

# All about Swirskii

[www.allaboutswirskii.com](http://www.allaboutswirskii.com)

This website is an initiative of Koppert Biological Systems and Applied Plant Research.

## Origin

*Amblyseius swirskii* is found in the wild in the eastern Mediterranean region, i.e. Israel, Italy, Cyprus and Egypt. The predatory mite is found there in crops like apples, vegetables and cotton. In Israel, *A. swirskii* is also frequently found in citrus crops.



## About the name

On this website, the name *Amblyseius swirskii* is always used to refer to this predatory mite. In publications, it may also be referred to as *Typhlodromips swirskii*. This is the same creature but with a different 'forename' (genus). Taxonomists differ in their views regarding the naming of this mite.

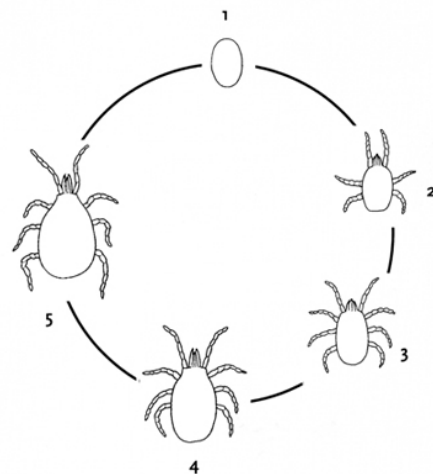
## Life cycle and appearance

### Life cycle

Just as with other predatory mites, the following stages of development are followed: egg, larva, protonymph, deutonymph, and adult.

#### *Stages of development of Amblyseius swirskii*

The development of the *Amblyseius swirskii* population is dependent on the type of food, the availability of food, the temperature and the humidity. *A. swirskii*, which occurs in the wild in the countries around the Mediterranean Sea, is well suited to warm and humid climate conditions. The critical relative humidity (RH) is approximately 70%.



In a crop, the predatory mites live in the microclimate found in the layer of air right next to the leaf surface. The atmospheric humidity in this layer of air can differ greatly from that in the greenhouse in which the plants are growing.

If the humidity in the microclimate around the leaf surface drops below 70% for a substantial length of time, the eggs of the predatory mite dehydrate and will not hatch. If the RH in the greenhouse drops significantly, the microclimate around the leaf generally ensures an adequate level of humidity. Only in cases of severe necrosis of the leaf due to infestations like spider mite and thrips can the microclimate become a limiting factor. The rate of transpiration decreases in cases of leaf necrosis. Consequently,

the leaf temperature is higher and the atmospheric humidity in the layer of air next to the leaf is lower.

The optimum temperature for *A. swirskii* lies between 25 and 28 degrees Celsius. *A. swirskii* is better able to survive at high temperatures than *A. cucumeris*. This has been demonstrated by Spanish research in sweet pepper crops.

The development from egg to the adult phase takes only five to six days at 26°C. If sufficient food is available, *A. swirskii* lays an average of two eggs per female per day.

The predatory mite does not go into diapause (dormancy) in response to shorter days or lower temperatures. This means that the predatory mite is also active on shorter days (with less than 12 hours of light). The temperature is an important aspect, however: If the temperature falls below 15 degrees Celsius, the predatory mite will be virtually inactive. *A. swirskii* can survive such a drop in temperature, but is not resistant to frost.

### Appearance

Mites can be identified by the fact that the adults have eight legs and the body is a whole unit, not made up of segments.

*Amblyseius swirskii* belongs to the *Phytoseiidae* family. This group of predatory mites is distinctive in that it has relatively few hairs on its back – 20 pairs of hairs at most. The commercially available predatory mites such as *Amblyseius cucumeris*, *Amblyseius degenerans*, *Amblyseius californicus*, and *Phytoseiulus persimilis* all belong to the *Phytoseiidae* family. Some are easy to recognise by their colour. For example, *Amblyseius degenerans* (which is released in sweet pepper crops) is always dark brown or black in colour. The spider mite specialist, *Phytoseiulus persimilis* is always bright red.

*A. swirskii* cannot be distinguished from a number of other predatory mites such as *A. cucumeris*, *A. californicus*, *Amblyseius barkeri* or *Amblyseius andersoni* with the naked eye or with a magnifying glass.

The differences in appearance are subtle and can only be seen under a microscope. However, if you want to be sure which predatory mite you are dealing with, you must seek an expert to determine the species.

