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Edward D. Walker
Michigan State University

Douglas A. Landis
Michigan State University

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STRAW ITCH MITE, *PYEMOTES TRITICI*, INFESTATION IN BROME SEED RELATED TO ACUTE DERMATITIS IN MICHIGAN GRANARY WORKERSEdward D. Walker¹ and Douglas A. Landis²

ABSTRACT

An infestation of *Pyemotes tritici*, the straw itch mite, apparently caused dermatitis on the arms and trunks of four workers in south-central Michigan who had unloaded a shipment of brome seed bags. Sampling of bag surfaces and contents indicated that mites occurred inside and on the surface of brome seed bags, but not in bags of other seed present at the site. One bag of fescue in contact with brome seed bags had mites on its surface. *Pyemotes tritici* densities on the brome seed bags ranged from 0.7–5.6 per cm², while infestations in brome seed ranged from 0.08–0.33 mites per ml of seed. An insect repellent containing DEET was effective in preventing mite bites.

Straw itch mites, *Pyemotes tritici* (Lagreze-Fossat and Montagne) are obligate ectoparasites of insects inhabiting straw and stored products (Bruce and LeCato 1979). These tiny (<0.25 mm in length) mites secrete a toxin from glands, located at the base of the pedipalps, that paralyzes prey, thus allowing the mites to feed undisturbed while attached to their hosts (Tomalski et al. 1988). Although *P. tritici* parasitizes insects, it may also bite humans under conditions where there is mite-human contact, such as when people sleep on mite-infested straw or handle infested grains, beans, or grasses (Booth and Jones 1952, Scott and Fine 1967, Moser 1975, Harwood and James 1979, Muttrie and Anderson 1984). The result of bites is a temporary wheal that becomes inflamed and itches; taken together, many bites yield an unpleasant, rash-like dermatitis (Swan 1934). Some people may show systemic symptoms including dizziness, fatigue, and aching joints (Muttrie and Anderson 1984).

Infestations of straw itch mite or other *Pyemotes* spp. affecting people have occurred in widespread locations, including Australia (Swan 1934), the midwestern U.S. (Booth and Jones 1952), Hawaii (Vaivanijkul and Haramoto 1969) and Scotland (Muttrie and Anderson 1984). Incidents of human exposure to straw itch mites may be common, but are poorly documented (Harwood and James 1979). Recently, we observed dermatitis among workers in a wholesale seed warehouse and distribution facility in south-central Michigan. The dermatitis was apparently associated with straw itch mites.

On 19 August 1992, the facility received a shipment of brome seed in 50 lb. bags, via commercial semi-truck, from Kansas City, Missouri. Four workers unloaded the bags by hand and stacked them in a warehouse. Other bags of grass seed from previous shipments were already present. The following day, the four workers developed intensively-itching rashes on their arms and

¹Department of Entomology, Michigan State University, East Lansing, MI 48824.

²Department of Entomology and Pesticide Research Center, Michigan State University, East Lansing, MI 48824.

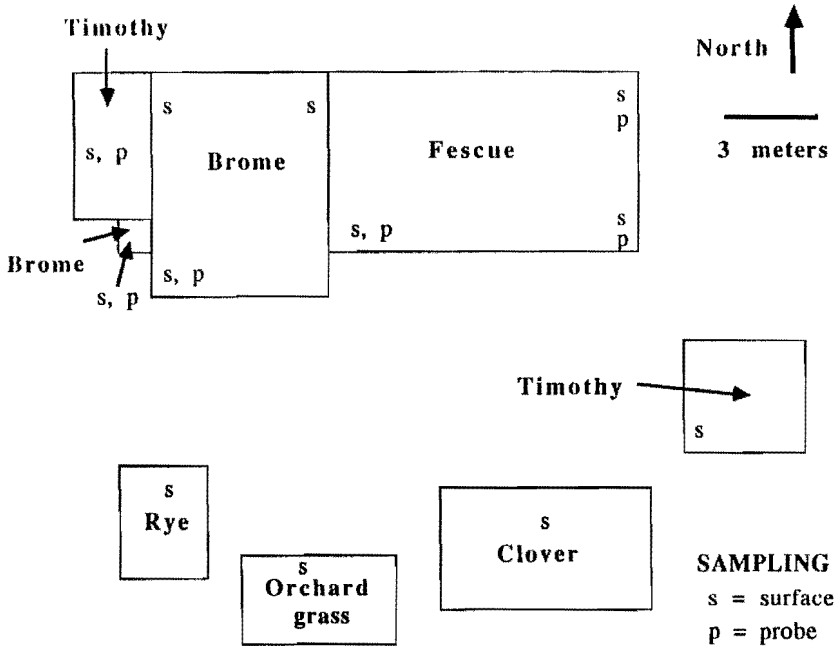


Figure 1. Distribution of stacks of seed bags and location of surface and probe sampling sites in a seed processing and distribution warehouse in south-central Michigan, 4 September 1992. Circled sites indicate the presence of *Pyemotes tritici* in probe or surface samples.

trunks. One worker sought medical attention and was treated with topical lindane (QuellTM). The warehouse foreman contacted the brome seed supplier in Kansas City, Missouri, who indicated that the rashes were caused by "brome mites" in the seed, and that this was a common problem when working with brome. Subsequently, the foreman contacted us and asked for an investigation of the problem.

