

When a susceptible cultivar is infested by couchgrass mite, most of the terminal growth will become distorted and tufted and the grass may often die. Damage is usually accelerated when another stress (either biotic or abiotic) is present

Damage by the couchgrass mite can cause a significant loss of stands of couchgrass especially when other biotic or abiotic stresses are present. James Reinert outlines results from a research project at Texas A&M University which screened commercial cultivars and 47 other couch genotypes for their susceptibility to couchgrass mite.



Cultivars of couchgrass (*Cynodon* spp.) are among the most widely used warm-season turfgrasses throughout much of the tropical and subtropical regions of the world. Over 60 cultivars of couchgrass have been developed in the United States alone and the species is used extensively on golf courses, sports fields and throughout residential and commercial landscapes and other high traffic areas.

The couchgrass mite, *Eriophyes cynodontiensis*, is a reoccurring pest throughout much of the area where couchgrass is adapted. However, over the last few years, it has again become a major pest on golf courses and other sports fields in Texas and other states across south USA.

The couchgrass mite is very small and not visible to the naked eye – 20 to 30 X magnification is required to see it – but its presence can readily be identified by its characteristic damage in couchgrass turf. Couchgrass damaged by this mite exhibits shortened leaves and internodes producing a typical rosetted and tufted growth, or ‘witch’s broom’ effect.

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. If the mite-infested grass is left untreated, large areas of couchgrass are often killed.

One of the best alternatives to the use of chemical pesticides is to develop and use well adapted cultivars of couchgrass that are resistant to the couchgrass mite. Several couchgrass genotypes have been identified in various studies by

Baltensperger (1961), Butler (1961, 1962 and 1965) and Johnson (1975) in field studies and by Reinert et al. in greenhouse studies (1978 and 2008).

In the latter study, FloraTex, a coarse-textured type of couchgrass, was identified as resistant and exhibited no symptoms while Tifway was identified as susceptible with 44 per cent of the test plants exhibiting symptoms of the mite. In both greenhouse (nine months) and field studies (six years), the couchgrass mite never expressed any damage to FloraTex.

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 (Reinert et al, 1993).

MATERIAL AND METHODS

The present study at Texas A&M University was initiated to evaluate hybrids from the couchgrass breeding programme at Oklahoma State University (OSU) 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 couchgrass mite.

Couchgrass cultivars and genotypes were established and grown in 18-cell trays in greenhouse culture at the Texas AgriLife Research and Extension Urban Solutions Center in Dallas. Tray cells measured 7.5cm x 7.5cm and 4cm deep. Both Experiment 1 with hybrids from OSU and Experiment 2 with mostly commercial cultivars were established during January 2010 in a greenhouse at the Dallas center.



Floradwarf was included in both experiments as a susceptible standard, while Tifgreen (328) was also included in Experiment 1 as an additional standard for comparison with the hybrids. For both experiments, one 7.5cm x 7.5cm 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 (six reps) was placed on greenhouse wire-mesh benches and surrounded with additional trays of either Baby, Champion, Floradwarf or Tifdwarf. These trays were heavily infested with couchgrass 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 to prevent vegetative contamination.

Plants in both experiments were assayed in March, about nine 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.

RESULTS

A wide range of susceptibility to couchgrass mite was recorded among the couchgrass 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 of the experimental varieties (cultivar 4200W 47-1).

Among the commercial 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.

Additionally, eight other cultivars – Champion, Continental, Lakewood, Tifdwarf, Baby, Majestic, Ormond and 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 and 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,

LIFE CYCLE OF THE COUCHGRASS MITE

The couchgrass mite (*Eriophyes cynodontiensis*) is extremely small and is invisible to the naked eye. Hand lenses usually do not have the magnifying power to make the mite visible. The mite appears worm-like with two pairs of legs facing forward.

The life cycle of this mite is quite rapid. Under ideal conditions the mite can complete its life cycle from hatching to an adult in seven days. Under most summertime conditions, the adults lay eggs every 2-5 days with the mite completing its life cycle in 10-14 days. The mites tend to develop between the leaf sheath and blade. This location makes it often difficult to get a chemical spray to the mite.

Culturally, lowering the mowing height will make for a less favourable environment for the mite. Care should be done not to cause scalping. Removing clippings will also help reduce mite populations. Irrigating and fertilising make for a healthier couchgrass turf. Miticides may or may not be effective. If used be sure to apply with adequate water. Short residual insecticides are effective but may need to be applied multiple times. In the United States many managers try to 'outgrow' the mite through fertilisation and irrigation.

