Factsheet 06/10

Protected Crops

Project No. PC 239, 239a & 261

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Grower system for rearing the predatory beetle *Atheta coriaria*

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This factsheet provides grower guidelines for rearing the predatory beetle *Atheta coriaria* on the nursery for reduced cost biological control of sciarid and shore flies, and for potential contribution to western flower thrips (WFT) control. The factsheet refers to results in HDC projects PC 239, PC 239a and PC 261.

Action points

- Learn to recognise the adults and larvae of both sciarid and shore flies.
- Monitor fly populations by using sticky traps for adults and by checking plants, compost, bench and floor coverings for both adults and larvae.
- Practice good nursery hygiene and avoid overwatering to minimise breeding areas for both fly species.
- Consider covering crops that are highly susceptible to fly infestation (such as potted herbs) with horticultural fleece during the early production stage. This can reduce fly egg laying on the growing media.
- If shore flies are still a problem on the nursery, consider using *Atheta* (Figure 1), as there are currently no other biological or chemical control options. If there is a history of large numbers of shore flies on the nursery, consider rearing *Atheta* so that cost-effective high release rates can be made.
- Review any biological control strategies currently being used against sciarid flies on the nursery and consider whether rearing your own *Atheta* might be of benefit in giving improved, cost-effective control.
- If trying the *Atheta* rearing system, use it on a small scale first, such as in a propagation house. Monitor any results carefully before considering using the system on a larger scale. *Atheta* may contribute to biological control of western flower thrips as well as to that of sciarid and shore flies.

1 *Atheta coriaria* adult © Nigel Cattlin / FLPA

Background

Sciarid and shore flies are common pests and contaminants respectively on many protected edible and ornamental crops. Sciarid fly larvae can cause crop losses by damaging roots. Shore fly adults can cause marketing problems in herbs, potted ornamentals, celery and lettuce due to the presence of flies or their droppings on the marketed plants, pots or sleeves. Although entomopathogenic nematodes (e.g. *Steinernema feltiae*) and predatory mites (*Hypoaspis* spp.) are available for sciarid fly control, they are expensive and do not always give reliable control. Neither of these biological control agents give effective control of shore flies.

The native ground-dwelling predatory beetle *Atheta coriaria* is commercially available for biological control of both sciarid and shore flies. The beetle eats fly life stages that live in the growing medium or on bench or floor coverings i.e. eggs, larvae and pupae. *Atheta* are not widely used as direct releases by growers have given variable results and the high release rates needed in heavy pest infestations are expensive. Work in HDC projects PC 239 and PC 239a developed a 'DIY' *Atheta* rearing system that growers can use on their own nurseries for low-cost control of sciarid and shore flies on protected herbs, ornamentals and celery. Project PC 261 tested the system for control of western flower thrips (WFT) on protected bedding plants.

Atheta life cycle

The adult beetles are small (3-4 mm long), dark brown and shiny, with an upturned abdomen (Figure 1). They are very active and can both crawl and fly. Females lay their eggs between soil particles and the eggs hatch into the first stage larvae, which are small and milky white (Figure 2). There are three larval stages, which become slightly darker and longer as they grow. The final, third stage larvae are brownish yellow and about 3-4 mm long (Figure 3). All larval stages are predatory and can run rapidly but cannot fly. When fully fed, the third stage larvae build pupation chambers out of soil or compost particles held together with strands of silk. Pupal chambers are not visible in compost. Pupae develop inside these chambers and do not feed or move until they emerge as new adults.

2 Young *Atheta coriaria* larva with white body segments © ADAS

3 Older *Atheta coriaria* larva with brown body segments © Nigel Cattlin

4 Sciarid fly larvae live in compost © ADAS

Pests eaten by *Atheta*

Atheta coriaria feeds on various insect eggs, larvae and pupae, particularly those of flies and beetles. The predator has been tested against various pests and is known to eat the ground-dwelling life stages of sciarid fly (Figure 4), shore fly (Figure 5), western flower thrips (WFT, Figure 6), cabbage root fly (Figure 7) and carrot fly.

Atheta release rates needed

Atheta is supplied as adults or mixed life stages (adults, eggs, larvae and pupae) in tubs of substrate. The suppliers recommend sprinkling the beetles together with the substrate carrier onto the growing media or bench and floor coverings for control of sciarid and shore flies (Figure 8).

