Extension Report #81

2002 Turfgrass and Horticultural Trials Report

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Introduction

This year turned out great! We finally hired our new turfgrass researcher and teacher, Deying Li, from Iowa State University. He arrived charged with enthusiasm and drive to get started on the new "Sports and Urban Turfgrass Management" program. He initiated three research projects and wrote proposals for five more. He has organized his first class and will be teaching it the spring semester of 2003. We currently have about 15 students enrolled in the program, with many more anticipated as word spreads.

Li has also been working hard on developing a Web site for the new curriculum. It will be available early in 2003 for students to browse and will hopefully be instrumental in attracting interested students.

The only sour note was the announcement of a new College of Business building scheduled for construction on our turf plots and flower trials site on the NDSU campus. Construction is expected to begin in the spring of 2005. However, after extensive discussions with President Chapman, it appears that horticulture and turf will benefit in the long run with even more land being turned over to us for research and demonstration purposes. Plans are currently underway for the development of that land.

Our flower plantings, turf and tomato plots were established in Fargo, Dickinson (sans tomatoes at the behest of the DREC Director) and Williston. The cooperation of Stark-Billings County Agent Jerry Larson and the assistance of Lorna Bradbury in Williston was greatly appreciated in helping to establish these plots and maintain them through the growing season.

Once again, I was privileged to have contact with one of my past students, Brett Hetland. His course at Okoboji is in the process of being certified by the Audubon Society. Brett is the kind of NDSU graduate that we can be proud of and will do much to help channel prospective students to NDSU's turf management program.

I am grateful for the assistance and support I get from Barb Laschkewitsch, Andrea Carlson, and administrative secretary Melissa Welter. Their organizational skills, old-fashioned hard work, and loyalty are important to my existence. Their importance is immeasurable.

Fargo Turfgrass Plots

The dormant seeding of 22 different species and cultivars of cool-season grasses that took place in the fall of 2001, failed completely. The only growth that showed promise were the weeds, the result of a dry autumn and winter. Consequently, we started over with a tilling of the plot land, applying Basamid as a soil fumigant, and reworking the surface again with a Bluebird power rake in preparation for reseeding.

With Li's arrival, we immediately started a fresh planting of cool-season grasses, an outline of which follows:

2002 Cool-Season Grass Demonstration

Materials and Methods:

Nitrogen levels:

1. 0 lbs of N/1000 ft^2 (control)
2. 2 lbs of N/1000 ft^2
3. 4 lbs of N/1000 ft^2
4. 6 lbs of N/1000 ft^2

Species and Cultivars:

1. 'Moonlight' Kentucky Bluegrass
2. 'Roadcrest' Fairway Wheat Grass
3. 'North Star' Kentucky Bluegrass
4. 'BrightStar BLT' Perennial Ryegrass
5. 'Navigator' Creeping Red Fescue
6. 'NuGlade' Kentucky Bluegrass
7. Contractor's Mix of Kentucky Bluegrasses (19.92% 'Washington', 19.85% 'Langara', and 9.24% VNS), 19.90% 'Cindy' Creeping Red Fescue,14.93% 'Academy' and 14.93% 'Pearl' Perennial Ryegrasses. This mixture is marketed as "Landscaper's Pro."

The soil was tested prior to the application of fertilizer and seeding.

A starter fertilizer of 24-5-10-5S was applied at 1 pound of N/1000 square feet.

The experimental design was a split plot design with fertility levels in the main plot, which was 0, 2, 4, and 6 pounds of N/1000 ft^2 and applied on May 1, June 1, Aug. 1, and Sept. 1 of 2002. The main plots measured 12 X 42 feet; the subplots 12 X 6 feet. The total area measured 126 X 48 feet, or 6048 ft^2 (refer to Table 1).

The subplots had seven grass species seeded at 4 pounds /1000 ft^2. Seeding was carried out on Aug. 1, 2002, at a rate of 20 g/m^2 (130.75 g/plot).

Treatment 7 (Contractor's Mix) was split into two halves, with one half being treated with bio-stimulant on Aug. 27 and Sept. 25, at a rate of 111 ounces /1000 ft^2.

The results and discussion of this study will be presented in complete detail with the 2003 annual report.

