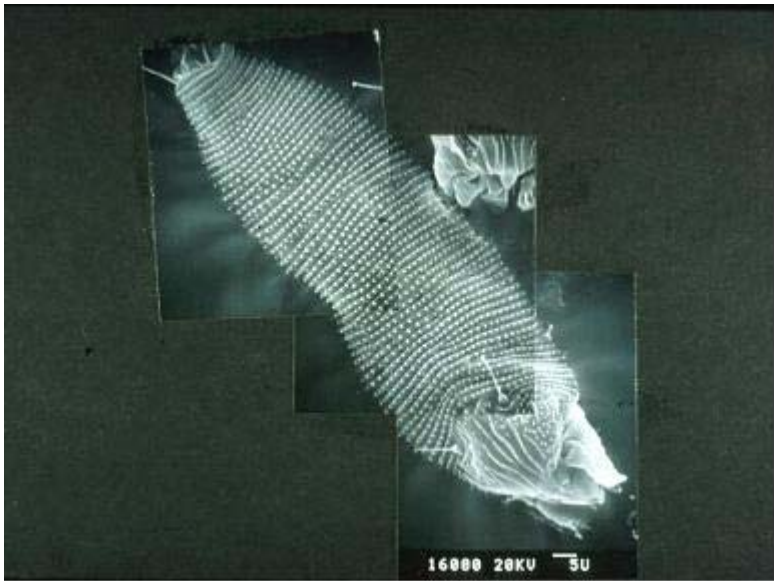
Turfgrass and Environmental Research Online

…Using Science to Benefit Golf



Damage by the bermudagrass mite, *Eriophyes cynodoniensis*, has increased the last few years. It can cause a significant loss of stands of bermudagrass, *Cynodon spp.*, especially when other biotic or abiotic stresses are present. Commercial cultivars and 47 other bermudagrass genotypes were screened at Texas A&M University for their susceptibility to the bermudagrass mite under greenhouse culture.

Volume 9, Number 18
September 15, 2010

PURPOSE

The purpose of *USGA Turfgrass and Environmental Research Online* is to effectively communicate the results of research projects funded under USGA's Turfgrass and Environmental Research Program to all who can benefit from such knowledge. Since 1983, the USGA has funded more than 450 projects at a cost of $31 million. The private, non-profit research program provides funding opportunities to university faculty interested in working on environmental and turf management problems affecting golf courses. The outstanding playing conditions of today's golf courses are a direct result of ***using science to benefit golf***.

Editor

Jeff Nus, Ph.D.
1032 Rogers Place
Lawrence, KS 66049
jnus@usga.org
(785) 832-2300
(785) 832-9265 (fax)

Research Director

Michael P. Kenna, Ph.D.
P.O. Box 2227
Stillwater, OK 74076
mkenna@usga.org
(405) 743-3900
(405) 743-3910 (fax)

Damage by Bermudagrass Mite and Resistance in Bermudagrass Cultivars

James A. Reinert

SUMMARY

Damage by the bermudagrass mite, *Eriophyes cynodoniensis*, has increased the last few years. It can cause a significant loss of stands of bermudagrass, *Cynodon spp.*, especially when other biotic or abiotic stresses are present. Commercial cultivars and 47 other bermudagrass genotypes were screened for their susceptibility to the bermudagrass mite under greenhouse culture. Results include:

- The cultivars, 'Cardinal', 'Greg Norman 1', 'Midlawn', 'TifSport', and 'Tifway' expressed no symptoms (terminal rosetting) during the 9-week test period and may be resistant to the mite. However, in previous studies, 'Tifway' has showed 44% susceptibility and therefore these cultivars may not all be resistant.
- Three hybrids also exhibited zero terminals with symptoms.
- Most of the commercial cultivars including many of the newer ultradwarf bermudagrass cultivars are highly susceptible to this mite and had 14 to 59 infested/rosetted terminals per plant.

