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Winter Grain Mite

Potential Pest of Small Grains and Orchardgrass

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Order: Acarina

Family: Penthaleidae

Species: *Penthaleus major* (Dugès)

Size: Adult, 1 mm long; eggs, .25 mm long.

Color: Adult is dark brown to almost black with red legs (Figs. 1 and 2); nymph is brownish with orange legs; a young larva is bright pink to orange but darkens to light brown after one day; freshly deposited eggs are smooth, kidney shaped, and reddish orange, but within minutes become wrinkled and after several days become a straw yellow color.

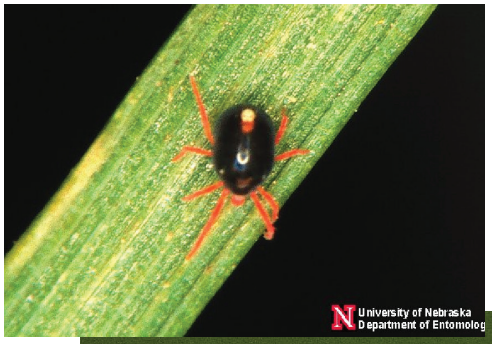

Fig. 1

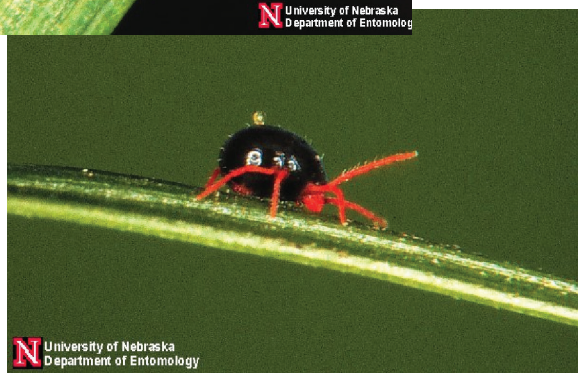

Fig. 2

Description: The adult is relatively large compared to other spider mites and is the only mite of economic importance with the anal pore (a tan to orange spot best seen with microscope, but can be seen with a hand lens) on the upper surface of the abdomen.

Hosts: Small grains, including wheat, barley, and oats, are susceptible to winter grain mite. Other hosts include grasses, especially bluegrass, bentgrass, ryegrass, and fescue. The mite also infests and damages legumes, vegetables, ornamental flowers, cotton, peanuts, and various weeds.

Infestations of winter grain mite were detected in several wheat fields in Chesapeake and Virginia Beach in 2002 and again in 2006. Winter grain mite, also known as the blue oat or pea mite, is not related to Virginia's more common two-spotted spider mite. It is widely distributed throughout the temperate regions of the world.

It is active during cooler periods of the year (mid-fall to late spring) with peak populations in winter months. Infestations in Virginia first occurred during the months of January and February and appeared to be more common in fields that had been previously treated with sludge. Populations declined to unobservable levels in late February to early March, but re-emerged in early April – indicating a second generation. The early spring infestations were associated with dead patches where plants began dying in January. However, researchers are still not certain that plant death was the result of mite injury alone, or if it was associated with additional plant stress caused by a high soil pH condition and manganese deficiency that is common in that area of the state. Winter grain mite infestations have also been reported in several orchardgrass fields in Virginia

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including Bedford, Orange, Culpeper, Page, Campbell, and other counties.

Discussions with mite experts and perusal of Web information have not provided a clear understanding of whether mites are capable of killing large areas of wheat or orchardgrass, or what the economic thresholds might be. Information on product efficacy is limited. The material in this publication is a summary of observations from various sources.

Life Cycle: The life cycle of the winter grain mite has six stages: egg, deutovum (prelarva), larva, protonymph, deutonymph, and adult. Females deposit an average of 31 eggs and require no males for fertilization, so unfertilized eggs produce more females. There are two physiologically different types of eggs laid, namely, the winter eggs that have a short incubation period of 25 to 35 days, and the aestivating (oversummering resting stage) eggs that have an extended incubation period of 110 to 140 days. The length of the life cycle varies with the weather. Under optimum conditions, the average time from egg to death of the adult is 98 days: eggs 25 days; immatures 35.5 days; adults 37.5 days.

