

Straw Itch Mites

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Introduction

The straw itch mite, also referred to as the hay itch mite or grain itch mite, *Pyemotes tritici* (Lagrèze-Fossot and Montané) (Trombidiformes: Pyemotidae), is found worldwide (Bowles et al. 2018) (Figure 1). Another related mite that has been erroneously reported as the straw itch mite in historic works is *Pyemotes ventricosus* (Newport) (Trombidiformes: Pyemotidae). The confusion in referring to this species as the straw itch mite was likely due to the similar bites and subsequent dermal reactions that occur; however, this species is a predator of the wood boring beetle larvae, carpet beetles, and some insect colonies (Scott and Fine 1963, Butler 1972, Moser 1975).



Figure 1. Straw itch mite adult via electron microscopy with 375x magnification. Photo courtesy of Eric Erbe, USDA Agricultural Research Service, Bugwood.org.

Straw itch mites are predatory ectoparasites of several insect pests including Indian meal moth, *Plodia interpunctella* (Hübner) (Lepidoptera: Pyralidae),

caterpillars, wheat stem maggots, *Meromyza americana* Fitch (Diptera: Chloropidae), larvae of tumbling flower beetles (Coleoptera: Mordellidae), and several other insect pests of small grains and stored grains (Webster 1910). For this reason, they are considered beneficial organisms. Straw itch mites are most commonly encountered when working with contaminated hay, straw, brome seed, or other stored small grains (Webster 1910, Walker and Landis 1994, Uenotsuchi et al. 2000, Mullen and Durden 2019). According to Davis (1950), infestation and subsequent human attacks by the straw itch mite were exacerbated by improper grain storage (i.e., storing new grain on old grain) that resulted in increased populations of the Angoumois grain moth, *Sitotroga cerealella* Olivier (Lepidoptera: Gelechiidae). In addition, increased wheat jointworm, *Tetramesa tritici* (Fitch) (Hymenoptera: Eurytomidae) populations also were attributed to increased attacks of individuals using straw for bedding (Davis 1950).

After exposure to contaminated materials, it is common to develop multiple skin lesions that itch intensely (Mullen and Durden 2019). Nearly all cases reported to South Dakota State University Extension Entomologists are the result of working with contaminated hay. It's important to note that there is no way to predict the presence of straw itch mite prior to purchasing hay. Their increased presence often is an indicator of a previous insect pest population in the material. Interestingly, the venom produced by the straw itch mite can paralyze insects that are 166,000 times larger than themselves (Tomalski et al. 1988).

Lifecycle

Straw itch mite reproduction is characterized as being arrhenotokous parthenogenesis (Bruce and Wrensch 1990). This means that females develop from fertilized eggs and males develop from unfertilized eggs. Female straw itch mites seek out hosts and attach to the host, biting it and subsequently paralyzing it (Bruce and Wrensch 1990). The females then begin feeding on the host's hemolymph (blood) until they are full, causing the abdomen to be enlarged or physogastric (Bruce and Wrensch 1990). During feeding, egg development will begin and continue to the adult stage (ovovivipary), at which point the female mites give live birth (Bruce and Wrensch 1990). Mating occurs immediately after emergence (Bruce and Wrensch 1990). Development from mating to birth is approximately four days (Bruce 1984). As a result of this lifecycle, populations of straw itch mites can increase rapidly when sufficient prey populations are available. On average, females produce 43 offspring per birth, with an average of 8.7% of the offspring being males (Bruce and Wrensch 1990). Males are born approximately every 3.4 days whereas females are born approximately every 5.4 days, which increases the frequency of mated females (Bruce and Wrensch 1990). Females produce offspring for an average of 15 days but can vary from four days to 33 days (Bruce and Wrensch 1990).

Identification

Mites (Scott and Fine 1963, Scott and Fine 1967)

- In most cases, the adults will not be observed unless magnification is used
- Unlike some other biting mites, no specimens will be found in the center of the lesions
- Males are approximately 0.16 mm in length
- Females are approximately 0.22 mm in length, and can reach 2.0 mm after feeding when the abdomen is enlarged
- Females have needle-like chelicerae that are used to pierce the host and inject venom (Vainvanijkul and Haramoto 1969, Tomalski et al. 1988)
- Front pair of legs are held pointing forward (Figure 2)

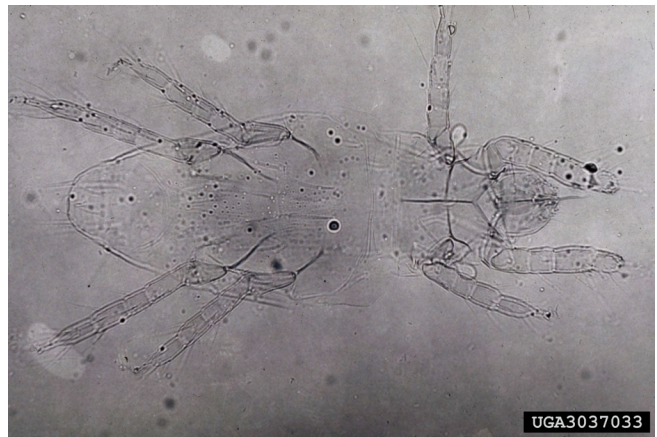


Figure 2. Straw itch mite adult viewed under a compound microscope. Photo courtesy of John Moser, USDA Forest Service, Bugwood.org.

Bites and Symptoms (*Pyemotes Dermatitis*) (Webster 1910, Scott and Fine 1963, Uenotsuchi et al. 2000):

- Bites are often concentrated on upper extremities and chest
- Characterized by red raised lesions (hives) that often overlap
- Each lesion typically has a fluid filled blister in the center
- Bites are typically noticed due to intense itchiness
- Some individuals report mild fevers
- At least one report of similar bites developing on the neck and back of a horse fed contaminated straw (Kunkle and Greiner 1982)

Human Impact and Veterinary Significance

The first report of straw itch mites attacking humans in the US is from 1830 (Webster 1910). There may have been cases prior to this date, but they were either not documented or the cause was misidentified. In humans, the straw itch mite typically attacks the back, abdomen, and forearms (Webster 1910, Mullen and Durden 2019). However, it is important to note that the eruptions or lesions can appear on any region of the body that is exposed to the contaminated product. Only female straw itch mites possess venom and are the culprits behind the bites (Bruce and Wrensch 1990). Because straw itch mite populations vary based on prey abundance, it is possible to encounter a very large population or a smaller population. Livestock can also be attacked by the straw itch mite (Kunkle and Greiner 1982).

Management

Management of the straw itch mite populations is often not realistic due to the material that is infested. In South Dakota, allowing infested material to freeze often reduces populations. Previous research has observed successful reduction of infestations with the use of acaracides, lindane, sulfur, or heat when applicable (Schenone et al. 1973, Grimm and Lawrence 1976, Hanks et al. 1992, Qaisrani and Beckett 2002). Straw itch mites and relatives can also become problematic for facilities that are rearing insects (Hanks et al. 1992). In these situations, the mites can be reduced by dusting the colonies with sulfur while having minimal impacts on the insect colony (Hanks et al. 1992).

When working with known or potentially contaminated products, insect repellants containing DEET can greatly reduce or prevent bites (Walker and Landis 1994). In their study, Walker and Landis (1994) observed a 100% reduction in bites with the use of a product containing 30% DEET.

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