# The Bermudagrass Stunt Mite

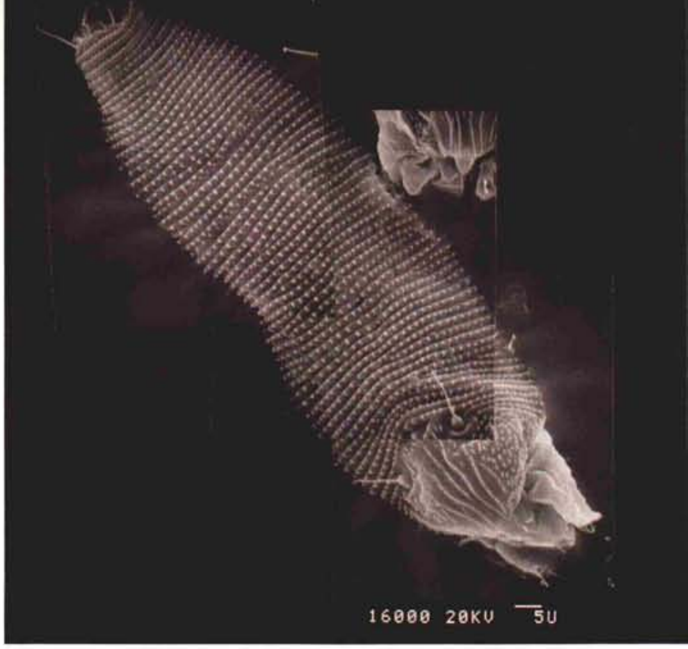


*Figure 1. The bermudagrass stunt mite at extremely high magnification with the scanning electron microscope.* (Photo courtesy of Dr. H. L. Cromroy, University of Florida, Gainesville.)

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BERMUDAGRASS is widely used for sport turf throughout the southern part of the United States and much of the tropical and subtropical regions of the world. Florida has 728 golf courses covering approximately 69,200 acres. In 1982 the cost of maintaining them reached $200 million, according to current University of Florida estimates.

The bermudagrass stunt mite, *Aceria cynodeniensis* (Hassan) Kiefer *(Figure 1),* is an important pest to bermudagrass. It is particularly a problem on golf turf in Florida and to recreational turf throughout the South. This mite is probably native to Australia, where bermudagrass has become a naturalized plant, but now it is widespread, occurring in New Zealand, North Africa, and North America. The host-specific eriophyid mite was first found infesting bermudagrass lawns in Phoenix, Arizona, in 1959. Soon it spread to California, Nevada, New Mexico, Texas, Georgia, Alabama, and Florida. It was first reported in Florida in 1962, at Patrick Air Force Base, Cocoa Beach, and Opa Locka. Now the mite has been found throughout Florida.

Bermudagrass stunt mites are whitish-cream in color, wormlike in shape *(Figure 1)*, and 165-210 microns (about 1/125 inch) in length. Without a vivid imagination, even a 10-power hand lens is inadequate to see this mite. Microscopic examination at 30-50 power is needed.

The eggs are laid under the leaf sheath. After hatching they pass through two larval stages before molting as adults. All life stages are found together under the leaf sheath, and there may be a few to a hundred or more mites with numerous eggs under a single leaf sheath. Dr. G. D. Butler, Jr., observed that the period for development from egg hatching to adulthood takes five to six days. The life cycle is probably within the range of seven to 10 days, depending upon the temperature.

Bermudagrass damaged by this host-specific eriophyid mite first shows a slight yellowing of the tips of the grass blades, followed by a shortening of the internodes, producing a rosetted and tufted growth or witch's-broom effect *(Figure 2)*. When an infestation is severe, there is almost no green growth from the grass, and the tufts become a mass of large knots that die, causing brown, thin areas in the turf *(Figure 3)*. These dead or heavily damaged areas often become infested with weeds, thus creating other management problems.

Over 49 toxicants (insecticides and miticides) have been evaluated in field experiments for control of the bermudagrass stunt mite. Experiments were conducted in Arizona by Dr. George Butler and associates from 1961 through 1965, and more recently in Florida from 1971 to the present by Dr. James Reinert and Dr. Harvey Cromroy. The chemicals evaluated and their level of effectiveness are given in *Table 1*. Only nine toxicants have shown any control in these tests. In recent field experiments (1981-1982) UC-55248 and Vydate® have shown excellent results in Florida *(Figure 4)*. Vydate may be the only new candidate for EPA labeling, however, since development of UC-55248 has been terminated by the manufacturer. The addition of a wetting agent to the spray tank mix has improved the level of control produced in these field experiments.

