The ICAC Recorder

Refuge Strategy and Resistance Monitoring are Critical for PBW Management

Interview with Dr Yuanxue Yang and Dr Hezhong Dong

Dr Yuanxue Yang is an assistant research fellow at Shandong Academy of Agricultural Sciences. Her research field is on cotton protection, focusing on pest management in cotton crop.

Dr Hezhong Dong is a senior principal scientist at Shandong Academy of Agricultural Sciences. His research field is on cotton ecology and physiology, focusing on field management for high yield and quality of cotton.

How serious is the problem of pink bollworm in different cotton growing regions of China?

Traditionally, there have been three major cotton growing regions in China, Yangtze River valley, Yellow River valley, and Northwest inland. Before *Bt* cotton was widely adopted in 2000 in China, the pink bollworm was one of the most serious insect pests of the nation, especially in Yangtze River valley. According to the estimates of cotton scientists and agronomists, it usually resulted in 15-20% and 5% yield reduction of cotton in Yangtze River valley and Yellow River valley cotton growing regions, respectively. However, Since the widespread of *Bt* cotton in 2000, the pink bollworm has not seriously occurred and is no longer a problem in China.

What could the range of economic damage (%) be in different regions? How serious was the pink bollworm in earlier times compared to what it is in recent years?

Because the occurrence varied with cotton growing regions, economic damage was also different in various regions. It was generally believed that the pink bollworm caused 15 and 5-10% economic loss in Yangtze River valley and Yellow River valley, respectively. However, the pink bollworm seldom occurred in the northwest inland, and thus there was no recorded economic damage in this region. It should be noted that the pink boll worm has not caused economic damage since wide adoption of *Bt* cotton in China.

What do you think are the factors that prompted its resurgence as a serious pest?

The pink bollworm currently is not a serious problem as the wide adoption of *Bt* cotton. However, if the pink bollworm produces resistance to *Bt* toxin, this factor will prompt its resurgence as a serious pest.

What in your opinion are the major factors that delayed its resistance development to *Bt* cotton in China?

China is one of the best countries to control the resistance to *Bt* cotton, which is largely due to the rich and diverse planting system and the use of F1 and F2 hybrid cotton seeds. There are many host plants of the cotton bollworm. The cotton-based intercropping system provides a natural refuge for the cotton bollworm. The host crop of pink bollworm is relatively single and other crops cannot provide refuge for it. However, hybrid cotton is widely planted in China. One of the parents is usually non-*Bt* cotton. The average purity of hybrid seed (F1) is 95-98%, which results in at least 3-5% of non-*Bt* cotton plants in the field and provides a refuge for pink bollworm. Therefore, intercropping, double cropping and hybrid seed delayed the resistance of boll worm or pink bollworm to *Bt* cotton.

Have there been any recent innovations for PBW management from research institutes in China?

In recent years, China's cotton planting has shifted to the Northwest. The cotton planting area in the Northwest Inland accounts for about 80% of the total national cotton area. However, pink bollworm rarely occurs in the Northwest inland and has not been a major pest, so the research on pink bollworm management is rarely carried out in recent years.

What in your opinion are the most important management strategies?

Refuge strategy and resistance monitoring should be the most important management strategies.

Photograph: Mahesh Upender