



## CHAPTER 07

# Communications Framework for Integrated Pest Management of Fall Armyworm in Asia\*

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\* The information on communications framework and principles described in this chapter is substantially based on CABI (2019), Framework for Strategic Communication during Pest Outbreaks: Learning from fall armyworm.

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# 1. Background

Early May 2018 in Karnataka, India, researchers under the jurisdiction of the University of Agricultural and Horticultural Sciences, Shivamogga (UAHSS), encountered an exotic pest feeding in the maize fields. Identified as *Spodoptera frugiperda* (FAW) by the UAHSS, followed by the University of Agricultural Sciences, Bangalore (UASB) and the Indian Council of Agricultural Research–National Bureau of Agricultural Insect Resources (ICAR-NBAIR), the pest was reported in India/Asia for the first time (Sharanabasappa *et al.* 2018). Soon thereafter the FAW adult moths were reported in various states across India. Shortly after this, reports of FAW began to emerge in Sri Lanka, Bangladesh, Myanmar, and a number of countries in South and South East Asia (see **Chapter 1**). In response, and in some cases as pre-emptive action, both public and private agencies rallied to provide the necessary support to maize farmers to mitigate the damage to the maize crop.

Because FAW was formally reported in West Africa in 2016 (Goergen *et al.* 2016) and subsequently reported throughout Africa soon thereafter, the arrival of FAW in Asia was not surprising; several of the Asian nations were prepared for the outbreak (BOX 1). The successful control of FAW in the Americas for over 100 years, combined with experiences from Africa, meant that appropriate control options and recommendations were already available (see **Chapter 3**). FAW, with its voracious appetite, would have had devastating effects on food production if the knowledge of how to control FAW from the Americas had not been deployed in various pest management, extension, and communication strategies. Communications to create enhanced awareness on FAW among the farming communities—its identification, behavior, signs of damage, and appropriate and rational management strategies at the farm, national, and regional levels—became the need of the hour. In particular, it was necessary to provide information to smallholder farmers, whose knowledge of the pest was very limited. Several countries in Asia have addressed the threat posed by FAW through communications and sharing of cross-sectoral knowledge developed with the assistance of stakeholders, including representatives from the government, international organizations, the private sector, and non-governmental organizations (NGOs) (e.g., BOX 2).

The coordinated efforts to communicate to key agricultural policy makers, development organizations, and extension partners are a priority in order to brace farmers for the detrimental effects of invasive species such as FAW. Because of the speed at which FAW can colonize new areas and affect farmers' fields, systems need to be in place that pre-emptively prepare for invasion, while offering stakeholders—including but not limited to farmers—appropriate and affordable integrated pest management (IPM) options that are at once easy to understand and to implement. At the same time, it is crucial that such efforts place emphasis on utilizing communications strategies and methods that are well designed and consider their target audiences, as the same type and level of technical information is not likely to be needed by different groups. In other words, the design of communication materials and methods for policy makers, the private sector, and farmers should be distinct, well planned, and targeted.

## BOX 1. Response to Early Warnings of FAW

Before FAW made entry into Asia, the Centre for Agriculture and Biosciences International (CABI), through its experience of working in Africa on FAW and looking at the predictability maps it had produced with the University of Exeter, sent an alert to National Plant Protection Organizations (NPPOs) of all its Plantwise countries (11 in total) on the possible future invasion of the pest. After learning of the pest, some countries including India, Bangladesh, and Myanmar called for high-level task force planning meetings under senior leadership of Ministries of Agriculture (MoA) and National Agriculture Research Systems (NARS) to deliberate on the current status of the pest and possible interventions. CABI organized the first regional conference on FAW in Nepal in November 2018, where NPPOs from South and South East Asian countries participated along with other international partners such as the International Maize and Wheat Improvement Center (CIMMYT) and the Food and Agriculture Organization of the United Nations (FAO). CABI apprised the partners on the spread, kinds of damage, and possible proven tools that could be explored for intervention in Asia. In 2019, CIMMYT organized two regional workshops with support of the United States Agency for International Development (USAID)—one in Hyderabad and the other in Nepal—to provide hands-on experience via field trips within the workshops to strengthen the understanding of representatives from ministry, research, extension, and private-sector stakeholders from several countries in Asia on FAW management. National-level workshops were held in Myanmar in early and late 2019 initially to create awareness among the stakeholders and to assess the different organizations' efforts toward addressing FAW and the gaps identified to form recommendations for future activities.

