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Haanchen barley mealybug

A new pest of barley emerges in Idaho

by Juan M. Alvarez

Background

A new insect pest of barley, the Haanchen barley mealybug, was discovered for the first time in Idaho near Soda Springs during June 2003 from a commercial barley field. Surveys since then have detected this pest in five eastern Idaho counties: Bingham, Bonneville, Caribou, Jefferson and Madison. It has been found aggressively feeding in great numbers on barley plants of different varieties (Arabian, Baronesse, Harrington, and Tradition), mostly under dryland production, typically just above the soil surface. In addition to infestations at the soil surface, adults and nymphs also occur along the stems under the leaf sheaths of the plant.

Samples sent to Greg Evans and Gregory Hodges, mealybug taxonomic specialists in the Florida Department of Plant Industry, definitively were identified as *Trionymus haancheni* McKenzie, the Haanchen barley mealybug. This species first was described in California during 1960 by Howard L. McKenzie, though it had been recognized there by farmers during the early 1950's as a pest of Haanchen barley in the Tulelake area of Siskiyou County.

This report is the first documented detection of the Haanchen barley mealybug in Idaho. Because the insect was previously unknown in Idaho and seemingly has not been economically important in any other states for at least 40 years, information about pest biology, damage potential, and control measures is quite limited. This publication summarizes what is known about the Haanchen barley mealybug from published literature as well as from field surveys and preliminary lab observations in Idaho during 2003.

Damage

First signs of mealybug presence are masses of cottony appearance at the base of the plants (Fig.1). These are the ovisacs (cottony clusters of eggs) of the mealybugs. Both nymphs and adults are the damaging stages. They feed with sucking mouthparts and reduce the amount of chlorophyll in the leaves, causing extensive yellowing and browning of foliage. Observational studies in the lab at Aberdeen with field-collected adult females showed that 10 mealybugs per plant can cause leaf-yellowing symptoms within a week. Heavy infestations in commercial fields eventually kill the plants (Fig. 2). It is also possible that these damage symptoms are caused by mealybugs injecting a toxic saliva into the plant.

In addition to direct feeding injury to barley plants, the Haanchen barley mealybug indirectly can damage the crop by producing a sticky saplike substance called honeydew. Honeydew has

Fig. 1. Haanchen mealybugs in the crown of a plant

Fig. 2. Barley field presenting severe damage by mealybugs

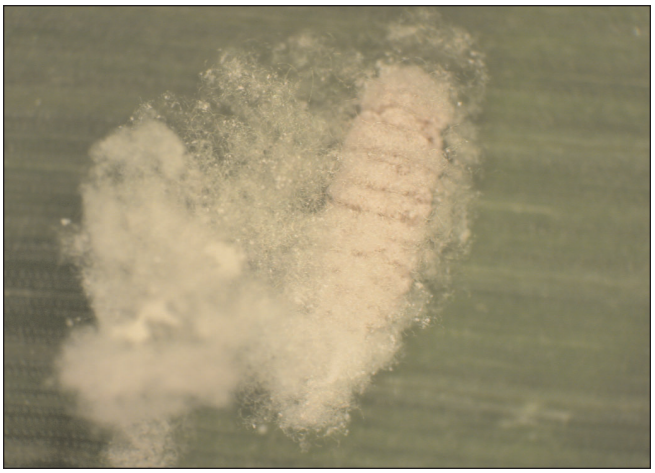

Fig. 3. Haanchen mealybug female covered by cottony ovisac mass

the potential to reduce grain quality. Barley growers in California during the 1950's reported that honeydew accumulations in commercial fields were extensive enough to clog combines at harvest. Idaho growers where infestations were confirmed during 2003 likewise reported that they had experienced the same problem with honeydew during the 2002 harvest in their fields. Growers, however, were not aware that these insects were present in their fields at that time.

It seems likely that the Haanchen mealybug has been present in Idaho for several years but simply went unnoticed or unrecognized until 2002 and 2003 when populations reached damaging levels. The early-season damage symptoms to foliage observed during 2003 in Idaho had not been previously reported. By the beginning of July 2003, mealybug infestations already were heavy enough to produce noticeable amounts of honeydew in some commercial barley fields, which suggests that harvest problems could be worse during 2003 than last year.

Of the cultivated crops, this mealybug primarily damages barley. However, it has been observed feeding on wheat and several grasses. The literature also reports that in California this insect can feed under leaf sheaths of another grass, *Elymus* sp. (Gramineae). At this time, the economic damage that these infestations will cause in Idaho is still unknown. It also is too soon to predict the extent to which this pest ultimately might establish itself beyond its current five-county distribution.

Description and Life Cycle

The name mealybug is derived from the waxy secretions that cover bodies of these insects.This wax makes mealybugs look like they have been sprinkled with finely-ground, powdery white meal. Mealybugs are related to aphids—they belong to the same order (Homoptera), though the Haanchen barley mealybug is in a different family, the Pseudococcidae, which includes several serious plant pests.

