

INTEGRATION OF THE PREDATORY MITE *Phytoseiulus persimilis* ATHIAS-HENRIOT, 1957  
AND THE CHEMICAL DIENOCHLOR FOR THE CONTROL OF *Tetranychus urticae* (KOCH, 1836)  
ON GLASSHOUSE ROSES

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ABSTRACT

Trials in southern England in 1977 indicated that a large resident population of the two-spotted spider mite, *Tetranychus urticae* (Koch, 1836) on mature glasshouse roses can be suppressed within one season relatively easily by the appropriate integration of the predatory mite *Phytoseiulus persimilis* Athias-Henriot, 1957 and certain acaricides, particularly dienochlor.

INTRODUCTION

The predatory mite *Phytoseiulus persimilis* Athias-Henriot, 1957 is now widely used for control of the two-spotted spider mite, *Tetranychus urticae* (Koch, 1836), on glasshouse food crops (GOULD, 1971; MARKKULA *et alii*, 1972; FRENCH *et alii*, 1976, ANON., 1976a, b). It has also been used successfully to control spider mite on chrysanthemums (SCOPES & BIGGERSTAFF, 1973) and on roses (SIMMONDS, 1972) under glass. The aim here was to devise a simple method for reducing, within one season, a large infestation of spider mite on mature roses on a typical commercial holding by a combination of chemical and biological treatments.

MATERIALS AND METHODS

The test site was a 0.13 ha wooden twin-span glasshouse at Egham, Surrey, England, containing 14,000 eight-year-old rose bushes used for commercial production. The house was unheated in December and January; the temperature inside fluctuated between 16 and 32°C during the rest of the year. Despite an application of aldicarb granules on 4 March 1977 and dicofol on 25 March, there was substantial spider mite

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Recebido em 02/02/79.

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damage in scattered patches throughout the house on 15 April, when the trials began. Webbing had not yet appeared although there were up to six adult spider mites per leaflet. Sulphur had been used to control mildew for six weeks up to 16 April. Isolated patches of *Macrosiphum rosae* (L.) had been treated with parathion/DDT powder. From this date onwards, the aphids were treated with pirimicarb and the mildew with dodemorph.

Three trial sites (each 3 x 7m, and with 159, 154 and 146 bushes respectively) in corners of the house were selected for the introduction of predators on 27 April. The rest of the house was treated with chemicals only. Each predator site included part of a bed against the house wall, part of the first path and part of the adjacent bed. The cultivars treated were Carol and Baccara (Site 1), Belinda and Baccara (Site 2), and Spanish Sun (Site 3).

The damage was greatest at Site 1, especially on cv. Carol, where every mature leaflet showed some degree of yellow speckling. At this site, 600 predators on whole broad-bean leaves were spread relatively evenly throughout the bushes. At each of the other two trial sites, where the spider mite infestation was much less, 200 predators were introduced. Immature predatory mites and eggs were also present on the bean material, which was placed underside upwards about 50 cm from the ground on mature foliage in the shade.

## RESULTS

At Site 1 the predators soon established, but they were unable to prevent an increase in spider mites, which led to a severe infestation of the young growth, particularly the buds. On 6 May this site was treated with a single spray of 'Turbaic Acaricide' (ultra-low volume dicofol plus tetradifon) applied just above the young growth. At the other two sites the predators established well and spread throughout the foliage. No chemical treatment was necessary because the initial spider mite population was much smaller than at Site 1.

On 7 May the bushes elsewhere in the house were beginning to show patches of economic damage and were sprayed with dienochlor at high-volume. This chemical substantially reduced the spider mite population.