Diazinon is the standard recommended treatment for this eriophyid mite. A treatment rate of four pounds active ingredient per acre (4.8g/ha), with a second application at the same rate applied seven to 10 days later is required for control. One golf course in Miami spent $25,000 for bermudagrass stunt mite control in 1974 and an additional $17,000 the following year. Several golf course superintendents in South Florida estimated a cost of $6,000 to $9,000 per 18-hole golf course for chemicals and additional fertilizer (no labor or equipment costs included) to control bermudagrass stunt mite damage in 1981.

Diazinon cannot be depended upon solely, since repeat applications are required, yearly treatment costs are high, pesticide-resistant mite populations may develop, and poor control with diazinon is often reported. Alternate means of control must be considered, including the use of host-resistant cultivars and proper selection of cultural practices.

A good alternative to chemical control is to develop varieties of bermudagrass that are resistant to the bermudagrass stunt mite. Cultivars have been evaluated for mite susceptibility under field conditions by Baltensperger and Butler, in Arizona, and in the greenhouse by Johnson and Reinert et al., in Florida. Of the 108 genotypes evaluated, most

*Figure 2. Bermudagrass injured by bermudagrass stunt mite. A. (above) Early infestation. B. (below) Early damage showing shortened leaves and reduced internode length. C. (bottom) Late stage damage.*

*Figure 4. Test plots on an "Ormond" bermudagrass tee severely infested with bermudagrass stunt mites.*

*Figure 3. Apron and slopes of a green showing bermudagrass stunt mite injury.*

*Figure 5. (Left) Greenhouse experiment to evaluate several bermudagrass genotypes for resistance to the bermudagrass stunt mite.*

*Figure 6. (Below) Bermudagrass stunt mite damage around base of tree. Areas around trees, shrubs and other obstacles on the golf course are often missed when pesticides are used.*

**TABLE 1**

**Toxicants Evaluated for Bermudagrass Stunt Mite Control and Their Effectiveness.**

| Toxicant | Response in Field Tests* Arizona | Response in Field Tests* Florida | Toxicant | Response in Field Tests* Arizona | Response in Field Tests* Florida |
|---|---|---|---|---|---|
| Diazinon | +++ | +++ | Dyfonate® (fonofos) | | — |
| UC-55248 | | +++ | Dylox® (trichlorfon) | | — |
| Vydate® (oxamyl) | | +++ | Ethion | — | |
| Temik® (aldicarb) | | +++ | Eradex® (thioquinox) | — | |
| Baygon® (propoxur) | ++ | — | Folcid® (captafol) | — | |
| Banol® (carbanolate) | + | | GS13005 (methidathion) | — | |
| Dursban® (chlorpyrifos) | ++ | — | Kelthane® (dicofol) | — | — |
| Nemacur® (phenamiphos) | | + | Korlan® (ronnel) | — | |
| Trithion® (carbophenothion) | | + | Lindane | — | |
| Acaraben® (chlorbenzilate) | | — | Malathion | — | |
| Acarol® (bromopropylate) | | — | Metasystox-R® | | |
| Akton® | | — | (oxydemeton-methyl) | — | |
| Aspon® (propyl thiopyrophate) | | — | Mocap® (ethoprop) | | — |
| Azodrin® (monocrotophos) | | — | Morestan® (quinomethionate) | — | |
| Brofene® (bromophos) | | — | Omite® (propargite) | | — |
| Bux® (metalkamate) | | — | Orthene® (acephate) | | — |
| Captan | — | | Phostex® | — | |
| Carzol® (formetanate) | | — | Phictran® (cyhexatin) | | — |
| Cygon® (dimethoate) | — | | Sulfur | — | |
| Dasanit® (fensulfothion) | | — | Tedion® (tetradifon) | — | |
| DDT | — | | Thiodan® (endosulfan) | — | |
| Delnav® (dioxathion) | | — | Tirpate® | | — |
| Dibrome® (naled) | — | | Torak® (dialifor) | | — |
| Dimilin® (diflubenzuron) | | — | Vendex® (fenbutatin-oxide) | | — |
| Di-Syston® (disulfoton) | — | — | Zectran® (mexacarbate) | — | |

*(+++) = good control, (++) = control, but not in all tests, (+) = poor control, (—) = no control.

were severely damaged, but several appeared to be resistant, while others showed some damage. Cultivars and their response to this mite are presented in *Table 2*. Most of the commonly grown cultivars are susceptible to damage; Tifdwarf and Midiron are the only two cultivars that did not show mite damage in lab and field experiments. FB-119, a mite-resistant common-type bermudagrass selection, is being developed for release by the Florida Agriculture Experiment Station. In laboratory and field tests, FB-119 was completely resistant to the bermudagrass stunt mite *(Figure 5)*.