As with other predators, release rates needed will depend on the pest density in the glasshouse and other factors such as time of year, temperatures, crop production time and the level of control required. For example, supermarket 'zero tolerance' of sciarid or shore flies on pot herbs means that high levels of control are needed during the short 5-week production time. Some other crops such as poinsettia are highly susceptible to damage by sciarid fly larvae and thus good control of the pest is needed on the young plants.

Growers of ornamentals and herbs have experienced variable results after releasing *Atheta* at the rates recommended by suppliers (up to 10 per m^2) for control of sciarid and shore flies. Our research results showed that much higher release rates may be needed. Sciarid fly females can lay up to 200 eggs each in their lifetime (Figure 9) and shore fly females can lay up to 300 each. On potted parsley infested with relatively low numbers of sciarid fly eggs (five eggs per pot), five *Atheta* per pot were needed to give 85% control of the pest over the 5-week production period. This rate is equivalent to 500 *Atheta* per m^2, which would be too expensive, if the predators are bought from a commercial supplier. Rearing the predators on the nursery offers growers a low-cost method for using high release rates and for maintaining an *Atheta* population on the nursery.

5 Shore fly larva feeding on algae © ADAS

6 WFT pupa © Nigel Cattlin / FLPA

7 *Atheta coriaria* is a good predator of fly larvae, shown here eating a cabbage root fly larva © Nigel Cattlin

8 Releasing *Atheta* from a commercial pack © Syngenta Bioline

9 Sciarid fly eggs are laid in clumps, on or just under the growing medium © ADAS

Setting up *Atheta* rearing units

In small glasshouses e.g. propagation houses, growers could rear *Atheta* in sealed containers and then make direct releases, as when using commercially supplied predators. In larger glasshouses it could be less time-consuming to let the beetles disperse from rearing containers of their own accord. Two methods are described below: one for rearing large numbers of *Atheta* in sealed boxes and; one for converting the boxes to 'rearing-release units' for use in the crops.

NB- These methods were designed for research experiments. Scaling up for large-scale use on commercial nurseries was not tested in the research projects.

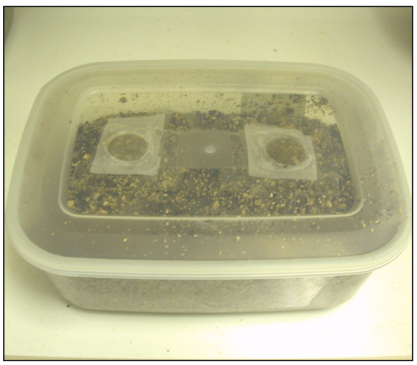
Rearing *Atheta* in sealed boxes

Materials

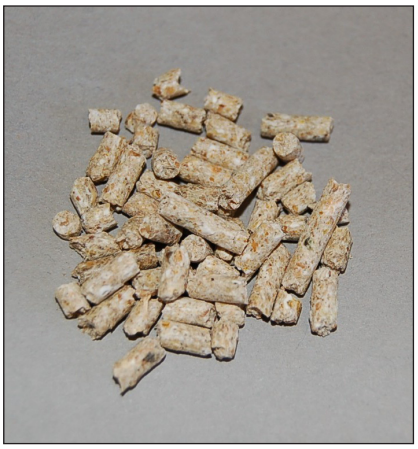
- Fresh pack(s) of *Atheta* from a commercial supplier
- Plastic boxes with snap-on lids such as 3-litre plastic food containers, available from most supermarkets.
- Insect-proof mesh or fine net curtain material
- PVA glue or sticky tape
- Compost (coir compost was used in this project)
- Vermiculite
- Turkey grower pellets, available from local animal feed suppliers. Dodson & Horrell pellets were used in these projects.
- Constant temperature environment at 25°C

