



Insects (et al.) in the Vegetable Garden (The Good, The Bad, The Bug-ly...)

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**....To modify a phrase used in
a recent popular movie...**

**“If you plant it,
THEY will come....”**



Quick Primer

Basic Entomology

- What is an Insect?
 - Belongs to Phylum Arthropoda
 - Jointed legs & body
 - Exoskeleton with chitin
 - Adults have 6 legs
max. 4 wings; 3 body
regions; 2 antennae
 - Modern spp. small but often
prolific, widespread
- At least 80% of the animals known in the world are
INSECTS!



Insects are NOT All the Same!



One host vs. several vs many

One generation/yr vs many

Toxins? Pathogens? Other?

Early vs late?

Exposed? Hidden?



“Strange” or “ugly”
have nothing to
do with whether
insects are pests

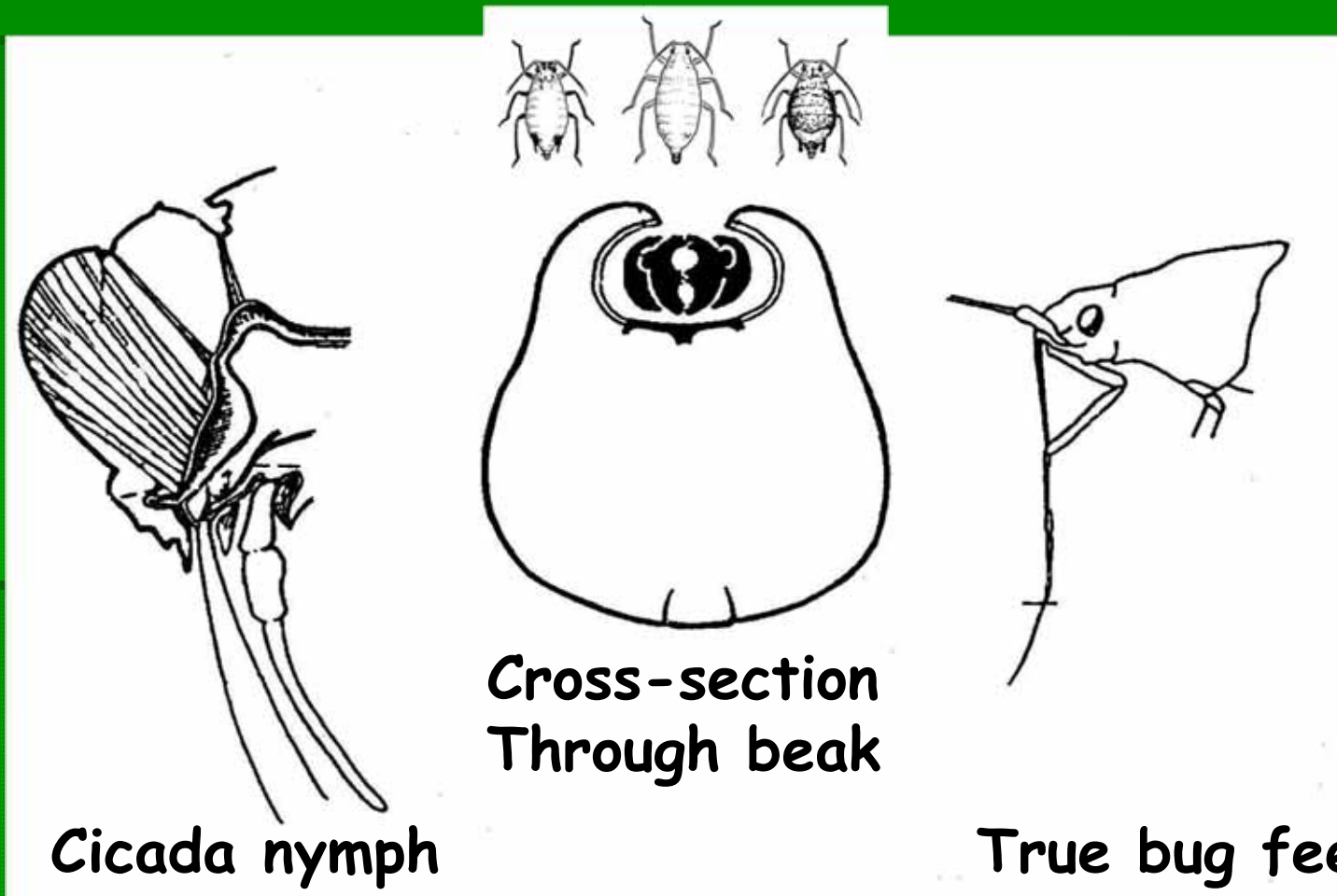


The first 4 insects have 2 things in common....