Cultivars of bermudagrass, *Cynodon spp.*, are among the most widely used warm-season turfgrasses throughout the southern half of the United States and throughout much of the tropical and subtropical regions of the world. Over 60 cultivars of bermudagrass have been developed in the United States alone (4), and the species is used extensively on golf courses, athletic fields, and throughout residential and commercial landscapes and other high traffic areas across the southern United States. Bermudagrass is also used for its soil stabilization capacity along roadsides, ditch banks, and low-maintenance, full-sun areas (18).

The bermudagrass mite, *Eriophyes cynodoniensis* (Sayed) (Aceri: Eriophyidae), is a reoccurring pest throughout much of the area where bermudagrass is adapted. However, over the last few years, it has again become a major pest on golf courses and other athletic fields in Texas and other states across the South. This host-specific eriophyid mite was first found infesting bermudagrass lawns in Phoenix, AZ in 1959 (6), and it soon spread to California, Nevada, New Mexico, Texas, Georgia, and Florida. Once it reached the southeastern states, it rapidly spread across the entire region. It now occurs in almost every region when bermudagrass is grown.

The bermudagrass mite is very small and not visible to the naked eye – 20 to 30 X magnification is required to see it (Figure 1), but its presence can readily be identified by its characteristic damage in bermudagrass turf. Bermudagrass damaged by this mite exhibits characteristic shortened leaves and internodes producing a typical rosetted and tufted growth, or 'witch's broom' effect (Figure 2). When a susceptible cultivar is infested, most of the terminal growth will become distorted and tufted and the grass will often die. Damage is usually accelerated when another stress (either biotic or abiotic) is present and the combined stresses are often too much for the grass (Figure 3). If the mite-infested grass is left

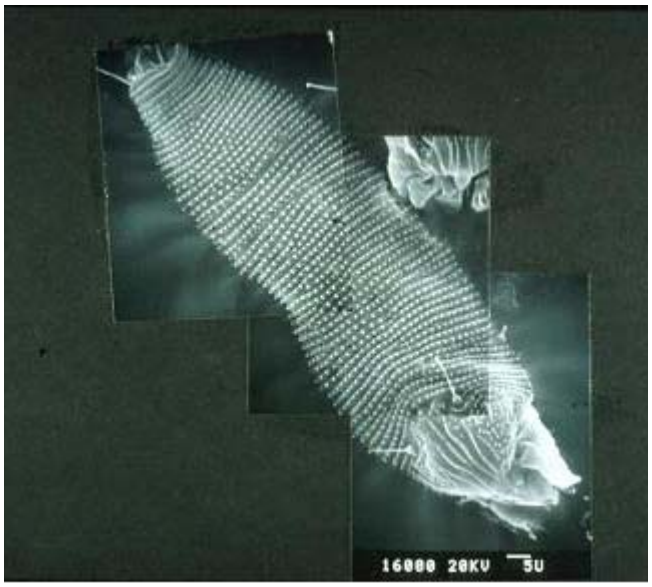


Figure 1. Close-up of bermudagrass mite using a scanning electron microscope. Normally, 20 to 30 X magnification is needed to see the mites on the grass.

JAMES A. REINERT, Ph.D., Regents Fellow and Professor, Texas AgriLife Research & Extension Urban Solutions Center, Texas A&M University, Dallas, TX.

USGA Turfgrass and Environmental Research Online 9(18):1-7.
TGIF Record Number: 169294

Figure 2. Bermudagrass mites causes a tufting, rosetting or 'witches broom' damage to the terminal growth on bermudagrass.

untreated, large areas of bermudagrass are often killed.

Reinert (11) showed that diazinon provided effective control for this eriophyid mite. However, the use of this insecticide has been restricted through regulations by the U.S. Environmental Protection Agency and can no longer be used for control of this pest, regardless of the turf utilization. Currently, we do not have any miticides that provide the lasting control that was provided by diazinon.

