

**SPRING EMERGENCE OF PINK BOLLWORM  
ON BT AND NON-BT COTTON  
IN THE COMARCA LAGUNERA, MEXICO**

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**Abstract**

Spring emergence of the pink bollworm (PBW), *Pectinophora gossypiella* (Saunders) on Bt and non-Bt cotton was determined in the Comarca Lagunera, Mexico, during 1997 and 1998. There was no spring emergence of PBW or it was very low on Bt cotton during both years. These results indicate that spring emergence is drastically reduced in those areas where Bt cotton was planted the previous year, and explain largely the low infestation levels of PBW and the reduction of insecticide use in the Comarca Lagunera during the last two years.

**Introduction**

The pink bollworm, *Pectinophora gossypiella* (Saunders), since its introduction to the Comarca Lagunera in 1911 has been the key pest of cotton, due to the direct damage it causes to crop, the cost of its control and the environmental contamination from the insecticides used against it. PBW survives from one year to another under a resting stage known as diapause or hibernation, which takes place when the larvae is completely mature. This resting stage occurs regularly before temperatures become too low in the winter, which are unfavorable for its development. Several studies show that the main factors involve in the induction and termination of PBW diapause are photoperiod, temperature, nutrition of larvae, and humidity (Albertos 1974, Butler *et al.* 1978, Watson *et al.* 1973). Nava (1982) determined that the PBW diapause begins around the first week of August and the maximum incidence occurs from the last week of October to the first week of November. He also reported that PBW spring emergence starts normally by the end of March, reaches a peak in May, and ends by late June.

**Materials and Methods**

This study was carried out from 1996-1997 and 1997-1998 at La Laguna Experiment Station, Matamoros, Coah., México.

**Spring Emergence from the Soil**

The following treatments were established during the 1996 fall at La Laguna Experiment Station: 1) transgenic variety NuCOTN 35B, and 2) conventional variety Deltapine 51. Four 4-m<sup>2</sup> metallic emergence cages per treatment were placed randomly directly on the ground on January 1, 1997. Emergence cages were reviewed weekly from January to June 1997 and PBW moth emerged were recorded.

The following treatments were established during the 1997 fall in commercial cotton plots of the Comarca Lagunera: 1) transgenic variety NuCOTN 35B under the conventional tillage cotton production system, 2) conventional variety Deltapine 20 under conventional tillage, 3) conventional variety Deltapine 5409 under conventional tillage, 4) conventional variety Deltapine 5409 under the minimum tillage cotton production system. Five 4-m<sup>2</sup> metallic emergence cages per treatment were placed randomly on the ground during the first week of February 1998. Emergence cages were reviewed twice a week from February to the end of May of 1998.

**Spring Emergence from  
PBW Infested Cotton Bolls**

A sample of 400 medium and large cotton bolls infested with PBW larvae were collected on September 19 and 24, and October 2, 10, 18 and 24 of 1997 from cotton plots planted with the conventional variety Deltapine 50 and the transgenic variety NuCOTN 35B at La Laguna Experiment Station. This sample was divided in four groups of 100 bolls each and placed into small emergence cages. Emergence cages had a wood box (30 x 30 x 14cm) on the bottom and a pyramidal top (29cm high) made of wood and metallic screen, which has a half-liter glass jar to trap emerging PBW adults. Emergence cages were subjected to field conditions and checked twice a week until the end of May, 1998.

**Results and Discussion**

**Spring Emergence from the Soil**

There was no emergence of PBW moths in the Bt cotton during 1997. On the contrary, average spring emergence in the non-Bt cotton was of 7.0 PBW moths/4m<sup>2</sup>. This data indicates that the estimated spring emergence was of 17,500 moths/ha in non-Bt cotton during 1997. Most PBW moths emerged in April and about 95% of the spring emergence occurred before cotton squaring (Table 1). These results explain, besides other factors, the low infestation levels of PBW during the 1997 cotton growing season. Moreover, they indicate that spring emergence will be very low or null in those areas where Bt cotton was planted the previous year.