Table 1. Experimental design layout. W → → → → N

Rep 1							
N4	3	5	2	1	6	4	7
N3	7	5	2	4	3	6	1
N2	5	7	2	3	1	4	6
N1	3	2	7	5	4	1	6

Rep 2							
N4	3	2	1	4	6	7	5
N1	4	1	7	6	3	2	5
N2	7	6	5	1	4	2	3
N3	3	2	1	4	5	7	6

Rep 3							
N2	5	4	2	3	1	7	6
N1	7	6	5	1	4	2	3
N4	1	2	4	6	5	7	3
N3	6	4	1	5	2	7	3

A second study was initiated:

Evaluation of Slow Release Fertilizer With Organic Matrix on the Quality of Turfgrass

Materials and Methods:

The study was conducted in a heated greenhouse on the NDSU campus beginning in the fall semester of 2002. Root-zone materials used in the study included sand (Ames Sand Company, Fargo) and reed-sedge peat (Dakota Peat & Equipment, Grand Forks) mixture with 90/10 sand/peat (v/v). The materials were uniformly packed into a plastic tubing 7.5 cm (3 inches) in diameter and 38 cm (15 inches) in length in three increments of same weight. The root-zone tubing was installed in a PVC tube of 7.6 cm diameter and 36 cm depth. 25 kg N/ha, 7.5 kg P/ha, and 14 kg K/ha (0.09 g of 12-8-8 product/tube) were applied as starter fertilizer to all treatments. Treatments included MN DOT 22-5-10 and Thrivin' 20-3-5 (Bio Builder, Alexandria, Minn.) at rates of one and two pounds 1000/ft^2 at four and eight weeks after seeding (WAFS) respectively.

The MN DOT 22-5-10 treatment was seeded with 'Nustar' Kentucky bluegrass at a rate of 150 kg/ha (0.066 g/tube); other treatments were seeded with 'Penncross' creeping bentgrass at a rate of 50 kg/ha (0.022 g/tube). A control with application of only Urea (46-0-0) was included for each grass species at a rate of 1 lb/1000 ft^2 . The PVC growing tubes were put on a mist bench for seed germination after seeding.

The temperature was controlled between 15 and 26 degrees C (60 to 78 degrees F) and light supplements were applied for 11 hours a day. The study was set up Dec. 12, 2002. All treatments and controls were repeated three times in a randomized complete block design.

Days to a germination 3-leaf stage were recorded as days after seeding (DAS). Upon germination, the tubes were tilted 15 degrees in order for the roots to grow toward the sides of the plastic tubing. Root lengths, biomass, and turf quality were measured and recorded. Nitrate-N ($NO-^3$) concentrations in the leaf and medium during different stages of growth were monitored.

Diagrammatic Representation of Study:

R1 9 4 1 6 7 3 2 8 5 10
R2 1 6 9 10 4 8 2 5 7 3
R3 6 8 2 1 3 7 10 5 9 4

And, the third study:

Effects of Bio-Stimulant on Turfgrass Quality Established in Different Rootzone Media

This study was conducted in a heated greenhouse on the NDSU campus in the fall of 2002. Root-zone materials used included sand (Ames Sand Co., Fargo) and reed-sedge peat (Dakota Peat & Equipment, Grand Forks, ND) in a mixture 90/10 (v/v), soil 1 and soil 2 (Fargo silty clay, fine, smectitic, frigid Typic Epiaquerts, Fargo). Physical properties of these root-zone materials are listed in Table 1. The materials were uniformly packed into a plastic tubing 7.5 cm in diameter (3 inches) and 38 cm in length (15 inches) in three increments of same weight.

Root-zone tubing was installed in a PVC tube of 7.6 cm diameter and 36 cm depth. 50 kg N/ha, 15 kg P/ha, and 28 kg K/ha (0.18 g/product/tube) were applied as starter fertilizer to all treatments. Treatments included Organic-Pro (Odyssey Marketing, LLC, Fargo) at rates of 0.5 and 1 gallon/acre for sand/peat mixture, 2 and 4 gallon/acre for soil materials, respectively, at the beginning of turf establishment. A control was included for each rootzone material without applying bio-stimulant. 'Penncross' creeping bentgrass was seeded on the sand/peat mixture rootzone at rate of 50 kg/ha (0.022 g/tube). 'Nustar' Kentucky bluegrass was seeded on the soil rootzone material at a rate of 300 kg/ha (0.13 g/tube).

The PVC growing tubes were put on a mist bench to stimulate seed germination. The temperature was controlled between 15 and 26 degrees C (60 to 78 degrees F) and supplemental lighting was used for 11 hours a day. The study was set up on Dec. 2, 2002. All treatments and control were repeated three times in a randomized complete block design.

