STUDY OF DIFFERENT MITE REARING SYSTEMS

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INTRODUCTION

There are several free-living mite species in the Acaridae family that can be naturally found in mammals' dens and bird nests where they encounter the temperature and humidity, the shelter and food required to complete their biological cycle. These mites are of small size and they have their body covered with abundant setae varying in length, shape and location and that are of interest when classifying the species. Mites are blind and go away from light and they grow in colonies in areas that are protected from direct light. It seems that mite feeding is varied and usually consists of the micro flora of the substrate they live on. Mites are often found in farms, stored foods and laboratory animal cultures, and also in human housing. Their major growth has been observed to occur when the temperature is between 20 and 25° C and the relative humidity between 80% and 90% (Jorrín, 2001a), and they complete their biological cycle in 9 to 12 days (Acha *et al.*, 1994).
Mite species can be successfully reared in axenic cultures in laboratory. This culture systems are very useful in taxonomy and as a source of individuals to carry out assays with pesticides, biological control, growth modelization, etc. However, there scarcely are references about mite rearing systems.

OBJECTIVE

This particular work is part of a project devoted to eliminate mites in dry cured meat applying a biological control. The objective of this communication is to study some mite rearing methods used in laboratory.

MATERIALS AND METHODS

For the actual study, mite species, belonging to Acaridae family, were used. These mites proceeded from hams manufactured in Guijuelo, a well-known ham producing area in Spain.
Following, the three used culture systems are described:

1- Each mite sample was put in an labelled Erlenmeyer. Then, the food was added and it was prepared with brewer's yeast and wheat germ in 3:1 proportion (Griffiths, 1966; George, 1982 en Okabe, 2001). The food was previously sterilized using propylene dioxide as it was proposed by George, (1982). After this treatment, the food was moistened and ready to use. The opening of each Erlenmeyer was closed with hydrophobic cotton and they were put in polypropylene desiccators that had a saturated potassium chloride solution in their lower deposit in order to provide the required humidity. Likewise, the desiccators were put into a heater at 25° C. The environment conditions as temperature and relative humidity were estimated using a probe (Testo 171-3). The cultures were controlled daily, the potassium chloride solution was changed monthly and the food was renewed when it got a dark colour.

2- A second study with another mass rearing culture (Fig. 1), developed at CIFA in Córdoba, Spain (Jorrín J., 2002) was tried. In this culture system, proposed by Jorrín, there was no food sterilization but a fungicide was added, according to Bot and Meyer's original method (1967). Each mite sample was put in a 60 mm Ø Petri dish with the food. As in the previous culture system, the food given to the mites was brewer's yeast and wheat germ but in 1:1 proportion. Moreover, charcoal powder was added to the food (5% in weight) to distinguish the mites among the medium. The culture was carried out in hermetic containers and the plates, having the individuals and the food, were raised over a saturated potassium chloride solution by means of a support that was designed for that purpose. The containers were put into a heater at 25° C like in the former culture system. Every day the cultures were put under the stereoscopic lens.

3- As part of the project, it was developed, by the Instituto Biotecnológico (INBIOTEC, León, Spain), a mite culture on fungus. In that culture system, there were used samples of fungus that lived on the ham surface and that were sent by INBIOTEC. That fungus samples were cultivated on walled Petri dishes in modified Czapek medium. Before inoculating the plates, it was put an sterilized filter paper over the medium in order to prevent the mite eating the agar instead of the fungus. These plates were put in a heater at 20° C until their growth. Then mites were deposited over the plates and these were closed with a strip of plastic film. Afterwards, the plates were put into a desiccator with a saturated potassium chloride solution in their lower deposit to provide humidity. The cultures were observed daily.

RESULTS AND DISCUSSION

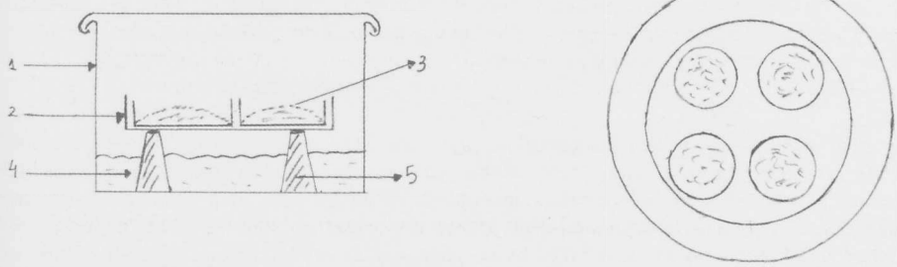
In relation to the culture carried out in Erlenmeyer flasks, it can be seen that it can be kept for a long time if cleanness and optimal growing conditions are maintained. However, mites can spread all over the desiccator, what means a contamination risk. Another disadvantage is that the culture cannot be observed under the stereoscopic lens unless a portion of it was extracted and put on a plate and this can result in other mites species contaminating the culture.
In the method proposed by Jorrín these disadvantages are avoided: it is easier to renew the culture by changing the old plates for new ones , with fresh food, that will be occupied with mites from the own culture (Jorrín, 2001b). Moreover, the culture can be observed under the lens and samples to prepare slides are also easily taken. This kind of culture better reproduces the mite habitat so it lets mites to move as they do over ham surface. No moulds grew in the culture during the time they were kept.
As various authors report (Thind, 1998; Zd'árková, 1998; George, 1982 in Okabe, 2001), the food provided, brewer's yeast and wheat germ, was the adequate to complete the mite biological cycle. It is really necessary to control temperature and relative humidity as any variation can cause damage to the culture, even its extinction.

With regard to the culture on fungus, it was observed that the mites completed their biological cycle as other authors showed (Okabe, 2001). Even, it was achieved that mites survived more than sixty days over the plates. During these assays it was made clear that the limiting factor was relative humidity as the culture was extinguished in the plates suffering desiccation. Even though, if relative humidity was precisely controlled mites' death could be prevented.

CONCLUSIONS

As it can be seen from the results, the culture carried out in Erlenmeyer flasks was rejected for its disadvantages. It does not happen so with the culture system proposed by Jorrín as it can be observed under the stereoscopic lens and it similar to the mite habitat. On the other hand, the culture on fungus is useful to determine appetite of the mite for one special fungus so that the mite survival period in this kind of culture (more than two months) goes beyond the time required to complete their biological cycle at the fixed temperature and humidity.

Figure 1. Culture system, by Jorrín.



lateral view

upper view

1.-container
2.-Petri dish, 140 mm Ø
3.-Petri dish, 60 mm Ø
4.-saturated potassium chloride solution
5.-support

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