

INTRODUCING *Typhlodromus pyri* (Phytoseiidae) INTO APPLE ORCHARDS IN POLAND

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A B S T R A C T

A protocol was developed for raising OP-resistant and OP-susceptible *Typhlodromus pyri* Scheut. (Phytoseiidae) in the laboratory all year around. *T. pyri* was raised in the laboratory on bean plants heavily infested with *Tetranychus urticae* Koch. (Tetranychidae). Over the last fifteen years, *T. pyri* has been released and stabilized in about 900 apple orchards in which IPM is practiced in different regions of Poland.

Two methods for introducing predatory mites were field-tested:

- Cloth strips with hibernating predatory females collected from apple orchards in the autumn were placed on the trunks of the apple trees in the spring.
- Bean leaves carrying *T. pyri* raised in the laboratory were placed inside the canopies of apple trees in spring.

Both cloth strips and bean leaves were satisfactory methods of introducing *T. pyri* into apple orchards. However, introducing *T. pyri* on cloth strips in the springtime when the apple trees were in the green cluster stage was the better method from a practical and economical point of view.

Key word: *Typhlodromus pyri*, apple orchard, introduction, laboratory rearing

INTRODUCTION

The predatory mite *Typhlodromus pyri* Scheut. (Phytoseiidae) is now one of the main biological control agents used in Integrated Pest Management in commercial apple orchards (Collyer, 1964; Huffaker et al. 1970; Zacharda, 1991). However, *T. pyri* is sometimes not present in an orchard or is present only in low numbers. In this case, *T. pyri* should be introduced (Niemczyk, 1991; 2000).

The aims of this study were to develop a protocol for raising *T. pyri* in the laboratory year around and to develop a method to mass introduce *T. pyri* into apple orchards.

MATERIAL AND METHODS

Raising phytoseiid mites in the laboratory

Two populations of *T. pyri* were used. The first population was OP-resistant and came from sprayed apple orchards in Chelcice in the Czech Republic. The second population was OP-susceptible and came from horse chestnut trees (*Aesculus hippocastanum*) growing in the Czech Republic.

The following procedure was used to raise *T. pyri* in the laboratory:

- bean seeds were sown in plastic boxes and put in the greenhouse;
- a few days after sprouting, the plants were infested with two-spotted spider mites (*Tetranychus urticae*, Tetranychidae);
- the plants were irrigated, but not fertilized;
- after four or five days, the infected plants were transferred to a growth chamber in which the temperature was about 25°C, the relative humidity was about 60%, with 16 hours light and 8 hours dark per day.
- *T. pyri* was then introduced;
- *T. pyri* fed on the two-spotted spider mites as well as on tulip and broad bean pollen.

Mites raised in this way in the laboratory can be introduced into apple orchards and other plantations. They can also be used to test how pesticides affect these beneficial organisms.

Introducing *Typhlodromus pyri* into apple orchards

Three methods for introducing predatory mites were investigated and implemented (Tab. 1).

Table 1. Methods for introducing of *T. pyri* into apple orchards

Method of introducing <i>T. pyri</i>	Application site on apple trees	Optimal introduction time in Poland
Cloth strips with hibernating predatory females	trunk and branches	second half of April
Branches from trees where <i>T. pyri</i> is abundant	entire canopy	July and August just after summer pruning
Bean plants carrying <i>T. pyri</i> raised in the laboratory	entire canopy	throughout the entire growing season

Over the last fifteen years, *T. pyri* has been released and stabilized in about 900 apple orchards in which IPM is practiced in different regions of Poland. Fruit growers are informed about spraying programs which do not harm *T. pyri*.

Effectiveness of two methods for introducing predatory mites into apple orchards

Two methods for introducing predatory mites were field-tested on a six-year-old apple orchard planted with 'Jonica' in Brzezna in southern Poland:

- cloth strips with hibernating predatory females collected from apple orchards in the autumn were placed on the trunks of the apple trees in the spring;
- bean leaves carrying *T. pyri* raised in the laboratory were placed inside the canopies of apple trees in spring.

