



# Fall armyworm (*Spodoptera frugiperda*) management using pheromone-based mass trapping data on summer maize at the PHI platform in Qob Elisa, Lebanon



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## SUMMARY

The invasive pest, fall armyworm (FAW), *Spodoptera frugiperda*, poses a significant threat to irrigated summer maize production in Lebanon and other countries in West Asia and North Africa, endangering food security and income to farmers. A field study conducted at Qob Elias (PHI-IP site), Bekaa valley in Lebanon during the summer of 2024 to evaluate the effectiveness of insecticides based on pheromone trap to manage FAW affecting summer maize. Three maize fields were planted with imported cultivars and FAW- was monitored using specific pheromone traps to track pest dynamics. Foliar insecticides were applied based on trap data to ensure timely interventions. Results revealed that FAW population was at peak between September 10 and 29, underscoring the importance of early planting and pre-peak management. The IPM approach significantly reduced FAW damage, achieving unobservable infestation levels compared to neighboring farmers employing traditional methods. This study highlights the critical role of pheromone traps in monitoring pest populations and reducing insecticide use, offering an effective and sustainable strategy for managing FAW in Lebanese maize fields. Neighboring farmers were engaged in knowledge-sharing activities, fostering broader adoption of these IPM practices in collaboration with ICARDA and LARI scientists.

## INTRODUCTION

The fall armyworm (FAW) has emerged as a significantly important pest of maize crops globally, posing a serious threat to food security and agricultural sustainability. In recent years, Lebanon has witnessed the invasive spread of FAW, leading to detrimental impacts on summer-planted maize fields. The indiscriminate use of chemical pesticides to combat FAW infestations is not only costly for small-scale farmers, but also increase risks to pollinators, human health and environment Therefore, IPM programs that include a combination of complementary and environmentally friendly components are needed to sustainably control FAW.

Effective FAW management requires timely detection of the pest so that appropriate crop protection measures can be taken at the early stages of crop infestation. Monitoring and detection using pheromones through moth traps are critical activities and essential tools for early detection of pests and for applying timely management decisions. Last year's trials at PHI-IP in Lebanon showed that FAW male pheromones were highly effective in reducing pesticide use in farmers' fields and were also effective in reducing FAW infestation. To consolidate the results and increase farmers' confidence in the results obtained last year, a field monitoring study was conducted at the PHI-IP site with different farmers and fields to assess the impact of IPM practices on FAW population dynamics, crop damage and overall sustainability of maize production in Lebanon.

## METHODOLOGY

Field monitoring of maize crops was conducted in Qob Elisa village (PHI-IP site), Bekaa valley in Lebanon during the summer of 2024. The treatments/options used were:

- Three maize fields were planted with cv. Nour on June 13 and June 28 and on July 11 with cv. Nawwar.

