Cucumber beetle biology and management in organic systems

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Introduction

- **Found throughout California and are major pests of cucurbits**
- **Western spotted and western striped cucumber beetles**
- **Banded cucumber beetle found only in southern California**
- **Problem in the Sacramento Valley since 1980s**
- **Male aggregation pheromone leads to rapid infestations**

R. Hemberger: Natural History of Orange County

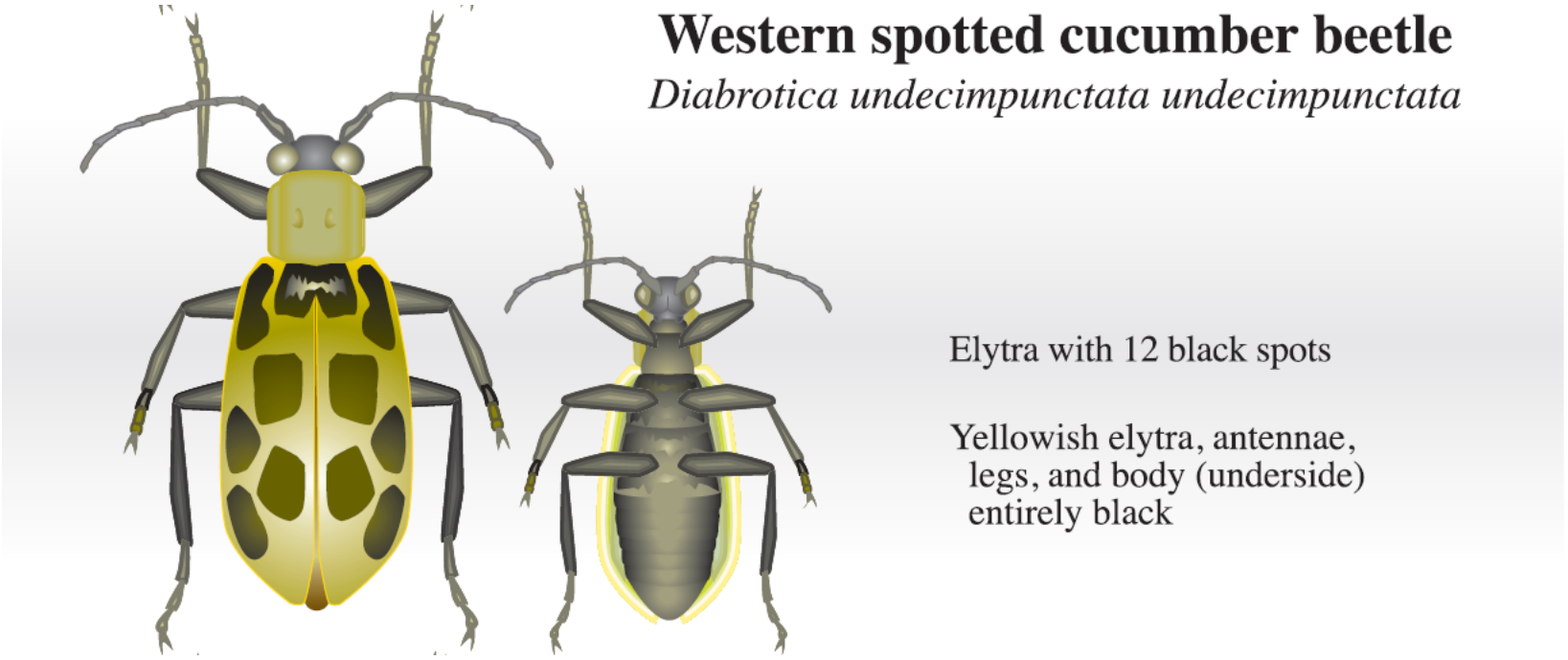
Life cycle

- **Overwinter as adults**
  - **Black heads, long antennae, and about 1/4 inch long**
- **Lay yellow-orange eggs at the base of plants or in soil cracks**
- **Larvae feed on plant roots and complete development in soil**
  - **Whitish and slender with three pairs of short legs**
  - **Head and tip of the abdomen are darker**
- **3 generations per year (4 population peaks)**