Each experimental plot consisted of ten trees growing in one row. 500 leaves per plot were collected in July, when the number of predatory mites was at its peak. 100 mites were applied to each tree on all plots except the control plot. Efficacy was estimated on the basis of the reduction in the population of red spider mites (*Panonychus ulmi* Koch.).

RESULTS

In the second year after *T. pyri* was introduced into the experimental plots, the number of red spider mites was below the economic threshold level on all experimental plots (Tab. 2).

T. pyri was an especially effective control agent in this particular orchard for several reasons: the trees were only five to six years old; tree canopies were small; the number of predators released was high, about 100 per tree; and *T. pyri* is more effective in controlling red spider mites than two-spotted spider mites.

Cloth strips were more effective, possibly because only fecund females were introduced. Bean leaves were slightly less effective, possibly because the predators introduced were at all different stages of development. Immature forms are less effective predators than adults.

Both cloth strips and bean leaves were satisfactory methods of introducing *T. pyri* into apple orchards. However, introducing *T. pyri* on cloth strips in the springtime when the apple trees were in the green cluster stage was the better method from a practical and economical point of view. Cloth strips are a fast, easy, fast and relatively inexpensive way for apple growers to introduce *T. pyri* into their orchards.

Table 2. *Typhlodromus pyri* and *Panonychus ulmi* on apple trees in Brzezna, Poland

Method of introducing <i>T. pyri</i>	Mean number of mobile forms per leaf	
	July 28, 1998	July 26, 1999
<i>Typhlodromus pyri</i>		
Cloth strips with hibernating predatory females at the beginning of April	3.3	3.3
Cloth strips with hibernating predatory females at the beginning of May	2.4	4
Bean leaves carrying <i>T. pyri</i> raised in the laboratory at the beginning of May	1.2	3
Control	0.03	0.3
<i>Panonychus ulmi</i>		
Cloth strips with hibernating predatory females at the beginning of April	1.8	0.08
Cloth strips with hibernating predatory females at the beginning of May	3.6	0.4
Bean leaves carrying <i>T. pyri</i> raised in the laboratory at the beginning of May	9.6	0.4
Control	10.8	2.6

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INTRODUKCJA DOBROCZYŃKA GRUSZOWCA *Typhlodromus pyri* (Phytoseiidae) DO SADÓW JABŁONIOWYCH W POLSCE

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S T R E S Z C Z E N I E

Opracowano metodę całorocznej masowej hodowli laboratoryjnej dwóch ras drapieżnego roztocza dobroczyńka gruszowca (*Typhlodromus pyri* Scheut.): rasy wrażliwej i rasy częściowo uodpornionej na preparaty fosforoorganiczne.

W warunkach polowych porównano efektywność dwóch metod introdukcji *T. pyri* do sadów jabłoniowych. Pierwszy sposób polegał na wykładaniu na gałęzie drzew ściętych liści fasoli, na których znajdował się drapieżca. Rośliny fasoli pochodziły z hodowli laboratoryjnej. Druga metoda polegała na zakładaniu wczesną wiosną na pnie i gałęzie drzew opasek z materiału filcopodobnego, w których znajdowały się zimujące samice *T. pyri*.

Oba sposoby dały satysfakcjonujące rezultaty. Z praktycznego i ekonomicznego punktu widzenia lepszą metodą i najczęściej w tej chwili stosowaną jest jednak wprowadzanie drapieżcy do sadu z użyciem opasek.

W ciągu ostatnich 15 lat dobroczyńka gruszowca introdukowano do około 900 sadów z integrowanym programem ochrony, zlokalizowanych w różnych rejonach Polski.

Słowa kluczowe: *Typhlodromus pyri*, sad jabłoniowy, introdukcja, hodowla laboratoryjna