HOST-RESISTANT cultivars should be used whenever possible and practical, not only for this pest, but for other insects, mites, plant pathogens, and nematodes. All major turfgrasses lack certain desirable characteristics, including pest resistance, and breeding for insect resistance is impeded by the lack of research funds, personnel, and adequate methods of screening germplasm. Entomologists, nematologists, plant pathologists, and turfgrass breeders need to join forces in developing new varieties of turfgrass resistant to one or more of the major pest problems.

Damage by the bermudagrass stunt mite can best be prevented by several management practices. First, correct identification of the pest is necessary. Quite often the turf damage is the result of combined infestations of several turf pests. Nematodes and bermudagrass scale are often present in bermudagrass that has been damaged by stunt mites, and they may have contributed significantly to the turf damage. Moreover, when bermudagrass is under stress from either lack of water, nematodes, bermudagrass scale, or other turf pests, it is less able to withstand the mites and, therefore, more vulnerable. Soil with poor water-holding capacity may also be a contributing factor.

When bermudagrass is treated with insecticides to control this mite, the second application seven to 10 days later is very important. It is necessary to control the young mites that hatch from eggs that were present during the first treatment but not affected by it. Thorough treatment of the whole infested area is important. Often turf areas around trees, shrubbery, and other obstructions, around bunkers, or along canals and lakes are not treated. These areas that are missed will act as reservoir areas for mites to reinfest the whole golf

TABLE 2

**Response of Bermudagrass Cultivars to Bermudagrass Stunt Mite.**

| Cultivar | Response* | Cultivar | Response* |
|---|---|---|---|
| 'Bayshore' (Gene Tift) | SS | 'Texturf 1F' | SS |
| 'Everglades No. 1' | SS | 'Texturf 10' | SS |
| FB-119 (Franklin) | R | 'Tifdwarf' | R |
| FB-137 (No Mow) | SS | 'Tiffine' | SS |
| 'Midiron' (P-16) | R | 'Tifgreen' | SS |
| 'Midmo' (S-16) | S | 'Tiflawn' | SS |
| 'Midway' (E-1) | S | 'Tifway' | S |
| 'Oklan' | U | 'Tifway II' | U |
| 'Ormond' | SS | 'Tufcote' | SS |
| 'Pee Dee' | U | 'U-3' | S |
| 'Royal Cape' | S | Uganda | S |
| 'Santa Ana' | U | 'Vamont' | U |
| 'St. Lucie' | SS | Common | SS |
| 'Sunturf' | SS | | |

*R = resistant, S = susceptible and showing some damage, SS = very susceptible with rosetting and severe damage, U = unevaluated, cultivar has not been tested.

course. Treatment with hand equipment or a spray hose attachment may be necessary for these areas. *Figure 6* shows an area around the base of a tree on a golf course where the bermudagrass had been severely damaged approximately a year after the Ormond bermudagrass on the course had been treated with diazinon. Damage showed up here first because of the added water stress, due to the shallow roots of the tree and the residual population of mites that were left in the untreated oval area around the base of the tree. Canal, stream, and lake banks also harbor residual mite populations, but the damage does not show up as well since there is no added water stress in these areas *(Figure 7).*

Mites can easily spread from an infested area. Like most eriophyid mites, the bermudagrass stunt mite can be carried by the wind. It is also capable of hitching a ride on other insects present in the bermudagrass. They can probably be moved by armyworms, webworms, and leafhoppers, and they have been seen attached to mole crickets that have recently flown from an infested area (Reinert, unpublished data). They are also easily dispersed in grass clippings. Mowers cut the rosettes and scatter the infested grass over wide areas of healthy turf. The infested grass sprigs can also be blown by the wind. Tires on equipment, even golf carts and golf shoes, may serve as vehicles of spread, since the infested grass would drop off from time to time.

Proper fertilization and even high rates of fertilizer applied with ample water can allow the bermudagrass to outgrow bermudagrass stunt mites. Rosettes and other symptoms will be present, but no loss of stand will occur, because the grass apparently is growing faster than the mites can kill it.

Host-resistant cultivars should be used whenever possible to eliminate or at least lessen the potential of injury.

In conclusion, the turf manager can, through good management practices and the use of host-resistant cultivars, reduce the potential of injury by the bermudagrass stunt mite. When populations reach damaging levels, they can be controlled with chemical treatment.

*Figure 7. Populations of the bermudagrass stunt mite are often left untreated along lake, canal, and stream banks which can reinfest adjacent treated areas of bermudagrass.*