- Piercing-Sucking Mouthparts
- Simple metamorphosis



Piercing-Sucking Mouthparts: Homoptera & Hemiptera

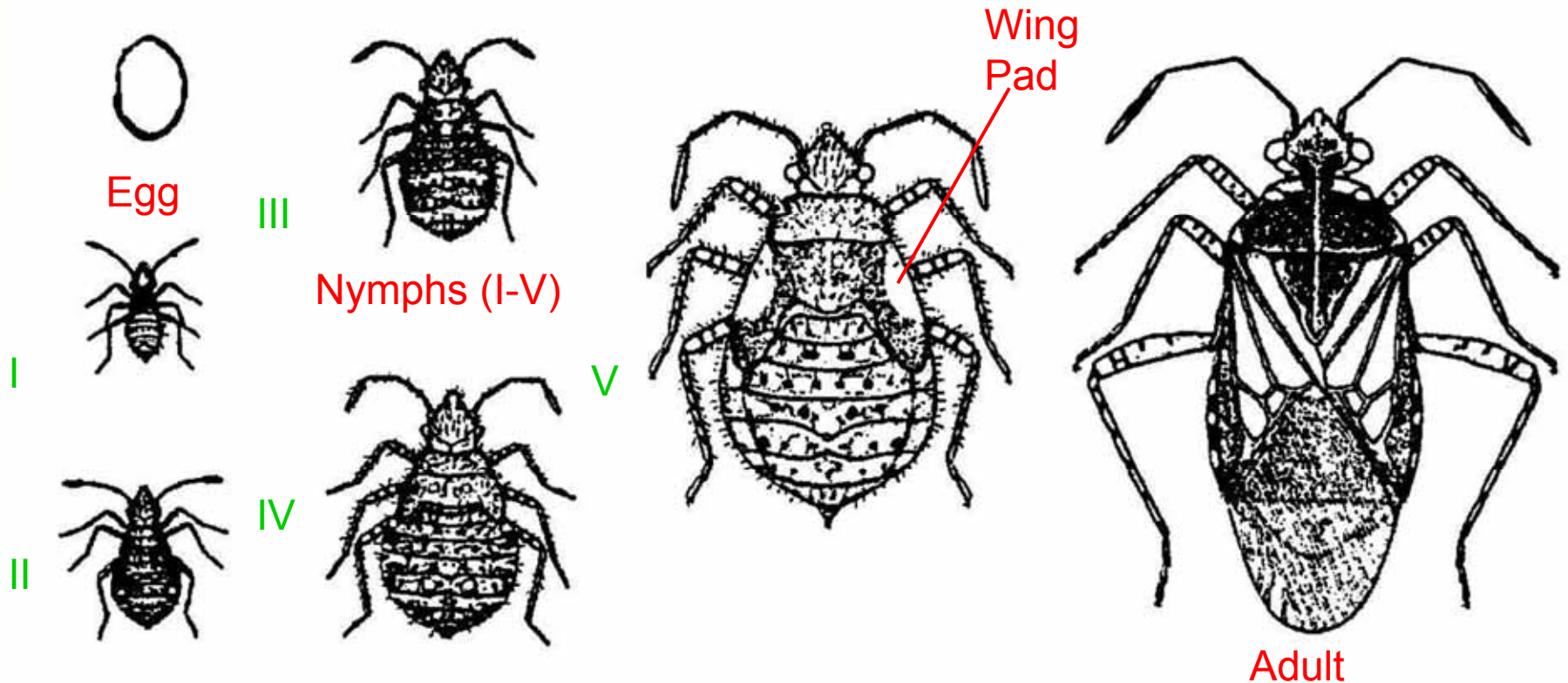


Cicada nymph

Cross-section
Through beak

True bug feeding,
Side view

Simple Metamorphosis---Bugs & More



False Chinch Bug

Overwinter on plant roots; numerous after wet winter; abundant now, moving in 'herds' of millions; nuisance or plant pest to varying degrees---also enter homes (nuisances)

False chinch bugs

- Occasional native pests; sucking mouthparts
- Adults gray/black; <math><1/8\text{''}</math>; winged, but walk
- Usually seen in 'herds' of millions, all stages



Common Aphids---usually cool weather pests; watch for these!



Potential virus vectors; weaken & wilt plants; can kill some plants; honeydew makers! Many common Species have female only colonies In summer; live birth!



Leafhoppers



Empoasca sp.,
Bean/potato Leafhopper



Circulifer tenellus,
Beet leafhopper
Curlytop vector

Curlytop Virus

- Beet leafhopper transmits it
- Peppers, tomatoes, beets, spinach, beans, cucurbits---stiffly erect foliage, stunted, can kill plants or eliminate fruiting
- No cure