Coordinated early pre-emptive efforts were made to raise awareness and prepare for the possible invasion. In particular, the Indian Council of Agricultural Research (ICAR) sounded the alert for the region once FAW was identified. The first high-level meeting under the chairmanship of the Secretary of the Department of Agricultural Research and Extension (DARE) and the Director General of ICAR was held on August 20, 2018. This was followed by a coordinated action involving the central bodies and state departments of agriculture, which was closely coordinated by the ICAR-Indian Institute of Maize Research, Ludhiana (Rakshit *et al.* 2019; Suby *et al.* 2020). As such, pre-emptive efforts to coordinate FAW activities commenced in Bangladesh even before FAW was able to migrate and invade, with USAID and CIMMYT convening stakeholders to initiate appropriate policy and strategies in September of 2018. This timely action enabled early efforts to fight back against FAW, with numerous public meetings, trainings, and activities put into place through to the end of 2019.

## BOX 2. USAID Mission-Sponsored Events and Activities for Addressing FAW in Asia\*

**Burma:\*\*** USAID held the first inclusive stakeholder meeting on FAW (March 2019). USAID worked with the MoA (Department of Agriculture [DOA]/Plant Protection Division [PPD]) to develop simplified guidelines for FAW control. These guidelines were used by the MoA as well as USAID (through the International Fertilizer Development Center [IFDC]) to train over 100 input retailers in the major maize-growing areas and helped these retailers establish demonstration plots with five rounds of monitoring (measure infestation, use an action threshold, use recommended control products). The *Bt* spray was an effective control agent. A crop cut (small yield test) from ~60 farmers (trained and control) found that control farmers had an ~8% lower yield. Michigan State University (MSU) and DOA/PPD collaborated to identify, via DNA analysis, the FAW haplotypes present (Nagoshi *et al.* 2020). USAID communicated with both Corteva and Syngenta to register new effective FAW control products with PPD. Spinetoram (Corteva) was registered for use in October 2019.

**Bangladesh:** Alongside initiatives undertaken by the government, USAID/Bangladesh and MSU's Borlaug Higher Education for Agricultural Research and Development (BHEARD) supported the 'Fighting Fall Armyworm in Bangladesh' activity, which is led by CIMMYT, to support the public and private sector to achieve more effective FAW mitigation. The key achievements of the project so far include the intensive training of 735 government officials (31% of whom were women) on FAW IPM. A smaller subset of master trainers also engaged in regular monitoring of FAW in farmers' fields and coordinated their own trainings. In sum, these actions resulted in 187,000 farmers receiving structured IPM advice on FAW. Other important USAID-sponsored communication projects include the production of educational materials (video and print) in Bangla and other languages, as detailed in BOX 9 and BOX 13. In a synergistic activity co-supported by the CIMMYT-led Cereal Systems Initiative for South Asia (CSISA), the project assisted in the development of technical materials and a rapid one-day awareness raising training for agricultural input dealers in 10 major maize-growing districts of Bangladesh. These trainings (described in BOX 9) were deployed by partnering with the Agricultural Input Retailer Network (AIRN) in Bangladesh. The Fighting FAW activity has provided consistent support to two Bangladesh national companies, Ispahani Agro-Limited (IAL) and Syngenta Bangladesh Ltd., through 50-50% cost share partnership agreements, to raise awareness and stimulate market demand for biological pesticides and biocontrol agents against FAW. The two companies trained a total of 1,187 pesticides dealers/retailers from nine major maize-growing districts and also provided hands-on training to 1,041 service providers. It also aided in efforts to fast-track registration of a biological pesticide for FAW and a low-toxicity seed-treating agent against FAW. This was achieved through raising awareness of FAW National Task Force members and lobbying the Plant Protection Wing of the Department of Agricultural Extension, and by working closely with the Bangladesh Agricultural Research Institute to accelerate field trials demonstrating the efficiency of those products in FAW control.

\* Information provided by Matt Curtis, Feed the Future Coordinator, USAID Burma, and Mohammad Sayed Shibly, USAID Bangladesh.

\*\* The military government changed the country's name to "Myanmar" when it took power in 1989. The U.S. government continues to use the name "Burma" because it believes that any change of the name of a country should be a decision for its people. Internationally, both names are recognised.

## 2. Importance of Gender-responsive Communication

Communication strategies that fit within broader pest response plans in countries affected by FAW are important to ensure that the information dissemination to stakeholders—especially to farmers—is as relevant, as science-based, and as harmonized as possible. This avoids mixed messaging and confusion that can hinder rapid and appropriate response efforts.

Information dissemination and messaging should be (a) timely, (b) developed in a participatory manner, (c) considerate of social equity and gender issues (especially in the types of information and method of dissemination chosen), (d) cognizant of target audiences and easy to understand, (e) action-oriented, (f) generated by credible organizations, and (g) shared in such a way that builds trust among end-users, particularly farmers. To ensure interaction and mutual understanding between farmers, extension workers, scientists, and policy makers, these general characteristics should be prioritized.