UC-IPM

Western spotted cucumber beetle ID

- ***Diabrotica undecimpunctata undecimpunctata***



P. Goodell and P. Philips. A Field Key to the Cucumber Beetle Species Found in California. UC-IPM.

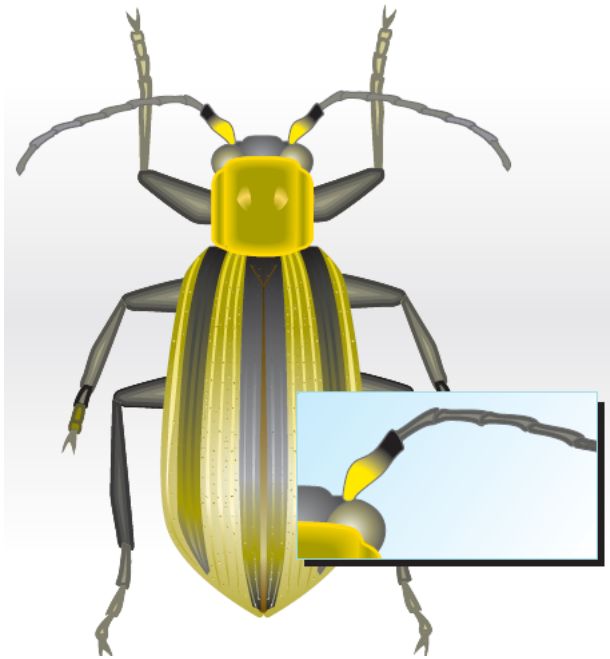
Western spotted cucumber beetle biology

- **Feed on small grains, legumes, grasses, cucurbits**
  - **Pigweed, bindweed, black nightshade, common lambsquarter, velvetleaf**
- **Develop on grasses or alfalfa**
- **Adults most damaging→ seedlings, flowers, foliage**
- **Can be very damaging to seedlings in just a few days time**
- **Larvae feed on a wide variety of plants including grasses, corn, legumes**

Photos: UC-IPM

Western striped cucumber beetle ID

- ***Acalymma trivittatum***



Western striped cucumber beetle

Acalymma trivittatum

Yellowish elytra with black stripes

Abdomen and antennae black with only basal part of 1st antennal segment pale yellow

P. Goodell and P. Philips. A Field Key to the Cucumber Beetle Species Found in California. UC-IPM.

Western striped cucumber beetle biology

- **Develop and feed on cucurbits**
  - **Pigweed, bindweed, burclover**
- **Move in from weedy areas/leaf litter earlier in the spring than spotted**
- **Adults most damaging-seedlings, flowers, foliage, FRUIT**
- **Can be very damaging to seedlings**
- **Feed on bottom of fruit→ scarring rind**
- **Larvae feed exclusively on cucurbit roots**
- **More damaging in cucurbit systems, especially melons**

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Cucumber beetle identification

- **Larger and more brightly colored than flea beetles**
- **Lack enlarged hind legs found on flea beetles**
- **Lady beetle antennae are short and stubby**
- **Cucumber beetles are long and threadlike**

Oregon State Extension Service

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Cucumber beetle damage

- **Serious pests of smooth-skinned cucurbits**
  - **Honeydew, crenshaw, and casaba melons**
- **Prefer tender, succulent portions of plants-flowers, foliage, maturing fruit**
- **Severe damage to seedlings→ stand reductions→ replanting**
- **Larvae may cause serious injury to young plants by feeding on roots**

Photos: UC-IPM

- Damage to the surface of the melon reduces marketable yield
- Once skin hardens, less prone to attack by beetles
- Scarring in the crown of the plant is also typical of adult damage

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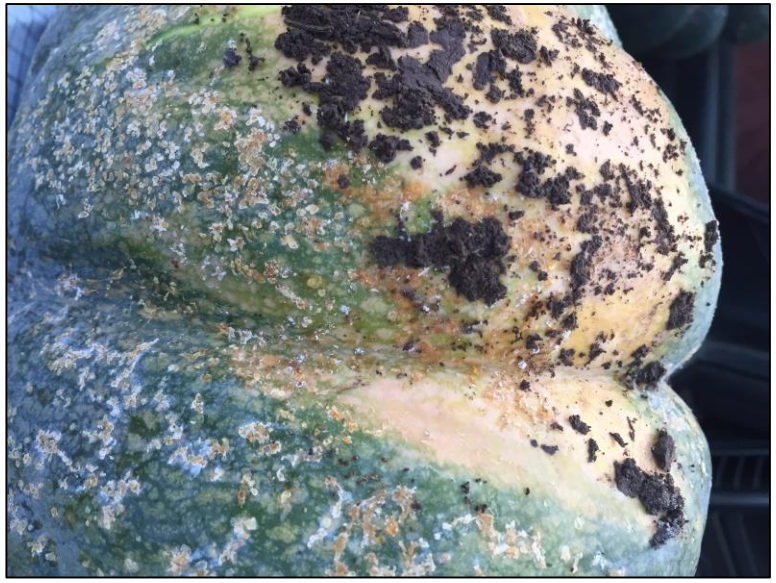
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Squash Mosaic Virus

- **Transmitted by cucumber beetles and also seed-borne**
- **Mosaic patterns and mottling of the leaf along with deformed fruit**
- **Beetles keep the virus up to 20 days after feeding on an infected plant**
- **Use virus-free seed to eliminate primary source of disease**