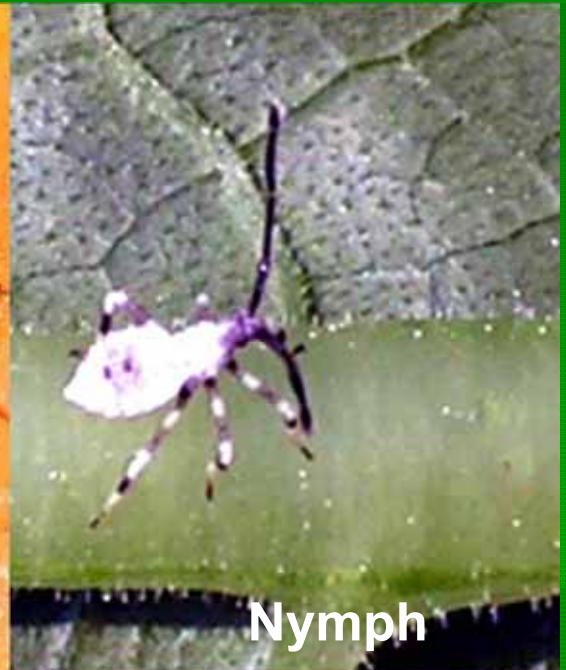
Squash Bug



Mating pair



Adult



Nymph

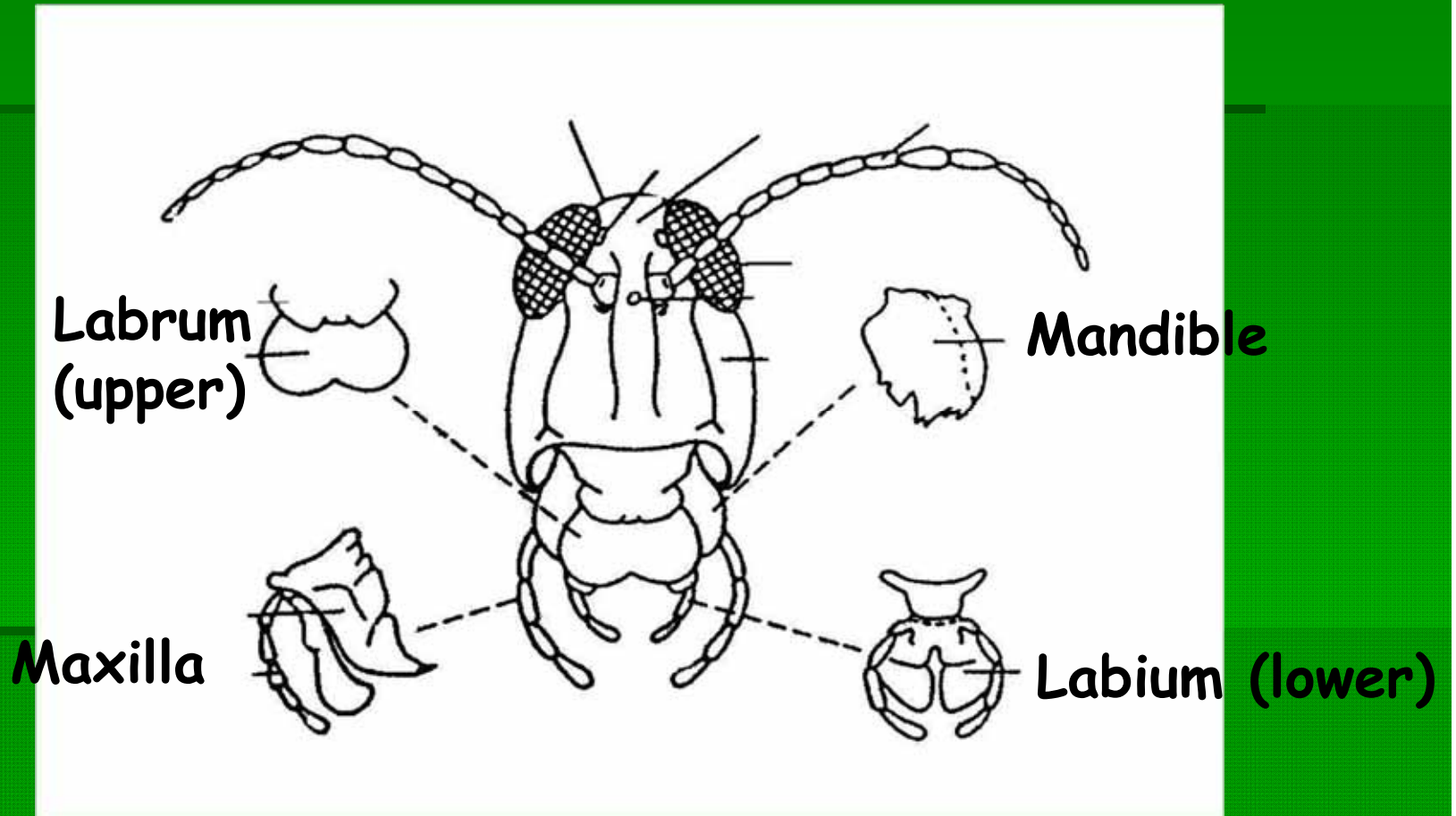
Any squash might attract them;
Love winter squash, incl. pumpkins

Pierce vines, inject toxins or micro-organisms(?) = dieback



Eggs

Chewing Mouthparts --- Grasshopper



Grasshoppers---160 spp in NM



Generalist Pest



Beneficial!

Grasshoppers still have 'simple metamorphosis'