Methods

- Wash the plastic boxes and lids in hot soapy water and rinse with plain water, as new plastic containers can be toxic to insects and used containers can introduce harmful contaminants.
- Make two ventilation holes (2.5 cm diameter) on the snap-on lids, e.g. by using a hole saw (widely available from DIY outlets).
- The ventilation holes should be covered with insect-proof mesh using PVA glue or sticky tape (Figure 10). This is to keep the beetles in and to keep unwanted insects and mites out.
- The rearing substrate (1:1 mix of coir and vermiculite) should be added to each box. Add 1.5 litres substrate to each 3-litre box. Dampen the rearing substrate with approximately 150 ml of water per litre of substrate to achieve approximately 75% moisture content before use.
- Similar numbers of *Atheta* should be added to each box. For research purposes, boxes with equal numbers of *Atheta* were needed so we added 60 adults to each box using a 'pooter' which allows collection of insects into a tube. A simpler method for growers would be to take a commercial tub of *Atheta* e.g. one containing 500 mixed life stages or adults, and after rotating the tub gently to distribute the beetles, to divide the substrate between eight rearing boxes. However, this method is less accurate and will give more variable production rate per box over time.
- Turkey grower pellets should be added to each box every week. Pellets are best ground up in a food processor, to allow better incorporation into the rearing substrate (Figures 11 and 12). *Atheta* was initially reared on ready ground 'turkey starter crumbs' but these are no longer available. When boxes are set up with 60 'starter' beetles per box, a feeding regime of 5g of turkey feed in week 1 and 15g per week thereafter gave the best production rate.
- The food source should be sprinkled onto the top of the rearing substrate and then fully incorporated by rotating the box two or three times through 360°(Figure 13). This avoids the problem of moulds growing on the food source if food is left exposed on the surface.
- Dampness of the substrate should be checked twice in the first week and weekly thereafter, when adding the food source. With experience this can be done by 'feel'. The substrate should be kept damp and crumbly but not too wet and compacted, and not too dry. Water can be added using a hand-held plant mister. The water should be mixed into the substrate by rotating the box together with the feed.
- The boxes should be kept at a constant temperature of 25°C; using a 16:8 light:dark photoperiod, although *Atheta* can also be kept in constant darkness. After four weeks at 25°C, the original *Atheta* adults will have completed a single generation and should have multiplied by about x 40. Thus a box started off with 60 adults should have produced about 2,400 beetles of mixed life stages.
- After four weeks, *Atheta* can be distributed in the glasshouse together with the substrate, or the boxes can be converted to 'rearing-release units'. One or more boxes of beetles (containing known estimated numbers) can be retained to set up fresh rearing boxes.
- After the initial 4-week breeding period, the boxes can be kept in the rearing area for up to six more weeks but they will continue to breed and become overcrowded. Surplus boxes could be kept at a lower temperature (15-20°C) which will slow down their development rate until they are needed.



10 *Atheta* rearing box with screened ventilation holes in lid © ADAS



11 Turkey pellets before grinding © ADAS

12 Turkey pellets after grinding in food processor © ADAS

13 Rotating rearing box to mix in food source and water © ADAS

Amending the ADAS method

The method described above is used by ADAS for rearing *Atheta* for experiments. Growers may wish to amend the materials or methods but this may affect the breeding rate and survival of the predators. For example:

• Other growing media can be used for rearing instead of coir. *Atheta* was successfully reared in peat-based compost. Results indicated that *Atheta* multiplication rate was comparable to that in the 'standard' coir and vermiculite mix, when rearing boxes were kept in a glasshouse during the summer. However, *Atheta* multiplied better in the coir mix than in the peat-based compost when kept in a cooler glasshouse in early spring. This was probably due to the peat-based compost being heavier, more compact and thus cooler than the more open coir and vermiculite mix.

• *Atheta* can be reared in a glasshouse with lower or fluctuating temperatures rather than in a controlled temperature room at the optimal 25°C. However, substrate temperatures should remain within the temperature range for *Atheta* development (15-32°C). At lower temperatures, development rate is slower and multiplication rate is lower than at higher temperatures, e.g. at 15°C, it will take at least six weeks for the beetles to complete a generation.

• Other food sources can be used to rear *Atheta*. The original method developed in Canada used trout-rearing pellets. We compared these with other animal feeds in project PC 239. *Atheta* multiplied as well on turkey grower pellets or turkey starter crumbs as on trout pellets. *Atheta* did not multiply as well on lamb finishing pellets. Both turkey feeds were preferable to trout pellets as they were much cheaper and did not have the unpleasant fishy smell or high oil content. *Atheta* multiplication rates on other animal feeds was not quantified.

