Fall Armyworm Management Options and suggested actions for Nepal
Experiences from CIMMYT

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March of the Fall Armyworm

Map: CIMMYT, August 2018

The shaded areas of this map represent countries with new or ongoing Fall Armyworm activity.
Fall Armyworm Spread in Africa and Asia

Map: FAO, August 2018

October 2018
44 countries, >22 mio km²
FAW is a challenge to smallholder farmers as well as to commercial seed producers: Need to protect the seed security
Effective monitoring and scouting for the pest at both farm and community levels is very important!
What is the best stage to control FAW?

Maximum amount of damage at these larval stages (L5 & L6); very difficult to control

Modified after Flander, 2017
The FAW IPM Guide for Africa released in Jan 2018; also translated into French and Portuguese versions.

A SAWBO Video on FAW Identification and Scouting released in August; to be translated soon in major Asian languages.

FAW Pest Management Decision Guides for various countries by CABI-USAID-CIMMYT team.

Can be downloaded HERE.
Cultural Control and Agro-ecological Management

• Early/timely planting
• Appropriate plant nutrition
• Increased diversification – intercropping with compatible crops
• Habitat management
Biological Control integrated with Host Plant Resistance against FAW in Brazil

*Trichogramma Egg Parasitoid*

*Bt and Baculovirus-based biopesticides*
Parasitoids:

- *Telenomus remus* Nixon (Hym.: Platygastridae)
- *Chelonus insularis* Cresson (Hym.: Braconidae)
- *Cotesia marginiventris* (Cresson) (Hym.: Braconidae)

Source: Goerg Goergen (IITA)
Host plant resistance is highly compatible with other IPM-based interventions

Variety with tolerance/resistance to FAW

- Biological Control
- Biopesticides
- Agro-ecological Management
**Germplasm Sources**

- CIMMYT’s breeding efforts against major insect-pests in the tropics, including Fall Armyworm, initiated in the 1970s in Mexico → **MIRT and MBR populations**.

- Polygenic FAW resistance identified in **Caribbean** maize germplasm and **Tuxpeno** germplasm.

- Parallel and significant efforts at **USDA-Mississippi, Univ. of Florida, and Embrapa-Brazil**.

An important germplasm base to identify, validate and deploy native genetic resistance against FAW in Africa
Intensive Germplasm Screening

- Intensive screening of CIMMYT and IITA maize germplasm in Kenya and Nigeria, respectively.
- FAW-tolerant maize germplasm from USDA-Mississippi also screened by CIMMYT in Kenya.
Germplasm Responses

CML71
Tolerant

Susceptible

Susceptible Checks

CIMMYT FAW Tolerant hybrids
**Bt Maize against FAW**

- *Cry* genes *cry1A, cry1Ab,* and *cry1F* deployed in commercial *Bt* maize varieties globally for over 20 years.
- *Bt* also produces Vegetative Insecticidal Proteins (VIP). These VIPs are encoded by *vip* genes, the most notable of which is the *vip3A* gene used to confer FAW resistance.
- In Brazil and North America, where over 80% of the total maize production area is cultivated with *Bt* maize.
There is no ONE solution that fits all
Need for Integrated Pest Management

Protecting crops from economic injury, and minimizing negative impacts on people, animals, and the environment
Present Membership of the Consortium

FAW R4D International Consortium

43 Institutions as Members, at present
FAW R4D International Conference
October 29-31, 2018; Addis Ababa, Ethiopia

220 delegates from 30 countries
Lessons for Nepal

- Maize is 2\textsuperscript{nd} most important cereal of Nepal
- A livelihood for millions of smallholder farmers
- FAW has a high chance to cause huge economical loss in Nepal if actions are not in place on time.
## Suggested actions to be taken against FAW in Nepal
(inputs from the Nepal team attended the PQPMC and CABI regional WS in Kathmandu (21 Nov 2018))

<table>
<thead>
<tr>
<th>Before detection</th>
<th>After detection</th>
<th>After establishment</th>
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<tbody>
<tr>
<td>Formation of national and provincial FAW Task Forces</td>
<td>Official identification of species (morphological and molecular)</td>
<td>FAW management focused project formulations and implementations</td>
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<td>Surveillance, monitoring and Quarantine alerts (early warning)</td>
<td>Official reporting</td>
<td>Field diagnosis through intensive plant clinics</td>
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<td>Preparations for the identification and notification</td>
<td>Research on FAW and tracking of pathways</td>
<td>Action researches on FAW IPM / Recommendation of cost effective IPM packages</td>
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<tr>
<td>Preparation for registration of biorationals and IPM packages</td>
<td>Awareness, Training, mass communications (Workshop, Seminar, Mass Communications, IEC materials preparation) and early warning</td>
<td>Training, awareness on FAW IPM solutions and early warning and forecasting</td>
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<tr>
<td>Policy awareness and mass Communications</td>
<td>Fast track registration of biorational and deploying IPM solutions</td>
<td>Economic research/analysis of management options</td>
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<tr>
<td>Development of national action plan</td>
<td>Continuous monitoring and scouting and promot low-cost but evidence-based cultural control approaches</td>
<td>Long term management research and IPM options including HPR</td>
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Use of Pheromone lures and FAW damages in the maize seed fields around Vijayawada (Eluru) (SE India, AP state) Photo: Abdu-Nov. 2018.
Thank You!