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This publication includes lecture notes of papers presented at the 2002 New Jersey Turfgrass Expo. Publication of these lectures provides a readily available source of information covering a wide range of topics and includes technical and popular presentations of importance to the turfgrass industry.

This proceedings also includes research papers that contain original research findings and reviews of selected subjects in turfgrass science. These papers are presented primarily to facilitate the timely dissemination of original turfgrass research for use by the turfgrass industry.

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Dr. Ann Brooks Gould, Editor
Dr. Bruce B. Clarke, Coordinator

INCIDENCE OF NEOTYPHODIUM ENDOPHYTE IN SEED LOTS OF CULTIVARS AND SELECTIONS OF THE 2001 NATIONAL TALL FESCUE TEST

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Since its introduction to the United States in the nineteenth century as a forage grass, tall fescue (*Festuca arundinacea*) has become an increasingly popular cool-season grass in the turf industry. Extensive research has allowed breeders to make significant improvements in developing turf-type tall fescue cultivars. Newer varieties and selections possess darker green color, finer leaf texture, lower growth habit, less disease and insect damage, and overall better turf quality. Tall fescue is best known to perform well under drought stress and high temperature conditions.

Presently, research is being conducted to study whether enhanced drought stress and insect resistance occurs where beneficial endophytes exist. Endophytes are naturally occurring fungi that live symbiotically in certain grasses. The endophytes are transmitted from plant to plant through seed. After germination, the endophyte mycelium grows within the sheath, stem, and leaf tissues of the maturing plant, eventually entering the flowering stem and seed. To maintain endophyte viability, seed should be stored at cool temperatures and dry conditions. Although endophytes are a remarkable discovery for the turf grass industry, they can have detrimental effects on grazing livestock. For this reason, endophyte infected grasses should never be used in pasture situations. The levels and toxicity of the endophytes in the plants varies extensively. Endophytes have been found in perennial ryegrass, tall fescue and the fine fescues.

In 2001, the National Turfgrass Evaluation Program (NTEP) distributed seed for a National Tall Fescue Test. Seed was sent to various locations around the country and tests will be evaluated for a number of years under many different conditions. The remnant seed from the 160 entries was analyzed to determine the percentage of seed infected with endophyte.

PROCEDURE

A sample of seed was taken from each entry in the 2001 National Tall Fescue Test and stained using the rose bengal staining method (Saha et al., 1988). In this procedure, seeds were soaked in an alkaline solution (5.0% aqueous ethyl alcohol, 0.5% rose bengal, and 2.5% sodium hydroxide) for 20 to 24 h, rinsed thoroughly in water, and then soaked in a 0.25% aqueous rose bengal solution for 6 h. Samples were then refrigerated until screened. Fifty individual seeds were squashed and analyzed under a microscope at 200X to determine the presence of endophyte.

RESULTS AND DISCUSSION

Results of the endophyte analysis are presented in Table 1. Of the 160 cultivars and selections examined, 146 entries had seeds infected with endophyte. The levels of infection varied extensively: 14 cultivars or selections had no infection, and the highest amount of endophyte detected was 94%. Most cultivars and selections contained moderate to high levels of endophyte compared to similar data from the 1996 National Tall Fescue Test. Since Endophyte-infected seed can lose viability over time and improper storage, it is possible that some turf plots in the 2001 National Tall Fescue Test may have lower levels of infection than indicated in Table 1.

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LITERATURE CITED

Saha, D. C., Jackson, M. A., and Johnson-Cicalese, J. M. 1988. A rapid staining method for detection of endophytic fungi in turf and forage grasses. Phytopathology 78:237-239.

Table 1. Endophyte infection of seeds from cultivars and selections entered in the 2001 National Tall Fescue Test. (NOTE: The endophyte in these seeds is not necessarily viable, thus the infection rate in the resulting turf plots may be lower.)