Photos: M. Lagorio

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Monitoring cucumber beetles

- **Hard to find in winter**
  - **Hide in leaf litter, near trees, shrubbery, fences, structures, weedy areas**
- **Start after transplanting or when seedlings emerge**
- **Continue through fruiting stage**
- **Scouting is most effective**
- **Less beetle damage seen between 4-leaf stage and flowering**

R. Hemberger: Natural History of Orange County

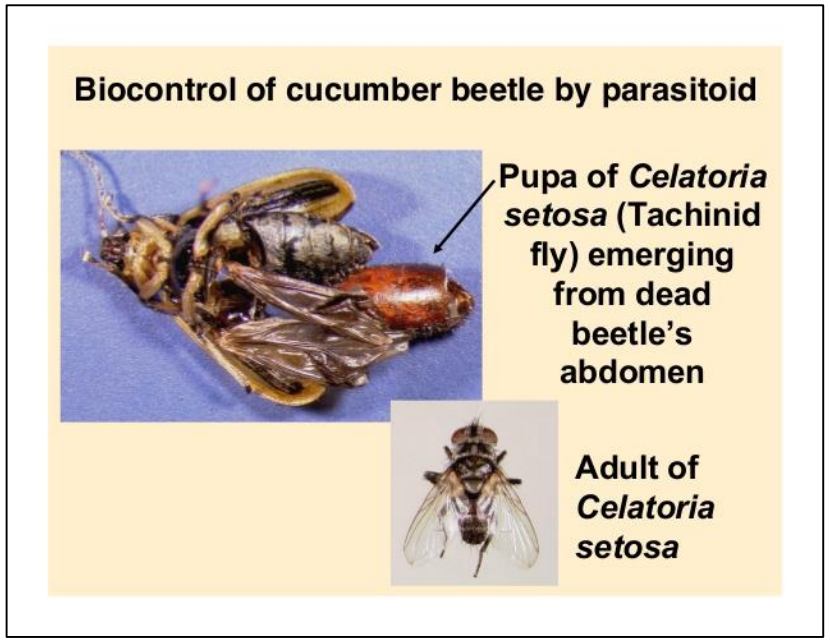
BugGuide.net

Management

- **Cucumber beetles are difficult to control**
- **Multiple population peaks throughout the season**
- **Late season infestations usually not as damaging as early season**
- **Larger plants can tolerate damage**
- **Biological, physical, cultural, chemical**

Biological control

- **Variety of natural enemies**
  - **Lacewings, damsel bugs, assassin bugs, bigeyed bugs, minute pirate bugs, soldier beetles, ground beetles, and spiders**
- **Parasitic tachinid fly, *Celatoria spp.***
- ***C. setosa* → western striped**
- ***C. diabroticae* → western spotted**
- **Rarely reduce populations below economically damaging levels**
- **More parasitism in organic fields**



Row Covers & Pest Control for Vegetable Gardens; Gardening Guidebook for Ohio

BugGuide.net

Physical control

- **Protect seedlings with covers or screens→ physical barrier**
- **Place covers early so beetles and other pests cannot lay eggs under the cover**
- **Remove once plants are large enough to tolerate damage**
- **Can also help with sunlight and other environmental conditions**
- **May limit ability to check plants or irrigate**
- **Expensive for large areas**

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Cultural control

- **Remove weedy areas prior to planting**
- **Plant larger transplants or extra seeds**
- **Older plants can tolerate up to 25% defoliation without yield loss**
- **Plant cucurbits as far from corn or other grasses as possible**
- **Planting late spring may help avoid first striped beetle population peak**
- **Trap crops (Blue Hubbard Squash) successful in MidWest**

University of Missouri IPM

Chemical control

- **Directed at adult beetles**
  - **Larvae of spotted develop outside of cucurbit fields**
  - **Striped larvae are located on roots and cannot be reached with chemicals**
- **No reversal of seedling damage**
  - **Spot treat with Spinosad or soil-based botanicals on edge rows to reduce spread if detected early**

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Cucumber beetle research

- **Sticky traps**
- **Jug traps w/floral-lure/emergence traps**
- **Testing 3 different traps in 2019 (in both organic and conventional)**
  - **All with floral-lure**

Summary

- **Adult cucumber beetles cause most damage, especially to seedlings**
- **Western striped cucumber beetles can be very damaging to melons, especially by scarring the fruit**
- **Larvae only problem on melons (striped) or grasses/legumes (spotted)**
- **Difficult to control**
- **Older plants withstand more damage**
- **Seedlings and maturing fruit are most vulnerable**
- **Migrate in from alfalfa/weedy areas (spotted) or leaf litter/weedy areas (striped)**
- **Remove weedy areas, plant away from corn or alfalfa, plant extra seeds**
- **No standardized monitoring method**
  - **Currently, scouting is most effective**
- **Trapping studies ongoing**

Questions?

References

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