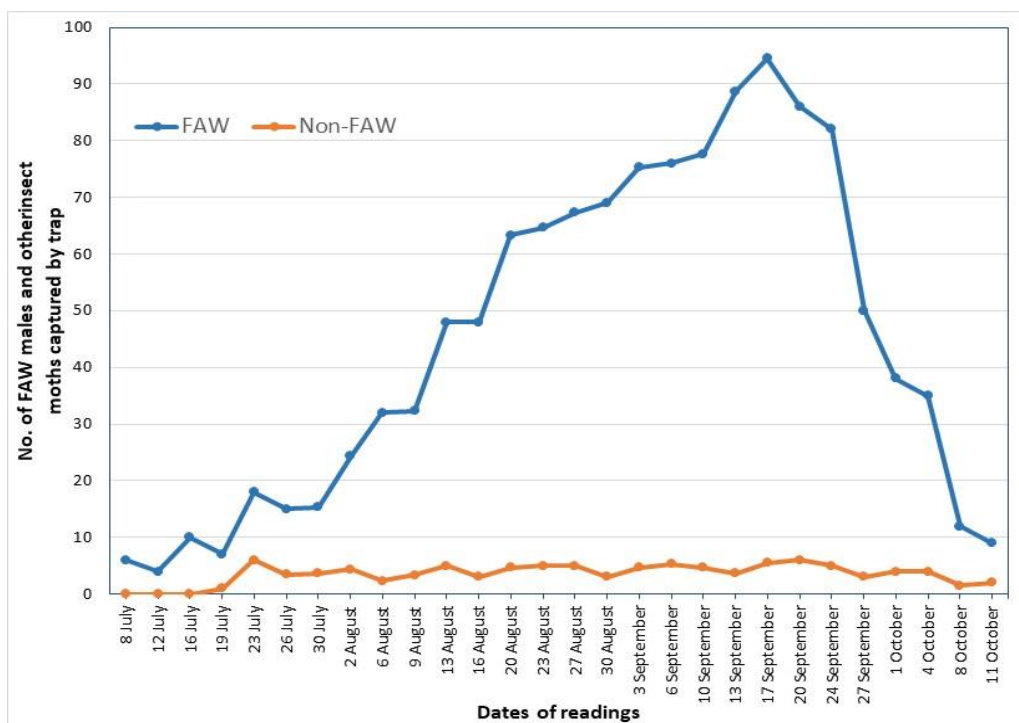
- Specific commercial FAW pheromone namely Z9-tetradecenyl acetate (1.96 mg), Z7-dodecenyl acetate (0.02 mg), and E7- dodecenyl acetate (0.02 mg) produced by Sanidad Agrícola ECONEX S.L., Spain was used in FWA monitoring (Figure 1).
- Funnel or bucket (unitrap, universal trap). One trap/ha, installed in the field 5 days after planting (Figure 1).
- Foliar insecticides were sprayed every 10-12 days based on trap data starting from 17 July using insecticide combinations: Emamectin benzoate + Alpha-cypermethrin; Indoxacarb + Alpha-cypermethrin; Lambda cyhalothrin + Emamectin benzoate; Lambda cyhalothrin + Indoxacarb, and one time application at the peak of the outbreak with Lambda-Cyhlothrin + Chlorantraniliprole.
- The number of FAW males and non-FAW moths caught were counted twice weekly from 8 July to mid-October 2024.

## RESULTS

- The peak population of FAW in the maize field occurred between September 10 and September 29 (Figure 2).
- The early planted maize (mid of June) maize escaped or suffered minimize infestation.
- Managing FAW before this peak period is crucial to prevent high infestation levels in the field.
- The management of FAW using pheromone traps and recommended insecticides resulted in almost unobservable damage to maize production in the field compared to neighboring farmers who followed their own practices.
- Monitoring of FAW population was effective in reducing the number of FAW males and helped farmers improve the timing of insecticide applications and reduce cost of production and increase their incomes.



**Figure 1.** (A) Pheromone and trap used, (B) trap in a maize field, (C) trapped moths, (D, E) Dr Elia Choueiri from LARI trained farmers on the FAW identification and use of the pheromone trap, (F) maize production from the field that used pheromone traps and recommended insecticides (right) compared to maize production from other fields that applied their own practices (left).



**Figure 2.** Number of FAW males and non-FAW insect moths captured by a pheromone trap at Qob Elias (PHI-IP site), Bekaa valley, Lebanon, 2024 (values are the average of pheromone-based mass trapping data collected from three maize fields).

## CONCLUSIONS & RECOMMENDATIONS

- Pheromone traps were instrumental in monitoring FAW infestations in farmers' fields. By capturing male FAW moths, the traps provided valuable information to farmers on the presence of FAW and the need for chemical spraying.
- Environmentally safe and low-risk insecticides, such as emamectin benzoate, indoxacarb and pyrethroids were effective in controlling FAW infestations when applied at appropriate time intervals.
- Managing FAW before the peak population period (September 10 to September 29) was crucial in preventing high levels of infestation in maize fields. Early intervention with pheromone traps and recommended insecticides led to minimal FAW damage compared to neighboring farmers' practices.
- These results highlight the effectiveness of using pheromone traps, recommended insecticides, and timely management practices in controlling fall armyworm infestations and minimizing crop damage in maize fields in Lebanon.
- Neighboring farmers were invited to visit the trial, and the lead farmer presented to them the treatments he applied, and the experience gained through this experiment and the advantages gained from participating in the PHI-IP in collaboration with ICARDA and LARI scientists.

**Consent Statement:** "Personal information including names, business title, emails, phones, images and GPS points included in this report have been authorized in writing or verbally by data subject"

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