

Lessons Learned in Local Greenhouse Management

On Location and Site

by Rupert Jannasch 2011-03-12

Building on a slope

- Built a pad going against the slope
- If you have to go North-South, the North side is a great place to put a header house (ie a place for furnace, transplanting area, pot storage area)

Drainage

- Choose a site with light, well drained soil
- If not possible consider adding some gravelly top soil or something with a lot of sand to build a base on which you can add your compost etc

Water

- There's a tendency to overwater in greenhouses
- Leads to problems with humidity, disease and weeds (ie chick weed)
- The important thing with watering is to be regular with your watering schedule but avoid overwatering

Salt and Nutrient Build up

- Use broad crop rotations to avoid build ups
- Keeping soil biologically active with good quality compost
- Heavy irrigation in off season may help to control salt build up

Compost management

- Chicken and sheep/cow manure is not the same (chicken manure is nutrient rich but poor in microbial activity)
- Make sure you have some compost that's accessible in the spring (not buried in a snow bank)
- It's hard to move compost over wet ground in spring

High Tunnels

- Ie long 200ft, single sheet covered tunnel, covered from April through summer
- Considerations:
 - 200ft tunnel is cumbersome to manage
 - It's a long distance to walk, consider dividing the structure
 - Removing the plastic in winter allows the soil to be exposed to freeze thaw cycles and rain to allow salts etc to leach out
 - If you're using a tractor in a tunnel, you can get a lot of compaction along the tunnel track
- Using raised beds in your tunnel is an extra management step, can be advantageous in some areas

Owen Robert's Experience

By Owen Roberts

- Run a total of 10 greenhouses, 3 heated double poly, 7 non heated
- Grow herbs, salad greens
- Greenhouse size is an important consideration when starting out
 - Start big
 - Consider equipment (irrigation) and plastic (ie lengths and sizes that manufacturers sell)
- Drip irrigation and row covers etc, keep them in the greenhouse (don't remove them...they get mixed up and misplaced)
- Closed greenhouse system vs. open greenhouse system
 - Planting flowers attract beneficial insects in open systems (ie nasturtiums)
 - Roll up sides also allow insects in and out
 - Have perennial plants in spots in greenhouse so beneficial insects can overwinter in greenhouse
- Consider the vision of your farm before you start constructing the specifics (eg a greenhouse or other permanent structure)...consider the big picture
- Drip line etc is good for water conservation, which is an important consideration as greenhouses can consume a lot of water

Biological Control in Your Greenhouse

David Blanchard Pleasant Hill Farm

What is biological control?

Biological control means using the natural enemies of pests to regulate pest populations below some economic threshold

Using good bugs to control bad bugs

Management and knowledge intensive approach but in the long run a lot less work than spraying

Two main types of biocontrol agents: predators and parasitoids

- Predators hunt and consume their prey
- Eg spiders, ladybirds, aphid midges, carabids, lacewings

Parasitoids lay their eggs in or on hosts

- Wasps or flies
- Always kill their host
- Adults are free living
- Most are specialists

Aphids are the most damaging crop pest because

- Parthenogenetic (asexual, all female reproduction)
- Viviparous (give birth to live young)
- Result: explosive population growth

Several biocontrol agents are available to tackle aphid outbreaks

- Ladybugs, but they reproduce much slower than aphids so aren't great in outbreak situation
- Lacewing larvae also good
- Parasitoid wasps and aphid midges are your best bets in an outbreak situation

Correct identification of aphid species is critical

- Books: Knowing and recognizing, the biology and life of glasshouse pests and Vegetable Pests
- <http://bugguide.net>
- www.greenhouse.cornell.edu/pests/pdfs/insects/Aphids.pdf

Biology of *Aphidius colemani* (a parasitic wasp)

- can be ordered overnight by mail (a little expensive for shipping)
- females lay eggs inside aphids
- parasitize green peach aphids and cotton aphids
- developing larva eats the aphid from the inside out killing it
- females can lay over 200 eggs each
- aphid becomes the cocoon...an aphid mummy

Aphidius colemani economics

- a bottle of 500 mummies costs \$60 delivered to NS (\$30 for insects and \$30 for shipping)
- this will treat an aphid outbreak in a 30'x96' greenhouse as long as you catch it early
- *Aphidius* will reproduce and multiply as long as conditions are favourable and aphids are present

Aphidius colemani requirements

- Will work even in winter
- Temperature is important, at least 16 centigrade days and 8 centigrade nights
- Optimum is 17 nights and 24 days
- Host specific

Preliminary results suggest that providing adult *Aphidius* with nectar helps them to parasitize more aphids

The aphid midge, *Aphidoletes aphidimyza*

- Adults lay their eggs among groups of aphids
- Predatory larvae kill aphids, by injecting a toxin than eating them
- In a large aphid population, they kill more aphids than they eat

Aphidoletes requirements

- Day length does matter 12 hr minimum
- Temperature requirements like *Aphidius*
- Will prey on almost all aphid species
- Adults feed on aphid honey dew
- Pupation occurs in the soil

Aphidoletes economics

- A bottle of 250 pupae cost \$70 delivered to NS

The banker plant concept: avoiding repeat purchases of *Aphidius colemani*

- *Aphidius* are so effective they destroy all their hosts
- Use a non pest aphid species to maintain the populations