Mites on warm-season turfgrasses: Australian research update

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The fairies at the bottom of the garden...

- Turfgrass feeding mites
  - Imaginary or real?

Outline of presentation

- Brief introduction to the research project
- Overview of Acari (mites & ticks)
- Turfgrass feeding mites in the literature
- Symptoms and mites identified on turfgrasses in Australia
- Where to for here?

TU10002: Mite damage – a survey on four warm-season turfgrasses

- Research project funded by Horticulture Australia Ltd
  - Funding comes from compulsory turf levy paid by sod growers with matching funds from the Australian government
- Project leader: Peter McMaugh (NSW)
- Team members:
  - Dr Don Loch (Queensland)
  - Dr Chris Lambrides (Queensland)
  - David Nickson (Victoria)
  - Danuta Knihinicki (Industry & Investment NSW)

TU10002: Mite damage – a survey on four warm-season turfgrasses

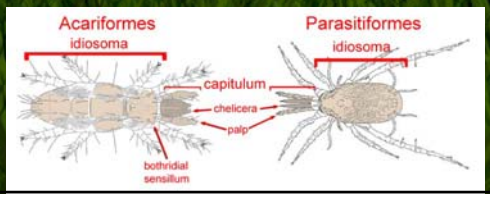
- Samples collected in all Australian states
  - *Cynodon dactylon* & hybrids
  - *Stenotaphrum secundatum*
  - *Pennisetum clandestinum*
  - *Zoysia* spp.
  - Other grasses as appropriate
- Record GPS location and symptoms (description & photographs)
- Extraction & identification by Danuta Knihinicki
  (acarologist specialising in taxonomy of plant-feeding mites and their predators)

Acari (mites & ticks)

- Second most diverse animal group
  - >55,000 described species worldwide
  - Total diversity estimated at >1,000,000 species
- Ubiquitous
  - Found in every major ecosystem on earth
  - Amazing diversity of habitat (e.g. geothermal springs, human hair follicles)
  - Plant, animal & insect parasites; predatory mites; fungal & dust mites
  - Vectors of disease, producers of allergens
  - Biological control agents for weeds (include very host-specific species)
- Tiny
  - Mostly <1 mm in length as adults (many <0.25 mm)
  - Omnipresent, yet often invisible to the naked eye
  - People often unaware of their presence and the damage done by mites

What is a mite?

- Arachnida
  - Spiders, mites, ticks, scorpions, whipscorpions, pseudoscorpions
- Mites distinguished from spiders by body shape
  - Spiders have 2 distinct segments (cephalothorax and abdomen)
  - Mites lack segmentation (cephalothorax and abdomen fused into one)

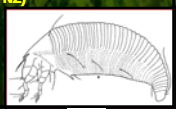


Turfgrass feeding mites in the literature

- Grass-webbing mites (Family Tetranychinae)
  - *Oligonychus araneum, O. digitatus* (Davis, 1968. *J. Aust. Ent. Soc.* 7: 123-126)
  - Not host specific
  - Occasionally affect turf & pasture grasses during hot dry weather

Turfgrass feeding mites in the literature

- Eriophyid mites (Family Eriophyidae)
  - Highly host specific
  - Microscopic mites with elongated worm-like bodies, 4 legs (2 pairs)
  - *Aceria* species
  - *A. cynodonis* (distorted terminal shoots & leaves on *Cynodon dactylon*)
  - *A. neocynodonis* (distorted rosettes ["witches brooming"] on *C. dactylon*) (Keifer *et al.*, 1982. *USDA Agric. Handbook 573*)
  - *A. zoysiae* (leaf streaking, "buggy whipping" & stunting of *Zoysia* spp.) (Baker *et al.*, 1986. *Internat. J. Acarol.* 12: 3-6)
  - *A. zoysima* (galled shoots on native *Z. minima* in NZ) (Manson, 1989. *NZ J. Zool.* 16: 37-49)



Turfgrass feeding mites in the literature

- False spider mites (Family Tenuipalpidae)
  - Not as host-specific as the Eriophyidae
  - *Dolichotetranychus* species
  - 11 species recorded on turf & other grasses (Mesa *et al.*, 2009. *Zootaxa* 2098)
  - *D. australianus, D. summersi* (on *Cynodon dactylon* – Australia & USA)
  - *D. zoysiae* (on *Zoysia pacifica* & *Z. matrella* – Japan)
  - *D. carnea* (on *Sporobolus* sp. – USA)
  - *D. cracens* (on *Sporobolus cryptandrus* – USA)
  - *D. salinas* (on *Distichlis spicata* – USA)
  - *D. micidus, D. muhlenbergia* (on *Muhlenbergia* spp. – USA)
  - D. *macer* (on *Aristida namaquensis* – South Africa)
  - D. *repenae* (on *Panicum repens* – India)
  - D. *tenellae* (on *Eragrostis tenella* – India)

Survey results – *Cynodon dactylon*, *Cynodon* hybrids

- *Aceria* species
  - Queensland, NSW, WA

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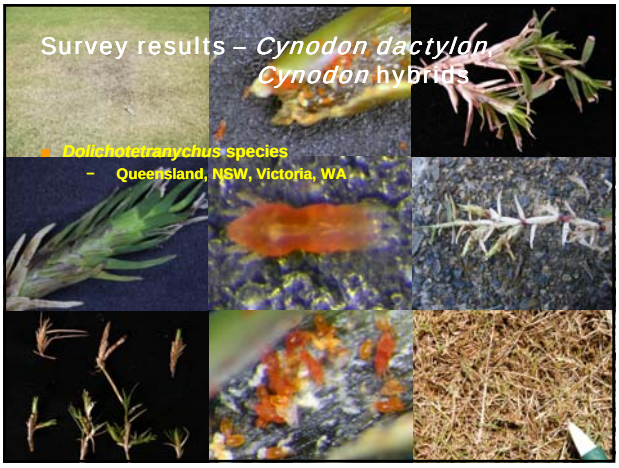
  - Queensland, NSW, Victoria, WA



Survey results – *Pennisetum clandestinum*

- *Dolichotetranychus* species
  - Queensland, NSW, ACT, Victoria, WA

Survey results – *Zoysia japonica, Z. matrella, Z. pacificaa*

- *Aceria* species
  - Queensland

Survey results – *Zoysia japonica, Z. matrella, Z. pacifica*

- *Aceria zoysiae*
  - Probably not present
  - "Buggy-whip" symptoms (US publications) not seen in Australia

Photos: Dr Aaron Patton

Survey results – *Zoysia matrella, Z. pacifica*

- *Dolichotetranychus* species
  - Queensland

Survey results – *Digitaria didactyla*

- *Dolichotetranychus* species
  - WA
  - Symptoms less obvious (poor root development, poor growth)

Where to from here?

The way forward

- Detailed studies of life cycles & ecology
  - Post-graduate student research
- Possible relationship to secondary disease organisms
  - e.g. summer decline in *Cynodon* greens
- Alternate hosts
  - Other introduced and native grasses (e.g. *Sporobolus virginicus*?)

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- Detailed studies of life cycles & ecology (including predators)
  - Post-graduate student research
- Possible relationship to secondary disease organisms
  - e.g. summer decline in *Cynodon* greens
- Alternate hosts
  - Other introduced and native grasses
- Effective control measures
  - Partially mask effects of mites with water and N
  - Repeat sprays with adulticide+ovicide to break life cycle
  - New chemistry?
- Increase industry awareness of problems & management
  - Sod producers, facility managers, etc