

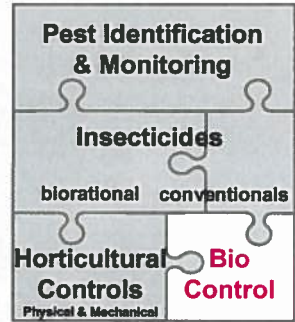
Friend, foe or escargot?

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INTEGRATED PEST MANAGEMENT



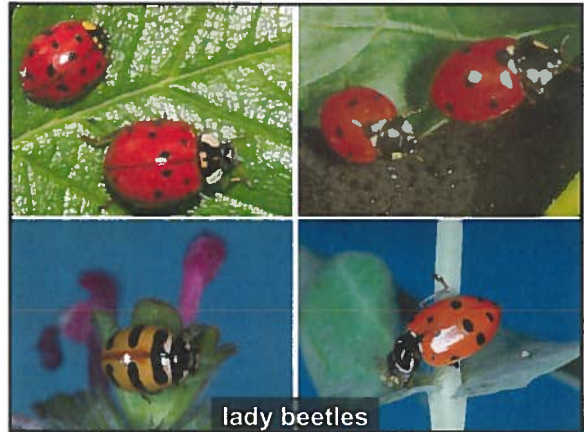
Biological Control
other living organisms or their products

“natural enemies”
predators
parasitoids
pathogens



PREDATORS

- often generalists
- consume many prey
- some require nectar & pollen



lady beetles



lady beetle EGGS



lady beetle MATURE LARVA



lady beetle PUPA



Scymnus lady beetle ADULT



Scymnus lady beetle LARVAE



green lacewing, *Chrysoperla* spp.
(adult vs larva)



green lacewing EGGS, *Chrysoperla* spp.



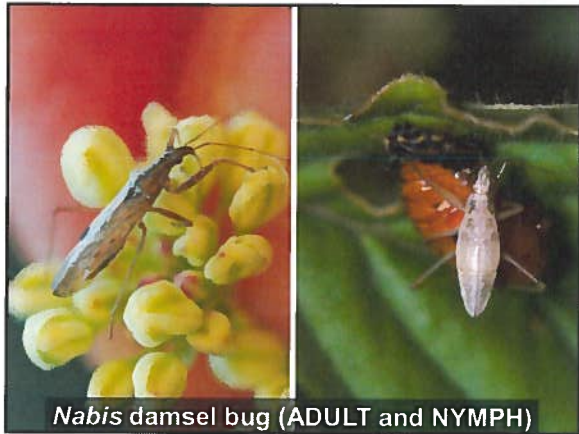
syrphid fly (hover fly, flower fly) ADULT



syrphid fly (hover fly, flower fly) LARVA



assassin bug ADULT



Nabis damsel bug (ADULT and NYMPH)



ground beetle ADULT



ground beetle LARVA



wireworm LARVAE



wireworm LARVA w/notch-like UROGOMPHI

PARASITOIDS
*insect parasite
of another insect*

tiny wasps (stingless)
& medium-sized flies

usually specialists

life cycle requires 1 host
parasitic larvae
free-living adults
(nectar & pollen)

kill many hosts



armyworm exoskeleton + parasitoid cocoon



tomato hornworm + parasitoid cocoons



aphid parasitoid + "mummies"



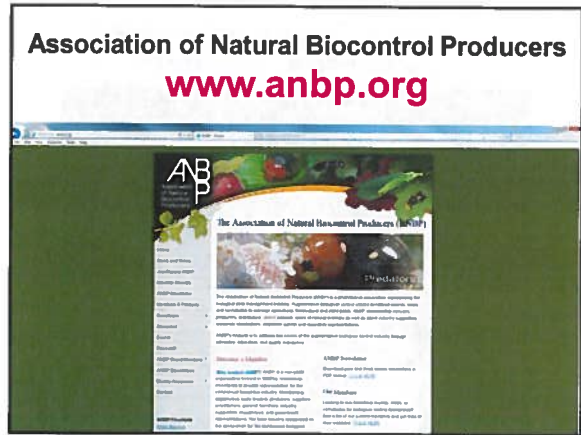
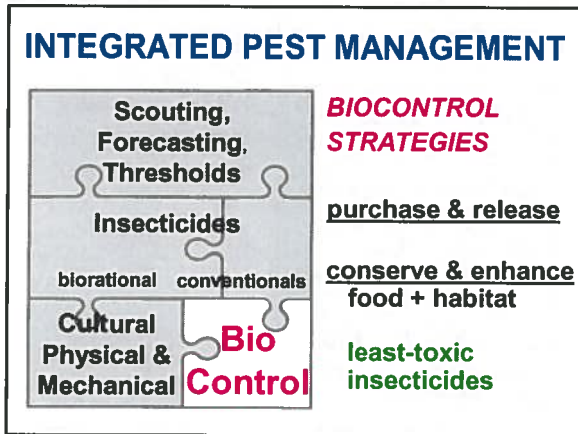
aphid parasitoids ("mummies")

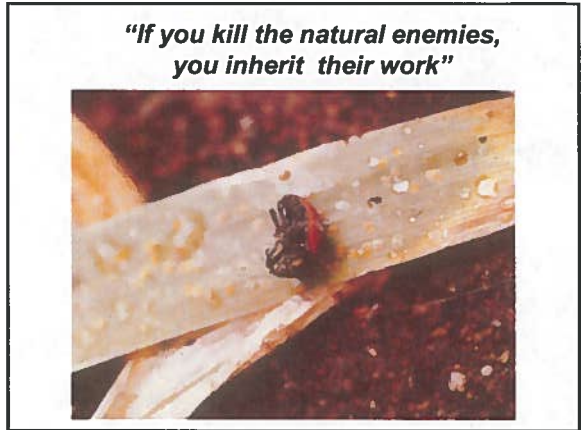


tachinid fly ADULT parasitoid



tachinid fly EGG on caterpillar host





**"If you kill the natural enemies,
you inherit their work"**

least-toxic insecticides:
 azadirachtin
 microbials
 Bt kurstaki
 oils
 spinosad
 soaps

conventional insecticides:
 systemics vs sucking bugs