The colour is completely dependent on what the mites have been eating. This can vary from dark red, to purple, to light yellow. With thrips and whitefly as prey, the colour tends to be a kind of light orange. It is also difficult to tell from its behaviour which predatory mite you are dealing with.



## Combating which infestations?

*Amblyseius swirskii* is a polyphagous predator with many different types of prey on its menu. In sweet peppers, aubergines and gerbera crops, *A. swirskii* can also survive on pollen. However, it is not yet clear whether this applies to pollen from all types of crop. If thrips or whitefly are present, the predatory mite quickly grows in numbers.

### Thrips

*Amblyseius swirskii* eats the first larval phase of thrips. A female mite can consume up to five young thrips larvae per day at 25°C. This is comparable with the predation capacity of *A. cucumeris* in the laboratory.

*A. swirskii* can develop on plants much more quickly than *A. cucumeris* if prey is available. This has emerged from trials carried out by both Applied Plant Research and Koppert. Over a period of three weeks, the predatory mite population of *A. swirskii* grew nine times faster than that of *A. cucumeris* in cucumber crops. This makes this predatory mite much more effective in combating thrips than *A. cucumeris*. Depending on the crop, other natural enemies of thrips besides *A. swirskii* are also necessary in order to guarantee good control.

### Whitefly

*A. swirskii* mainly eats the eggs and the initial larvae of both glasshouse whitefly and cotton whitefly. Each female mite can consume up to 19 eggs or 15 young larvae per day at 25°C. There are also indications that *A. swirskii* eats the eggs of the cabbage whitefly.

Depending on the crop, other natural enemies of whitefly besides *A. swirskii* are also necessary in order to guarantee good control.

### Spider mite

*A. swirskii* also eats the younger phases of two-spotted spider mite and has a slightly suppressive effect on two-spotted spider mite. The predatory mites are hindered by the spider mite webs, and consequently avoid spider mite hot-spots. For effective control, it is absolutely essential to release specialised natural enemies of spider mite.

### Tarsonemid mites

It is known that *A. swirskii* also eats broad mite. Other predatory mites that can help to control broad mite include *Amblyseius californicus*, *Amblyseius cucumeris* and *Amblyseius barkeri*.

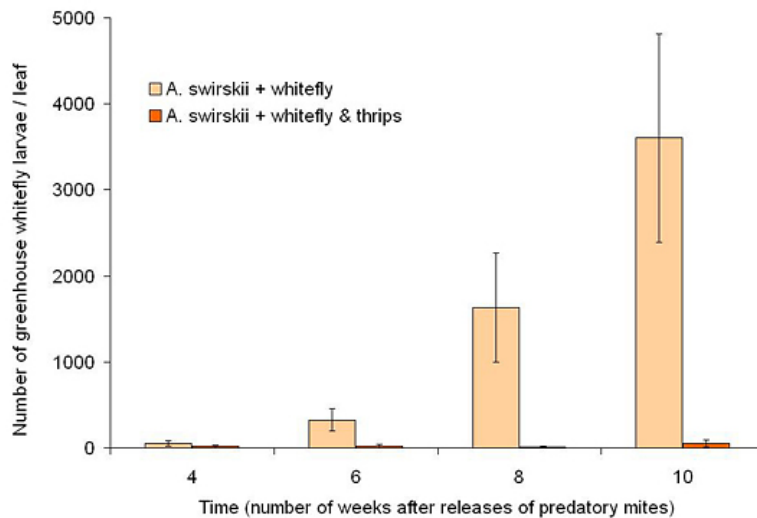
### Is there a preference?

In a greenhouse situation, it is not unusual for several infestations to be present at the same time. A polyphagous predator like *A. swirskii* can therefore choose from various food sources such as thrips larvae, eggs and the larvae of whitefly, spider mite and pollen from the plant. You may wonder whether this is a disadvantage in combating a particular infestation. Does *A. swirskii* have a clear preference for a particular infestation or source of food?

