

Protected Cropping – Pest Management

We do not have the space within this guide to cover all glasshouse pests in detail, but here are some general principles. If you have a significant area of protected cropping consider investing in a detailed guide¹.

Some factors that contribute to high levels of pests:

- Overfeeding crops leading to soft growth, particularly if the crop is under stress by out of season production, Even optimised conditions can lead to soft, sappy growth, which is particularly prone as light levels and temperatures deteriorate in late summer.
- Extremes of temperature,
- Water or nutritional stress
- Overcrowding.
- While mono-cropping in itself does not make plants more susceptible, once pests occur they are able to spread more rapidly through a single crop or variety.

Introducing natural predators and parasites

For large heated systems it is more difficult to bring in wild insects. However even where space within the greenhouse is not available for planting attractant plants it is worth seeing which other areas of your site might be available for host plants. Anecdotal evidence² suggests that the first generation of an introduced predator is not always very effective while the offspring and grandchildren become more acclimatised and effectual at controlling pests.

For smaller mixed systems, encouraging beneficial predators and parasites is relatively straight forward as many of their favourite food plants are flowering crops, in particular coriander, basil and rocket that tend to run to seed rapidly anyway. Additional banker or attractor plants can be inter-planted such as **Limnanthes**, **buckwheat**, **Calendula**, or a bed can be designated for this purpose. **Achillea** and **Solidago** are excellent perennial attractors while herbs like **hyssop**, **thyme** and **oregano** offer dual benefits (although may also attract leafhopper). Ladybirds, lacewing, hoverfly and parasitoid wasps are useful but there are a plethora of other native predatory and parasitic species, including hyperparasitoids and secondary hyperparasitoids, whose complex interactions are far from well understood.

¹ For instance though not cheap, "Knowing and Recognizing the biology of glasshouse pests and their natural enemies" is highly recommended.

<http://www.koppertonline.com/showitem.asp?item=product&id=126>

² Feedback from Soil Association Protected Cropping Working Group.

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Beneficial Attracting strategies

Beneficial	How to attract
Hoverfly larvae - predate cabbage aphid	Interplant spring greens with <i>Limnanthes</i> ; sow them at the same time.
Parasitoid <i>Aphidius</i> spp. - predate black bean aphid	Allow umbellifers to flower near French beans and chard
<i>Orius</i> sp. - predate on thrip larvae	Flowering basil will feed them
Ladybird larvae	collect from seeding leaf beets in spring where they often feed on aphid drawn to the sappy shoots. The timing is ideal to move them onto peppers, aubergine, tomato, and cucumbers as they are planted out.
<i>Cortisia</i> parasite – predate many caterpillar spp.	Allow brassicas to flower
Range of other beneficial insects	<ul style="list-style-type: none"> • Allow a few of most varieties of crop (and weeds!) to flower after winter. This provides food for many insects and promotes early activity in the greenhouse when food is not available outside. • Manage hedges and borders outside for conservation and biodiversity; maintain mixed species and areas left undisturbed for overwinter shelter. • Removing infested crops from the greenhouse is good practice but in a healthy system it is not unusual to witness one plant covered with insects while its neighbours remain pest free. If there are also predators on the infested plant then leaving it in situ may also have advantages.

Pest management with introduced agents is most effective as a preventative measure and in fact can be prohibitively expensive as a curative due to the numbers required. Different situations will require different tactics so seek advice and be prepared to learn from your mistakes. The use of crop protection products is restricted and must be approved via an annual plan. Biological agents are permitted though a few non-indigenous species require a license for release from DEFRA obtained from the producing company.

In situations where an infestation threatens a valuable crop, sprays can be used to control the pest then a relevant biological agent may be introduced once (if!) control has been regained. The limited range of products with direct pesticidal activity requires approval or permission.

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Slug populations are easier to limit in greenhouses due to the control over irrigation and frequent cultivation. Debris, edges and ground cover may harbour slugs, targeted use of nematodes is very efficient. Encourage reptiles, amphibians and hedgehogs, and avoid leaving crops wet overnight

Birds can damage glass and crops if trapped and are often attracted to red fruits (tomatoes, strawberries), which are at risk where near to ground level.

Rodents need to be controlled for health and safety reasons but will also eat crops, seeds and seedlings and will be discouraged by secure boundaries, good general housekeeping and not providing year round food and lodgings near the greenhouse (eg. Compost heap, stables, feed store).

Getting the Right Predator

The following list will assist in monitoring and matchmaking pests with their nemeses, but a decent book (and internet searches) on plant pests will outline the types of crop at risk and help identification :

Pest	Predator / Agent
Aphid (general)	<i>Adalia Bipunctata</i> and <i>Coccinella septempunctata</i> - 2-spot and 7-spot Ladybird, larvae and adult predators <i>Chrysoperla carnea</i> - - Lacewing (larvae) <i>Aphidoletes aphidimyza</i> - predatory midge
Large Aphid species	<i>Aphelinus abdominalis</i> , <i>Aphidius ervi</i> , <i>Praon spp.</i> - Parasitic Wasps
Small Aphid species	<i>Aphidius colemani</i> and <i>matricariae</i> - Parasitic Wasps
Spider mite	<i>Amblyseius californicus</i> * <i>Phytoseiulus persimilis</i> - Predatory mites <i>Feltiella acarisuga</i> - Predatory Midge (larvae)
Thrips	<i>Amblyseius cucumeris</i> - Predatory Mite <i>Orius laevigatus</i> <i>Orius majusculus</i> - Predatory Bugs
Leafhopper	<i>Anagrus atomus</i> - Parasitic Wasp
Leafminer	<i>Dacnusa sibirica</i> , <i>Diglyphus isaea</i> - Parasitic Wasps
Whitefly	<i>Encarsia Formosa</i> - Parasitic Wasp <i>Macrolophus caliginosus</i> *

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	- Predatory Bug
Scarid and Thrip larvae	<i>Hypoaspis miles</i> - Predatory Mite <i>Steinernema feltiae</i> - - Parasitic Nematode
Caterpillar	<i>Trichogramma</i> - Parasitic Wasp (eggs) <i>Bacillus thuringiensis</i> - Bacteria releasing toxin (Bt / DiPel DF)

* non-indigenous requiring licence.

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