Days to a germination 3-leaf stage were recorded as days after seeding (DAS). Upon germination, the tubes were tilted 15 degrees in order for the roots to grow toward the sides of the plastic tubing. Root length, biomass, and turf quality were measured and recorded. Nitrate ($NO-^3$) N concentrations in the leaf and medium during different stages of growth were monitored.

Table 2. Treatments applied in the rootzone media.

		Application at Seeding		Application 30 DAS	
Treatment #	Treatments	Gallons/Acre	ml/tube	Gallons/Acre	ml/tube
1	sand/peat	0.5	0.002	0.5	0.002
2	sand/peat	2	0.008	0.5	0.002
3	control 1	0	0	0	0
4	soil 1	2	0.008	1	0.004
5	soil 1	4	0.017	2	0.008
6	control 2	0	0	0	0
7	soil 2	2	0.008	1	0.004
8	soil 2	4	0.017	2	0.008
9	control 3	0	0	0	0

Additionally, about one acre of land was tilled on the Fargo campus and sowed into 'Park' Kentucky bluegrass. The task was accomplished with the able assistance of Loren Richards and his brother using their tractor and Brillion cultipacker. The seeding was completed in about 90 minutes. One-half of the site was seeded at a rate of about 1.25 lb/MSF, (1000 square feet), and the other half was seeded at a rate of about 2.5 lb/MSF, on Aug. 13, 2002. A fertility study on this plot is planned for 2003-2004.

NDSU Football Practice Fields

The NDSU football practice fields received a special treatment in 2002 — a solid-tine deep aeration on July 8, 2002. The tines were set to go to a depth of 8-10 inches and the heads were all flagged. It was thought that the irrigation pipe was below the reach of the aeration tines. That assumption proved to be wrong when the irrigation system was reactivated about 10 days later — a delay due to the rainfall patterns at the time. The fields responded beautifully to the treatment, with the roots penetrating deeper than ever before.

However, the damage to the irrigation system was extensive and it was necessary to bring in an outside contractor, Welter Landscape Services, to expedite the repair. It was completed in little more than one-half day, so the turfgrass did not suffer any setback. By the time the players arrived in mid-August for practice, the field looked as good as it could, and because of the deep penetration of the roots, the turf looked better going into winter than it ever had.

Thanks to Josh Zeithamer and his father for the aeration service.

Echinacea Study: Fargo, Dickinson and Williston

With the loss of the study in Fargo in June 2000 due to the torrential rain that occurred, data collection had to be limited to the Dickinson and Williston plots. This was successfully undertaken and the collected specimens turned over to Gail Brenahan, research lab specialist, for HPLC (High Performance Liquid Chromatography) analysis. This was the final year for data collection and is being analyzed as of this writing. The raised bed seed planting of E. angustifolia that was made at the Dickinson site for analysis at the end of the 2002 growing season performed poorly. No plant material was collected for analysis.

As often happens with field research, the initial results are not what was expected. A complete report will be in the 2003 summary.

Lycopene and pH/Acidic Tomato Study

Julie Garden-Robinson, Clifford and Charlene Hall, Lorna Bradbury, Ron Smith

This study began last year and continued this year to get a better depth of data. Tomato cultivars were started in the NDSU horticulture greenhouses and transplanted to Williston and Fargo. Dickinson chose not to participate in the study. The Fargo plants were nearly wiped out due to heavy rains and poor soil drainage. However, we were able to pump enough excess water off the site to grow a crop and harvest sufficient fruit for data collection.

While the data collection on the lycopene concentration is still forthcoming, we did get some interesting and varied results from the initial pH/acidity testing. A pH above 4.6 indicates it's a potentially hazardous food for canning so acidification with lemon juice or citric acid would be necessary to prepare a safe product for canning. All but one tested in the potentially hazardous category. Consequently, all tomato canning recipes should include acidification with either lemon juice or citric acid to be safe.

The lycopene information will likely be a separate report, but will be included in next year's summary. Initially, the

Israeli's were the first to breed a tomato with increased lycopene content. However, several cultivars are now available making similar claims. Lycopene consumption via brightly colored fruits is linked with reduced risks of some cancer types. The higher the lycopene content, the "healthier" they are likely to be for consumption.

The Table 1 below shows how the tomato cultivars differed between the two sites — Fargo and Williston.

