



Repellents for Dispersing Ham Mites

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Abstract

Mites can be a major pest in our foods—especially ham and cheese. (US Fed News Service) Currently, there is a huge interest for reducing our impact on the ozone layer, so researchers are looking at ways to prevent pests in our meats in place of fumigating with ozone-depleting methyl bromide. (Targeted News Service) In the past, researchers at K-State have found that propylene glycol can keep mites off of hams (Abbar, et al. 2016). Although there have been a couple of tests on what deters these mites from meats, we wanted to see if spraying the surface area surrounding these foods would deter them as well. So, we investigated what solutions would repel mites the most. It seemed as if rosemary repelled the mites most. Use of natural repellents like Rosemary can represent safe and effective alternatives for pest management.

Purpose

The purpose of this research is to examine a few known or suspected ham mite deterrents and see if spraying the surrounding surface area, rather than directly onto the food, will keep mites away from food, and then to find which deterrent works best.

Question and Hypothesis

Question: What alternative solutions to methyl bromide can we use to best repel mites from our meats?

Hypothesis: Propylene glycol, glycerin, rosemary, and salt solutions will prevent walking mites from orienting to food.

Study System

Mites are an extremely small food pest that can be found on surfaces of cured meat and cheeses. They do not have wings, but crawl from one area to the next. If there are many mites infesting a piece of meat or cheese, the area may appear to have a sand-like texture on top of it. Female mites can produce hundreds of eggs which grow quickly. A mite's life cycle can be completed in as little as two and a half weeks. (L.H. Townsend)



Figure 1. Single large mite on glass dish



Figure 2. Group of mites feeding on lab diet

Methods and Experimental Design

1. Take 4 uncovered Petri dishes and grease the sides to prevent the mites from climbing up the side and escaping.
2. Use colored tape to mark the control vs treatment side of the dish.
3. Cut a piece of filter paper in half and cover it in the first solution. Then place the damp paper on the side with the tape.
4. Submerge the other cut half in distilled water and place on the other side of the dish as the control.
5. Place a 1-cm cube piece of dog food-based mite diet on both pieces of filter paper (Fig. 3). Then repeat all steps in three more similar petri dishes.
6. Using a laboratory spatula, place approximately 200 ul of mobile-stages of mites in the center of the dish (Figs. 4 and 5).
7. Place Petri dishes in a dark room (facing four different directions) and leave undisturbed for 2 hours.
8. Count mites on the food (Fig. 6) as well as on the filter paper under a microscope for each side of the Petri dish (control vs treatment).



Figure 3. Setup of four Petri dishes prior to adding mite population.



Figure 4. Mites aggregated in center of the dish right after they were released.

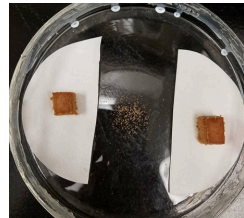


Figure 5. Mites start to disperse minutes after being released.



Figure 6. Mites grouped up on the pet food mite diet 2 hours after being released.

Results

Mites remained aggregated in the center of each dish (Fig. 4) and then began dispersing within five minutes (Fig. 5). At the end of the 2-hour exposure period it was obvious that many mites had moved across the papers to the cubes of food (Fig. 6). There was a much higher proportion of mites on the water-treated side of dishes that had rosemary oil on the treated side (Fig. 7). The Glycerol and Na Propionate also seemed to show that they repel mites as well, while results for Propylene Glycol solutions and Na Sorbate solutions showed very little differences between treated and untreated surfaces. (Fig. 7)

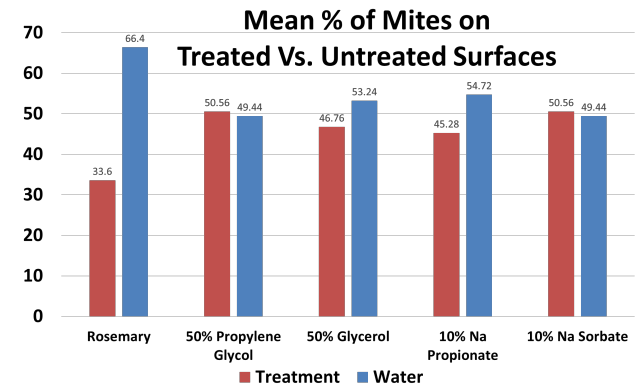


Figure 7. Results from the two-choice tests.

Conclusions

We saw a significant difference between the number of mites on the surfaces treated with rosemary solution compared to those with water. Therefore, rosemary oils seem to be a good repellent for mites, even if not directly sprayed onto their food source. Surfaces with Propylene Glycol seemed to have similar mite numbers to water even, which was not predicted past work showing foods treated with PG are avoided by mites (Abbar, Salehe, 2016). This could be due to mites trying to quickly find a food source after being released in our dishes and quickly walking over the small distance of PG-treated surface to get to the "safe" food source. Maybe mites just don't like the substance on their food but it does not bother them if they have to crawl across it.

Future Directions

We tested how these solutions would repel mites if they walked across short distances on treated surfaces, but this data does not show what the mites would do if there was a larger treated surface that they had to walk across. We could modify this experiment by spraying the shelf racks that aging meats hang on, or spray floors with each solution and see if these treatments can be effective in larger commercial size areas.

References

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