Beet armyworm on cotton

*Spodoptera exigua* lesser armyworm, *cottonworm*, 甜菜夜蛾 in Chinese

### Prevention
- Shred residues before planting by cultivator or shredder to reduce moth’s egg laying sites
- Destroy weeds mechanically before and during growing season
- Grow insect tolerant varieties G1, G12
- Select healthy seeds for good plant growth
- Avoid planting other host crops (cabbage, beet) around cotton, and as intercropping
- After harvest, plough more than 20 cm deep to expose pupae to freezing temperatures. If no major pests or diseases were in your field leave residues to improve soil and prevent moisture loss.
- Rotate with crops from different family than cotton; but don’t grow brassicas (cabbage, beet, rape) which are moths’ oviposition sites.

### Monitoring
- Hang up black light traps to monitor moths (1 lamps / 667m²). If many are captured release biocontrol agent
- Monitor surface of leaves for egg masses and young caterpillars every 3 to 5 days after crop germination
- Masses of 50 to 150 eggs are on upperside of leaves (white, round, sesame size eggs).
- The optimal time for controlling armyworm is after egg hatch before caterpillars begin to eat leaves. Control caterpillar before they reach the 4th instar (overeating stage). 3rd instar caterpillar 0.4 to 0.7 cm, back is light brown and chest is dark-green or yellow-green. 4th instar caterpillar: 0.7 to 1.4 cm yellow-green or dark green.
- If you miss this time, consider action at 8-10 damaged plants per 100 plants. Caterpillars eat windows into leaves but veins remain.
- Watch for armyworm caterpillars on adjacent crops and on weeds in and around the field. If many larvae are present while cotton plants are small, consider action

### Direct Control
- Hang up black light lamps traps to capture adult moths (2 lamps / 667m²)
- Release agent *Trichogramma confusum* against armyworm eggs every month after germination, at least 2 x (180-210000 wasps per hectare; 8-10 releasing spots every 667 m²). Buy from Jinling Agricultural University or other sources.
- Flat spray soap against young caterpillars over leaves (Gaihehuagong Ltd., and others).
- Spray beneficial fungus, such as Beauveria bassiana (many products). Dust formulation and 1.5kg diluted in water and sprayed per hectare against young caterpillars.

### Direct Control
- Spay before caterpillar reach 2th, latest at 3rd instar because older caterpillars are hard to control. Spray under and upperside of leaves. Spray at dusk of rainless day. Sometimes sprays on field edges are enough.
- When using a chemical or botanical pesticide, always wear protective clothing and follow the instructions on the product label.
- WHO toxicity class II pesticides may not be allowed in certain IPM or “green” production schemes
- Always consult recent list of registered pesticides of ICAMA/China, and of China pesticide information network.

### Restrictions
- Novaluron – (甲酰胺) products (such as 2-Thiohydantoin 2-硫代乙内酰脲, or Chlorbenzuron 3 SC 幼螨3号, YidingbaoSC 又丁, Eshaling SC 除螨灵) 25%
- Chlorbenzuron formulations diluted 1000 times, but double check product labels as products may differ. The effective duration of this pesticide is about 30 days. Use only with chitin-synthesis stopper
- Diflubenzuron – products (such as Chuchongjiao WP 除虫脲, Dimieling WP 敌滅灵) It is an insect growth regulator, therefore needs to be sprayed on young larvae. It will take 3-5 days to have effects.
- WHO toxicity class U (Unlikely to present acute hazard in normal use); Pre-harvest interval p.h.i. 35 days; restricted re-entry interval r.e.i. 3 days after spray; max 2 sprays in min 20 day intervals. Relatively environmentally friendly, but harmful to fish and *Trichogramma biocentrol agents.*
- WHO class III (slightly acute hazardous); p.h.i. 20 days; r.e.i. 3 days after spray; max 1 spray. Do not mix with quick acting insecticides. Do not mix with alkaline matters.

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![Image of cotton bollworm](https://via.placeholder.com/150)

**Old (5th) intsar caterpillar are 2-3 cm (Nigel Cattlin)**

**Young 1/4 to 1 cm caterpillar (2nd instar) cause mesh in leaves (Nigel Cattlin)**

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**China**

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