ONTARIO Turfgrass SYMPOSIUM

Conference Highlights

- Breeding Improved Turfgrasses for Sports Turf Use by Dr. William Meyer
- Sports Turf Managers' Certification Program by Steve Trusty
- Sports Turf Safety and Risk Management by Dr. Arthur Mittlestaedt Jr.
- Lawn Tennis Court Maintenance by Thom Charters

Breeding Improved Turfgrasses for Sports Turf Use

DR. WILLIAM A. MEYER

Dr. Meyer is the Associate Director at the Centre for Turfgrass Science at Rutger's University's Cook College located in New Brunswick, New Jersey. Bill has developed or co-developed over 60 improved turfgrass and forage cultivars. He was on the Board of Directors for the International Turfgrass Society from 1989 to 1997.

New Brunswick is located in a good transition zone and is subject to a wide variety of summer stresses. These factors, in combination with the many disease problems found around the United States, make New Brunswick a good place to test turf-related plants.

Ryegrass history

The variety Manhattan was introduced in 1967. Dr. Reid Funk, working out of Rutger's University, found these clones in Central Park in six to seven inch patches that came from one seed 150 years earlier. He put the material together and named it Manhattan, the first turf type of ryegrass. Dr. Funk told people there might be a market for ryegrass, maybe 1,000,000 pounds per year; however, he warned that caution should be taken in seed production since there is not a lot of germplasm available.

Current figures show that the market for turf type perennial ryegrasses is around 200,000,000 pounds per year. Dr. Funk was a little conservative in his estimate of the total market demand, but he was correct to issue a warning on seed production. We need new material. Most of the present varieties and the germplasm we are using at Rutger's came from the mid-Atlantic area including the Manhattan source. Citation, Pennant, and All-Star came from Baltimore City's old areas. I found plants in St. Louis and in Washington D.C. in the mid 1970s.

Disease Resistance

It takes years to breed in disease resistance, and we have continued to make improvements. In 1997, many of the plants were outdoing the top rated varieties that existed in 1995. So there is still improvement in ryegrass for overall quality. We have bred in a lot of resistance for leaf spot in the ryes, which is very important during establishment time. Much improvement has been made in brown patch. In contrast with the straight European variety, we have made good progress. We haven't any resistance to gray leaf spot (prevalent in our area), but we have developed some resistance to red thread—an area where we still need to improve. We do not have disease resistance genetically to Pythium. Future improvements also need to be made with respect to good heat and cold tolerance—especially in ryegrass.

Breeding

In the cool season, there are two different breeding methods that we use to try to breed grasses for athletic field usage. In the case of Kentucky bluegrass, breeding is what we call asexual or apomictic. This means that when the flower opens up, a cell outside of the mother tissue becomes the embryo. Since the embryo is like an identical seedling to the mother plant, we have to use some very strange techniques to change or make a new bluegrass hybrid. One of the problems with this asexual characteristic in bluegrass is that it is very difficult to predict bases on these crosses.

In the case of all other cool season grasses, ryegrass being one, they are what is called open-pollinated. Each plant is self sterile and needs pollen from another source in order to produce seed. So we can make use of 220 clones that have the same pollen time, cross these plant progenies, and make selections based on the best mixes found in each research cycle. Each cycle builds on the previous one. With open pollination, they are incompatible, and we make what we call population improvement on the species. In the case of ryegrass, Dr. Funk started breeding the species in 1961, and we can trace breeding records back 45 years. Some of the material used to start the program is still available. Progeny testing is done. Individual plants are lined out in three by five foot plots. We can observe each clone and test against the mother plant to identify the paternal affects on each progeny. Of approximately 1000 planted, we select about 0.5% that will increase for the next year.

Each cycle builds on the previous one. If you have followed tall fescue or ryegrass development, you will know we have made continual progress in terms of density, quality, colour, and mowing quality.

We have also gone to places in Europe like Warsaw, Poland. The origin of ryegrass species and surviving clones were found around Old World buildings which date back two to three hundred years. These were crossed with the population at Rutger's in order to combine the old with the new.

Traffic Tolerance

Traffic is a complex term. It not only refers to the tearing away of the turf, but also to compaction, and the ability to grow in compacted soils. If you look at our present cool-season species, ryegrass is by far the most traffic tolerant. It has the ability to take pounding, particularly in walk off areas of the golf course, and it does well in compacted soils. Bentgrass takes traffic, but unfortunately it has to be mown at least at half an inch or less to look good. This is too short for most athletic situations.

With Kentucky bluegrass, some of the improved varieties are wear tolerant. Tall fescue is a grass that is wear tolerant once it is established. It is slow to develop and slow to establish. The fine fescues as a group have poor traffic tolerance. Breeding of traffic tolerant grasses is something we worked on this summer. We looked at bluegrasses and ryegrasses and found that the denser, more aggressive, healthier varieties are the most traffic tolerant. We also found that dollar spot increased with traffic, something we did not know previously.

The amazing thing about ryegrass is its ability to establish. Varieties are much better to mow. The beauty of the ryes is that in two weeks they start to tiller and make turf even under traffic. I make that point because tall fescue will not tolerate traffic during establishment whereas ryegrass will during establishment.

In order to come up with a traffic simulator, we brainstormed last winter. The idea arose to take the broom off a Sweepster and put it on the front of a Toro Groundsmaster. We then took the Sweepster head off the broom and replaced it with rubber fingers. The fingers were then mounted on the Sweepster, operating at 150 rpm. These 10" rubber fingers battered the turf and followed the contours. At 150 rpm, we did not need to go over the plots as often. We always went in two directions, and each plot was done twice. We found more dollar spot on the weaker varieties after traffic simulation.

If you look at our present cool-season species, ryegrass is by far the most traffic tolerant. It has the ability to take pounding, particularly in walk off areas of the golf course, and it does well in compacted soils.

Although not as important in Canada, we have a limited germplasm source for tall fescues. In our breeding program we are looking for more. We have had continued improvement in colour, density, and persistence. In seed, we produce 100 million pounds per year in the U.S. in turf type and 100 to 160 million pounds of K31. We continue to show improvement in leaf spot and pink snow mould which is a problem in Canada. Tall fescue will not handle traffic until about three months old.

Fine fescues were destroyed after only five passes with the simulator. Hard fescues may become more traffic tolerant.

In the bluegrasses, the very aggressive varieties will cover a three by five foot plot in five to 10 years and spread six to eight feet. They have good vigour and will crowd other grasses and dominate blends. The dwarf varieties have consistently been successful since the 1980s. Called northern tolerant compact types, they have topped national trials, displayed a higher density and an overall increased disease resistance, and have reduced clipping accumulations. Slower to green up, they always do well under high maintenance; however, they do not have as good winter colour. We encourage people in cold areas not to use ryegrass alone, but to blend it with 70% bluegrass and 30% ryegrass. Midnight, Able I, American, Indigo, and Glade all are very good. ♦