Table 1. Acidity/pH comparison of selected tomato cultivars between Fargo and Williston.

(No data indicates crop failure at that location due, most likely, to weather conditions.)

Tomato Cultivar	Fargo	Williston
	pH/Acidity Values	
Brandy Wine	4.82	No Data
Golden Gem	4.64	No Data
Fargo	4.68	No Data
Vita Gold	4.76	5.09
Glacier	4.66	No Data
HA 3502	4.67	4.97
Green Zebra*	4.39	4.62
Super Italian Paste	4.96	5.08
Prairie Fire	4.71	No Data
Bush Celebrity	4.86	4.93
HA 3510	4.73	4.95
Health Kick	4.75	5.04
Classica	4.71	5.05
Golden Girl	4.74	4.85
Sugar Shack	4.71	4.70
Golden Queen	No Data	4.87
White Beauty	No Data	4.92
Dr. Carolyn	No Data	5.01
Super Marzano	No Data	5.20
La Roma	No Data	5.08
HA 3505	No Data	4.97
First Prize	No Data	5.00
Russian	No Data	5.09
Fireworks	No Data	5.10
Opalka	No Data	5.08

* Green Zebra —the only cultivar grown at the Fargo site that tested in the safe pH/acidity range

Bedding Plant Cultivar Trial Synopsis of Top Performers

The three trial sites were Fargo, Dickinson, and Williston. Plantings were of All-America selections and species and cultivars that were of interest to particular seed companies. The following information is a selection of information that was recorded over the 2002 growing season. For a complete report, request a copy of the "2002 Cultivar Trials of Bedding Plants."

Annual plants with a high frost tolerance are of interest to North Dakota gardeners. The following plants showed 50 percent or less damage from a temperature event of 28 degrees F (-2 degrees C).

< 50% Damage - Medium Tolerance	0% Damage - High Tolerance
Ageratum - Floss Flower	Abutilon - Flowering Maple
Capsicum 'Chilly Chili' - Pepper	Antirrhinum - Snapdragon
Cobaea - Cup and Saucer Vine	Asarina - Flowering Vine
Monarda - Bee Balm	Chrysanthemum - Mum
Pelargonium - Zonals - Geranium	Dianthus - Pinks
Tagetes - Marigold	Gaillardia - Blanket Flower
Tithonia - Mexican Sunflower	Gazania - Treasure Flower
Tropaeolum - Nasturtium	Gypsophila - Baby's Breath
	Lobularia - Sweet Alyssum
	Nicotiana - Flowering Tobacco
	Pelargonium - Exoticas, Cascades - Geranium
	Petunia - especially 'Wave" series
	Rudbeckia - Coneflower
	Scabiosa - Pincushion Flower
	Viola - Viola (or miniature pansies)

The following is a selected listing of 10 of the top performing annuals at the three sites — Fargo, Dickinson, and Williston. For further information request a complete copy of the "**2002 Cultivar Trials of Bedding Plants**" report.

A selection of 2002 top performers

Fargo	Dickinson	Williston
Ageratum cultivars	Agastache 'Golden Jubilee	Agastache 'Golden Jubilee
Antirrhinum 'Floral Showers'	Capsicum 'Chilly Chili'	Dianthus 'Amazon Neon Duo'
Asarina 'Mystic Pink'	Capsicum 'Explosive Ember'	Dianthus 'Melody Pink'
Begonia 'PartyFun'	Dianthus 'Melody Pink'	Gaillardia 'Sundance Bicolor'
Capsicum 'Chilly Chili'	Gazania 'Tiger Mix'	Nicotiana 'Avalon Bright Pink'
Celosia 'Pink Candle'	Nicotiana 'Avalon Bright Pink'	Osteospermum 'Passion Mix'
Dianthus 'Amazon Neon Duo'	Pelargonium 'Tricolor'	Pelargonium 'Appleblossom'
Eustoma 'Forever Blue'	Pennisetum spp. (Fountain Grass)	Petunia 'Bravo Salmon Imp'
Gaillardia 'Sundance Bicolor'	Pennisetum 'Purple Majesty'	Petunia 'Bravo White'
Gypsophila 'Garden Bride'	Petunia 'Bravo Lavender'	Petunia 'Giant Purple Surfinia'

Acknowledgements

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Rivard Seed
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Argyle, MN 56713

TurfMasters Plus
PO Box 8084
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For more information on this and other topics, see: www.ag.ndsu.nodak.edu

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