



## Know Your Cotton Insect Pest SPOTTED AND SPINY BOLLWORMS

**Common Name** : Spotted and spiny bollworms  
**Local Name** : Thipkyachi, kateri bond ali  
**Scientific Name** : *Earias vittella* Fab.  
*E. insulana* Boisd.  
**Family** : Noctuidae  
**Order** : Lepidoptera  
**Pest Category** : Borer



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must to break the link for the pest between cotton and alternate host crops. Bt hybrids suited to climate and soil in areas of endemic infestations prove to be highly effective. Pheromone traps of *E. vittella* and *E. insulana* can be set up @ two per ha that attract male moths to indicate the initiation and the degree of population development. The pheromone lures in the form of septa are to be changed once in 45-60 days with the trap height adjusted to 60 cm above the ground level in the early season, and 15 cm above crop canopy in the late season. The mechanical removal and destruction of the affected shoots along with the larvae during the pre and early squaring crop stage curtails the population build up further in the season. Managing the crop towards early maturity decreases the period of crop susceptibility to yield loss by bollworms. Therefore, practices that attract more attack by bollworms through increased vegetative growth such as closer spacing; excessive use of systemic insecticides during early season for sucking pest management and excessive nitrogen application should be avoided. The September is the month wherein *Earias* spp. combined with *Helicoverpa armigera* cause excessive shedding of squares. Bollworm management at this stage should be based on the available and damage level to fruiting parts on the plants besides weather. *Rogas aligarhensis* parasitisation on *E. vittella* larvae is common on the crop that had no insecticidal spray against sucking pests during early crop growth phase. The use of insecticides to be economical should commence only when majority of plants have at least few flowers and set bolls on them and the fruiting damage exceeds 10% in relation to total fruiting structures. Mechanical collection and destruction is advised when all the sizes of larvae occur simultaneously. As the name indicates, bollworms should be suppressed only when there are bolls on the plant and boll damage is happening. Decision to spray should be taken not based on the level of damage but based on the retention of bolls on the crop, and in conjunction with the presence of damaging larvae on the

crop. In Central India watch should be kept on medium to large sized bolls during October-November months from damage due to *Earias*. An average of single larva of *Earias* per plant can lead to partial damage of many bolls resulting in bad kapas in open bolls at harvest. The insecticides that are recommended with their dosages for *Earias* management are given in table below. *E. vittella* management should be attempted with insecticides selected from IGRs, Spinosyn, conventional (OPs, and Carbamates) and other newer groups (Oxidiazine & Avermectin) in rotation considering the cost of the insecticide and anticipated level of yield saving from their application. There should be minimum of 10 - 15 days interval between two sprays even at times of outbreaks to be cost effective.

The amount of spray fluid varies more with the canopy

### Recommended insecticides for *Earias* management

Group and name of the chemical	Formulation	Quantity of chemical (ml or g/ha)
<b>Carbamates</b>		
Methomyl	25 EC	2000
Thiodicarb	75 WP	2000
<b>Organophosphorus compounds (OP)</b>		
Acephate	75 WP	780
Chlorpyrifos	20 EC	1250
Profenophos	50 EC	1500
Quinolphos	25 EC	2000
Triazophos	40 EC	1500
<b>Insect growth regulators (IGR)</b>		
Novuluron	10 EC	1000
Lufenuron	5 EC	1200
Diafenthiuron	50 WP	700
Buprofezin	25 EC	400
Pyriproxyfen	10 EC	500
<b>Oxidiazine</b>		
Indoxacarb	15 EC	500
<b>Spinosyn</b>		
Spinosad	48 EC	100
<b>Avermectin</b>		
Emamectin Benzoate	5 EC	200

size than with the crop age. It is recommended that power sprayers be used against bollworm management through insecticides. Normally 200-300 litres/ha of water should be used for a crop that had attained eight to sixteen nodes.

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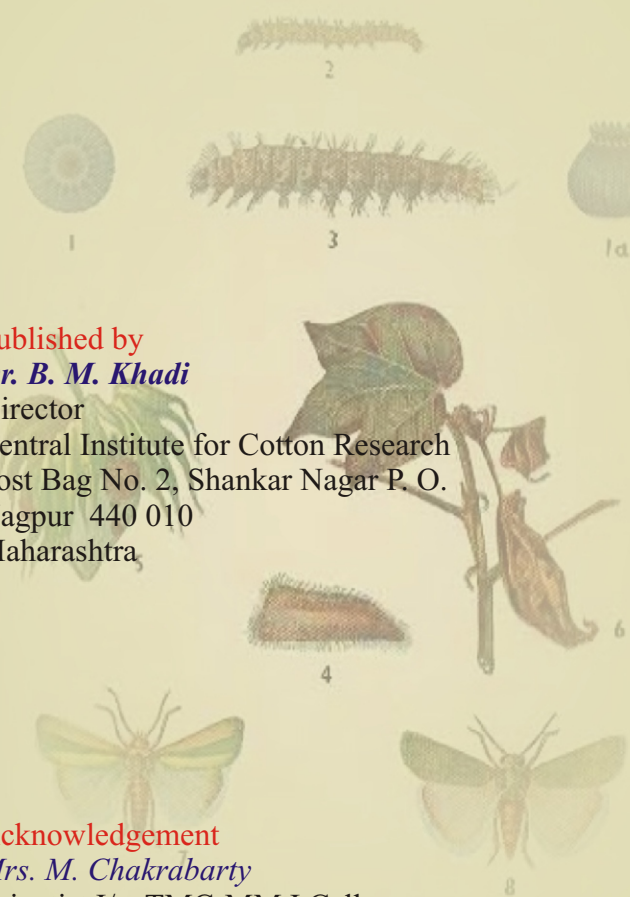
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### Description of Insect Stages:

**Egg:** Eggs are spherical bluish green, sculptured and less than 0.5 mm diameter. Eggs are laid singly on most part of the cotton plant (flower buds, bolls, peduncles and bracteoles); the favoured region being young shoots.

**Larva:** Full grown larva is about 1.3-1.8 cm long, stout and spindle shaped bearing a number of long setae on each segment. Last two thoracic and all abdominal segments bear two pairs of fleshy tubercles, one of which is dorsal



Fully grown larva

and the other lateral. Larva is light brown, tinged with grey to green, pale along the mid dorsal line with dark spots at the base of tubercles of the thoracic segments. Larva of *E. insulana* is generally lighter in colour, the pattern being grey and yellow than brown and deep orange. In *E. vittella* larval tubercles are much less prominent especially in the abdomen.

**Pupa:** Pupation is in a boat shaped tough silken cocoon that is dirty, white to brownish in colour. Pupae are found on plants or on fallen buds and bolls.

**Adult:** Adult moths differ with species. In *E. insulana*, the head, the thorax, and forewing colour varies from silver green to straw yellow; the distal fringe of wing is of the same colour. There are three distinct transverse lines of darker shade and traces of the fourth at times. Green forms are common during summer, while yellow/brown forms occur toward the end of season. *E. vittella*, moths are quite distinctively creamy white or peach with a central green wedge running from proximal to the distal edge of the forewing.



Adult of *E. vittella*

### Nature of Damage:

Neonate larvae cause damage to the terminal bud of the vegetative shoots and channel downwards or into auxiliary nodes during early stages of crop growth. The

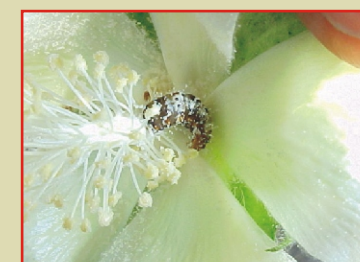
whole apex of main stem collapses, if the main stem growing point is affected. If the apical bud alone is damaged, there is twining of the main stem due to the growth of auxiliary monopodial buds. When flower buds/bolls are attacked, the tunnel opening is blocked by excrement. Tunnel in bolls is often from below, angled to



Tunneling of shoot by *Earias*



Square feeding by *Earias*



*Earias* feeding on flower



Feeding hole plugged by excreta



Boll feeding by *Earias*



Damage due to *Earias* feeding

the peduncle. Larvae do not confine their feeding to a complete single boll and hence damage is disproportionate to their numbers. Damaged bolls often succumb to secondary infection by bacterial and fungal pathogens.

### Symptoms:

Terminal shoots dry and wither away when the larvae bore into the pre squaring plants. Shoots when split open show downward channels with or without larvae. Feeding



Withered terminal shoot



Growth of auxiliary monopodial branches due to terminal damage

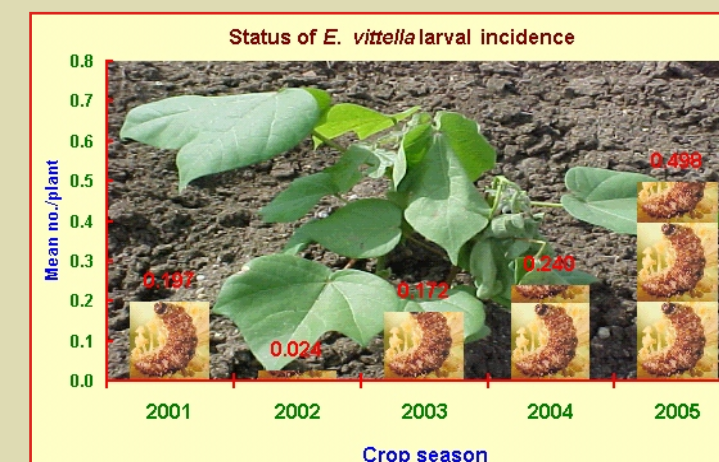
holes in squares and on bolls are seen with or without larvae however blocked by excrement. Flare up of squares and their shedding, premature dropping or opening of the attacked bolls are common.