In 1998, the average spring emergence was only 0.2 PBW moths/4m<sup>2</sup> in the Bt cotton. Spring emergence in the conventional varieties ranged from 1.4 moths/4m<sup>2</sup>, in the minimum labor system, to 3.6 moths/4m<sup>2</sup> in the traditional system. There were 1.5 times more emergence in the conventional tillage system than in the minimum tillage system, when Deltapine 5409 data are compared in both cotton production system (Table 2). These data indicate that estimate spring emergence ranged from 6,000 to 9,000 moths/ha in the conventional tillage cotton production system of the Comarca Lagunera, in 1998. Most PBW moths emerged during May in this year and about 58% of the spring emergence in the conventional tillage system occurred before cotton squaring. Due to this, the number of moths infesting cotton squares in 1998 was higher than in 1997. Consequently, PBW infestation levels during the 1998 cotton growing season were higher than in 1997.

### **Spring Emergence from PBW Infested Bolls**

Non-hibernating moth emergence from non-Bt cotton bolls (variety Deltapine 50) was high and spring emergence was low. Only 18 hibernating moths emerged from 2400 non-Bt cotton bolls during 1998, which corresponded to 0.74 moths emerged per small wood cage. This very low spring emergence in non-Bt cotton bolls was related to the severe winter 1997-1998. Few non-hibernating moths emerged from Bt cotton bolls and there was no spring emergence from Bt cotton bolls during 1998 (Table 3).

### **Conclusions**

Spring emergence of PBW was very low or null in Bt cotton, which indicates that spring emergence is drastically reduced in those areas where Bt cotton was planted the previous year. These results explain, largely the low infestation levels of PBW and the reduction of insecticide used during 1997 and 1998 in the Comarca Lagunera.

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### **References**

Albertos, S.C. 1974. Studies on diapause induction and development of the pink bollworm *Pectinophora gossypiella* (Saunders) (Lepidoptera: Gelechiidae), under controlled conditions. Ph.D. Tesis, Universidad de California, Riverside, 76 p.

Butler, G.A., Jr., A.G. Hamilton and A.P. Gutiérrez 1978. Pink bollworm diapause induction in relation to temperature and photophase. *Ann. Entomol. Soc. Am.* 71: 202-204.

Nava C.U. 1982. Emergencia de origen diapáusico del gusano rosado del algodnero *Pectinophora gossypiella* (Saunders) en la Comarca Lagunera, Méx. Tesis Profesional. U.A.CH., Chapingo, Méx. 87 p.

Watson T.F., M.L. Lindsey and J.E. Slosser. 1973. Effect of temperature, moisture, and photoperiod on termination of diapause in the pink bollworm. *Environ, Entomol.* 2: 967-970.

Table 1. Average numbers of hibernating PBW moths emerged per 4-m<sup>2</sup> emergence cage, in 1997.

Month	NuCOTN 35 B	Deltapine 51
March	0	0
April	0	3.00
May	0	2.75
June	0	1.25
Total	0	7.00

Table 2. Average numbers of hibernating PBW moths emerged per 4-m<sup>2</sup> emergence cage, in 1998.

Month	Conventional Tillage			Minimum Tillage (DP5409)
	NC 35B	DP 20	DP 5409	
March	0	0	0.6	0.4
April	0.2	0.2	0.2	0
May	0	2.2	2.8	1.0
June	0	0	0	0
Total	0.2	2.4	3.6	1.4

Table 3. Average numbers of PBW moths emerged per small emergence cage, in 1998.

Month	NuCOTN 35 B	Deltapine 50
October, 1997	0.12	0.45
November	0.12	41.96
December	0.04	8.96
January, 1998	0	0.75
February	0	0
March	0	0
April	0	0.37
May	0	0.37
June	0	0
Non-hibernating moths	0.28	52.12
Hibernating moths	0	0.74
Total	0.28	52.86