Avoiding potential problems

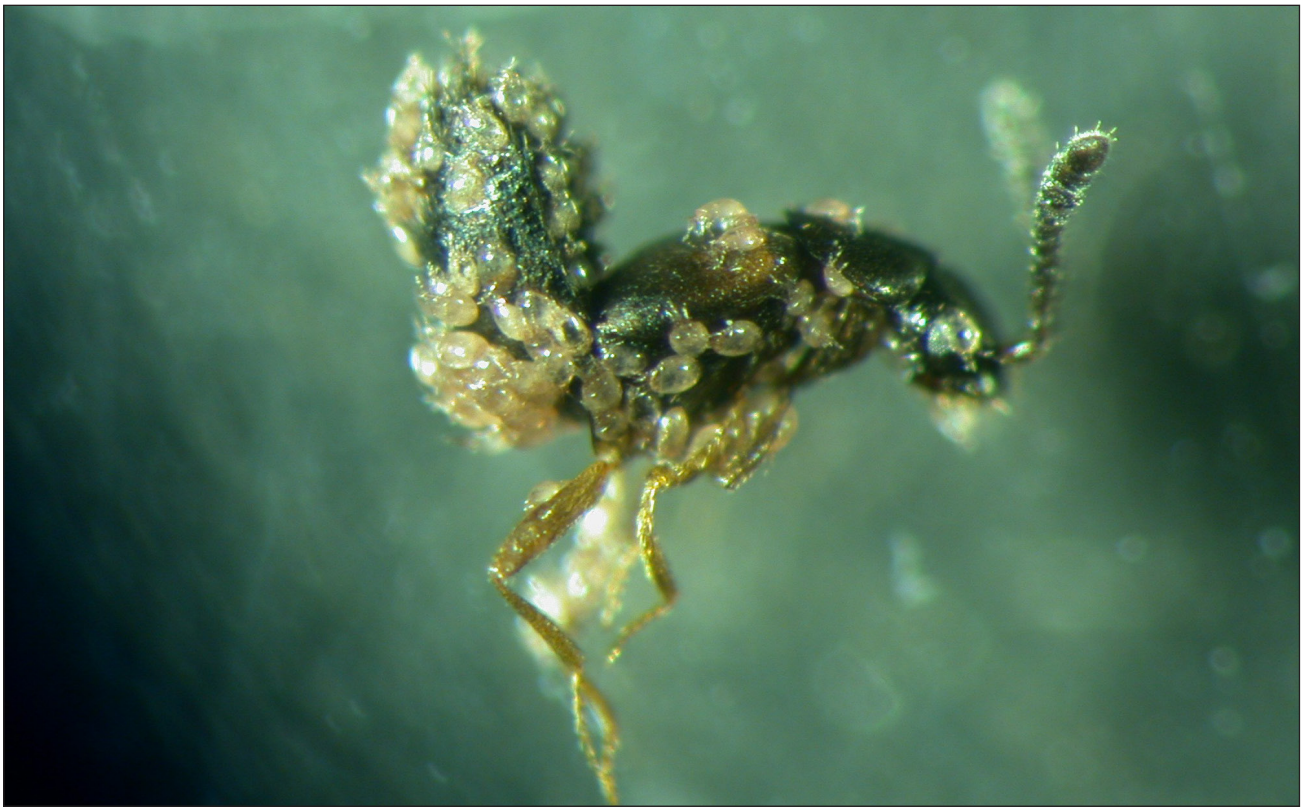
• Always use fresh, healthy *Atheta* to start off each batch of rearing boxes. If in doubt, obtain fresh supplies from a commercial supplier rather than retain 'starter' beetles from your own cultures.

• Maintaining the correct dampness of the rearing substrate is critical. If too dry, *Atheta* eggs will die and pupae may not emerge as adults. If too wet, the food source will go mouldy and other potential contaminants can thrive. For example, small mites can occasionally infest the beetles, more so in wet conditions, where they can build up to such high numbers that they will impair beetle movement and breeding (Figure 14). If these mites are seen, the cultures should be disposed of and fresh *Atheta* supplies bought from commercial producers to start new cultures in clean boxes. An easy way of dealing with unwanted cultures is to put the boxes in a freezer for a few days and then disposing of the contents.

• Always mix the food source into the rearing substrate to avoid fungal contamination.

• Adding the right amount of food is critical. Adding too little will lead to poor breeding rates and cannibalism of eggs and larvae, but adding too much will lead to excess food going mouldy. The amount of feed given to known numbers of *Atheta* in the method described above was determined by careful research aimed at optimising the breeding rate. This feeding regime would need to be amended for boxes started with different numbers of beetles.