One of the best alternatives to the use of chemical pesticides is to develop and use well adapted cultivars of bermudagrass that are resistant to the bermudagrass mite. Several bermudagrass genotypes have been identified in various studies by Baltensperger (3), Butler (5, 7, 8), and Johnson (10) in field studies and by Reinert et al. in greenhouse studies (12, 13). In the latter study, 'FloraTex', a coarse-textured type of bermudagrass, was identified as resistant and exhibited no symptoms while 'Tifway' was identified as susceptible with 44% of the test plants exhibiting symptoms of the mite. In both greenhouse (9 months) and field studies (6 years), the bermudagrass mite never expressed any damage to 'FloraTex'. It was subsequently released jointly by the Florida and Texas Agricultural Experiment Stations (9). Resistance has also been identified to a related eriophyid mite, *Eriophyes zoysiae* Baker, Kona and O'Neill, that is host-specific to zoysiagrass. 'Royal' and 'Zorro' are fine-textured zoysiagrasses that are highly resistant to this mite (15). Resistance to the bermudagrass mite and other turfgrass insect and mite pests has been summarized (14).

The present study was initiated to evaluate hybrids from the bermudagrass breeding program at Oklahoma State University, Stillwater, OK and many of the newer commercial cultivars, including the ultradwarfs that have become very popular across the turf industry in recent years to determine their susceptibility or resistance to the bermudagrass mite.

Materials and Methods

Bermudagrass cultivars and genotypes were established and grown in 18-cell trays in greenhouse culture at the Texas AgriLife Research and Extension Urban Solutions Center at Dallas, TX. Cultivars and genotypes evaluated are listed in Table 1. Tray cells measured 7.5 x 7.5 cm and 4 cm deep. Both Experiment 1 with hybrids from Oklahoma State University and Experiment 2 with mostly commercial cultivars were established during January in a greenhouse at the Dallas center. 'Floradwarf' was included in both experiments as a susceptible standard. 'Tifgreen' was also included in Experiment 1 as an addition-

Figure 3. Damage by bermudagrass mite on the approaches to a green. Turf was being lost due to a combined effect of mite damage coupled with an infestation of bermudagrass scale and water stress.