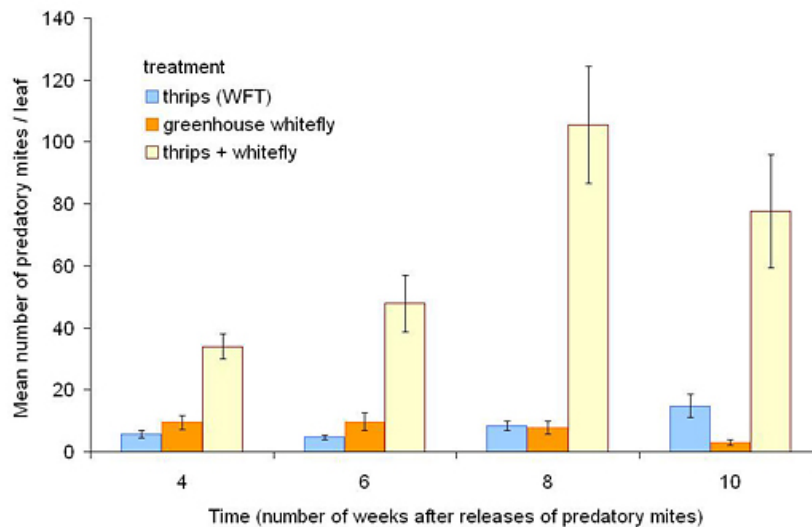
Experiments carried out at the Universiteit van Amsterdam showed that whitefly was controlled better when pollen was also available than when only whitefly was present. Greenhouse trials by Applied Plant Research demonstrated a similar principle. The control of glasshouse whitefly was better when

both thrips and glasshouse whitefly were present than when only glasshouse whitefly was present (see figure 1). The control of thrips was equally good in both cases. A varied menu does not therefore lead to a certain type of prey being ignored. Instead, it results in much stronger growth in the population and thus in better control of the pests present (see figure 2).

**Figure 1.** Development of *A. swirskii* in the presence of thrips, glasshouse whitefly or a combination of the two over a period of 10 weeks after the release of the predatory mites.



**Figure 2.** Development of glasshouse whitefly in a cucumber crop with *A. swirskii* in a situation with only glasshouse whitefly or a situation with both glasshouse whitefly and thrips.



Development of glasshouse whitefly in a cucumber crop *A. swirskii* in a situation with only glasshouse whitefly or a situation with both glasshouse whitefly and thrips.

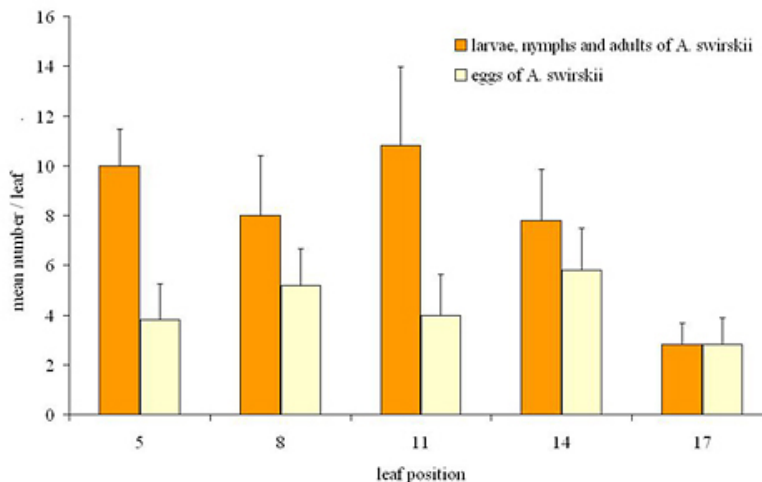
## Search behaviour and distribution

For a predatory mite, a plant is a gigantic living environment. If sufficient food is available, such as pollen, thrips larvae/eggs and whitefly larvae, the predatory will tend not to leave the plant. A population of *Amblyseius swirskii* can grow very quickly if there is enough food. Research by Applied Plant Research in cucumber crops showed that if thrips was present, a population of *A. swirskii* grew from 10 to on average 600 predatory mites per plant over a period of three weeks.

If the density of predatory mites grows, a shortage of food will be reached more quickly. In that case, the female predatory mites in particular go elsewhere, looking for new plants or parts of the same plant in order to lay eggs and begin a new colony.

In sweet pepper and aubergine crops, *A. swirskii* is mainly found in the upper levels of the crop. In the other crops that have been researched to date, *A. swirskii* is found throughout the plant (both at lower and higher levels of the crop). An experiment in cucumber crops showed that the distribution through the plant is very even (see figure 1).

**Figure 1** Distribution of *A. swirskii* in a cucumber plant affected by thrips.



Predatory mites cannot fly and their mobility is therefore limited. For *A. swirskii*, dispersal generally takes place within a crop row rather than between rows. The predatory mites can disperse themselves via leaves that are connected to each other, or via wires in the crop. Trials carried out by Applied Plant Research showed that predatory mites moved 10m from a ricinus plant into a sweet pepper crop in three weeks. The predatory mites can therefore move around a crop row reasonably quickly. In spite of this, the recommendation is to distribute the mites well when releasing them.

