

# Hypoaspis

## Fungus gnat predator

### Biocontrol organism

#### ☞ *Stratiolaelaps (Hypoaspis) nr miles*

Hypoaspis is a soil-dwelling predatory mite, feeding on fungus gnat larvae, thrips pupae, springtails and other small insects that inhabit the soil. Adult hypoaspis are between 0.5 mm

and 1 mm long, with females larger and much more common than males. Adult females are light brown in colour.

The life cycle of hypoaspis consists of egg, larva (6 legs), nymph (8 legs) and adult. The whole life cycle takes about 10 days at 25°C but can vary from 7 to 30 days depending on temperature. At

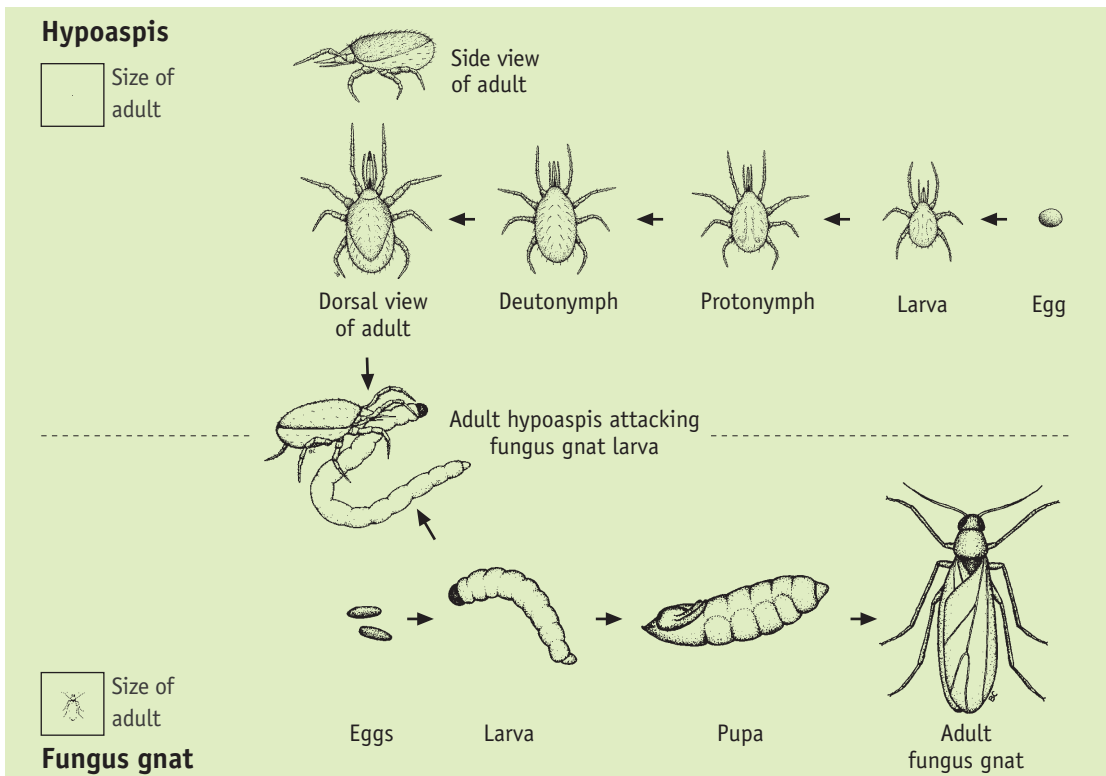


Figure 4: Life cycles of hypoaspis and fungus gnat



Plate 16: Hypoaspis adult from the side

temperatures below 12°C hypoaspis is inactive, but it will not die unless frozen. Eggs are laid in the soil and hatch into larvae in 1–3 days.

Hypoaspis lives in the top 1–2 cm of soil and can be seen moving quickly on top of the soil when the surface is disturbed or pots are tapped. It can survive for up to 7 weeks without insect prey, by feeding on organic matter, plant debris and nematodes.

## Target pests

☞ **Fungus gnats** *Bradysia* spp.

☞ **Western flower thrips** *Frankliniella occidentalis*

Adult fungus gnats are small black flies and cause no direct damage. They are poor flyers, and stay near the soil surface unless disturbed. The larvae of fungus gnats are maggot-like in appearance, almost transparent, with a small black head. They mainly inhabit the top layer of soil close to the crowns of plants, and feed on fungi, root hairs, soft plant tissue and other organic matter at or below ground level. They often tunnel into cuttings and seedlings. As well as the direct injury that the fungus gnat larvae cause to plants, root rot diseases such as phytophthora and pythium often invade feeding sites, causing plants to die or lose vigour. Fungal spores are also carried by



Plate 17: Hypoaspis adult from above, showing distinctive 'V' on back

adult flies and deposited at new sites, increasing the spread of disease.

