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Winter Grain Mites

Robert Bauernfeind, Entomologist

Winter grain mite (WGM) is the common name for *Penthaleus major* (Duges). WGMs are active during cooler periods of the year, from mid-fall to late spring, with peak populations occurring during the winter months. Originally considered a pest of small grains such as barley, oats, rye and wheat, WGMs are also recognized as a pest capable of damaging various species of turfgrass including perennial ryegrass, bluegrass, bentgrass and fescue.

Developmental Stages

Various species of mites are found in turfgrasses. These include Banks grass mites, winter grain mites, clover mites, brown wheat mites, predatory mites and fungal feeding mites. Only experts can precisely identify most mite species, but WGMs are easy to identify because of their distinctive appearance.

Eggs: Freshly deposited WGM eggs are smooth, kidney-shaped and reddish-orange. Within minutes of being laid, eggs become wrinkled (Figure 1). Several days later, their color changes to straw-yellow. Eggs are not subject to casual observation because they are small (.25 millimeter long) and distributed on grass blades, in root systems or in thatch. WGMs oversummer as eggs. An additional, shorter egg stage separates the two WGM generations that occur during the period of WGM activity.

Immatures: WGMs emerging from eggs are called **larvae**. Larvae are .18 of a millimeter long and have three pairs of legs. Larvae are reddish-orange to begin with, but darken to light brown after one day. Legs remain yellowish-orange. Before molting into nymphs, larvae turn dark brown and take on a greenish tinge, which may be hard to discern without proper lighting.

The most notable difference between larvae and **nymphs** is the addition of a fourth pair of legs. All three nymphal growth stages are similar in appearance except for a gradual increase in size as they develop. Overall body color is dark brown. Legs are yellowish-orange. Before each molt, nymphs become plump and take on a greenish-tinge. Third instar nymphs undergo a final molt to become adult WGMs.

Adults: Compared to other mite species associated with grasses, WGMs are relatively large (adults may reach 1 millimeter in length). Adults have dark brown to black bodies with a greenish tinge. Most evident are their reddish-orange legs (Figure 2).

Additional WGM characteristics include reddish-orange mouthparts; a pair of silvery eyes located behind the second pair of legs; first and fourth pairs of legs that are longer than the middle pairs (differences are minimal, so all legs actually appear similar in length); and a dorsal anal pore which is surrounded by a reddish-orange spot. Although these markings are cited in literature, they are of little practical importance because of the difficulty in observing such small mites.

Life History and Seasonal Development

There are no definitive recorded studies for the life history and seasonal development of the WGM in Kansas. However, studies and information generated for north-central Texas can be used to approximate WGM activities in Kansas.

Life History: Temperature is an important factor influencing the development and abundance of WGMs. While time spent in various life stages varies depending on temperatures, under optimum conditions the average number of days from oviposition to death of an adult mite is 98.1 days:

Egg incubation = 25.0 days

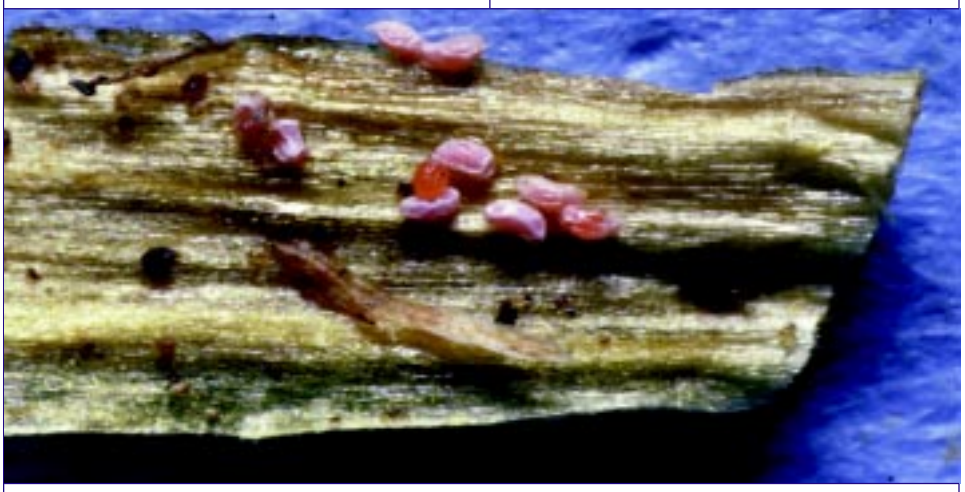

Figure 1.

