

SPLAT: A New Pheromone Technology for The Management of Pink Bollworm in Cotton

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Cotton is an important commercial crop contributing for the growth of agricultural and industrial sector in India. However, there are multiple factors which can hinder the total output of cotton per unit area including pest and diseases, cultivation of varieties/hybrids, soil type and other environmental factors. Of these, insect pest damage is predominant viz., sucking pests and bollworm complex (Spotted bollworm, Pink bollworm, and American bollworm) are major production constraint and contribute the loss up to 50–60 %. Among bollworm complex, pink bollworm (*Pectinophora gossypiella*) causing significant damage to the cotton growing regions across India and it is due to the development of resistance against Bt toxins (Cry1Ac and Cry2Ab). The newly emerged larvae enter into the bolls, which feed internally on developing seeds. Sometime, larvae undergo diapause during the onset of cool and dry conditions. The development of resistance to Cry1Ac and Cry2Ab has forced the cotton growers to spray insecticides repeatedly from flowering to boll maturation. Yet. The multiple application of insecticides also did not provide satisfactory control due its feeding behaviour.

Sex pheromones are volatile substances released by female insects to attract males for mating. Pink bollworm sex pheromone consists of two compounds, (Z,Z)- and (Z,E)-7,11-hexadecadienyl acetates, in about a 50:50 ratio and it is commonly known as gossyplure. Monitoring using pheromones is best carried out for pink bollworm, a pest whose trap catches correlate well with larval damage in green bolls. Mass trapping and mating disruption of adult moths have been tried previously by using sex pheromone; Yet, it gives only partial results because the traps and pheromone dispensers deployed at a lower density than recommended. Considering all these shortcomings, there is a need to shift from traditional management practices to a novel technique

called SPLAT (Specialized Pheromone and Lure Application Technology), which is best suited alternative to manage pink bollworm population.



Fig. 1 Application of gossyplure dollops on the crop canopy for pink bollworm mating disruption

Specialized Pheromone and Lure Application Technology (SPLAT) is a wax-based formulation having sustained-release of pheromone which led to mating disruption and prevents insect pests from reproducing. It consists of gossyplure ((Z,Z/ZE)7, 11-hexadecadienyl acetate) as active ingredient blended with wax and water. The simulation of emitting the natural pheromone of female moths causes males to become confused and very difficult to locate a female to mate with. This results in collapse of insect pest population due to reduced mating rates. In this technology, a small drop of formulation known as dollop will be placed on the crop itself and thus release volatile components of pheromone. The amount of sex pheromone emitted by each SPLAT dollop would be sufficient to shut down mating as males have diverted away from females due to the powerful allure of the pheromone. Unlike females, SPLAT dollops emit high doses of pheromone continuously.

The dosage required per acre is around 125 g per application and it should be applied at different intervals like 30, 60-65, 90-95 and 120- 125 days after sowing. A minimum area of 25 acres at one location may be best suited for its effectiveness. The ready to use formulation is in the form of a paste and can be applied in the form of small dollops (peanut size) at primary branch axil (below 3 to 4 inches from crop canopy) at 400 to 500 spots per acre at 3 meters apart in zigzag pattern. Unlike female moths, SPLAT dollops can emit high doses of pheromone continuously and the amount of sex pheromone emitted by each SPLAT dollop is many times more than the amount of natural pheromone, which creates a very powerful attraction and the male moths of pink bollworms are attracted towards these dollops of SPLAT paste confusing them for females. The male could not locate the female moths and it keep hovering over the crop canopy. In absence of female, they are

unable to copulate, because of which the process of fertilization and reproduction is affected and thereby, the field gets rid of pink bollworm attack.

ICAR-National Research Centre for Integrated Pest Management, New Delhi, in collaboration with ICAR-Central Institute of Cotton Research, Nagpur and University of Agricultural Sciences, Raichur have taken a field trial in a large scale and the results are encouraging. SPLAT technology against pink bollworm is a boon to farming community and this can be a novel technology for the management of pink bollworm. However, it must be an integral part of Integrated Pest Management (IPM) strategies to optimize cotton yield along with healthy environment. Although there are many tools available for pink bollworm management, the disadvantages associated with each one far outweigh their benefits.

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