Hypoaspis feeds on the early larval stages of fungus gnats. They are most effective when applied before the pest population becomes established or when it is at a low density. Adult mites consume between one and five prey per day.

Hypoaspis can also aid in thrips control by feeding on the thrips pupae in the soil, but cannot be relied on for total control. Pot trials in the UK and Canada have shown up to 30% reduction in thrips populations.

Shoreflies can often be confused with fungus gnats. The adult shorefly has red eyes and short antennae; the larva is similar to that of the fungus gnat but does not have a black head. The larvae normally feed on algae in waterlogged areas but have also been implicated in the spread of plant root pathogens.

## Suitable crops/environments

Hypoaspis will establish in most greenhouse conditions and most growing media, including potting mixes, soil, rock wool and perlite. It will not tolerate flooding or waterlogged areas, but is not harmed by regular watering provided the medium has good air porosity. Dry, sandy soils

with little organic matter are not suitable. Optimum soil temperatures for development are between 20°C and 30°C. Soil temperatures consistently over 30°C are harmful, but these conditions are unusual at soil level due to watering and shade from foliage.

## Before release

Best results are achieved by releasing hypoaspis when pest populations are at a low level. Monitor gnat levels with yellow sticky traps and release the predator preventively as soon as gnats are detected. Areas of greater infestation must be identified for more concentrated treatment or possible modification of the growing



Plate 18: Fungus gnat adult



Plate 19: Fungus gnat larva

environment. Some pesticides are harmful to hypoaspis, particularly if applied to the soil. Discuss your chemical usage with the supplier before releasing the predator.

## At release

Predators are packaged in a pasteurised peat and vermiculite mix for commercial use. They are usually sold in containers of 15 000 mites at all life stages. The presence of mites can easily be checked on arrival by disturbing the mix; the mites should be seen moving across the surface. However, if the temperature is low they will be inactive. In warmer conditions the top of the mixture may dry out slightly during shipment; the mites will then congregate toward the bottom of the container, or around moist clumps of media. Hypoaspis should be released as soon as possible on receipt and not stored below 10°C or above 25°C. They can be held at room temperature for 1–2 days, although this not recommended.

## Recommended release rates

**Preventive treatment:** 15 000 per 100–150 m<sup>2</sup> of bedding, or 15 000 per 200–300 150-mm pots. Treatment of the greenhouse floor is recommended if soil is conducive to fungus gnat development. Occasional treatment of the perimeter of greenhouses has proved effective. For propagation areas, very early treatment is critical for successful control.

**Curative treatment:** Where fungus gnats are well established and curative treatment is required, the release rates given above should be doubled. Even distribution will give best results, so where possible treat all areas. Predators will move quite well over the soil. If pots are touching and pest levels are low, distribution is not as critical. Apply early at full rates and allow time for predators to spread. Do not mix hypoaspis with the potting medium before potting,

because they live mainly in the top 1–2 cm of soil and may not survive below that depth.

## After release

After release, monitor hypoaspis as well as pest numbers. Hypoaspis can be hard to find. A reduction of adult fungus gnat numbers should be apparent in 2–3 weeks. Identify any hot spots of pest activity, as these may require retreatment or spot treatment. Re-release hypoaspis if necessary.

## Cultural practices to aid hypoaspis establishment

Make sure that the medium being used is suitable for hypoaspis. It should preferably have good air porosity, have some organic content and not be waterlogged. Hypoaspis prefers soil temperatures

between 20°C and 30°C, so for best results maintain temperatures within this range. Use a clean, sterile potting medium when planting. Otherwise it is possible that the potting medium may already be infested before being used for planting. Maintain floors and outsides of greenhouses in a well-drained and weed-free condition.

## Chemical use

Hypoaspis is compatible with insect parasitic nematodes such as *Steinernema feltiae*, which can also be used for fungus gnat control. Soil-dwelling predators are less susceptible than above-ground parasites and predators to many chemical treatments. However some, particularly pyrethroids, are toxic — especially if applied at high volumes or as soil drenches. Discuss any intended chemical use with your supplier before releasing predators.