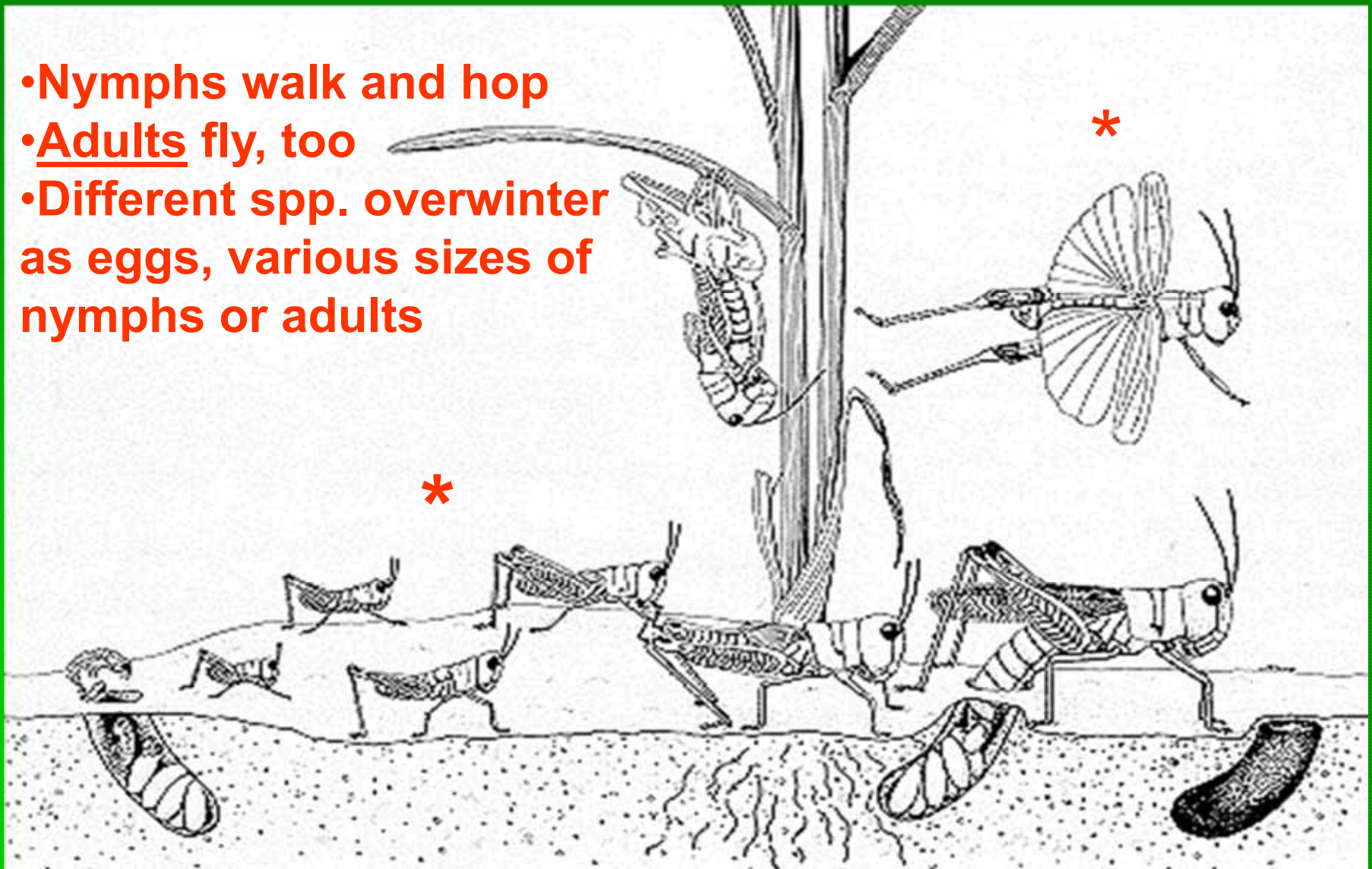
Grasshopper damage

- Defoliation (consumption or cut/drop)
- Eating buds, flowers, etc. (ditto)
- Chewing bark, stems; waste!
- Reduce quantity & quality of yield; kill, too