We visited the facility on 4 September 1992. The establishment was clean and well organized. Seed bags were stacked on pallets in a receiving warehouse with a cement floor. Varieties included several grasses (timothy, brome, fescue, rye, and orchard) and clover. The distribution of the stacks is shown in Fig. 1. We sampled the grain bags using two methods. First, we wiped pieces of clear adhesive tape of known length (range, 6.4–8.6 cm) and width (1.9 cm) over 10 cm² of bag surface, removed them, and placed them into vials. Second, we inserted a 1/2" diam. seed probe (Seedburow) into bags of brome, fescue, and timothy, removed the seed sample, and poured the sample into vials. Vials with tape or seeds were filled with 70% ethanol. In the laboratory, material from sample vials was placed into petri dishes and sorted under magnification. Mites were counted and identified (Baker et al. 1956, Cross and Moser 1975). Volume of seed per core sample was measured in a volumetric graduated cylinder. The number of mites per square centimeter of tape or volume of seed was calculated.

To measure the efficacy of a repellent (Deep Woods OFF™ containing 30% concentration of N,N-diethyl-meta-toluamide or DEET) to prevent straw itch mite bites, one of us applied repellent as a spray to exposed skin and clothing before entering the facility, while the other did not. The following day, we counted the number of mite bites on the arms and mid-section of the body of both people.

We observed female *P. tritici* on surface (tape) samples from 5/5 (100%) brome seed bags, but only 1/8 (12.5%) bags of other seed varieties. The single tape sample with *P. tritici* that did not come from a brome seed bag, was from the surface of a bag of fescue seed located directly adjacent to, and in contact with, the brome bags (see Fig. 1). The total number of *P. tritici* taken on tape samples from brome bags was 276, while the total number on tape samples from the fescue bag was 5. The mean density of *P. tritici* on brome bags was 3.7 per cm² (range, 0.7–5.6 per cm²). The mean density of *P. tritici* on bags of other seed varieties was 0.04 per cm² (range, 0.0–0.3 per cm²). There was a significant difference in *P. tritici* densities between brome and other seed bags (Mann-Whitney *U*-test, $U = 40$, $P < 0.005$). In core samples, 3/3 (100%) of brome samples yielded *P. tritici* (8 mites total), while probes in 3 fescue seed and one timothy seed bag yielded no mites but did yield 17 individual Psocoptera. The volume of brome seed core samples ranged from 9–12 ml, while the volume of other core seed samples ranged from 12–15 ml. The mean density of *P. tritici* in brome seed core samples was 0.19 per ml (range, 0.08–0.33 per ml). There were too few *P. tritici* for statistical comparison of core samples. Besides *P. tritici* and Psocoptera, surface and probe samples contained no other arthropods.

On the day following sampling, the person that had used repellent had no mite bites. The person who had not used repellent had 20 chigger-type, intensively itching bites on both forearms and around the navel. A warehouse worker who subsequently moved infested bags also applied repellent (Deep Woods OFF™ containing 30% concentration of DEET) before handling. He reported no bites on areas sprayed with repellent (arms and front of chest). However, he did receive 6–8 bites on his back and sides, where repellent was not applied.

The sampling data indicate that *P. tritici* occurred mainly on the surfaces of the bags of brome seed that had been imported from Kansas City. The other bags of seed had no *P. tritici* on surfaces or in seed core samples, with the exception of a single fescue bag where 5 *P. tritici* were found on a surface sample. Because the fescue and brome bags were adjacent and touching at that sampling point, we believe that these mites had simply moved from the brome bags to the fescue bags. Core samples yielded few mites compared to surface samples. Probably, mites had left the brome seed bags because of a lack of prey, and were moving about on the surfaces of the bags. Among the *P. tritici* (all females), none had a distended hysterosoma containing eggs, further suggesting that the mites lacked prey in the seed bags and had moved to the outside of the bags, perhaps in search of prey. Therefore, we believe that the workers handling the bags during unloading were exposed to *P. tritici* bites, and then developed the dermatitis conditions described earlier.

Although not a replicated experiment, our experience with a repellent at the warehouse indicated that DEET was effective in preventing straw itch mite bites.

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