Genotypes/Cultivars	Source of Plant Material
3200W 1-20	Hybrid - Oklahoma State University, Stillwater, OK
3200W 6-12	Hybrid - Oklahoma State University, Stillwater, OK
3200W 9-4	Hybrid - Oklahoma State University, Stillwater, OK
3200W 18-11	Hybrid - Oklahoma State University, Stillwater, OK
3200W 30-20	Hybrid - Oklahoma State University, Stillwater, OK
3200W 70-18	Hybrid - Oklahoma State University, Stillwater, OK
3200W 78-10	Hybrid - Oklahoma State University, Stillwater, OK
3200W 94-2	Hybrid - Oklahoma State University, Stillwater, OK
4200W 19-18	Hybrid - Oklahoma State University, Stillwater, OK
4200W 20-6	Hybrid - Oklahoma State University, Stillwater, OK
4200W 22-10	Hybrid - Oklahoma State University, Stillwater, OK
4200W 22-13	Hybrid - Oklahoma State University, Stillwater, OK
4200W 25-1	Hybrid - Oklahoma State University, Stillwater, OK
4200W 25-7	Hybrid - Oklahoma State University, Stillwater, OK
4200W 25-15	Hybrid - Oklahoma State University, Stillwater, OK
4200W 26-13	Hybrid - Oklahoma State University, Stillwater, OK
4200W 38-2	Hybrid - Oklahoma State University, Stillwater, OK
4200W 46-4	Hybrid - Oklahoma State University, Stillwater, OK
4200W 47-1	Hybrid - Oklahoma State University, Stillwater, OK
4200W 47-7	Hybrid - Oklahoma State University, Stillwater, OK
4200W 49-17	Hybrid - Oklahoma State University, Stillwater, OK
4200W 51-14	Hybrid - Oklahoma State University, Stillwater, OK
4200W 52-15	Hybrid - Oklahoma State University, Stillwater, OK
4200W 53-1	Hybrid - Oklahoma State University, Stillwater, OK
4200W 55-5	Hybrid - Oklahoma State University, Stillwater, OK
4200W 56-14	Hybrid - Oklahoma State University, Stillwater, OK
4200W 68-9	Hybrid - Oklahoma State University, Stillwater, OK
4200W 74-3	Hybrid - Oklahoma State University, Stillwater, OK
CCB 10-9	Hybrid - Oklahoma State University, Stillwater, OK
CCB 24-4	Hybrid - Oklahoma State University, Stillwater, OK
CCB 25-6	Hybrid - Oklahoma State University, Stillwater, OK
CN 2-9	Hybrid - Clemson University, Clemson, SC
FHB 44	Hybrid – University of Florida, Gainesville, FL
FHB 89	Hybrid – University of Florida, Gainesville, FL
FHB 227	Hybrid – University of Florida, Gainesville, FL
FHB 240	Hybrid – University of Florida, Gainesville, FL
FHB 272	Hybrid – University of Florida, Gainesville, FL
FHB 281	Hybrid – University of Florida, Gainesville, FL
FHB 285	Hybrid – University of Florida, Gainesville, FL
J540	Olsen-Fennel Seed Co.
OKC 19-9	Hybrid - Oklahoma State University, Stillwater, OK
Tif 94-16	Hybrid – University of Georgia, Tifton, GA
Tif 94-18	Hybrid – University of Georgia, Tifton, GA
Tif 94-21	Hybrid – University of Georgia, Tifton, GA
Tif 94-29	Hybrid – University of Georgia, Tifton, GA
Tif 99-16	Hybrid – University of Georgia, Tifton, GA
SWI-11	Seeds West Inc., Roll, AZ
Arizona Common	Commercial cultivar
Baby	Commercial cultivar
Blue-Muda	Commercial cultivar
Cardinal	Commercial cultivar
Champion	Commercial cultivar
Floradwarf	Commercial cultivar
GN 1	Commercial cultivar
Jackpot	Commercial cultivar
Lakewood	Commercial cultivar
Majestic	Commercial cultivar
Midlawn	Commercial cultivar
Mirage	Commercial cultivar
Mobile	Commercial cultivar
Mississippi Supreme	Commercial cultivar
NuMex-Sahara	Commercial cultivar
Ormond	Commercial cultivar
Patriot	Commercial cultivar
Pyramid	Commercial cultivar
Princess 77	Commercial cultivar
Riviera	Commercial cultivar
Savannah	Commercial cultivar
Shanghai	Commercial cultivar
Shangri La	Commercial cultivar
Southern Star	Commercial cultivar
Sundevil II	Commercial cultivar
Sydney	Commercial cultivar
Tifdwarf	Commercial cultivar
Tifgreen	Commercial cultivar
TifEagle	Commercial cultivar
TifSport	Commercial cultivar
Tifway	Commercial cultivar
Transcontinental	Commercial cultivar

Table 1. Bermudagrass genotypes and cultivars evaluated for resistance to the bermudagrass mite, Dallas, TX.

al standard for comparison with the hybrids. For both experiments, one 7.5 x 7.5-cm plant of each genotype was randomly assigned to a cell in each replicate consisting of several trays. Six replicates were used in both experiments.

For each experiment, the entire set of trays (6 reps) was placed on greenhouse wire-mesh benches and surrounded with additional trays of either 'Baby', 'Champion', 'Floradwarf', or 'Tifdwarf'. The trays of these three cultivars were heavily infested with bermudagrass mites before the test, and they were placed around each experiment to provide adequate mite inoculum for the grasses in the experiment. By placing infested plant material on all sides of each experiment, mites were in position to readily disperse across the test plantings. The air circulation from the cool-cell fans at one end of the greenhouse provided a gentle breeze across each experiment. Since eriophyid mites are known to readily disperse from one plant to another by wind, this method provided ideal conditions for the mites to disperse naturally across each set of plants. Plants were watered daily and inspected and trimmed as needed throughout both experiments to prevent vegetative contamination among the genotypes.

