

- Bt cotton as a component of pest management technically pre empts the use of other bioagents viz., *Trichogramma chilonis* and *Helicoverpa armigera* nuclear polyhedrosis virus (HaNPV), mechanical control, use of pheromones and insecticides against bollworms.
- Biorationals such as *Bacillus thuringiensis*, HaNPV, Neem seed kernel extract and neem oil can be used as an initial sprays when *H. armigera* egg numbers and early instars are more on conventional cotton.
- Always target younger stages of bollworms as they are susceptible to the normal recommended dosages of insecticides.
- Rotation of chemical groups along the crop phenology helps in preventing the build up of resistance and increases the life of insecticides.
- Early crop maturity decreases the period of crop susceptibility to yield loss by insects, reduces insect control costs and lowers selection pressure for insecticide resistance development.
- Pay special attention to fields that have been treated with insecticides!
- Integrated Pest Management (IPM) does not exclude the use of insecticides.
- IPM is not organic farming.
- IPM is not universal and varies among commodities, geographic locations and pest status.
- IPM is not implemented overnight and requires many years of focused activities.
- IPM is a strategy of pest management as a part of the production system
- IPM is an evolutionary process and continues to advance with the changing varietal scenario, pest status and available pest management options.
- IPM is not a rigid program of management techniques, but involves intelligent selection of practices of pest management with the goals of higher production, quality, economic returns and environment friendliness.

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TIPS ON COTTON INSECT PEST MANAGEMENT FOR PRODUCTION OF GOOD QUALITY COTTON



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- ☛ Insects are pests only when they are sufficiently numerous to cause economic damage
- ☛ Pest status on cotton keeps changing over seasons depending on the management practices imposed by man in growing the crop largely, and upon natural biotic and abiotic components.
- ☛ Insects thrive on a wide variety of hosts during off-season and hence keep a watch of adjacent crops including vegetables, and weeds for pests that could injure cotton.
- ☛ Cultural decisions concerning cotton production can influence the infestation levels of insect pests.
- ☛ After final picking, allow animal grazing to eat away the remaining green bolls that are sources of pink bollworm carry over.
- ☛ Termination of the crop immediate to last picking pre-empts food and shelter for insect pests.
- ☛ Do not stack cotton stalks after harvest near the fields.
- ☛ Destruction of crop residues at the end of crop season prevents carry over of pest populations to the following season
- ☛ Keeping a closed season through maintenance of host free period during off season aid in reduced pest problems in the following season
- ☛ Timely disposal of the seed cotton from farms curtails the carry over of pink bollworm to the next season.
- ☛ Only recommended varieties/hybrids including Bt hybrids, for the agro climatic region from reliable seed sources must be procured.
- ☛ Bt transgenic cotton hybrids should be grown in better cotton production systems where edaphic and climatic uncertainties are less.
- ☛ Use delinted seeds to get uniform and better germination.
- ☛ Select to grow early maturing cultivars of cotton in areas that are hot spots for pink bollworm.
- ☛ Grow only *Desi arboreum* cotton in whitefly transmitted leaf curl virus hot-spot areas.

- ☛ Selection of a sucking pest tolerant cotton cultivar even in Bt hybrids is mandatory for a good crop stand and to realise better yields.
- ☛ Adopt the optimum planting dates specific to the region to harvest maximum !
- ☛ Early sowing of cotton on ridges and furrows conserves moisture and aids in better plant growth.
- ☛ Adopt recommended spacings for the varieties and hybrids in respect to your area.
- ☛ Apply fertilizers at proper dosages and at proper time in splits as recommended.
- ☛ Intercropping of cowpea with cotton encourages aphidophagous predators and bollworm parasitoids.
- ☛ Sucking insect pests called as sap feeders are plant stand as well as photosynthetic reducers.
- ☛ Combined injury due to jassids, aphids and thrips cause premature shedding of flower buds leading to delayed crop maturity.
- ☛ Anticipate outbreaks of thrips and aphids during periods of dry weather.
- ☛ Whiteflies are mid to late season pests and transmitters of leaf curl virus disease.
- ☛ Resurgence of thrips on cotton crop grown with seed treatment, and of aphids and whiteflies after pyrethroid sprays are common.
- ☛ Mirids that have obtained pest status recently although belong to sucking pest category, cause damage to fruiting structures similar to bollworms.
- ☛ During squaring, pay attention to the missing squares and scars, indicative of excess mirid bug or thrip damage.
- ☛ Excess shedding of squares of variable sizes with clear cut round feeding holes indicate the incidence of *Helicoverpa armigera*.
- ☛ Larvae of *Earias* do not confine their feeding to a complete single boll and hence damage is disproportionate to their numbers.
- ☛ The most severe pink bollworm infestation commonly occurs in fields planted back to cotton the following year.

- ☛ There can be cent per cent pink bollworm infestation on bolls but there would not be any shedding.
- ☛ Cotton ecosystem can supplement more of beneficial insects than the number of pests if "IPM treadmill" sets in.
- ☛ Watch out for the activity of predators such as lady bird beetle grubs, chrysopids and spiders before deciding to spray, as they execute considerable natural control of sucking pests.
- ☛ Regular periodic sampling of insect pest incidence until most bolls have matured is a must for their effective management.
- ☛ Cotton plant can compensate for the early season fruit loss and there are occasions where overcompensation to pest attack leads to higher yields.
- ☛ Using preventive and cultural control tactics can reduce the need for insecticides by delaying or reducing the severity of insect pest outbreaks.
- ☛ Pheromone lures are available for all species of bollworms and prefer to use them with traps from squaring onwards, for monitoring their onset in cotton fields.
- ☛ Operate light traps between 2 and 4 A.M. during periods of heavy attack of anyone or more bollworms for mass trapping.
- ☛ Set up pheromone traps @ 5 / ha for pink bollworm. Eight moths / trap / night for three consecutive nights can also be used as an ETL.
- ☛ Erect bird perches @ 5/hectare to facilitate bird visitation and predation in cotton ecosystem.
- ☛ Heavy rains limit or reduce the population of sucking pests in general, and of aphids, thrips and whiteflies, in particular.
- ☛ Avoid use of broad spectrum organophosphates such as monocrotophos, metasystox, dimethoate and phosphomidon as early season sprays as they destroy the natural enemy populations besides predisposing plants for bollworm attack.
- ☛ Mechanical picking of *H. armigera* during periods of heavy attack gives you more relief than repeated sprayings!