The adult female is quite small but is visible to the eye without magnification, reaching a length of approximately 1/5 inch (5 mm). As noted, the body in some cases is covered with a white waxy secretion that extends as thin wispy filaments along the edges of the body and at the posterior end (Fig.3). Body shape is elongate-oval, segmented, rather slender, and with well-developed legs.

Precise identification only can be done by an expert using microscopic examination. Although a second species was also identified in Idaho samples, *Trionymus* nr. *utahensis* (Cockerell), one can conclude with some confidence that the insects causing damage on barley in eastern Idaho and fitting the descriptions here indeed are the Haanchen barley mealybug.

Adult males have yet to be seen on infested plants. They are the only winged life stage of this insect. All other stages disperse short distances by crawling from plant to plant, or over longer distances on wind currents and as accidental hitchhikers on infested plants or soil transported by wildlife or human commerce.

Females choose protected places to position the egg sacs. Eggs are laid in loose, cottony wax. These cottony egg sacs are usually laid on the lower part of the plant close to the roots. Egg sacs were also observed under the leaf sheaths of the plant (Fig.4). Preliminary observations in the laboratory with field-collected specimens have

Fig. 4. Ovisac placed under a leaf sheath of a barley plant

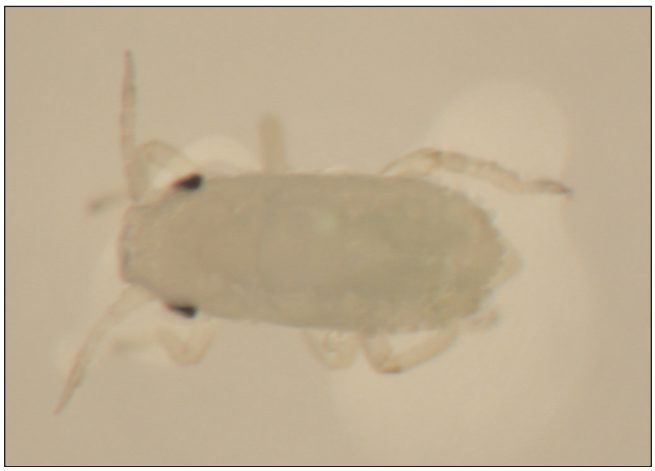

Fig. 5. Haanchen mealybug crawler

shown that a single female can lay as many as 256 eggs in a single ovisac during a week. This may indicate that reproduction occurs asexually in the absence of males. The eggs are pink-red and not visible to the naked eye.

Eggs hatch producing the crawlers (the most mobile nymphal stage, Fig. 5), which disperse to find suitable sites for feeding on plant sap. Crawlers can also be transported to other plants by wind, people, or animals. Crawlers develop through several successive nymphal instars that resemble small adults, each of which has legs and so can actively move, until the mature adult stage is reached and the cycle repeats. The number of generations in Idaho is still unknown but all instars can be found at a single time on a plant host.

Control

Exact circumstances that explain how this pest established itself in Idaho and what environmental or biological factors account for population increases are not known. Mild winter conditions in southeast Idaho during the last few years perhaps explain increased populations. One could also speculate that outbreaks are related to the elimination of mealybug parasitoids after the application of insecticides directed against other barley pests such as cereal leaf beetle and aphids. The most basic elements of an integrated pest management program are lacking for this pest. Formal recommendations for field scouting do not exist, nor are there established economic thresholds.

No insecticides currently are registered for use against this insect. Mealybug control in other crops typically targets the small, highly mobile crawler stage because it tends to be more vulnerable than the later, larger life stages. Applications often are timed for the week after egg laying begins so as to kill the nymphs before they develop to the egg-laying adult stage. This approach is necessary because some mealybug species consist entirely of females that reproduce asexually without mating. This means that every individual is capable of increasing the infestation. Coupled with a short generation time, the ability to reproduce asexually can allow infestations to quickly explode to damaging levels.

The concealed feeding habits of the Haanchen barley mealybug, and the fact that eggs are protected inside the cottony ovisacs, would further complicate and limit insecticide use in barley because any insects sheltered under leaf sheaths or ovisacs would be protected from contact sprays. Foliar-applied contact insecticides that also have fuming action (so that the chemical penetrates to insects behind leaf sheaths), or systemic insecticides, perhaps might provide some control. But again, no insecticides specifically are registered for this use and none have been tested for cost-effectiveness under Idaho production conditions.

Repeated applications would likely be needed to reduce infestation levels. But experience with other mealybugs in different crops has shown that insecticides by themselves are not effective. Indeed, broad-spectrum insecticide applications are known to contribute to mealybug outbreaks in fruit tree and small fruit crops by eliminating naturally occurring biocontrol agents that otherwise keep mealybug infestations at non-damaging levels. Biological control with parasitoids and predators has been the most effective and long lasting management option with some other species of mealybugs.

Photos by Juan Manuel Alvarez
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