



Know Your Cotton Insect Pest PINK BOLLWORM

Common Name	: Pink bollworm
Local Name	: Gulabi/Shendri bond ali
Scientific Name	: <i>Pectinophora gossypiella</i> Saund.
Family	: Gelechiidae
Order	: Lepidoptera
Pest Category	: Borer



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of Good Quality Cotton”

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Prediction Criteria:

Maximum temperature greater than 33°C, morning relative humidity less than 70 %, evening relative humidity greater than 40 % during the standard weeks of 40, 41 and 43, and less than 12°C minimum temperature between 48 and 49, respectively result in *P. gossypiella* severity.

Pest Management Options:

Cultural control plays a key role in keeping down the number of pink bollworm carry-over between cotton crops. Maintenance of host free period during off-season is a must to ensure a pink boll worm free next season. Therefore, effective measures of prevention of pink bollworm damage include post harvest, off-season and preplanting actions. Allowing cattle grazing of the left over green bolls on the plant at the end of crop season, timely crop termination to maintain closed season, clean up/ destruction of cotton stubbles immediate to harvest, avoiding stacking of cotton stalks for fuel purpose over long periods and summer deep ploughing to expose the pupae of the surviving larvae constitute post harvest and off season cultural measures. These practices adopted on a field-to-field basis over large areas of cotton growing regions by the cultivators would largely bring down the attack of pink bollworm in the ensuing season. While planning for the next season selection of varieties with early maturity, drying of seeds under sun for 6-8 hours and sowing of acid delinted seeds are effective and economical to prevent the carry over of pink bollworm to the next cotton season.

During the cropping season care must be taken to monitor pink bollworm infestation on the crop. This can be done easily through the use of gossyplure pheromone baited traps that attract the males. Once few male moths are found in the traps it is an indication of the incidence starting in the bolls of the cotton plants. One approach of pink bollworm suppression is to trap most of the male moths in the crop ecosystem by using large number of pheromone traps (@ 20 nos./ha) so that mating is disrupted and the population development is arrested. For this method to be effective traps should be placed over many fields over larger areas. Since the damage and stages of pink bollworm are not visible the decision of

insecticidal spray is arrived at using the male catches in the traps. If the moth catches exceed eight per trap for three consecutive days an insecticidal spray in the field is desired. When much of the bolls on the plants are 20-25 days old during October end and November insecticidal protection is a must. In the absence of pheromone traps, assessment of pink bollworm damage should be based on destructive sampling (boll cracking method) and chemical spray should be taken up when two live larvae are found in 20 medium sized green bolls sampled per acre. Pyrethroids can be used against pink bollworm during this period. The open bolls on the plants should be harvested before the spray, as there is likelihood of aphid resurgence. When there is resurgence of aphids that would affect the quality of cotton it is recommended to spray any one organophosphorus insecticides. This takes care of pinkies as well as stainers resulting in the harvest of quality cotton.

Recommended insecticides for pink bollworm management

Group and name of the chemical	Formulation	Quantity of chemical (ml or g/ha)
Carbamates		
Methomyl	25 EC	2000
Thiodicarb	75 WP	2000
Organophosphorus compounds (OP)		
Acephate	75 WP	780
Chlorpyrifos	20 EC	1250
Profenophos	50 EC	1500
Quinolphos	25 EC	2000
Triazophos	40 EC	1500
Synthetic pyrethroids		
Cypermethrin	10 EC	600
Cypermethrin	25 EC	200
α - Cypermethrin	10 EC	200
Decamethrin	2.8 EC	450
Fenvalerate	20 EC	400
Lambda-cyhalothrin	5 EC	400
Bifenthrin	10 EC	800
β- Cyfluthrin	25 EC	75
Spinosyn		
Spinosad	48 EC	100
Avermectin		
Emamectin benzoate	5 EC	200

