

81ST PLENARY MEETING

MUMBAI, INDIA

2-5 December 2023

Cotton Value Chain:
"Local Innovations for Global Prosperity"



MINUTES

THIRD BREAKOUT SESSION Combating Pest Management Challenges SUNDAY, 3 DECEMBER, 16:00 TO 18:00

Chair: Dr YG Prasad, Director, ICAR-Central Institute for Cotton Research
Co-chair: Dr AL Waghmare, Director, Directorate of Cotton Development

The meeting began at 16:00.

In this session featuring four speakers, Dr Sandhya Kranthi emphasised understanding the root causes of pest emergence in Indian cotton cultivation to develop effective, eco-friendly pest management strategies. Dr PK Singh discussed genetically modified cotton lines targeting pink bollworm, leaf armyworm, and whitefly to enhance cotton productivity in India. Ms Driana Lwanda addressed pest management challenges in African cotton farming, highlighting traditional practices and proposed solutions. Dr Megha Parajulee shared insights into technological advancements in cotton production, successful pest eradication programs in the USA, and the introduction of a Marathi-translated cotton crop protection app for Maharashtra. Together, these presentations shed light on pest management practices and innovations, showcasing efforts to improve cotton cultivation across different regions.

Dr Sandhya Kranthi's presentation on 'Pest Management Challenges in India and Proposed Solutions' emphasised the importance of understanding the root causes of pest emergence in cotton cultivation. She highlighted that identifying these underlying factors was crucial for developing effective and eco-friendly pest management strategies rather than just treating the symptoms. Various factors like new crop varieties, novel pesticides, excessive fertiliser use, and changes in crop duration have exacerbated pest issues in India, including the American bollworm, pink bollworm, whiteflies, and the cotton leaf curl virus. Historically, shifts in pest prevalence have occurred due to changes in agricultural practices, chemical usage, fertilisers, and crop varieties. For instance, the introduction of synthetic pyrethroids in 1980 led to the emergence of American bollworm and whitefly as major pests. Excessive pyrethroid use

disrupted natural biological control systems, resulting in pestilence and pest resistance to multiple insecticide groups. The pink bollworm resurged as a major threat due to extended cotton cultivation periods and the adoption of hybrid Bt-cotton, ultimately developing resistance to Bt-toxins. Whiteflies and cotton leaf curl virus problems also worsened due to excessive urea application and new cotton varieties. To address these challenges, the presentation recommended sustainable strategies focusing on ecological tactics, non-pesticidal technologies, and coordinated insecticide and Bt-cotton use, drawing from successful experiences in the United States. The goal was to establish durable and sustainable pest management practices in Indian cotton cultivation.

Dr PK Singh discussed the management of cotton pests in India, focussing on the pink bollworm, leaf armyworm, and whitefly. India's cotton productivity has been hindered by these pests, prompting the development of genetically modified (GM) cotton lines. The first GM cotton line targets the pink bollworm and leaf armyworm, achieving over 90% mortality for pink bollworms and comparable control for leaf armyworm. It expresses a specific insecticidal protein for up to 160 days. The second GM cotton, Tma12 Cotton, disrupts whitefly development but is less effective in the field. A third GM cotton with an unpublished insecticidal gene aims to improve whitefly control. For large-scale whitefly control, a GM cotton variety is engineered to attract and harm whiteflies, also attracting their natural enemy, *Eretmocerus* sp., preventing their reproduction. Overall, these GM cotton varieties offer promising solutions for pest management, but a multi-location project is needed for comprehensive cotton protection against herbivores and sucking pests.

In her presentation, Ms Driana Lwanda highlighted the significant challenges faced by cotton farmers in Africa regarding pest management. Africa, the world's fourth-largest cotton producer, relies on smallholder rain-fed agriculture, but low productivity and poor cotton quality are prevalent due to limited access to modern inputs and pest infestations. Pests like bollworm, leafworm, aphids, whiteflies, and cotton stainers are major culprits. African farmers employ traditional pest management practices such as crop rotation, intercropping, trap crops, hand-picking, cultural practices, natural insecticides, and biological control. However, challenges like pesticide misuse, resistance, inadequate research, climate change impacts, and limited access to pest-resistant cotton varieties persist. Proposed solutions encompass research and innovation, integrated pest management, improved extension services, climate-resilient practices, and the establishment of pest monitoring and early warning systems, aiming to enhance pest control, boost cotton productivity, and ensure sustainability in African cotton farming.

Dr Megha Parajulee presented an overview of his group's extensive entomological extension research, emphasising technological advancements in cotton production, particularly tailored for rainfed regions, successfully implemented in Texas, USA. He illustrated these innovations with photographs, offering insights into their practical application. Furthermore, Dr Parajulee highlighted the remarkable achievements of the boll weevil (*Anthonomus grandis*) and pink bollworm eradication programmes in the

United States. Originating from Mexico, the boll weevil devastated southern cotton-producing regions in the late 19th century, prompting comprehensive eradication efforts. The pink bollworm eradication program was successfully completed in 2018, demonstrating milestones in integrated pest management (IPM). Additionally, Dr Parajulee introduced a Marathi-translated application designed for cotton crop protection, enhancing accessibility and adoption among local farmers in Maharashtra. These combined efforts underscore the significance of science-driven solutions and collaboration in effective pest management within agriculture.

The session ended at 18:00.