### Life History:

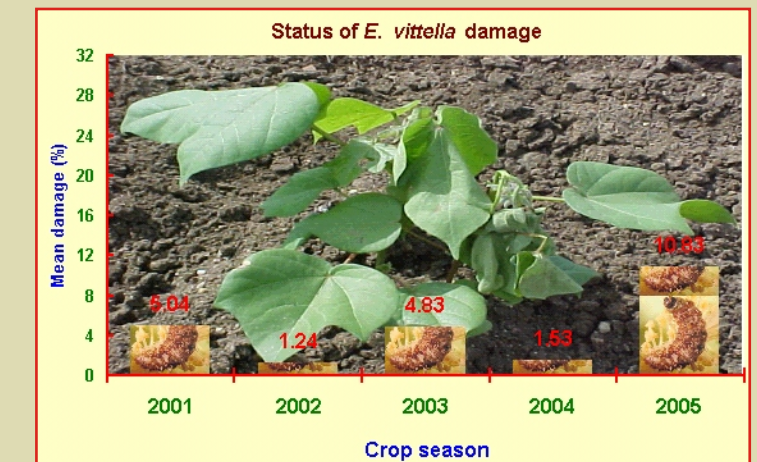
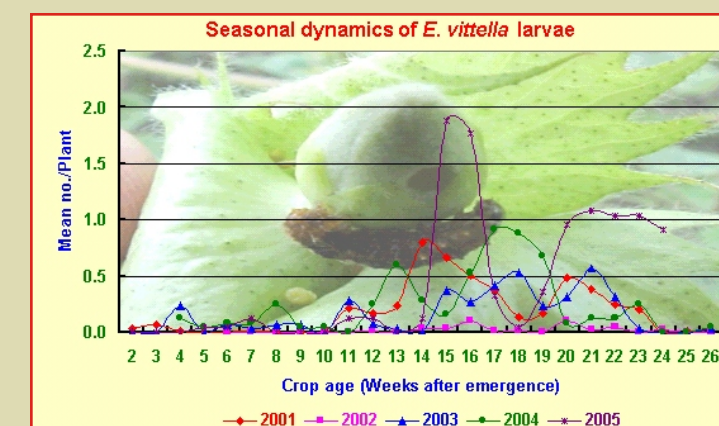
The female moth deposits 2 or 3 eggs on bracts, leaf axils and veins on the under surface of leaf. A female may lay about 385 eggs and the incubation period is about 3 days. The larva becomes fully grown in 10-12 days. The pupal period is 7-10 days. The total life cycle ranges from 20-22 days. *E. insulana* is the most abundant species in Northern states and *E. vittella* is predominant in Peninsular India. Okra or bhendi crop provides effective means of carry over from one to the next season.

### Seasonal Dynamics:

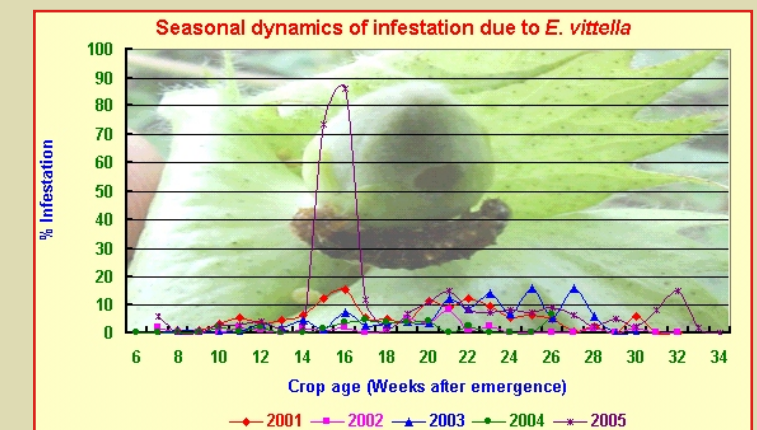
*E. vittella* seasonal mean damage in the rainfed cotton production system has reached more than 10 % during 2005, being the highest in the last 5 years. *E. vittella* incidence commences as early as on 3 weeks old crop. The number of generations up to the first flush of cotton



fruiting varies among seasons, but population levels are invariably low. Population build up is large during the



effective boll development phase of crop causing damage to all fruiting forms. Seasonal fluctuations of larval populations depend upon the crop phenology in a given year. The damage due to *Earias* to fruiting structures of



15-16 weeks old crop is high whenever *Helicoverpa armigera* incidence is low to moderate. Nevertheless beyond 20 weeks after crop emergence damage by *Earias* is continuous. *Earias* clearly shows co-existence with *H. armigera* during early season and *Pectinophora gossypiella* in the late seasons. The continuous damage to developing bolls caused by *E. vittella* along with intermittent rains lead to boll rot and results in large number of bolls opening with partial damage, thus causing reduction in yield levels.

### Pest Management Options:

Previous season's post harvest cultural operations such as timely crop termination, destruction of cotton stalks and crop residues in the fields reduce the food supply and shelter to the bollworms. Preplanting clean up measures during off-season to keep the fields, their bunds and borders free of weed hosts (esp. malvaceous plants) are a