Plants in both experiments were assayed in March, approximately 9 weeks after exposure to infestation, for susceptibility to mites by closely examining each plant and counting the number of deformed or rosetted terminals per plant. Plant texture varied significantly among the genotypes and since the potential number of infested leaves could vary accordingly, the finer textured genotypes had the potential of a much greater number of deformed/infested terminals. Therefore, the highest number of rosetted terminals found for each entry is also presented.

Statistical transformations were used on both data sets to achieve normality and homogeneity before analysis (17), but untransformed means are presented. Analyses of variance (ANOVA) for this completely randomized design were performed to test the differences between cultivars and hybrids, and means were compared at the 5% level of significance using Fisher's least significant difference multiple range test (16).

Results

Means and highest number of infestation terminals per plant for the two experiments are summarized in Tables 2 and 3. A wide range of susceptibility to bermudagrass mite was recorded among the bermudagrass cultivars and genotypes evaluated. Susceptibility ratings ranged from zero rosetted terminals on five cultivars and four hybrids to a mean of 160 rosettes and a high of 265 deformed terminals on one plant (4200W 47-1).

Experimental Varieties (Hybrids)

In addition to 4200W 47-1, the most susceptible genotype in the study, six other hybrids were highly susceptible to mites and produced more than 20 rosetted terminals per plant, including 4200W 19-18 > 4200W 49-17 > 4200W 22-13 > Tif 94-18 > 3200W 1-20 > TXTD 67. Additionally, 13 more hybrids, 4200W 25-7 > 3200W 78-10 > 3200W 9-4 > 4200W 55-5 > FHB 89 > 4200W 68-9 > 4200W 56-14 > 4200W 38-2 >Tif 99-16 > 3200W 51-14 > FHB 272 > J 540 > CBC 24-4, yielded means more than 5 deformed terminals per plant. All of these hybrids except CBC 24-4 (8 deformed) and J 540 (13 deformed) had at least one of the six replicate plants with 15 or more deformed terminals. Thirteen of the hybrids produced a mean of one to five rosetted terminals with at least three rosettes on one of the test plants.

An additional 11 experimental genotypes had means of less than 1 with at least one rosette on one of the replicate plants. Three of these hybrids, 4200W 20-6, 4200W 52-15, and 3200W 70-18, did not have any rosetted terminals on any of the six replicate plants. Hybrids with mean numbers of rosetted terminals of up to 1.17 all fell within the least infested statistical grouping (Table 2).

Cultivar/Genotype	Rosetted Terminals per Plant: Mean no.[1]		Highest no.[2]
4200W 47-1	160.00	a [3, 4]	265
4200W 19-18	55.17	b	105
Floradwarf	45.50	bc	69
4200W 49-17	37.33	cd	60
4200W 22-13	33.30	de	39
3200W 1-20	26.83	ef	55
Tifgreen	22.83	fg	36
4200W 25-7	18.00	gh	26
3200W 78-10	17.67	ghi	32
3200W 9-4	15.67	hij	37
4200W 55-5	14.33	hij	23
4200W 68-9	11.70	Ilk	15
4200W 56-14	11.50	Ilk	18
4200W 38-2	10.67	Jk	20
4200W 51-14	8.67	kl	24
3200W 94-2	4.67	lm	7
3200W 30-20	3.33	mn	12
4200W 26-13	3.33	mn	5
3200W 18-11	2.83	no	9
3200W 6-12	2.33	no	7
4200W 47-7	2.00	nop	4
4200W 22-10	1.17	opq	4
4200W 74-3	1.17	opq	5
4200W 25-1	0.83	pq	3
4200W 25-15	0.83	pq	5
4200W 53-1	0.33	q	1
4200W 46-4	0.17	q	1
3200W 70-18	0.00	q	0
4200W 20-6	0.00	q	0
4200W 52-15	0.00	q	0

[1] Mean number of rosetted terminals per 7.5 x 7.5-cm plant.
[2] Highest number of rosetted terminals per plant (6 reps).
[3] Data were transformed for analysis; actual data reported.
[4] Mean separation by Fisher's least significant difference (LSD) multiple range test (P = 0.05).