• Shade boxes from direct sunlight (e.g cover lids with foil) if *Atheta* is being reared in a glasshouse, otherwise beetles may suffer from overheating and algae will grow on the substrate surface.



14 A potential problem: *Atheta* adult infested with mites © ADAS

‘Rearing-release units’

Converting rearing boxes to rearing-release units

Boxes can be converted to ‘rearing-release units’ for use in the crop, once *Atheta* have completed a generation in the sealed rearing box (four weeks at a constant 25°C; longer at cooler temperatures). This method was used in experiments, in both research and commercial glasshouses. Scaling up the system for large-scale use by growers was not tested in the research projects.

Rearing boxes should be taken into the glasshouse and the insect screening removed from the ventilation holes in the lids. Box lids should be shaded with foil and holes made in the foil above the ventilation holes. This allows the beetles to leave the boxes of their own accord and disperse in the glasshouse (Figure 15).

15 Rearing-release box in parsley © ADAS

Maintenance of rearing-release boxes

The aim of using a rearing-release system is to give quick and sustained releases of *Atheta,* for as long as possible, with minimal time input. *Atheta* needs feeding and the rearing substrate needs to be kept damp so that *Atheta* remaining in the boxes keep breeding and dispersing over several weeks.

Keeping the substrate damp: Several simple methods for keeping the rearing substrate damp in different commercial crops and irrigation systems were tested:

• For potted ornamental crops stood on capillary matting using sub-irrigation: Rearing-release boxes can be adapted so that the substrate takes up water from the matting in the same way as that in the potted plants. Four holes were drilled (7mm diameter) in the base of each box and plugged with wet cotton wool. The cotton wool acted as a wick to draw up moisture from the damp matting on which the boxes were stood. The same system (without the cotton wool plugs) could be used used in potted ornamentals or herbs grown on conventional ebb and flood benches.

• In soil-grown crops such as celery and lettuce, the above method can be used, but care should be taken not to allow the substrate to get too wet from additional overhead watering.

• In pot herbs grown in gutters and watered with an ebb and flood system, the rearing-release boxes were fitted with a hole in the base to accommodate an empty pot the same size as those used for the herbs. The pot was pushed through the hole in the base of the rearing-release box so that the rim of the pot was flush with the base of the box. The pot and box was filled with the rearing substrate and the box was placed on the gutter, with the pot in the base of the box fitted into one of the holes in the gutter. This allowed water to be taken up by the rearing substrate during the herb production period.

• In crops of bedding plants grown in trays stood on the floor on ground-cover matting, overhead watering, during crop irrigation, can be used.

Feeding the boxes: Different feeding strategies for rearing-release boxes containing about 2,000 *Atheta* each were tested. The best feeding regime for both quick and sustained release of *Atheta* is described below:

• Do not feed the beetles the week before introducing them into the glasshouse (when the sealed boxes are still in the ‘production’ controlled temperature room). This leads to a flush of beetles leaving the release boxes in this first week in the glasshouse, after the insect screening is removed.

• *Atheta* in rearing-release boxes should be fed with 5g of turkey feed one week after introducing them into the glasshouse and every week thereafter. In research, this feeding regime led to over 2,000 *Atheta* being released from each box over a 6-week period, and at least 1,000 beetles being left inside boxes, to keep breeding.

• Feeding each box with 5g of turkey feed every two weeks instead of every week leads to similar numbers of *Atheta* being released from each box over a 6-week period, but less beetles will be left inside the box to keep breeding. Therefore, feeding every two weeks may not sustain beetle release for as long a period as feeding every week.

• Releasing *Atheta* from the boxes was only tested for a 6-week period in research. Release over a longer period, or from boxes containing different ‘starter’ numbers of beetles to the ones tested would need further evaluation.

Numbers of rearing-release units needed in the glasshouse

No firm recommendations can be given for numbers of rearing-release units required per unit area of glasshouse, as this will depend on many factors including density of the target pest, numbers of *Atheta* in each rearing unit, crop production time, temperatures and level of control required. Two examples of research results are given below:

• In project PC 239, one rearing-release box per 5m^2 was used in a commercial crop of potted parsley in a glasshouse heavily infested with sciarid flies. There was a mean of 860 *Atheta* per box at the start of the experiment. At the end of the 4-week production period, numbers of sciarid flies were 59% lower than where the nematodes *Steinernema feltiae* and *Hypoaspis miles* were used for control.