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Larval stage	= 12.2 days
Nymphal stage 1	= 8.6 days
Nymphal stage 2	= 7.8 days
Nymphal stage 3	= 7.0 days
Adult	= 37.5 days

Oviposition is heaviest between 50 and 60˚F. Female mites require no males. Unfertilized eggs produce more female mites. The average number of eggs is 31 per female. Optimum temperature for egg hatch is 45 to 55˚F. Adult activities are greatest between 40 and 75˚F.

Seasonal Development: There are two generations of WGM per year. Generally speaking, activity begins around November 1 when cooler temperatures and adequate moisture stimulate the hatching of first generation larvae from oversummered eggs. WGM activities cease about April 15 after second generation adults have completed depositing the next batch of eggs, which do not hatch once temperatures exceed 75˚F. During the approximately 5 ½ months when WGMs are present, populations peak about February 1 (Generation 1) and April 1 (Generation 2).

Damage

General: WGM mouthparts are made up of a pair of chelicerae (modified anterior appendages). Each chelicera is short and armed with two distal and downward-curved teeth. The beaklike chelicerae are used to pierce the epidermal cells of host plant tissue. Mites feed on the escaped exudates (chlorophyll and cellular fluids).

Due to the whitish-grayish appearance of damaged or dead cells, leaves and stems may exhibit a flecked appearance (Figure 3). Extensive feeding on individual leaves and stems may result in a coalescence of dead spots, causing an overall silvery or grayish cast. So, a heavily infested lawn may take on a gray or silvery cast when viewed from a distance (Figure 4). At the very least, such feeding damage is no worse than winterkilled leaf tissue. Conversely, if mites persist and move down to the crown area, extensive feeding on meristematic tissues could cause plant death.

Specifics: Most turf entomologists agree that presence of the WGM does not automatically spell disaster. In most instances, and even after heavy mite pressure, grass plants and lawns rebound. The mite population peaks in April, but when the weather warms mite activity automatically shuts down. This peak also coincides with the time of prolific vegetative growth for cool season grasses. Slow-to-green-up lawns (possibly a result of WGM feeding) rapidly flush new growth, and WGM are soon forgotten.

However, drought-stressed lawns subjected to overwhelming WGM populations have been severely damaged or killed in eastern Kansas. The negative impact of WGMs on turf is evident when comparing lush green lawns that receive timely acaracide treatments to untreated lawns killed by WGMs.

Control Recommendations

Specific guidelines for controlling WGM have not been developed. And because WGMs are not considered a pest of great importance, it is unlikely that major research will be conducted to generate such control guidelines.

Observing WGMs: It is difficult to assess WGM population levels for several reasons. As previously mentioned, WGMs are small. Looking for WGMs requires keen eyesight and patience. WGMs are light sensitive. They hide during daylight hours. At day's end, WGMs come out of the soil and ascend grass blades in preparation for nighttime feeding. On overcast days, mites may be active throughout the day. Under snow cover, WGMs may feed continually. Activity can vary depending on the temperature. WGMs are easily disturbed. They drop to the ground when blades of grass are touched or handled. It is difficult to count WGMs hidden in thatch or soil, and they reportedly burrow into the soil to depths of 5 inches depending on temperatures and moisture. WGMs are not equally distributed and are nearly impossible to find. Experience has shown that WGMs congregate in grassy areas near porch steps, sidewalks, driveways, decorative stones or timbers, and the bases of trees, mailboxes and lamp posts.