Table 2. Susceptibility of bermudagrass cultivars/genotypes in Experiment 1 to infestation by bermudagrass mite. Mean number of infested terminals per plant (6 reps) and the highest number of terminals on any plant.

Commercial Cultivars

Among the cultivars evaluated, 'Floradwarf' had significantly more rosetted terminals than any other cultivar tested, with highs of 69 and 76 (Experiment 2 and 1, respectively) deformed terminals on at least one replicate plant with means of 45.5 and 58.8 rosetted terminals, respectively (Table 3). Additionally, eight other cultivars, 'Champion' > 'Continental' >

Cultivar/Genotype	Rosetted Terminals per Plant	
	Mean no.[1]	Highest no.[2]
Floradwarf	58.83 a [3, 4]	76
Champion	37.17 b	65
Transcontinental	31.33 bc	74
Tif 94-18	30.67 bcd	49
Lakewood	29.00 bcd	59
Tifdwarf	28.83 bcd	42
Baby	27.67 cde	50
Majestic	23.83 cdef	57
Ormond	22.83 def	76
TXTD 67	22.50 def	43
TifEagle	19.00 fg	36
Shangri La	15.50 ghi	64
MS Supreme	14.00 hi	44
FHB 89	13.83 ghi	20
Tif 99-16	10.00 hi	25
Blue-Muda	8.50 ij	21
FHB 272	6.50 j	15
J 540	5.83 j	13
CBC 24-4	5.33 j	8
Southern Star	4.83 jk	15
Tif 94-29	4.17 jkl	10
Arizona Common	3.50 klm	7
FHB 227	2.83 klm	12
FHB 240	1.67 lmn	4
FHB 44	1.67 lmn	7
Mobile	1.67 lmn	3
CCB 25-6	1.50 mn	3
Sydney	1.50 mn	7
Patriot	1.17 mn	5
Sundevil II	0.83 mno	3
CCB 10-9	0.50 mno	2
Mirage	0.50 mno	2
Pyramid	0.50 mno	2
CN 2-9	0.17 no	1
FHB 281	0.17 no	1
FHB 285	0.17 no	1
Jackpot	0.17 no	1
NuMex-Sahara	0.17 no	1
Riviera	0.17 no	1
OKC 19-9	0.17 no	1
Princess 77	0.17 no	1
Savannah	0.17 no	1
Shanghai	0.17 no	1
SWI-11	0.17 no	1
Tif 94-21	0.17 no	1
Cardinal	0.00 o	0
GN 1	0.00 o	0
Midlawn	0.00 o	0
Tifsport	0.00 o	0
Tifway	0.00 o	0

[1] mean number of rosetted terminals per 7.5 x 7.5-cm plant.

[2] Highest number of rosetted terminals per plant (6 reps).

[3] Data were transformed for analysis; actual data reported.

[4] Mean separation by Fisher's least-significant difference (LSD) multiple range test (P = 0.05).

Table 3. Susceptibility of bermudagrass cultivars/genotypes in Experiment 2 to infestation by bermudagrass mite. Mean number of rosetted terminals per plant (6 reps) and the highest number of terminals on any plant are presented.

'Lakewood' > 'Tifdwarf' > 'Baby' > 'Majestic' > 'Ormond' ≥ 'Tifgreen', each had means more than 20 rosetted terminals per plant and at least one replicate plant with at least 36 rosetted terminals.

Four more cultivars, 'TifEagle' > 'Shangri La' > 'MS Supreme' > 'Blue-Muda', each had means between 5 and 20 rosetted terminals per plant. An additional eight cultivars exhibited mean infestation levels between 0.5 and 5 infested terminals per plant with some replicate plants with at least 2 rosettes. Six of the cultivars, 'Jackpot', 'NuMex-Sahara', 'Riviera', 'Princess 77', 'Savannah', and 'Shanghai', were moderately resistant with a mean of only 0.17 rosetted terminals per plant. To have this susceptibility level, at least one of the six replicate plants for each cultivar exhibited one rosetted terminal. 'Cardinal', 'Greg Norman 1', 'Midlawn', 'TifSport', and 'Tifway' did not exhibit any rosetted plants in this study.