The amount of spray fluid varies more with the canopy 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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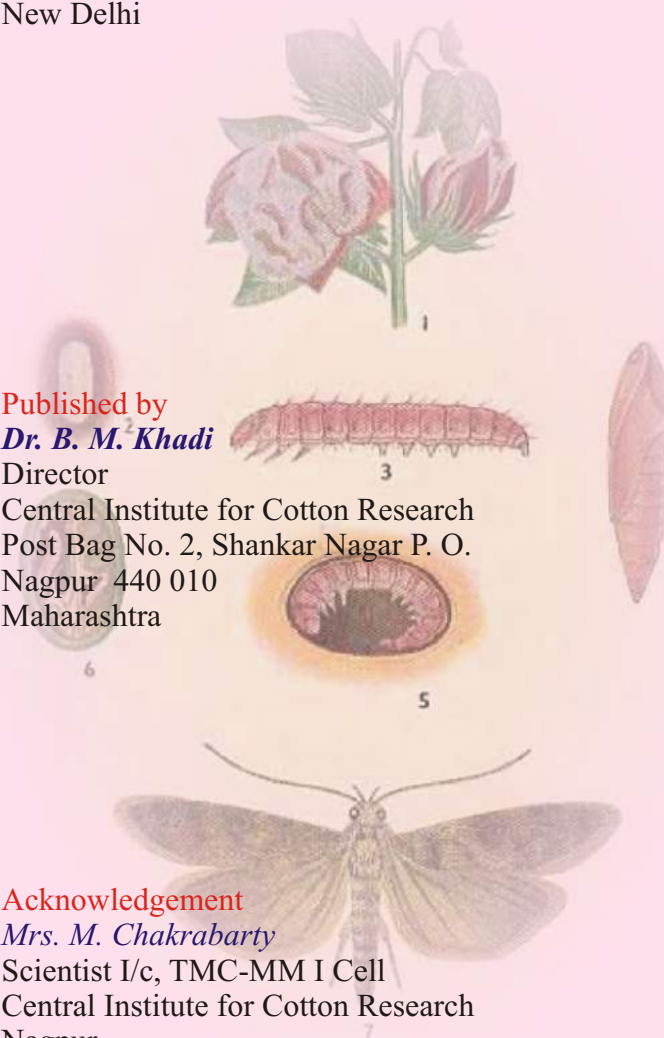
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Description of Insect Stages:

Egg: Eggs are pearly iridescent white, flattened, oval measuring approximately 0.5 mm long, 0.25 mm wide and sculptured with longitudinal lines. Eggs are laid singly or in groups of four to five.

Larva: First two instars are white, while from third instar pink colour develops. The larvae have the characteristic dark brown head due to the sclerotised prothoracic shield.



Early instar larva

Pupa: Pupae are light brown when fresh, gradually become dark brown as the pupation proceeds. Pupa measures up to 7 mm in length.



Late instar larva

Adult: The adult moth is greyish brown with blackish bands on the forewings and the hind wings are silvery grey. Moths emerge from pupae in the morning or in the evening, but are nocturnal, hiding amongst soil debris or cracks during the day.



Adult of *Pectinophora*

Nature of Damage:

Larva when attacks the bud of less than 10 days old, shedding of bud occurs and larva dies. But with older bud, larva can complete development. There can be cent percent pink bollworm infestation on bolls but there need not be any shedding. Larva in flower bud spins webbing that prevents proper flower opening leading to "rosetted-bloom". Ten to twenty days old bolls are



Rosetted bloom



Larval feeding on young boll

attacked from under bracteoles. Larvae feed on the developing seeds. While in younger bolls entire content may be destroyed, in older bolls development could be completed on three to four seeds. Interloculi movement is also seen. Several larvae can infest a single boll.



Larva feeding on seeds

Symptoms:

'Rosetted flower' (improper opening of petals) is typical of bollworm attack. Small exit holes (smaller than the feeding holes of other two bollworms viz., *Earias* & *Helicoverpa*) are seen on developing green bolls. Stained lint around feeding areas resulting in bad quality kapas is seen in open bolls. Improper boll opening with damaged seeds are obvious. Small round holes are seen on the septa between locules of open bolls. Lint of pink bollworm attacked bolls is of inferior quality.



Exit hole by larva before pupation



Improper opening of boll



Pectinophora damage in open bolls

Life History:

Early in the season, eggs are laid in any of the sheltered places of the plant axis of petioles or peduncles, the underside of young leaves, on buds or flowers. Once the bolls are 15 days old, these become favored sites for oviposition. Incubation period is 3-6 days. First two instars are white, while from third instar pink colour develops. Larval cycle lasts for 9-14 days in