Temperature and moisture are the most important factors influencing mite development and abundance. Cool rather than warm temperatures favor their development. Egg laying is heaviest between 50° and 60°F; the optimum conditions for hatching are between 44° and 55°F. When temperatures drop below or rise above these ranges, the mites stop feeding and descend to the ground or burrow into the soil. Mite activity in the spring drops rapidly and the eggs fail to hatch when the daily temperature exceeds 75°F. Aestivating (oversummering resting stage) eggs do not hatch in the fall until rains provide adequate moisture. On hot, dry days it may be necessary to dig into the soil to a depth of four or five inches to find mites. The mites are not harmed by short periods of sleet or ice cover or by ground frozen to a depth of several inches.

The female mites deposit their eggs on the sheath leaves and stems and on and in soil near the base of the plants. Eggs may be deposited singly, but usually large numbers are found together. Adequate moisture is essential for larvae to emerge from eggs, and is essential during the entire prelarval period.

There are two generations per year. The first develops from oversummering eggs. Development begins after the onset of favorable temperature and moisture conditions in late September and October with populations peaking in December and January. The second generation develops from eggs laid by the first generation reaching maximum infestation density in March and April. Populations then decrease as temperatures exceed the range of tolerance. The females of this generation lay aestivating or oversummering eggs.

The larvae become very active soon after hatching and begin to feed on the sheath leaves or tender shoots near the ground. The larvae as well as the adults feed higher up on the plants at night or on cloudy days. As the sun rises, the mites descend the plants and seek protection during the hot part of the day on the moist soil surface under foliage. If the soil is dry and there is little foliage cover, they dig into the soil in search of moisture and cooler temperatures. At sunset and thereafter the plants become covered with feeding mites where, with the aid of a searchlight, they can be observed feeding at all hours of the night. They drop to the ground upon being disturbed.

Dispersion from field to field may occur by transportation of aestivating eggs or mites on grain stubble or leaves, on soil adhering to implements that are moved about, or on forage or straw carried from infested fields in livestock feeding operations. Aestivating eggs may also be transported on debris by wind, and local distribution may occur by adult migration. Such migrations to grain fields may take place from fencerows or other uncultivated areas. Fescue grass appears to be the favored host in such situations in Texas.

Type of Damage: Heavily infested fields appear grayish or silvery, a result of the removal of plant chlorophyll by mite feeding (Fig. 3). When high infestations feed on the plants for several days, the tips of the leaves exhibit a scorched appearance and then turn brown, and the entire plant may die. These mites do not cause the yellowing characteristic of spider mite feeding. Many

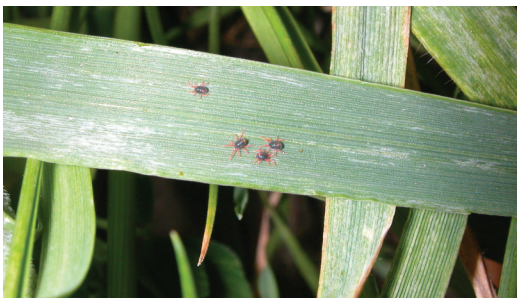

Fig. 3 Photo courtesy of: Ing. Agr. Gaudio Guillermo; SENASA-SINAVIMO (*http://www.sinavimo.gov.ar/fito/incs/programasnacionales/trigo/galeria_imag_disculpas.htm*)

of the infested plants do not die, but become stunted and produce little forage or grain; damage on young plants, however, is more severe than on large, healthy ones. Damage may also be greater in plants stressed by nutrient deficiencies or drought conditions. There are two types of damage to the small grains, namely, reduced amount of forage throughout the winter and reduced yields of grain in the spring and summer.

Control Methods

Prevention and Nonchemical: Cropping practices have a marked effect upon the occurrence and damage caused by the winter grain mite. Injury by this mite may be prevented by crop rotation, that is, by not planting small grains more than two years in succession. Crops such as cotton, corn, clover, or sorghum may be used in such rotations.

Little is known about natural enemies of winter grain mite. Although lacewing larvae and the predatory mite, *Balaustium* spp., prey on the winter grain mite, these predators are not of importance in reducing populations.

Treatment (Chemical): Foliar applications of pyrethroids such as Warrior or a comparable product appear to be efficacious against winter grain mite. Certain organophosphates (Lorsban, Di-Syston, Dimethoate) are also effective. The carbamate, Lannate, provides only a moderate level of control. *Be sure to follow the rates and usage restrictions on the product labels.*

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