• In project PC 261, one rearing-release box per 16m^2 was used in a crop of potted Impatiens grown in a research glasshouse heavily infested with WFT. There was a mean of 1140 *Atheta* per box at the start of the experiment. At the end of the 6-week experiment, numbers of WFT were 82% lower than in the untreated control glasshouse.

Grower experience with *Atheta* rearing units

The *Atheta* rearing or rearing-release system was not fully validated on a large scale on commercial nurseries. However, several growers of protected ornamentals and herbs have experimented with their own *Atheta* rearing or rearing-release systems and report reductions in numbers of both sciarid and shore flies. One grower of herbs and ornamentals reported excellent control of previously high populations of sciarid flies in a propagation house, when *Atheta* were reared in sealed boxes and then distributed around the glasshouse on repeated occasions over several months. Two growers of ornamental bedding and pot plants have reported reductions in numbers of shore flies where *Atheta* rearing-release units have been maintained in the glasshouses between early spring and autumn.

16 *Atheta* 'bait pot' sunk in soil in lettuce crop © STC

Strategy for using *Atheta* reared on the nursery

It is likely that in high sciarid or shore fly densities, the most practical strategy for using *Atheta* would be to use direct releases of high numbers to reduce the pest population at the start of the crop. Such high release rates would only be cost-effective if *Atheta* were reared on the nursery. Once the resident pest population in the glasshouse has been reduced, it may then be possible to maintain control by using direct releases of lower numbers of *Atheta* or by using a rearing-release system.

Monitoring for *Atheta* in the glasshouse

It can be difficult to see *Atheta* in the crop because although they sometimes can be found on the surface of compost or soil, they prefer to live within the growing medium. When present in high numbers in pot-grown crops, *Atheta* can often be seen underneath the pots, particularly if stood on damp capillary matting. *Atheta* adults will fly, particularly in warm temperatures and can sometimes be seen in flight or on sticky traps, but they are not attracted to blue or yellow and so cannot be monitored using sticky traps.

A simple 'bait pot' system was used for monitoring *Atheta* in commercial glasshouses. The bait pots were 9cm plastic pots filled with peat-based compost into which a small amount of ground turkey feed was incorporated. In crops of potted ornamentals or herbs, or bedding plants grown in trays, the pots were stood on the floor or on benches. In soil-grown crops such as celery or lettuce; pots should be sunk in the soil so that the rims are level with the soil surface (Figure 16). Compost in bait pots must be kept damp, using the same irrigation system as used for the crop. Bait pots were used to monitor dispersal of *Atheta* from rearing-release boxes in several commercial crops including poinsettia and lettuce. *Atheta* entered and bred in the bait pots. When pots were turned out onto a white plastic tray *Atheta* adults and larvae could be seen in the compost. Research using the bait pot system has shown that *Atheta* adults will leave rearing-release boxes and disperse within a week to produce larvae in bait pots located throught a 2000m^2 glasshouse.

Compatibility of *Atheta* with other biological control agents and pesticides within an IPM programme

Atheta and other biocontrols

Atheta is a ground-dwelling predator. Thus it might eat (or be eaten by) other ground-dwelling biological control agents. In PC 239 we tested the interactions between *Atheta* and two other biological control agents, *Hypoaspis miles* and *Aphidoletes aphidimyza*.

Hypoaspis miles: Canadian laboratory experiments had already shown that *Hypoaspis miles* and *H. aculeifer* eat *Atheta* larvae, and that *Atheta* adults eat *H. aculeifer* eggs and young nymphs. In PC 239 a glasshouse experiment was done where *H. miles* was released at the recommended 'curative' rate to potted parsley plants with a natural infestation of sciarid flies. *Atheta* rearing-release units were used in this glasshouse. After four weeks, *H. miles* had not reduced numbers of *Atheta* per parsley pot but *Atheta* had reduced numbers of *H. miles* compared with untreated controls. The result indicated that use of a rearing-release system, which releases high numbers of *Atheta*, is incompatible with the use of *Hypoaspis* in an IPM programme. Further experiments on commercial nurseries would need to test the efficacy of using the *Atheta* rearing-release system for biological control of sciarid flies, before the system can be recommended as an alternative to the use of *Hypoaspis*.