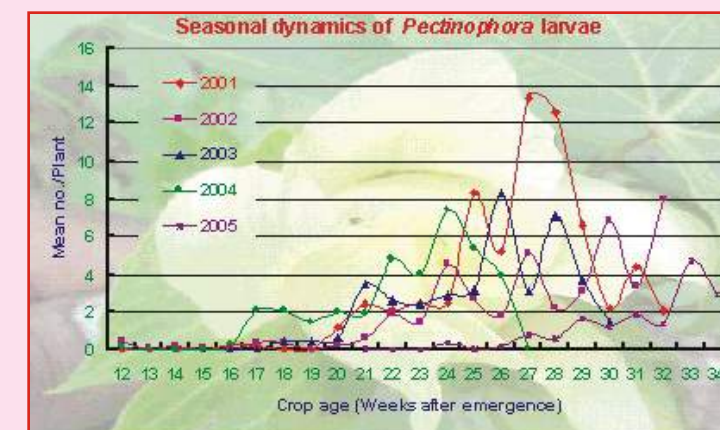


Diapausing larvae

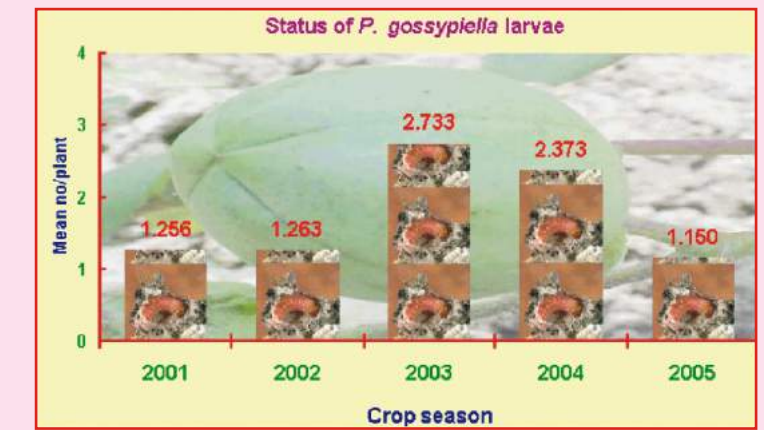
hotter regions. The mature larvae are either 'short-cycle' and will go on to pupate or 'long cycle' to enter a state of diapause. While the former is the observed phenomenon in South India, diapause is seen in the North and Central parts of India. Short cycle larvae pupating may cut a round exit hole through carpel wall and fall to ground or may tunnel the cuticle, leaving it as a transparent window and pupate inside. Pupation is inside a loose fitting cocoon with a highly webbed exit at one end. Pupal period ranges between 8 and 13 days. The life cycle is completed in 3-6 weeks. Late season has invariably overlapping broods. The long cycle larvae entering diapause, spins a tough thick walled, closely woven, spherical cell referred as "hibernaculum" with no exit hole. Always, the long-term larvae occur during end of crop season, where there are mature bolls present and larvae often form their hibernaculae inside seeds. Hibernacula may occupy single seeds or double seeds. *P. gossypiella* hibernate as full fed larvae during cold weather. Diapause larvae often spin up in the lint of an open boll and if still active in ginnery, will spin up on bales of lint, bags of seed or in cracks and crevices. Moths emerging from the hibernating larvae are long lived with females and males alive for 56 and 20 days, respectively.

Seasonal Dynamics:

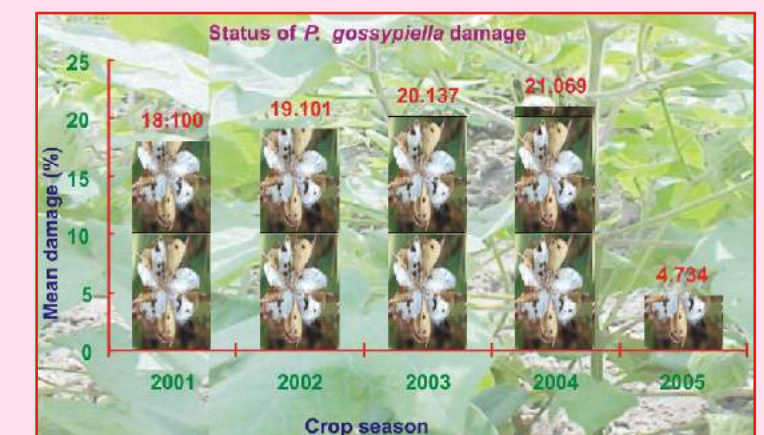
Insect is highly adaptable to different climatic conditions and larvae hide over unfavourable season inside empty



cottonseed in which they are well protected and remain alive for many months. Survival of the pest from one season to another is entirely through hibernating larvae in seeds, soils and plant debris. Incidence of *P. gossypiella* during the season commences from the moth emerging from the overwintering larvae through the summer season. This is the only pest, which peaks at harvest. Depending upon the periods of crop maturity the seasonal



incidence and infestation levels vary. The effective population buildup starts after 100 to 110 days of crop emergence, while the peak infestations occur after 140 days. The crop with late maturity suffers heavy attack with 50-75 % of the bolls showing damaged locule (s) in



open bolls. In the last five years, the levels of incidence were high during 2002 & 2003, whereas 2005 had the lowest incidence as well as damage. The higher damage levels despite lower incidence arise due to less number of bolls available at the end of season. If the pink bollworm appears early in the crop season due to favourable weather conditions, the damage is much more intensive during late season.