Some parts of the plants themselves appear to be avoided, whereas mites can be found much more readily in certain other spots. It appears that mites avoid greasy spots caused by honeydew from whitefly. *A. swirskii* is also generally not found in patches of more severe spider mite infestation where the spider mites have spun webs. It is however noteworthy that *A. swirskii* is often found in patches of rose powdery mildew.

### Side effects of pesticides on *Amblyseius swirskii*

When introducing a new natural enemy, knowledge about the additional effects of natural enemies is initially very limited. It is important to build up this knowledge quickly and carefully. This takes place in various ways: through dedicated (laboratory) research, observations in field trials and the evaluation of experiences in practice. Naturally, for the grower, the side effects in practice are the most important thing to know about. These effects are described by means of an estimate of the effect that occurs when the natural enemy comes into contact with the agent concerned. A category classification has been agreed within the IOBC (International Organisation for Biological and Integrated Control) regarding mortality (and/or the reduction in capacity, i.e. the effect on the control capacity) as a consequence of the use of chemical agents (see table 1).

**Table 1:** Categories

symbol/category	reduction in control capacity
<b>1</b> Harmless	< 25 %
<b>2</b> Slightly harmful	25 - 50 %
<b>3</b> Moderately harmful	50 - 75 %
<b>4</b> Very harmful	> 75 %
<b>?</b> Effect unknown	

Alongside this effect, the persistence is also of importance: an estimate of the length of time that the agent still impacts on the natural enemy after application. For natural enemies, this period is generally expressed in weeks after the most recent application of the agent.

It is important to see the information on side effects as a guideline and not as an absolute value that is identical in every situation. The season, the crop, the growth, the climate, the dosage used and the application technique all play a role in the end effect. Furthermore, a chemical application just after the introduction of natural enemies generally has more of a negative effect than when used on an established population of natural enemies. If no alternative food (such as pollen) is available, the application of agents that destroy the predatory mites' prey will lead to the considerable reduction of the population of predatory mites.

**Table 2:** Currently known side effects of agents on *A. swirskii*

<b>Side effects of pesticides on <i>Amblyseius swirskii</i></b>				
Trade name	Active ingredient	Egg	Adult	Persistence (in weeks)
<b>Insecticides</b>				
VERTIMEC	abamectine	4	4	?
NEEM-AZAL	azadirachtin		8-9	?
diversen	Bacillus thuringiensis var. kurstaki		1	0
FLORAMITE	bifenazate	1	1	0
APPLAUD	buprofezin		2-3	?
TORQUE	fenbutatin oxide	1	1	0
ADMIRE	imidacloprid	2-3	2-3	?
ADMIRE	imidacloprid - drench		1	0
MATCH	lufenuron	1	1	0
RUNNER	methoxyfenozide	1	1	0
MILBEKNOCK	milbemectine	2-3	4	?
ULTRAFINE	mineral oil		8-9	?
PRIMOR	pirimicarb		1	0
SAVONA	potassium salts of fatty acids		8-9	0
PLENUM	pymetrozine	1	1	0
ASEPTACAREX	pyridaben	4	8-9	?
ADMIRAL	pyriproxyfen		2-3	?
TRACER	spinosad	4	4	?
OBERON	spiromesifen	1	1	0
NOMOLT	teflubenzuron	1	1	0
CALYPSO	tiachloprid	1	1	0
ACTARA 25 WG	thiamethoxam	1	1	0
MYCOTAL	Verticillium lecanii	1	1	0
<b>Fungicides</b>				
ORTIVA	azoxystrobine	1	1	0
BAYCOR	bitertanol		1	0
COLLIS	boscalid + krexoxim-methyl	1	1	0
NIMROD	bupirimate		1	0
RUBIGAN	fenarimol		1	0
FUNGAFLOX	imazalil		1	0
EUPAREEN-M	tolylfluamide	1	1	0
ROCKET	triflumizole	1	1	0
Various	sulphur - evaporation		1	0

New data from research and practice becomes available on a regular basis. The current information on the side effects of chemical agents on *A. swirskii* can be found at [www.koppert.com](http://www.koppert.com)

This table contains information about the side effects of pesticides. The information should be regarded as a guideline. Always read the label before use.

If in doubt about any of the information, it is advisable to contact your crop advisor or a Koppert Consultant before applying the product in question. Only use chemicals registered for application.