NTEP Number	Cultivar or Selection	Endophyte Infection[1] (%)
3	Justice	94
4	F-4	92
20	2nd Millennium	92
60	Adam's Valley	92
9	Pick-OD3-01	90
14	Rebel Sentry	90
40	Titan Ltd	90
63	Constitution	90
129	SR 8600	90
6	Cochise III	88
50	Mustang 3	88
71	BAR Fa 1005	88
105	K01-8015	88
123	CAS-MC1	88
51	Dynasty	86
5	DaVinci	84
7	BR-4	82
31	Tuxedo	82
38	ATF 802	82
46	Padre	82
54	CIS TF-64	82
113	01-RUTOR 2	82
142	Kalahari	82
8	Roberts L1Z	80
109	K01-E09	80
15	Finesse II	78
62	Titanium	78
108	K01-E03	78
114	BE-1	78
121	EA 155	78
138	GO-OD2	78
110	K01-WAF	76
143	UT-RB3	76
21	JT-99	74
64	Cayenne	74
91	Endeavor	74
107	Wyatt	74
39	Rendition	72
76	PST-5TI	72
155	K01-8007	72
41	Biltmore	70
56	CIS TF-67	70
59	Bingo	70
61	DLSD	70

(Continued)

Table 1 (continued).

NTEP Number	Cultivar or Selection	Endophyte Infection[1] (%)
67	Roberts SM4	70
112	01-ORU1	70
116	PST-5BAB	70
120	MA 158	70
125	MA 127	70
127	Grande II	70
12	Rebel Exeda	68
19	Focus	68
45	Magellan	68
94	Tar Heel	68
133	Masterpiece	68
1	Kentucky-31	66
52	Watchdog	66
17	Forte	64
43	Bravo	64
34	ATF 799	62
73	Roberts DOL	62
85	Silverado II	62
157	DP 50-9226	62
84	Tar Heel II	60
128	SR 8250	60
134	Rembrandt	60
13	Prospect	58
28	Scorpion	58
58	CIS TF-77	58
44	Lancer E	56
53	CIS TF-65	56
83	PST-DDL	54
10	Plantation	52
55	Raptor	52
36	ATF 586	50
87	PST-5FZD	50
122	CAS-157	50
124	CAS ED	48
11	Signia	46
75	PST-5NAS	46
88	PST-5LO	46
86	PST-5KI	44
132	Picasso	44
156	DP 50-9082	44
47	Stetson	42
95	Wolfpack	42
101	JT-12	42
102	JT-15	42
126	EA-163	42
16	Millennium	40
29	MCN-RC	40

(Continued)

Table 1 (continued).

NTEP Number	Cultivar or Selection	Endophyte Infection[1] (%)
33	ATF-806	40
154	MRF-211	40
37	Kitty Hawk 2000	38
57	CIS TF-60	38
78	PST-57E	38
80	PST-5S12	38
104	Quest	38
131	SR 8550	38
72	Jaguar 3	36
135	Legitimate	34
160	Bonsai	34
48	T991	32
82	PST-5B2	32
89	Silverstar	32
98	JT-6	32
103	JT-9	32
141	GO-SIU2	32
70	BAR Fa 1003	30
42	NA TDD	28
81	PST-5A1	28
66	Pick TF H-97	26
90	PST-53T	26
117	PST-5TUO	26
151	MRF-28	26
77	PST-5KU	24
65	Pick-OOAFA	22
79	PST-5JM	22
153	MRF-210	22
74	Pick ZMG	20
119	Starfire	20
137	Falcon II	20
158	ATF-800	20
99	JT-13	18
150	MRF-27	18
100	JT-18	16
149	MRF-26	16
92	Matador	14
115	DLF-J210	14
130	SRX 805	14
97	Pure Gold	12
106	Coyote	12
145	MRF-22	10
148	MRF-25	10
136	ProSeeds 5301	8
23	Barlexas	6
93	Olympic Gold	6
147	MRF-24	6

(Continued)

Table 1 (continued).

NTEP Number	Cultivar or Selection	Endophyte Infection[1] (%)
152	MRF-29	6
111	01-TFOR3	4
2	Elisa	2
26	Barrington	2
49	Laramie	2
144	Southern Choice II	2
146	Daytona	2
159	ATF-803	2
18	Dominion	0
22	TF-66	0
24	Tracer	0
25	Barrera	0
27	Barlexas II	0
30	Tulsa II	0
32	ATF 707	0
35	ATF 704	0
68	JTTFF-2000	0
69	P-58	0
96	Tomahawk RT	0
118	BAR Fa 1CR 7	0
139	GO-FL3	0
140	GO-RD4	0

[1]Percent infection based on 50 seeds examined from each entry.