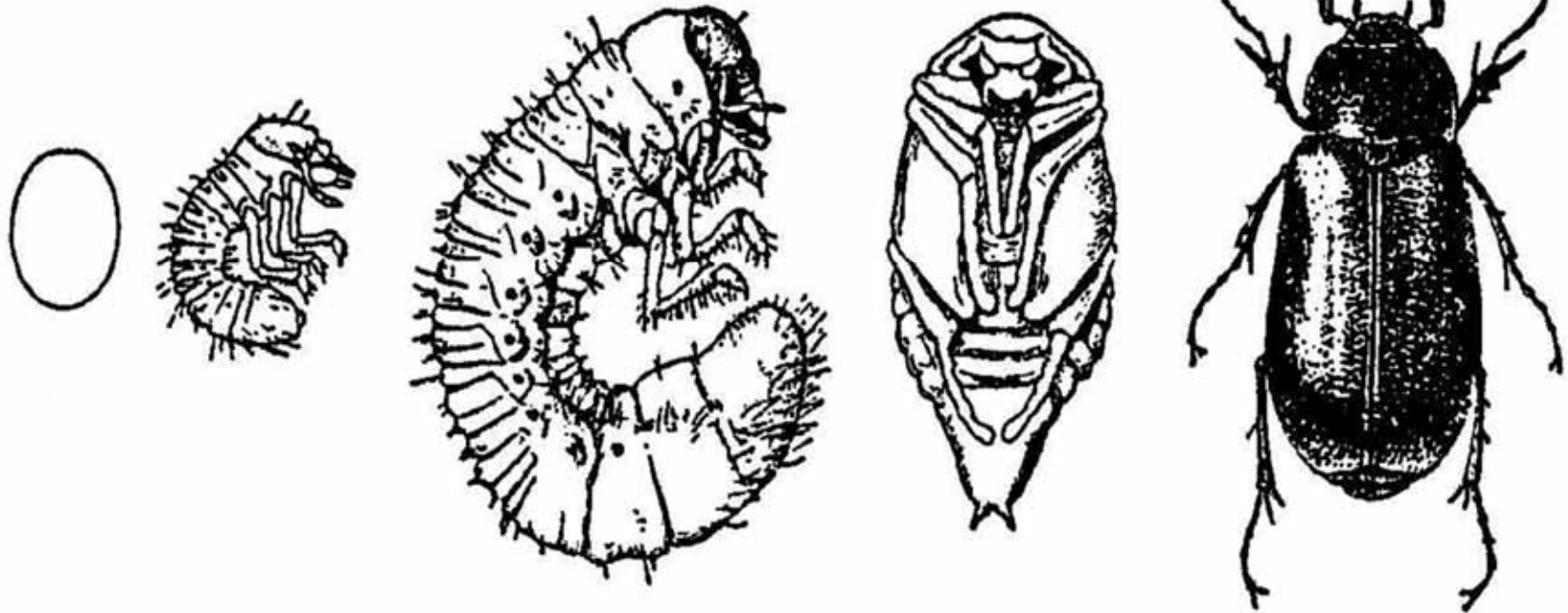


Grasshopper Life Cycle

- Nymphs walk and hop
- Adults fly, too
- Different spp. overwinter as eggs, various sizes of nymphs or adults



Complete Metamorphosis Green June Beetle



----Larvae (Instars)----

Pupa

Adult

Beetles---larvae AND adults have chewing mouthparts. However, some adult beetles do not eat, relying on fat accumulated during larval stages.

White Grubs; May & June Beetles



White grubs---eat roots, rotting plant matter
May be in veggie gardens eating compost

Adult beetles---abundant fliers in late spring,
Summer; most are not veggie pests