Gender must be taken into account when considering the type of information and method of dissemination. For example, if diagrams or pictures show farmers in the field, they can be women (and not just men). Certain times during the day may be more suitable for radio/TV programs for reaching women than others. In some Asian countries, it is not uncommon to see that women farmers will only visit plant clinics and seek advice if they can talk to a woman advisor (Figure 1).



**Figure 1.** Communications through woman extension officers is particularly important and effective in reaching out to women farmers in some of the Asian countries. Photo credit: CABI/FAO Bangladesh.

Policy makers and response team managers need accurate and timely data and evidence to evaluate complex issues, explore multiple options, and propose the most suitable solutions for securing resources and providing the necessary technical support. The relevance of the messages to the context is also crucial, as essential messages on pest management can fail to meet their purpose when they are communicated in inappropriate formats or through inaccessible channels. As noted above, the information exchanged or disseminated must be specifically tailored to the intended audiences (CABI 2019). Good communication strategies, methods, and systems can in turn reduce information overload, mitigate conflicting messages, avoid duplicative or inefficient efforts, and ultimately positively influence farmers' decision-making processes by orienting them towards rational and data-driven pest and agroecosystem management.

### 3. Communication Planning Framework

Communications planning is a central aspect of any invasive pest response campaign. It is especially critical with invasive pests because of the pest's novelty to affected farming communities, and in some cases, such as the FAW, the speed with which the pest can migrate and infest new areas. The ability to quickly provide accurate information to a wide range of stakeholders is important not only for managing the pest but also to address responses that are not science-based and that may in some cases create hazards. In addition, resources to fund information dissemination are likely to be limited, necessitating a well-planned strategy. It is perhaps also worth noting that while effective communications could best be accomplished through a national or regional coordinated framework, experience has shown that this likely will be a significant challenge. However, broad coordination and stakeholder buy-in to messaging is preferred whenever and to the extent possible.

Communication planning can be divided into five distinct phases (CABI 2019):

- Information and communication needs assessment
- Communication strategy formulation
- Implementation
- Evaluation
- Revision

**Information and communication needs assessment:** Understanding the information needs of the diversity of stakeholders impacted by a new invasive species will help guide the strategy for quickly and efficiently compiling the information, formatting it for distribution, and identifying the mechanisms for dissemination. The assessment should be holistic and cover the broad demographics of stakeholders, including but not limited to gender, language, and cultural attributes, as well as socioeconomic groupings. The assessment should also address mechanisms, e.g., radio and internet, as means for disseminating information across a wide range of options. Budgetary and technology constraints should also be assessed.

It is critical to understand that in many cases, invasive species, such as FAW, were already well-studied and successfully managed at their point of origin. In many ways this helps to simplify the needs assessment because a solid baseline already exists that can inform the context of the needs assessment in the pest's new environment. Nevertheless, one must recognize that the socioeconomic contexts and the technology landscape at the point of origin of FAW (the Americas) are quite different from those of newly infested countries, such as those in Asia.

**Communication strategy formation:** Once the needs assessment is complete, the next step is to use the results to develop a communications strategic plan. The plan should outline the goals and objectives of the strategy, the operational plan for meeting those goals, the messages, and the target audiences. The plan should also provide for a means of monitoring and evaluation as well as taking into consideration the lessons learned over time. Accordingly, the plan should contain the following elements:

- Goals and objectives of the strategy
  - a. The characteristics represented by the acronym SMART—Specific, Measurable, Achievable, Realistic, and Time-bound—can be used to guide drafting of goals and objectives.
- An operational plan including activities, scheduling, cost, scope, and implementation
  - a. Clearly articulate who is Responsible, Accountable, Consulted, and/or Informed (RACI).
  - b. Milestones and critical path elements should be identified.
  - c. A timeline for implementation, including milestones, is required.
- Specific messages to be developed and disseminated
  - a. A review process should be included to ensure information is accurate and science-based.
- Identification of target audiences, with particular attention to cultural, educational, gender, and institutional aspects
- Communications channels/means/technologies
- A monitoring and evaluation process for course correction and lessons learned

The remainder of this manual describes approaches and examples from early experience with FAW in Asia. Section 4 describes further aspects of planning. Sections 5 and 6 describe communications for two specific groups: those who support farmers (Section 5) and the farmers themselves (Section 6).

