

Eriophyid mite control in garlic improves using a multi-pronged approach

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Introduction to eriophyid mites:

Over the last few years more and more garlic growers have noticed their garlic degrading in storage due to eriophyid mite feeding. Eriophyid mites have been an issue in the US and Europe for decades and are considered the most damaging pest of garlic globally. Since they are microscopic, and may lead to increases in other more easily identified diseases, many growers in New York have not been aware of this issue until recently. If this is the first time you are reading about this pest and are curious if this has been an issue in your garlic, there are a few signs you can use to detect eriophyid mites, particularly once populations are high.

Garlic that is infested with eriophyid mites will lose weight more quickly than other garlic in storage and infested cloves will begin to shrink and turn yellow or light brown. Early in the infestation the clove surface will change from being shiny to dull, and over time cloves may develop a sparkly or powdery coating.



You will begin to see the details on mites at 32X magnification. They are long and narrow, similar to thrips, and have rasping mouthparts which they use to extract juice from the clove surface.



Understanding the life cycle:

Eriophyid mites may come to your farm on infested seed garlic, but they can also travel on wind, so clean seed is not the key to prevention as it is with some diseases. Generally, mite populations remain low in

the field, where temperature, soil moisture and humidity limit reproductive rates. Mite feeding in the early season occurs at or near the growing point and may result in twisted, stunted, and off-color leaves. Later leaf growth is generally not affected in New York.

As the garlic matures mites move into the garlic head and live between the clove and the innermost wrapper leaf. The key point at which populations of mites may increase exponentially is during storage, when humidity is lower than in the field and temperatures are moderate. Populations will continue to increase at room temperature indefinitely, so infestations become worse the longer garlic is maintained in this state with no control measures.

Control improves with multiple approaches:

Most growers do not experience eriophyid mite infestations consistently from year to year, so the management plan changes from year to year. One of the yearly control measures that can also improve storage quality is heating the surface of the garlic. At 113° mite eggs are killed within an hour (Courtin et al, 2000). This process should be done with great attention to prevent bulbs reaching the temperature of 120°, at which point waxy breakdown occurs. During this control step you'll want to make sure you have good air movement around garlic to keep the temperature even, and it is important to complete this step at the end of drying, when the surface temperature of the garlic is no longer being affected by evaporative cooling.

After garlic enters storage it is important to establish a monitoring schedule so that mite infestations are detected early. Varieties which peel more easily such as Rocamboles including German Red and Italian Red are more susceptible to mite infestations than Porcelain varieties such as German White or German Extra Hardy, so monitoring these will likely show you your worst possible infestations. Squeezing garlic to see if it feels like the wrappers are loosening is a good first detection step. Follow up by peeling the cloves to see if the surface has become dull or discolored. You can always send a sample to the Cornell Plant Diagnostic Clinic for confirmation if you are unsure if your garlic is infested.

If you find that garlic is infested, there are two ways to reduce mite populations: predatory mites or temperature reduction. Maximum population growth occurs at 77° and 80-95% RH. As the temperature drops from here, reproduction slows, stopping at 43°. Hence, a moderate infestation could be held static by storing garlic at 43° or lower. If you store cool to cold, remember that the garlic is being vernalized, and will sprout if brought to warmer temperatures. Keep it cold until its being sold or distributed.

If storing garlic at these lower temperatures is undesirable, another control measure to consider is the use of predatory mites. We recently completed a study examining the effectiveness of this option and the results were mixed, indicating the need for additional work to better understand the best timing for a mite release. Encouragingly, the most effective application of mites was at the farm with the highest pressure, though they were not able to completely control the mites.

Next Steps:

Working with predatory mites to improve their effectiveness is a high priority moving forward, and we look forward to working with biocontrol companies to refine best practices for deployment in storage. If you are interested in being involved in any future studies involving the use of predatory mites in storage, reach out to Crystal at cls263@cornell.edu.

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Sources:

Courtin et al, 2005. Temperature and relative humidity effects on egg and nymphal development of *Aceria tulipae* (K.) (Acari: Eriophyidae) on garlic leaves (*Allium sativum* L.). *Annals of applied biology*. <https://doi.org/10.1111/j.1744-7348.2000.tb00061.x>