Flea Beetles

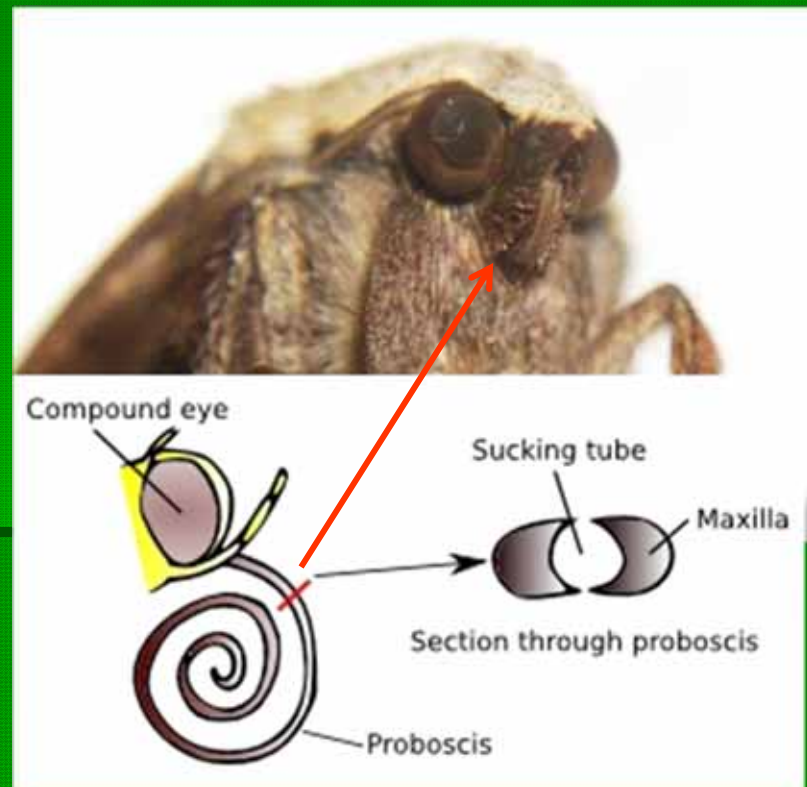


Caterpillar Pests of Veggies



Larvae have chewing mouthparts
skeletonize, bore, mine or eat the
whole thing

Adults (moths or butterflies) may lack
mouthparts; most have a sucking
proboscis with which they drink fluids



Cutworms



Euxoa auxiliaris [MONA 10731]
AZ Choicise Co., 8200 ft Chirichahua Mts, Barfoot
Park. MV/UV Lights. 23 May 2001. B. Walsh leg



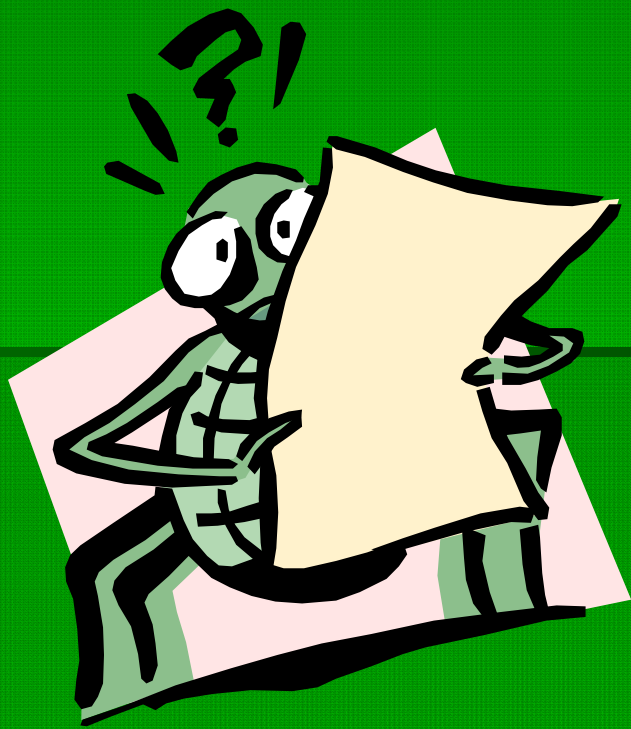
Corn Earworm = Cotton Bollworm =
Tomato Fruitworm = *Helicoverpa*
(Old *Heliothis*)



Tomato Hornworm



So What Can I Do About Some of These Pests? Options?



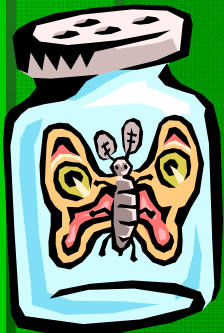
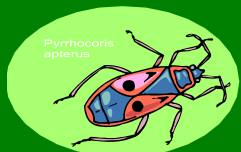
Principles and Practices
of
Integrated Pest
Management

Remember: there is NO
'Silver Bullet' for any pest
or situation

1)What IS That? How to Take a Sample....

- Collect specimens into small vial, small jar, sandwich bag, etc. Live is usually best!
- Take it to your County Extension Agent ASAP along with:

- your name, phone, where was it found and what's it on?
- Good, clear, close-up digital photos are encouraged!



2)Composting

Shredding, crushing, grinding, 'cooking'...

Since compost can be food, shelter for other pests...



These operations will kill pests
Follow instructions for good compost results!