Discussion

This study emphasized the wide range of susceptibility to the bermudagrass mite among bermudagrass germplasm. The levels of infestation may appear to be skewed to some extent since the more dwarf genotypes tend to have the highest number of rosettes per plant. These dwarf type plants also have considerably more growing points and therefore have an increased potential for a greater number of rosetted terminals per plant. There are many more terminals to express symptoms on an ultradwarf like 'Baby', 'Champion', 'Continental', 'Floradwarf', or 'Tifdwarf' than are available to be distorted on the coarser textured cultivars like 'Arizona Common' or 'NuMex-Sahara'.

Additionally, the infested cultivars or hybrids expressing rosetting and tufting create the potential for continued and increasing damage with a longer exposure to mite infestations.

There was also the possibility that some of the cultivars avoided heavier infestation because they were infested late in the study. Likewise, some of the cultivars may have been only lightly

Range of Infestation*				
0	<1 to 1	>1 to <5	>5 to <20	>20
Apparent resistance	Low	Moderate	High	
Cardinal	Jackpot	AZ Common	Blue-Muda	Baby
GN 1	Mirage	Mobile	MS Supreme	Champion
Midlawn	NuMex Sahara	Patriot	Shangri La	Floradwarf
Tifsport	Princess 77	Southern Star	TifEagle	Lakewood
Tifway**	Pyramid	Sydney		Majestic
	Riviera			Ormond
	Savannah			Tifdwarf
	Shanghai			Tifgreen
	Sundevil II			Transcontinental

*(number of rosettes per 7.5 x 7.5-cm plant)

**'Tifway' was found to have 44% of the plants infested with bermudagrass mite in a previous test (12), therefore, the other four cultivars with no rosettes and those with low levels of infestation in this experiment may also be susceptible.

Table 4. Summary of the range of susceptibility to the bermudagrass mite among bermudagrass cultivars evaluated in these tests.

infested during the test period but would have continued to express more damage with additional time and exposure to the available mite inoculum. A good example of this second possibility is the failure of 'Tifway' to become infested during the test period in this study.

In a previous experiment, 44% of the 'Tifway' test plants expressed rosetting after an eight-month infestation period (12). Since this study was much shorter and lasted only 9 weeks, plants may have expressed symptoms after a longer exposure to the surrounding infestations. It is also possible that the mite-induced injury symptoms are slower to develop on some of the more coarse genotypes. In two field evaluations of bermudagrass rated for mite injury symptoms, 'Tifway', 'Baby', 'Continental', 'Floradwarf', and many other cultivars that were very susceptible in this study showed no symptoms from this mite even after 1-2 years post-establishment in field studies (1, 2).

A summary of the ranking of the cultivars evaluated in these tests is provided to quickly visualize the ranges of susceptibility among the cultivars (Table 4). Additional evaluations of the cultivars and hybrids with less than 1 rosette per plant is needed to confirm whether these plants are consistently resistant to the bermudagrass mite, or whether they avoided infestation and symptom expression during this short-term exposure.

Acknowledgements

This study was supported in part by grants from Gardner Turfgrass, Inc., the U.S. Golf Association's Turfgrass and Environmental Research Program, and O. J. Noer Research Foundation, Inc. Appreciation is extended to Dennis Hays for technical assistance and Drs. Charles Taliaferro and James A. McAfee for providing plant materials for this study.