Aphidoletes aphidimyza: *Aphidoletes* is a predatory midge that is used

for biological control of aphids. The larvae drop from the plants to pupate, where they may be potential prey for *Atheta*. In experiments, *Atheta* adults ate *Aphidoletes* larvae when offered as the only prey in a Petri dish. However, *Atheta* did not significantly reduce numbers of *Aphidoletes* larvae and pupae in a compost of aphid-infested parsley plants, when alternative prey i.e. sciarid flies and soil-dwelling mites were present in or on the compost. These results indicated that *Atheta* and *Aphidoletes* can be compatible in IPM, but only if alternative prey are available.

Canadian research showed that *Atheta* adults are not susceptible to infection by the insect-parasitic nematodes *Steinernema feltiae* (used as compost drenches for control of sciarid flies). The nematodes were able to infect and kill third stage *Atheta* larvae, but percentage mortality was low. The results indicated that *S. feltiae* should be compatible with *Atheta*. The impact of *Atheta* on nematodes in the compost has not been tested.

Compatibility of pesticides with *Atheta*

As with all biological control agents, any pesticides used together with *Atheta* in an IPM programme must be carefully selected to minimise any adverse effects on the predators. As *Atheta* is a ground-dwelling predator, they are likely to be particularly affected by pesticides incorporated in the compost or used as drenches. However, pesticides applied as foliar sprays may also impact on *Atheta*, as some pesticide will always reach the compost or soil during application. The research projects did not include any pesticide testing against *Atheta*. Current knowledge on the side-effects on *Atheta* of selected key pesticides used against whitefly on poinsettia, (which is also highly susceptible to sciarid flies) is:

• Imidacloprid (e.g. Intercept 70WG applied as a compost drench and Imidasect 5GR incorporated in the compost at potting) was confirmed in Canadian research to be harmful to both *Atheta* adults and larvae. This pesticide should not be used together with *Atheta* in an IPM programme.

• No specific information is available on the side-effects on *Atheta* of thiacloprid (e.g. Calypso) or acetamiprid (Gazelle), both applied as foliar sprays. However, both products are known to kill beetle adults and larvae and and could have negative effects on *Atheta*.

• Spiromesifen (Oberon) is known to be safe to beetle larvae but no information is available on beetle adults. It is likely that Oberon is compatible with *Atheta* but more specific information is needed.

In addition to the above pesticides, it should be noted that all pyrethroid insecticides such as cypermethrin (e.g. Toppel 100 EC) and deltamethrin (e.g. Decis) are very harmful to beetles and most other biological control agents for over eight weeks after application, so they should not be used in IPM programmes.

Further information on the side effects of pesticides on all biological control agents are available from biological control suppliers or IPM consultants. On-line side-effects information is available on the Biobest and Koppert websites: www.biobest.be
www.koppert.com
Specific information may not be available on *Atheta*, but may be available on other beetle species or beetles in general (these may be referred to as *Coleoptera* which is the Latin name for beetles and weevils).

Further information

Other useful publications

• HDC Project reports PC 239 and 239a Protected herb, ornamentals and celery: *Development of an on-nursery rearing system for Atheta coriaria for reduced cost biological control of sciarid and shore flies.*

• HDC Project report PC 261 Protected bedding and pot plants: *Evaluation of WFT control by Atheta coriaria using an on-nursery rearing system.*

• HDC Crop Walkers' Guides, Pot and bedding plants, Herbs

• ADAS/Defra/HDC Best Practice Guide for Integrated Pest and Disease Management on Protected Herbs. www.hdc.org.uk/herbs

• HDC Factsheet 08/02 Control of sciarid flies in protected ornamentals.

• ADAS/Defra IPM in protected ornamental crops, a best practice guide for UK growers (available from ADAS Boxworth, Cambridge, Tel. 01954 268214).

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• Russ Woodcock, Bordon Hill Nurseries, for comments on commercial use of *Atheta* rearing units in ornamental bedding plants.

Suppliers of Atheta

Agralan Ltd
Tel. 01285 860015
www.agralan.co.uk
www.biobest.be

BCP Certis
Tel. 01233 667080
www.bcpcertis.com

Fargro Ltd
Tel. 01903 72159
www.fargro.co.uk

Koppert UK Ltd
Tel. 01440 704488
www.koppert.com

Syngenta Bioline
Tel. 01255 863215
www.syngenta-bioline.co.uk

Atheta and other biological control agents are also available through horticultural distributors

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