– Source: www.greencast.com.au



Couchgrass mite (*Eriophyes cynodontiensis*)

Couchgrass damaged by mites exhibits shortened leaves and internodes producing a typical rosetted and tufted growth, or 'witch's broom' effect



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 emphasised the wide range of susceptibility to the couchgrass mite among couchgrass 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. 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 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 per cent of the Tifway test plants expressed rosetting after an eight-month infestation period (Reinert et al, 1978). Since this study was much shorter and lasted only nine weeks, plants may have

OBSERVATIONS FROM TU05001 – WARM-SEASON GREENS TRIALS

As part of the recent Horticulture Australia Limited Project TU05001 – Management guidelines for new warm-season grasses in Australia – conducted by DEEDI in conjunction with the AGCSA – the following observations were made about mite damage (pgs 116-117). The final report for this project can be downloaded from the AGCSATech section on the AGCSA website (<http://www.agcsa.com.au/agcsatech/research>)

"Insecticides were applied as needed to control mites (*Eriophyes* sp.) which were possibly couchgrass mites (*Eriophyes cynodonsensis*), ants, mole cricket, lawn armyworm and African black beetle larvae. A preventative programme was not adopted which provided us with an opportunity to observe and record any differences seen within the susceptibility of the cultivars trialed.

Repeat application of miticides were sprayed in an attempt to control two-spotted mites in October of 2006, but no further applications were applied throughout the duration of the trial. This does not mean that the mites were not present, or were not causing underlying problems to turfgrass quality and playability.

On 21 September 2009 an inspection and visual rating was undertaken of mite damage of the *Cynodon* hybrid cultivars growing in the unreplicated turf demonstration plots (measuring 3m x 2.5m) at DEEDI Redlands Research Station. General observations were made and the plots were given a rating from 'no effect present' to 'severely affected' (Table 1).

Results indicated from the unreplicated plots that there were some cultivars that showed signs of possible mite resistance or tolerance, while others had varied levels of infestation.

Further research is warranted in this area to determine what species of mites are causing problems, but also whether certain cultivars are resistant to the effects of mites. A digital photograph was taken of a medium-to coarse textured *Cynodon* hybrid cultivar on 6 January 2010 showing the damage commonly seen following an infestation of mites.

Mites possess the ability to inhibit the lateral development of the turf plant by feeding on plant tissue following the puncturing of the surface cells with their fangs or stylets. The damage can often be seen following a close inspection of the turf. However, the arachnids, which are between 0.2mm and 0.5mm in size, are commonly very hard to find and accurately identify. The result if not detected poses a threat to new leaf and stolon tissue that become severely distorted effecting lateral growth and turf vigour."

TABLE 1. RATINGS OF MITE DAMAGE OF CYNODON HYBRIDS AT REDLANDS RESEARCH STATION

Cultivar	Damage Rating
Champion Dwarf	Medium
FloraDwarf	Severe
MiniVerde	Medium
MS-Supreme	Light
Novotek	Light
TifEagle	No effect
Tifdwarf	No effect
Tifgreen	No effect

TABLE 1. RANGE OF SUSCEPTIBILITY TO THE COUCHGRASS MITE AMONG COMMERCIAL CULTIVARS

0 Resistance	Range of infestation ¹			
	<1 to 1 Low	>1 to <5 Moderate	>5 to <20	>20 High
Cardinal	Jackpot	Arizona Common	Blue-Muda	Baby
Greg Norman 1	Mirage	Mobile	MS Supreme	Champion
Midlawn	NuMex Sahara	Patriot	Shangri La	Floradwarf
Tifsport	Princess 77	Southern Star	TifEagle	Lakewood
Tifway ²	Pyramid	Sydney		Majestic
	Riviera			Ormond
	Savannah			Tifdwarf
	Shanghai			Tifgreen (328)
	Sundevil II			Transcontinental

1 – Number of rosettes per 7.5cm x 7.5cm plant
2 – Tifway was found to have 44 per cent of the plants infested with couchgrass mite in a previous test (Reinert et al, 1978), therefore, the other four cultivars with no rosettes and those with low levels of infestation in this experiment may also be susceptible.

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 couchgrass 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 (NTEP 1992 and 1997).

A summary of the ranking of the cultivars evaluated in these Texas A&M tests is provided to quickly visualise the ranges of susceptibility among

the cultivars (Table 1). 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 couchgrass mite, or whether they avoided infestation and symptom expression during this short-term exposure.

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