Literature Cited

1. Anonymous. 2001. National Turfgrass Evaluation Program (NTEP) 1997 national bermudagrass test. 2000 Prog. Rep. NTEP No. 01-5. http://www.ntep.org/reports/bg97/bg97_01-5/bg97_01-5.htm (TGIF Record 77309)

2. Anonymous. 1994. National Turfgrass Evaluation Program (NTEP) 1992 national bermudagrass test. 1993 Prog. Rep. NTEP No. 94-3. http://www.ntep.org/data/bg92/bg92_97-9f/bd92t35a.txt (TGIF Record 37550)

3. Baltensperger, A. A. 1961. Evaluation of bermudagrass varieties and strains. *Arizona Agr. Exp. Stn. Rep.* 203:3-14. (TGIF Record 169183)

4.Busey, P., and A. E. Dudeck. 2007. Bermudagrass varieties. http://grove.ufl.edu/~turf/bermvars/index.html(TGIF Record 169172)

5. Butler, Jr., G. D., and W. R. Kneebone 1965. Variations in response of bermudagrass varieties to bermudagrass mite infestations with and without chemical control. *Arizona Agr. Exp. Stn. Rep.* 230:7-10. (TGIF Record 169201)

6. Butler, Jr., G. D.. 1963. The biology of the bermudagrass eriophyid mite. *Arizona Agr. Exp. Stn. Rep.* 219:8-13. (TGIF Record 169168)

7. Butler, Jr., G. D. 1962. Variations in response of bermudagrass strains to eriophyid mite infestations. *Arizona Agr. Exp. Stn. Rep.* 212:10-11.(TGIF Record 169154)

8. Butler, Jr., G. D. 1961. Variations in response of bermudagrass strains to eriophyid mite infestations. *Arizona Agr. Exp. Stn. Rep.* 203:15-19. (TGIF Record 169188)

9. Dudeck, A. E., J. B. Beard, J. A. Reinert, and S. I. Sifers. 1995. Registration of 'FloraTex' bermudagrass (Reg. No. CV-27, PI 586639). *Crop Sci.* 35(5):1505. (TGIF Record 35175)

10. Johnson, F. A. 1975. Bermudagrass mite, *Eriophyes cynodoniensis* Sayed (Acarina: Eriophyidae), in Florida with reference to its injury, symptomology, ecology, and integrated control. Ph.D. Dissertation, Univ. Florida, Gainesville. 182 p. (TGIF Record 9814)

11. Reinert, J. A. 1974. Bermudagrass mite research. *Proc. South. Nurs. Assoc. Res. Conf.* 19:49. The Southern Nurseryman's Association, Nasheville, TN. (TGIF Record 169262)

12. Reinert, J. A., A. E. Dudeck, and G. H. Snyder. 1978. Resistance in bermudagrass to the bermudagrass mite. *Environ. Entomol.* 7:885-888. (TGIF Record 1283)

13. Reinert, J. A., C. Taliaferro, and J. McAfee. 2008. Susceptibility of bermudagrass (Cynodon) varieties to bermudagrass mite (Eriophyses cynodoniensis). *Acta Horticulturae* 783:519-528. (TGIF Record 136453)

14. Reinert, J. A., M. C. Engelke, and J. C. Read. 2004. Host resistance to insects and mites, a review – A major IPM strategy in turfgrass culture. *Acta Horticulturae* 661:463-486. (TGIF Record 102568)

15. Reinert, J. A., M. C. Engelke, and S. J. Morton. 1993. Zoysiagrass resistance to the zoysiagrass mite, *Eriophyes zoysiae* (Acari: Eriophyidae). *Int. Turfgrass Soc. Res. J.* 7:349-352 (TGIF Record 28046)

16. SAS Institute. 2003. SAS system for Windows, release 8.02. SAS Institute, Cary, NC.

17. Steel, R.G.. D., J. H. Torrie, and D. A. Dickey. (eds.). 1997. Principles and procedures of statistics:a biometrical approach, 3rd ed. WCB/McGraw-hill, New York, NY.

18. Trenholm, L. E., J. L. Cisar, and J. B. Unruh. 2003. Bermudagrass for Florida lawns. Univ. Florida, Coop. Ext. Serv., Gainesville, FL LH007, 7 p. http://edis.ifas.ufl.edu/LH007 (TGIF Record 131130)