Which predatory mite for which pest under which conditions?

Koppert

Whitepaper

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Introduction

Koppert sells a range of phytoseiid mites that can be used to control several pests. To choose the right species for your purpose it is important to understand the strengths and weaknesses of these mites. Here we provide information to help you to choose the right species for your specific situation.

Predatory Mite	Two-spotted spider mite	Thrips	Whitefly	Pollen
	+ + + + *	-	-	-
Phytoseiulus persimilis **Spidex**				
	+ + +	+	+	+ +
Neoseiulus californicus **Spical**				
	+	+ + +	+	+ + +
Neoseiulus cucumeris **Thripex**				
	+	+ + +	+ + +	+ +
Amblyseius swirskii **Swirski-Mite**				
	+	+ + + +	+ + + +	+ +
Amblydromalus limonicus **Limonica**				
	+	+ + + +	+ + +	+ + +
Transeius montdorensis **Montdo-Mite**				
	+	+ + +	+ +	+ + +
Amblyseius andersoni **Anso-Mite**				

Tabel 1. Predation and development of several predatory mites on two-spotted spider mite, thrips, whitefly and pollen. * – no predation, no development, not usable; + limited predation/development, insufficient effect; ++ some development/effect but limited; +++ sufficient control effect/development; ++++ very good control/ development.

Control of two-spotted spider mites

- *N. californicus* is (compared to *P. persimilis*) more effective at lower densities of spider mites. At higher densities *P. persimilis* is the best option.
- *N. californicus* is more effective on spider mites than the generalists.
- *N. cucumeris, A. swirskii, A. limonicus, T. montdorensis* and *A.andersoni* are not very good at predating two-spotted spider mites because they avoid the webbing. At low spider mite densities these predators can slow down the development of spider mites.

Control of thrips

- *N. cucumeris, A. swirskii and A. andersoni* predate about the same number of thrips per day. If sufficient food is available, the population of *A. swirskii* grows much faster than *N. cucumeris* (greater numerical response).
- In contrast to the other thrips-predating phytoseiids, *A. limonicus* and *T. montdorensis* predate also large (2nd instar) thrips larvae. They also have the highest numerical response to thrips. At high thrips pressure, these species are the best option.
- *N. californicus* can prey on thrips but prey consumption and reproduction are low on a diet of thrips only. It should therefore no be used for thrips control.

Control of whiteflies

- *A. swirskii, A. limonicus* and *T. montdorensis* are all good control agents for whiteflies.
- *A. limonicus* has the highest numerical response to whiteflies and is the best option when the pest pressure is high.
- In laboratory trials the oviposition of *A. andersoni* with whitefly eggs as prey is good. This species was never tested against whiteflies on plants.
- The reproduction of all predatory mite species is low when exclusively whiteflies are provided as prey. They do much better with an additional food source (mites, thrips, pollen, etc.) In greenhouses and fields, they will usually find some other food. Also, prey mites can be provided as supplementary feeding.

Effects of temperature and humidity

Temperature

- *N. californicus* works well at low (15°C) as well as high (30°C) temperatures.
- *N. cucumeris* is not good at high temperatures (30°C).
- *A. swirskii* and *T. montdorensis* are both effective above 18°C and have their optimum at high temperatures (30°C). At 15°C there is till some predation but development is very slow. If the temperature is below 8°C for a longer time, *A. swirskii* will die.

Humidity

All phytoseiids need a relatively high relative humidity to develop and multiply. According to results from laboratory trials, the minimum is somewhere between 60 and 70%. Generally, *P. persimilis, A. limonicus* and *T. montdorensis* are slightly more sensitive to low humidity than *N. californicus, N. cucumeris, A. swirskii* and *A. andersoni.* In a healthy, good growing plant canopy the humidity close to the leaf surface, where the mites live, is higher than in the surrounding air. High humidity, e.g. at night, can compensate for low humidity during the day.

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Predatory mite species	10 - 15°C		15 - 20°C		20 - 25°C		25 - 30°C		30 - 35°C	
Phytoseiulus persimilis	average	good	good	good	good	good	good	average	bad	bad
Neoseiulus californicus	average	good	good	good	good	good	good	good	good	average
Neoseiulus cucumeris	average	average	good	good	good	good	average	avarage	bad	bad
Amblyseius swirskii	bad	average	average	good	good	good	good	good	good	average
Amblydromalus limonicus	average	good	good	good	good	good	average	average	bad	bad
Transeius montdorensis	bad	average	average	good	good	good	good	good	average	bad
Amblyseius andersoni	average	good	average	good	good	good	good	avarage	bad	bad

Tabel 2. Effectiveness (measured as development and oviposition) of different predatory mite species at different temperatures. Please note: These temperature ranges are indications. Starting of activity and development in the lower temperature range is a gradual process. Thereafter, development increases nearly linearly with temperature. After the maximum is reached, development declines sharply (Fig. 1). How to read: *N. californicus* is most effective between 15°C and 32.5°C. It still has some effect between 12.5°C and 15°C, and between 32.5°C and 35°C.

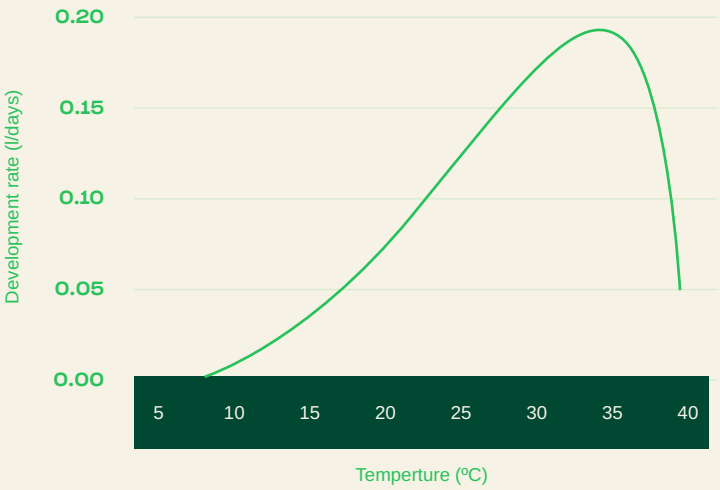

Fig. 1. Typical relationship of temperature and development rate of a predatory mite.

We therefore purposely refrain from providing specific temperature or humidity values within which the predatory mites will work or not.

Most laboratory data are generated at constant temperature and humidity. These conditions never occur in a greenhouse or field. The few data available at variable conditions show that this can have a positive or negative effect on the population development of pests and beneficials depending on the temperature and humidity ranges and extremes.

General remarks

The charts shown in this Information sheet are made based on the current knowledge and our experience. Successful biological control depends on many factors in addition to temperature and humidity. These include for instance the plant species and variety, other pests and beneficials present and pesticides used.