



Winter Grain Mites

Winter grain mite is the common name for *Penthaleus major* (Duges). Winter grain mites 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, these mites are capable of damaging various species of turfgrass including perennial ryegrass, bluegrass, bentgrass and fescue.

Developmental Stages

Various species of mites are found in turf-grasses. 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 winter grain mites are easy to identify because of their distinctive appearance.

Eggs

Freshly deposited winter grain mite eggs are smooth, kidney-shaped and reddish-orange. Within minutes of being laid, eggs wrinkle (Figure 1). Several days later, their color changes to straw yellow. Eggs may be difficult to see because they are small (0.25 millimeter long) and distributed on grass blades, in root systems or in thatch. Winter grain mites overwinter as eggs. Another, shorter egg stage separates the two winter grain mite generations that occur during the active period.

Immatures

Larvae are 0.18 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 see 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. The body is dark brown and the 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 adults.

Adults

Compared to other mite species associated with grasses, winter grain mites 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 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 hard to see because the mites are so small.

Life History and Seasonal Development

There are no definitive studies for the life history and seasonal development of this insect in Kansas. However, studies and information generated for north-central Texas can be used to estimate winter grain mite activities in Kansas.



Figure 1. Winter grain mite eggs



Figure 2. Winter grain mite adult

Life History

Temperature is an important factor in the development and abundance of winter grain mites. 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
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 winter grain mites per year. Generally, activity begins around Nov. 1 when cooler temperatures and adequate moisture stimulate the hatching of first generation larvae from oversummered eggs. Mite activities cease about April 15 after second generation adults have deposited the next batch of eggs, which do not hatch once temperatures exceed 75°F. During the approximately 5½ months when these insects are present, populations peak about Feb. 1 (generation 1) and April 1 (generation 2).

Damage

Winter grain mite 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 beak-like che-

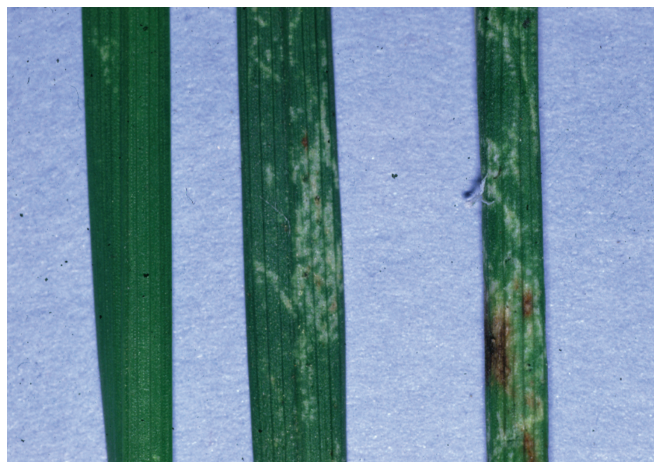


Figure 3. Winter grain mite damage

licerae are used to pierce the skin of host plants. Mites feed on the chlorophyll and cellular fluids that ooze out.

Because of the white-gray appearance of damaged or dead cells, leaves and stems may look flecked (Figure 3). Extensive feeding on individual leaves and stems may result in a coalescence of dead spots, causing an overall silver or gray color. A heavily infested lawn may look gray or silver from a distance (Figure 4). At the very least, such feeding damage is no worse than winter-killed leaf tissue. But if mites persist and move down to the crown area, extensive feeding can kill plants.

Most turf entomologists agree that presence of winter grain mites does not automatically spell disaster. In most cases, lawns rebound even after heavy mite pressure. The mite population peaks in April and shuts down when the weather warms. This peak coincides with rapid growth of cool-season grasses. Lawns that have been slow to greenup because of mite feeding rapidly flush new growth, and these insects are soon forgotten.

Drought-stressed lawns subjected to overwhelming winter grain mite populations have been severely damaged or killed in eastern Kansas. When lush green lawns that received timely acaricide treatments are compared to untreated lawns killed by winter grain mites, this pest's impact is evident.

Control Recommendations

Specific guidelines for controlling these insects have not been developed. Because winter grain mites are not considered an important pest, it is unlikely that major research will be conducted to generate control guidelines.



Figure 4. Lawn infested with winter grain mites

Observing winter grain mites

It is difficult to assess winter grain mite populations for several reasons. As previously mentioned, these mites are small. Looking for them requires keen eyesight and patience. Winter grain mites are light sensitive. They hide during daylight hours. At the end of the day, winter grain mites come out of the soil and climb grass blades for nighttime feeding. On overcast days, mites may be active throughout the day. Under snow cover, these mites may feed continually. Activity can vary depending on the temperature. Winter grain mites are easily disturbed. They drop to the ground when blades of grass are touched or handled. It is difficult to count mites hidden in thatch or soil, and they reportedly burrow 5 inches into the soil, depending on temperatures and moisture. Winter grain mites are not equally distributed and are nearly impossible to find. Experience has shown that they 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 winter grain mites, the decision to initiate or withhold treatment would still be uncertain because there are no established winter grain mite 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 winter grain mites at individual sites.

Treatment options

Lawns that may be treated with an acaracide should be inspected for the presence of winter grain mites. The decision to treat depends on the individual. If picture-perfect turf is expected, treatments might be required when only a few

mites are observed. If less than perfect turf is acceptable, it may be best to wait and apply rescue treatments only if necessary.

Lawn-care specialists may find it difficult to decide whether or not to use control measures against winter grain mites. Clients may be dissatisfied if no control is used and insects delay greenup or cause dead spots or lawns. Based on experience, lawn-care professionals have developed a sense of when acaracide treatments might be warranted.

Several active ingredients are used in insecticides that are registered for the control of mites in lawns. TalstarOne, Onyx and BifenthrinPro contain the active ingredient bifenthrin. The active ingredient deltamethrin is used in DeltaGard T&O. Lambda-cyhalothrin is used in Scimitar and Battle. Battle and Scimitar GS are restricted-use products and can only be purchased and applied by individuals certified by the Kansas Department of Agriculture or applied by uncertified personnel under the direct supervision of certified individuals.

The user is responsible for reading the product label to ensure safe and legal use.

Robert Bauernfeind, entomologist

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