ryegrass using traditional plant breeding methods. The first herbicide tolerant variety was released by the University of Minnesota in 2001 and is called P101. Commercial seed production was initiated in northern Minnesota and seed was commercially available starting in the Fall, 2003. P101 has a moderate level of winter hardiness and turf quality, but improved rust resistance. Plant breeding efforts have continued and the second generation cultivar, P201, was released in 2003. P201 is herbicide tolerant with significant improvements in turf quality and winter hardiness over P101. Seed should be commercially available by 2006.

Breeding activities have been conducted cooperatively with Rutgers University to improve the level of turf quality and disease resistance in our perennial ryegrass breeding populations. Through two cycles of crossing our breeding populations with the elite breeding populations from Rutgers, we have been able to incorporate resistance to gray leaf spot, a devastating new disease of perennial ryegrass, and substantially improve the turf quality of our breeding populations. Currently, these populations are in field evaluations to continue our selection program to improve winter hardiness and resistance to rust while maintaining high turf quality.

Table 1.
2002 Perennial Ryegrass Turf Trial - St. Paul Campus

2003 Ratings

Entry Mean Turf Quality Winter Injury

Private Cultivars:

Affinity	3.8	4.7
Blackhawk	3.4	5.0
Brightstar SLT	4.2	3.7
Brightstar II	4.6	3.3
Citation fore	4.7	3.3
NK-200	3.2	4.0
Paragon	4.1	4.0
Pinnacle	3.6	4.3
Prowler	3.7	3.3

University of Minnesota Cultivars and Experimental Populations:

P101	4.4	4.0
P201	4.6	4.3
Spreader2	5.3	5.0
TQ x SP	4.7	3.0
MHT x Rutgers	5.7	6.0
Spreader x Rutgers	6.9	4.0
Wh select	3.7	5.0
WH x TQ	3.6	5.0

Turf quality rating:

1 = poor to 9 = excellent

Winter hardiness rating:

1 = dead to 9 = no injury

Seeding date: 8/22/02

Table 2.

**2002 Perennial Ryegrass
Winter Hardiness Evaluation**

Winter Hardiness

Entry St. Paul Roseau Mean

Private Cultivars:

Affinity	6.5	0.9	3.7
Brightstar SLT	5.9	1.8	3.8
Citation Fore	6.4	2.1	4.2
NK-200**	6.4	3.0	4.6

**University of Minnesota Cultivars
and Experimental Populations:**

P101	6.1	1.2	3.6
P201	6.7	2.1	4.4
Spreader2	6.9	2.4	4.2
TQ x SP	7.6	1.7	4.7
Wh select	7.7	3.5	5.6
WH x TQ	7.4	5.3	6.3
LSD @5%	1.2	1.4	1.0

***Winter injury rating scale:**

1= dead to 10 = no injury.

** poor stand of NK-200 which resulted in more winter injury