Observe frequently---cover items attracting pests

'Solar cook' infested
Items before composting?



3) Barriers

Hot Topic Now



Row covers



Greenhouse, hoop house, etc.

4) Choice of mulches

- None---squash bug?
- Compost mixture
- Straw or grass clippings
- Plastic---between rows---black or tan
- Plastic with reflective foil
- Other

5) Biological Controls---aka “Beneficials”

- Predators
- Parasitoids
- Pathogens



Spiders are Under-appreciated Predators



And many more!



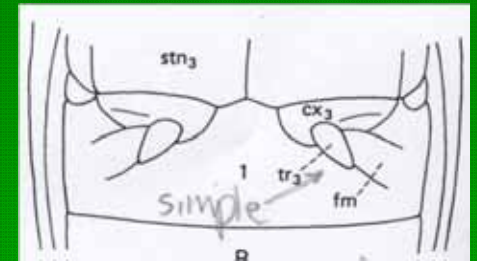
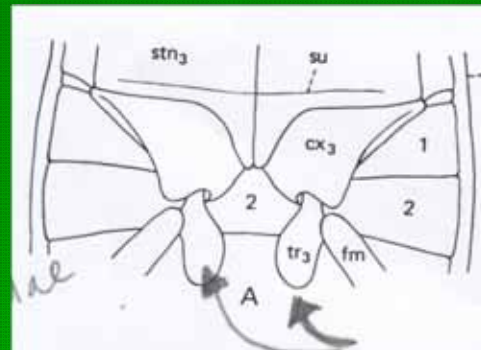
Predatory Bugs: Minute Pirate, Damsel, Big-Eyed, Predatory (Some) Stink & Assassin



Green Lacewings



Carabids or Ground Beetles, Tiger Beetles



Carabid Beetle vs Darkling Beetle



The Real Thing—see?

Carabid



Carabid



Darkling



Ladybird Beetle, "Lady Bugs"



Syrphid Flies, Hover Flies



Large Predatory Wasps: *Vespula*, Tarantula Hawk Wasp, *Polistes*



Tarantula Hawk, *Pepsis*

Hornet, *Vespula*



Paper wasp,
Polistes sp.



Parasitic Nematodes *Steinernema* spp.

Typically, these attack prey living in soil

Enter prey through any orifice, feed and breed internally; host dies, releasing nemas

Persistence in NM conditions???



Parasitic Flies---the Tachinids



Tachinid maggots from monarch pupa



Tachinid eggs on leafroller larva

Small Parasitic Wasps, e.g. Braconids & Chalcidoids---more precise



Larger Parasitic Wasps



6) Pesticides---last resort

- **Factoids about insecticides**
 - All are registered annually by EPA and NMDA
 - In NM, need efficacy data to register products
 - YOUR responsibility to read & follow labels
 - 2 general categories of pesticides
 - Restricted use (applicator license needed)
 - General use---these are for gardeners, homeowners; no license needed; applied on your property

Considering a Pesticide?

- **READ THE LABEL!—legal document**
 - Site(s) (crop or situation)
 - Pest (s)
 - Ingredients Statement: Active & inert
 - **KEEP OUT OF REACH OF CHILDREN (standard)**
 - Basic directions for mixing, application (how, when, safety, how often, residue, what to avoid)
 - Storage
 - Emergency/accident procedures

Insecticides for Gardeners New Mexico, 2011

- Conventional, synthetic products
- Natural products---minerals, some plant-derived
- 'Almost organic'---same AIs as 'organics' but not all approved ingredients or method of formulation not approved
- 'Organic'---OMRI approved products

NM Registered & OMRI Approved: Certified Organic

- Neem products---certain azadirachtins, oils, oil-soaps
- Microbiological products---certain Bts, Beauveria products, spinosad (Entrust, Monterey Garden Insect Spray)
- Pyrethrum--- certain Pyganic formulations, certain other products
- Soaps --- e.g. M-Pede
- Minerals---e.g. Surround
- Oils---JMS Organic Stylet Oil





The END!!!

**Thank you
very
much!**

