Short Communication

Modification of a leaf-washing apparatus for the recovery of mites

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ABSTRACT

Boller’s funnel and sieve apparatus for extracting phytoseiid mites (Acari: Phytoseiidae) from leaves was modified. The modification consisted of including a reservoir dish enabling the placing of the whole sample of leaves into the apparatus, attaching a collecting chamber, simplification of the fixing of the fine lower sieve and adding an upper fine sieve. This modification enables the rapid processing of samples of up to 150 leaves.

Key words: Acari, Phytoseiidae, sampling, leaf-washing apparatus.

INTRODUCTION

Estimates of the number of small arthropods, in particular spider mites (Acari: Tetranychidae) and predatory mites (Acari: Phytoseiidae), from foliage are often necessary in population ecology and pest control. A direct census of mites on leaves using a stereomicroscope is tedious, time-consuming and, therefore, may be subject to inaccuracies. This has led many authors to develop methods that make the whole procedure of extracting small arthropods, in particular mites from foliage samples, easier, quicker and more precise. Different methods have been developed for the extraction of mites from foliage, such as a brushing machine (Henderson and McBurnie, 1954) or shake and wash methods (e.g. Henderson, 1960) in which the mites are washed off foliage using different solutions, for example ethanol (Zacharda et al., 1988), sodium hypochloride (Andres, 1957) or detergents (Boller, 1984). The use of shake and wash procedures is associated with the construction of a reasonably complicated apparatus. In the simple cases, the apparatus consists of a funnel and sieves (Boller, 1984) or a separating funnel (Zacharda et al., 1988); the more complicated apparatuses are rotation washing machines (Leigh et al., 1984).

During research of autochthonous phytoseiids on both wild and cultivated...
shrubs and trees, the author was faced with the problem of processing samples of 100 leaves; this sample size was necessary because of the low density of phytoseiids, in particular in the first half of the season. The same problem occurred in another study, where samples of 100 apple leaves sampled in the framework of a study of phytoseiids in apple orchards were processed using Boller’s apparatus (Boller, 1984). The need to process samples consisting of up to 150 leaves each led to a modification of Boller’s apparatus, enabling the processing of numerous larger samples in a short time.

MATERIALS AND METHODS

Description of the apparatus

The equipment (Fig. 1) consisted of the following.

(1) A plastic hemispherical or commercial rinse dish used for fruit washing, with holes (4×4 mm) in the bottom. A rinse dish with an upper diameter of 28 cm was used, but any other suitable dish can be used. The dish serves as a reservoir in which to place the whole sample.

(2) A rough sieve (mesh approximately 2 mm) for catching dirt and bigger leaf fragments and/or bigger arthropods if present. Standard laboratory sieves with an appropriate mesh size may be used.

(3) A middle washing sieve (mesh size 0.3–0.5 mm) for catching smaller leaf fragments, bigger trichomes, dust and/or arthropods.

(4) A funnel with a diameter of approximately 60 cm.

(5) A circular nylon net (mesh size approximately 0.16 mm) with a diameter approximately 4 cm larger than the diameter of the plastic chamber (7). In the middle of the net there is a circular opening with the same diameter as the lower funnel tube. The net prevents the possible escape of mites that could float on the detergent foam during the waste washing.

(6) Rubber rings for fastening the net (5) to the chamber (7).

(7) A plastic collecting chamber made from a wide-necked plastic bottle (200–250 ml) at least 11 cm high, by cutting off the bottom (in the apparatus the top); the neck should be at least 4 cm in diameter and provided with a thread.

(8) A circular net of the same material as the net (5), with a diameter at least 1 cm larger than the neck of the chamber (7). This net serves to catch mites and transfer them to a microscope or to a vial where the mites can be deposited for later study. The preparation of a large number of such nets is recommended.

(9) A plastic pot with the bottom cut off, approximately 5 cm high, with a bottom diameter the same as the outside diameter of the neck (serving as the bottom) of the collecting chamber. If the plastic pot has a thin wall, it is recommended strengthening it with adhesive tape. Instead of a plastic pot, the twist cap (stopper) from the bottle (7) may be used; its centre is carved out. The pot serves to fasten the net (8) to the collecting chamber (7) and as a base for the apparatus if a portable laboratory stand is not used.