SYMPOSIUM PROCEEDINGS NO. 82

Best Practice in Disease, Pest and Weed Management

The State of the Art

Edited by: D V Alford, F Feldmann, J Hasler and A von Tiedemann

Proceedings of an international Symposium held at Humboldt University, Berlin, Germany
10 - 12 May 2007

DPG
BCPC

Behavioural response of the predatory mite Phytoseiulus persimilis **in inert materials of application**

D Wendorf, H Sermann, C Büttner
Humboldt University Berlin, Lentzeallee 55, D-14195 Berlin, Germany
Email: helga.sermann@agrar.hu-berlin.de

P Katz
Katz-Biotech AG, Industriestraße 38, D-73642 Welzheim, Germany

INTRODUCTION

A large-scale application of the predatory mite *Phytoseiulus persimilis* for use in the biological control of spider mites, for instance in cucumber fields, involves specific problems. Owing to the need to mechanize this customary manual method of application, an inert material for transport and distribution of the predatory mites must be provided. This material has to hold the mites for the duration of the application and must be suitable for use in a mechanical procedure. *Therefore, the behaviour of P. persimilis was tested in chosen materials. Special interest was given to the distribution of the animals in the material, the time of remaining in the material and certain factors that might have an impact on the time of their remaining in the material.*

MATERIALS AND METHODS

The materials used in the laboratory studies were buckwheat husks, millet husks, wood shavings (0.8–2.0 mm), spelt husks (Germany wheat) and vermiculite (1–3 mm). To examine the effect of abiotic influences on the migratory behaviour and the time of remaining in the material, both the dampness of the materials was varied (0%, 5%, 10% and 20%) and the temperature (6°, 8° and 10°C), as well as the duration of exposure to the different temperatures (2, 4 and 16 h), were varied. The animals used in the studies were mass-reared predatory mites (*P. persimilis*).

To study the influence of dampness, 10 ml of the material with the chosen dampness (0%, 5%, 10% and 20%) were put into a petri dish. Then, 50 mites were positioned centrally on this material and immediately covered with additional 10 ml of the same material. The effect on the emigration of the mites was observed after 5, 10, 15, 30 and 45 minutes by controlling the number of individuals that vacated the material.

To study the effect of temperature, small transparent pipes (ø = 3.7 cm, ht = 12 cm) made of synthetic material were used. Again, 10 ml of the material (10% dampness) were put into the container; 50 mites were then positioned centrally on this material and immediately covered with an additional 40 ml of the same material. The container was closed with a lid made out of gauze and stored for 2 h, 4 h and 16 h at 10°C, 8°C and 6°C in cooling chamber. Effects of temperature and time of exposure to the corresponding temperature were examined. The time until resumption of movement and the moment of emigration after the cooling was recorded quantitatively.

RESULTS

Dampness

Emigration from all dry materials was completed 15 minutes at the latest after the beginning of the test. Emigration from buckwheat husks and spelt husks was especially fast. After 5 minutes, 88% and 92% of the mites, respectively, were already found outside the material. No effect on mortality or disturbance of mobility could be detected.

The increase of dampness had an obvious effect on the duration of time mites remained in the material. This could be due to the ‘comfort’ of the mites in the material. Depending on the material, emigration was completed after 30 to 45 minutes. In this respect the materials millet husks and wood shavings showed the most favourable effect at 10% dampness.

Temperature

Depending on temperature and duration of cooling, an obvious delay in the resumption of movement and the moment of emigration from the material after the cooling was observed. Decreasing temperatures and increasing times of exposure prolonged the time of remaining in the material and, therefore, show a differentiated and repressive effect on both migration and emigration. Overall, however, brief (2 h) and moderate cooling (10°C) was not very effective.

The strongest effect on delaying the resumption of movement was recorded after cooling for 16 h at a temperature of 6°C, and the beginning of emigration was delayed by up to 40–50 minutes.

Under these circumstances, the emigration of 50% of the inserted mites was accomplished in 68 minutes (vermiculite) to 176 minutes (wood shavings). At room temperature, however, the mites had already emigrated from each material after c. 45 minutes (10% dampness). In addition, for each material, a comparable effect on the migratory behaviour was recorded for the following combinations: 10°C for 16 h, 8°C for 4 h and 6°C for 2 h. In respect to the materials, the strongest effect of cooling was detected for millet husks and wood shavings. Cooling of vermiculite showed only a moderate additional effect on delaying the migratory activity of the mites.

CONCLUSIONS

The time of remaining in the dry materials proofed to be comparatively short. By increasing the dampness of the materials to 10%, in combination with the effect of cooling the time can be prolonged considerably. The effect of slowing down the mobility of the mites in the material has to be judged positively in respect of mechanised application. However, it depends on the chosen form of application technology whether this effect is sufficient for the mechanised application process. Further factors that might have an impact on the mobility and distribution in the materials are still being examined.