Experimental & Applied Acarology, 5 (1988) 181-183
Elsevier Science Publishers B.V., Amsterdam — Printed in The Netherlands

Short Communication

Washing Technique for Monitoring Mites in Apple Orchards

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(Accepted 22 September 1987)

ABSTRACT

Zacharda, M., Pultar, O. and Muška, J., 1988. Washing technique for monitoring mites in apple orchards. *Exp. Appl. Acarol.*, 5: 181-183.

A shake-and-wash technique for monitoring the predatory phytoseiid mites *Typhlodromus pyri, Amblyseius finlandicus*, and their prey, *Panonychus ulmi, Tetranychus urticae* and *Aculus schlechtendali* in commercial apple orchards was developed. The removal and recovery of mites from leaves, shoots and spurs is based on agitating the plant material by hand in alcohol and subsequently removing the mites using a separating funnel. The mites are quickly killed and easily washed off the plant material, and are thus well preserved for further study. The technique is more efficient than directly counting the mites on plant material under a dissection microscope and can be easily employed both in the laboratory and in the field.

INTRODUCTION

A study of the biological control of spider mites in commercial apple orchards was carried out jointly by the Institute of Entomology, Czechoslovak Academy of Sciences and the biolaboratories of the Agriculture Cooperative Farm Mír in Chelčice, South Bohemia. The project required the development of a routine collecting technique to monitor both predatory and phytophagous mites on branches and leaves of apple trees. Such a technique should not only rapidly kill and preserve the mites but also allow their removal without physical damage under both field and laboratory conditions.

Sabelis (1985) and Nachman (1985) have described and discussed the efficiency of sampling techniques for mites of the families Tetranychidae and Phytoseiidae, respectively. Some of these techniques can be modified for use under a variety of conditions. For example, Henderson (1960) described a sampling technique based on a leaf-washing method for estimating populations of

0168-8162/88/$03.50

small arthropods on plants, while Leigh et al. (1984) developed a 'mite rinse' to recover spider mites from multiple leaf samples of cotton.

In order to assess the population of apple-tree-inhabiting predatory phytoseiid mites (*Typhlodromus pyri* Scheuten and *Amblyseius finlandicus* (Oudemans) and their prey, the tetranychids *Panonychus ulmi* (Koch), *Tetranychus urticae* Koch and *T. vienensis* Zacher, and the eriophyid *Aculus schlechtendali* Nalepa, we have developed a washing technique. This group of species represents the basic predator-prey complex being assessed in the management of our experimental commercial apple orchards.

DESCRIPTION OF THE TECHNIQUE

Both phytophagous and predatory mites are removed from the plant material by the following method.

A sample (or a subsample) of plant material, for example about 10–15 leaves, spurs, or shoots with undeveloped leaves, is put into a 0.5 or 1-l jar with a broad neck. Then approximately 300–500 ml of 80–90% ethanol is added; the jar is tightly closed with a stopper and shaken for 5–10 s. After about a 1-min rest, the jar is shaken again but more vigorously. Then, using forceps, the plant material is removed. In removing the plant material it is desirable to agitate it briefly again. After this procedure other samples of plant material can be washed in the same alcohol. The alcohol containing the preserved mites is then poured into a separating funnel attached to a portable laboratory stand. The mites are allowed to settle, which takes about 2 min, and are then run off through the bottom of the separating funnel into counting or small evaporating dishes. The excess alcohol remaining in the funnel can be filtered and used for another removal and recovery of mites.

It was observed that the predatory mites in particular did not die immediately after addition of the alcohol, but they tried to escape from their shelters in leaf folds and by leaf ribs. This allowed the mites to be easily washed off the plant material during agitation. The mites were not damaged and were suitably preserved for further acarological study (Krantz, 1978).

To test the efficiency of the shake-and-wash technique, mites were counted under a binocular microscope on 50 leaves in each of 10 samples, the leaves subsequently washed, and the recovered mites counted. When compared with direct counting method, it was found that the shake-and-wash technique was more efficient by 10–20%. The technique was also efficient for the removal and recovery of all developmental stages of mites of the predator–prey complex under study.

ACKNOWLEDGEMENT

We wish to thank Dr. Anne S. Baker, Arachnida Section, British Museum (Natural History), London and Dr. M.G. Solomon, East Malling Research Station, Kent, Great Britain, for helping us with the presentation of this paper.

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