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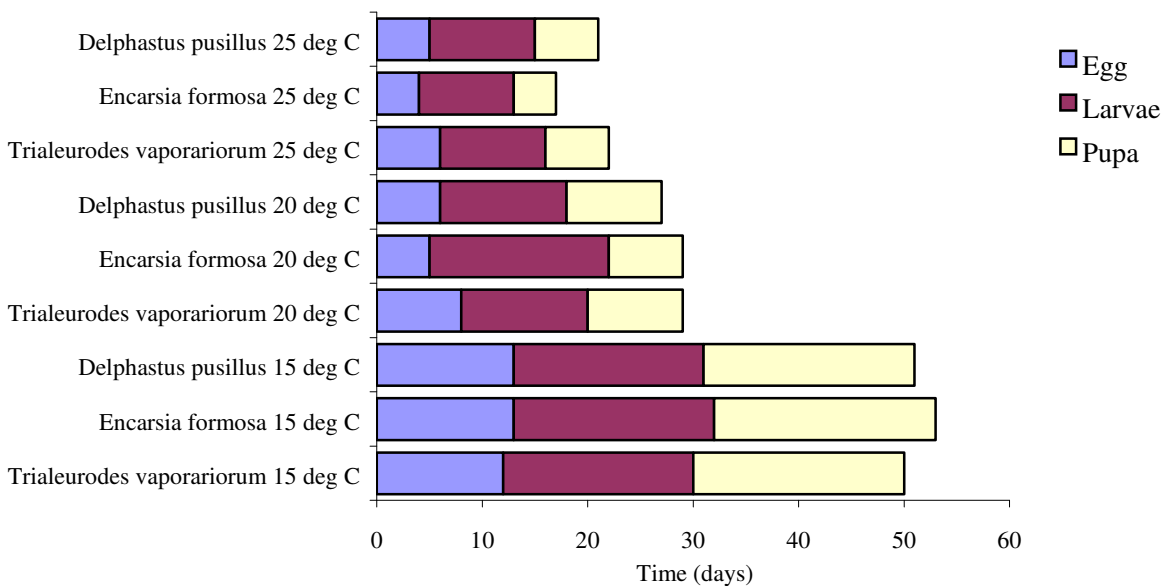
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## Information

### Biological Control - WHITEFLY

Glasshouse whitefly (*Trialeurodes vaporariorum*) is a familiar pest, attacking a wide range of greenhouse crops. They feed on the plant sap reducing plant vigour and cause "sooty moulds" which reduce the plants' photosynthetic ability and can affect the quality of fruit and flowers.

#### PEST AND PREDATOR LIFE CYCLES



#### LIFE CYCLE OF WHITEFLY

Adults feed on the growing shoots of plants and lay their eggs on the young leaves. The eggs hatch into larvae, which feed on the plant sap and develop through four stages as the leaf gets older until pupae are formed. These are also attached to the underside of the leaf on which the original eggs were laid. The development time is dependent upon the leaf temperature and the food quality of the plant. During the development from egg to pupa, the larva excretes sticky "honeydew" onto leaves and fruit below, on which sooty moulds develop. The adult whiteflies emerge from the pupae on the lower leaves but then fly to younger leaves to lay their eggs.

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## BIOLOGICAL CONTROL

The control of whiteflies with the parasitic wasp *Encarsia formosa* has been the most widely used biological control system in horticulture. It is used in most tomato and cucumber crops, and increasingly in ornamentals where whiteflies are resistant to many pesticides. *Encarsia* are introduced as black parasitised whitefly pupae, from which the adult female wasps emerge. *Encarsia* lay their eggs in the developing whitefly larvae, resulting in the parasitised pupae appearing in the crop. Adult *Encarsia* emerge from these black pupae and seek young whitefly larvae in which to lay their eggs. It is essential that whitefly introductions are started as soon as whitefly are present in the crop, which might mean starting prior to whitefly being found, i.e. as prevention.

The latest system of combining *Encarsia* and *Eretmocerus* has produced higher numbers of infected black scale. *Eretmocerus* are also parasitic wasps which attack whitefly larvae. They deposit an egg adjacent to the scale which hatches and burrows its way into the larvae. Infested scale turn yellow. *Eretmocerus* are very useful during periods of high temperature/low humidity when the *Encarsia* start to become adversely affected. They also host feed which can significantly reduce whitefly populations. It is also important to use adequate numbers of parasites over a long period of time, at least eight weeks.

*Amblyseius swirskii* is a predatory mite that feeds on a range of pests including the eggs and larvae of whitefly (both *Trialeurodes vaporariorum* and *Bemisia tabaci*). The critical relative humidity (RH) required is around 70% and the optimum temperature for *A. swirskii* is between 25 and 28°C. 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 (hibernation) 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) but it becomes inactive below 15°C.

*Macrolophus caliginosus* is a predatory bug that also attacks whiteflies. Although this bug prefers to feed on whitefly, virtually any insect or mite is suitable prey. *Macrolophus* can feed on plant sap, but egg-laying and sustained population growth only occurs when feeding on prey. Until other crops have been tested *Macrolophus* should only be used on tomatoes. Severe economic damage can occur on some other crops such as aubergine and gerbera.

### Products

The *Encarsia* and *Eretmocerus* pupae are stuck onto the cards in a channel that offers excellent protection during transit.

*Amblyseius* are supplied in sachets or bottles to shake over the crop.

*Macrolophus* is supplied as adults in units of 250 or 500.

### Introduction rates

Predator	Preventative	Curative – light	Curative - heavy
<i>Encarsia</i>	1.5/m <sup>2</sup>	3/m <sup>2</sup>	9/m <sup>2</sup>
<i>Eretmocerus</i>	1.5/m <sup>2</sup>	3/m <sup>2</sup>	9/m <sup>2</sup>
<i>Amblyseius swirskii</i>	2.5/m <sup>2</sup>	2.5/m <sup>2</sup>	1/m <sup>2</sup>
<i>Macrolophus</i>	0.5/m <sup>2</sup>	0.5/m <sup>2</sup>	5/m <sup>2</sup>

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