Even if it were possible to accurately count and record the actual numbers of individual WGMs,

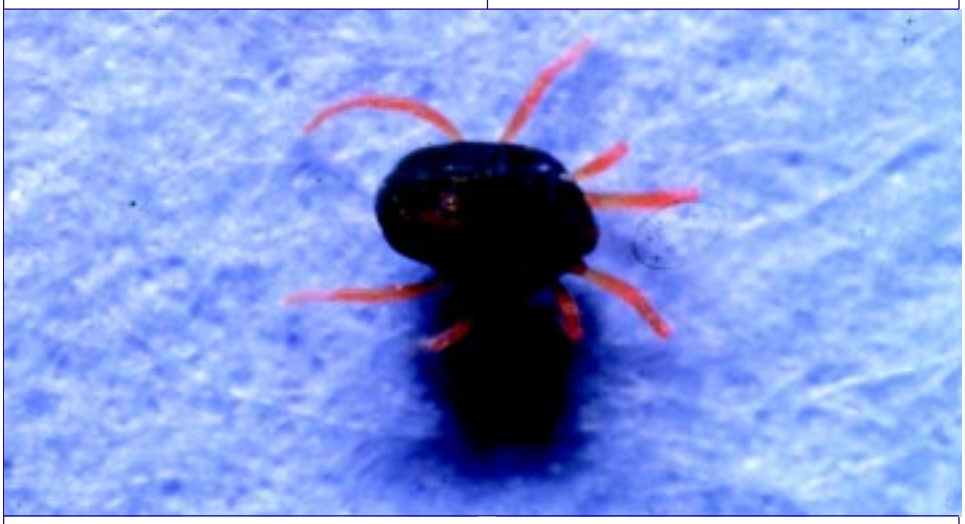

Figure 2.

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decisions to initiate or withhold treatment would remain uncertain because there are no established WGM threshold treatment levels. Also, the vigor and health of individual plants, thickness of stand, and prevailing environmental conditions, especially availability of soil moisture for plants, would alter the extent of damage caused by varying populations of WGMs at individual sites.

Implementing WGM Control: It is recommended that lawns under consideration for receiving an acaracide treatment, at the very least, be inspected for the presence of WGMs. The decision to treat depends on the requests of individual lawn owners. In instances where picture perfect turf is expected, treatments might be required even if only a few mites were observed. In situations where there is tolerance for natural events, a wait-and-see attitude might prevail. If there is an acceptance of some visible damage, rescue treatments should be applied only if necessary.

When considering whether or not to initiate treatments against WGMs, lawn care specialists face a difficult decision. Decisions not to treat may lead to client dissatisfaction if WGMs delay greenup, or cause dead spots or dead lawns. Based on observations and written reports, some lawn-care professionals have developed a sense of when acaracide treatments might be warranted.

While there are no active ingredients specifically registered for use against WGMs, the active ingredient Lambda cyhalothrin has a broad registration against mites in turf. Thus, Scimitar and Battle can legally be recommended for use against WGMs, which are included under the broad umbrella, mites.

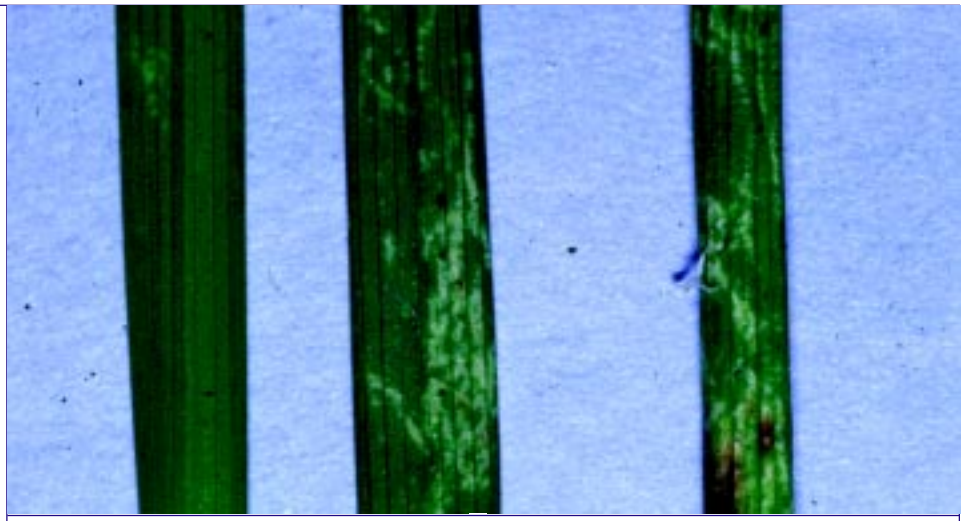

Figure 3.

Figure 4.

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