Despite a good kill of young spider mites on the new shoots at Site 1 with dicofol/tetradifon, the pest population increased again and produced webbing on 17 May. The affected shoots were given a high volume spray of tetradifon (1.6 ml/l.) the same day. At this time the predator was abundant on the older leaves at all three sites. In addition, it was present in small numbers throughout most of the house. At Sites 1-3 the spider mite had been completely eliminated by the predator plus dicofol/tetradifon by 17 July. Indeed the predator was consuming isolated patches of spider mite that had not been killed by spraying up to 6 m from the introduction site. Isolated individuals and small groups of predators were present up to 16 m from the original sites, but their economic effect at these large distances was only local. Elsewhere in the dienochlor area, where the chemical and/or predator were unable to

prevent spider mite webbing by 17 July, a further dienochlor spray was applied on 19 July and caused considerable spider mite mortality. Spider mites never appeared again in large numbers and predators were still present in small numbers throughout most of the house on 2 November. By 16 December no predators were found but occasional individuals of the green non-diapausing type of spider mite were present in scattered locations, having escaped both dienochlor and predator.

## DISCUSSION

A large residual *T. urticae* infestation can be suppressed, although not necessarily completely eradicated, in one growing season by deploying the predator *Ph. persimilis* simultaneously with an application of certain acaricides. At Site 1 the predator was introduced first and then the crop was top-sprayed with ultra-low volume dicofol plus tetradifon. Both chemical applications were effective in reducing the large numbers of young spider mites accumulating at the tops of the rose buds, while the predator continued to eliminate the spider mites lower down on the plant. At Site 2 and 3 the pest infestation was sufficiently low to be controlled solely by the predator. Elsewhere in the house the majority of spider mites were killed by dienochlor, but most individuals that escaped the spray were consumed by the predator, which showed considerable powers of dispersal.

As a future control measure it is suggested that the predator is spread throughout the glasshouse early in the season and isolated outbreaks of the pest at the tops of the plants should be sprayed. Tetradifon and/or dicofol can be used but dienochlor is preferred as it is relatively harmless to the predator, and there seems to be no evidence that spider mites are resistant to it, as they are to organochlorines in some areas. Sulphur, which is highly toxic to the predators, should be replaced by dodemorph or daconil for control of mildew.

The predators should be scattered quickly throughout the house at the first signs of spider mite activity. The number of predators released depends on the severity of the infestation; a higher number will give more satisfactory biological control, and there will be less need for chemical redressing of the populations. However, large quantities of predators are expensive, and for the commercial grower it may be more practicable to use less of them and to top-spray as necessary. In practice the time-factor, and hence cost, defeats accurate counting out of predators (MARKKULA & TIITTANEN, 1976; SAMWAYS, 1978) and therefore satisfactory commercial control is somewhat empirical and intuitive, and more importantly, tailored to the conditions prevailing on an individual holding at one time.

It is possible that a similar programme involving the integration of *Ph. persimilis* and dienochlor could be used on outdoor roses in the areas of Brazil that are not subject to frosts, which kill the predator.

## ACKNOWLEDGMENTS

Mr. Graham Sparkes very kindly supplied the predators and Mr. Peter Mason provided a house for the trial.

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## RESUMO

Integração do ácaro predador *Phytoseiulus persimilis* Athias-Henriot, 1957 e do acaricida dienochlor para controle de *Tetranychus urticae* (Koch, 1836) sobre rosas cultivadas em estufas

Os testes, realizados no sul da Inglaterra em 1977, indicam que uma grande população do ácaro *Tetranychus urticae* (Koch, 1836) sobre rosas maduras cultivadas em estufas, pode ser suprimida numa só temporada, de maneira relativamente fácil e barata, pela integração adequada de *Phytoseiulus persimilis* Athias-Henriot, 1957 (ácaro predador) e de certos acaricidas, principalmente dienochlor. A vantagem de utilizar esses dois métodos é a seguinte: os predadores diminuem o acréscimo do número

de ácaro ou, quando a infestação for pouca, os elimina. Mais tarde na temporada, os inseticidas, na forma líquida, pulverizados de modo barato e eficaz, matam uma grande proporção dos novos ácaros nas áreas muito infestadas dos ponteiros das plantas. Os ácaros não eliminados pela aplicação dos inseticidas frequentemente são consumidos pelos predadores, que os procuram ativamente.

Estes resultados indicam que há possibilidade de se usar este mesmo programa integrado no campo, em regiões do Brasil não sujeitas a geadas.