## 4. Communication Approaches to Raise Awareness of FAW Management Strategies in Asia

With the progressive addition of new countries reporting FAW invasion, a number of approaches to contain and manage the pest emerged and began to be popularized by different organizations. Because Asia is reasonably well-connected through various intergovernmental platforms and by a number of international research and development organizations focused on agricultural productivity and pest management, relative harmonization—or at least broad sharing of information and learning on management strategies and communication approaches—has not been overly difficult. Importantly, international organizations including CIMMYT, FAO, USAID, and CABI all had a pivotal role in working with their respective national counterparts since 2018 (BOX 1 and BOX 2). Strong and early response actions were taken in several countries, including India, Bangladesh, China, Myanmar, and Vietnam, some of which provide the case studies in this chapter. Some of the actions taken across the region to raise preparedness among stakeholders by creating awareness of the signs of FAW infestation and feeding and its management are described below. We focus on steps that can be used as communication strategies with examples of relevant lessons and learning that have come out of these actions, which can assist in streamlining communication approaches in the case of emerging and future threats.

### 4.1. Planning Process and Levels

The National Planning System architecture consists of three levels of planning: strategic, operational, and tactical.

#### 4.1.1. Strategic Level

- Strategic-level planning sets the context and expectations for operational planning and emergency response. This planning is generally the responsibility of a National Task Force, which includes stakeholders from all relevant departments, *e.g.*, research, extension, and Information and Communication Technology (ICT).
- Stakeholder engagement and commitment are crucial at the onset of the outbreak and in the long-term management of the pest.
- Development communication principles applied to outbreak communication include dialogue, consensus, participation, and ownership (CABI 2019).

#### 4.1.2. Operational Level

Operational-level planning provides the tasks and resources needed to execute the strategy, *e.g.*, through National Task Forces. The major responsibilities of the Task Force include the following:

- Establish collaboration on best approaches to devise and implement IPM of FAW, appropriate to the geographical distribution of the pest.
- Coordinate implementation of harmonized strategies to reduce crop yield losses caused by FAW.
- Lower the risk of further spread of FAW to new areas.

Examples of National Task Forces are given in BOX 3.

### BOX 3. Operational-Level Planning

#### India

To provide an actionable plan, appropriate plant resistance, pesticidal, cultural, and biocontrol measures were identified by ICAR-Indian Institute of Maize Research (ICAR-IIMR), NBAIR, and All India Coordinated Research Project (AICRP) on Maize centers, to specifically target FAW. Government authorities also opted for *ad hoc* approval of certain insecticides to accentuate the protective measures available to the farmers. A High-Power Committee (HPC) was constituted in August 2018, which is jointly chaired by the Secretary (Department of Agricultural Cooperation & Farmers Welfare) and Secretary (Department of Agricultural Research and Education) to review the status and recommend appropriate strategies. Various sub-committees have also been constituted in the state of Karnataka, Maharashtra, Madhya Pradesh, Tamil Nadu, Andhra Pradesh, Telangana, Bihar, and Rajasthan, which are headed by the Director/Commissioner of Agriculture or Principal Secretary of the respective state. Periodically the HPC reviewed the progress of the pest and discussed possible measures to contain the spread and damage by the insect. A package of practices to control FAW as developed by ICAR-IIMR in collaboration with ICAR-NBAIR was disseminated to all stakeholders through the Directorate of Plant Protection, Quarantine & Storage (DPPQS), departments of agriculture, and State Agricultural Universities.

#### Bangladesh

A National Task Force has been formed in Bangladesh under the stewardship of the MoA. Its members consist of all relevant stakeholders from research (Bangladesh Agricultural Research Council [BARC], Bangladesh Wheat and Maize Research Institute [BWMRI], and Bangladesh Agricultural Research Institute [BARI]), extension (Department of Agricultural Extension [DAE]), and international organizations such as FAO and CIMMYT. The task force meets every month to review activities undertaken for FAW awareness and management and endorses proposals regarding communication, strategies, and inputs for FAW management to provide a harmonized approach across the country. In this context, the task force has issued fast-track registration to two important environmentally friendly inputs to manage the pest on an emergency basis.

#### Vietnam

Cognizant of the threat to maize production, Vietnam's Ministry of Agriculture and Rural Development (MARD) through the Plant Protection Department took numerous proactive measures. These initiatives included the timely detection of FAW; issuance of technical prevention and control guidance; establishment of collaborations with international organizations and the private sector; training programs for key stakeholders including farmers, officials of plant protection, and extension and crop production departments; temporary approval of insecticides; and successful demonstration of *Bacillus thuringiensis* (*Bt*) genetically modified maize resistant to FAW as a part of IPM solutions (USDA 2019).

### 4.1.3. Tactical Level

Tactical-level planning addresses how to apply resources to complete the operational tasks within a given time frame, and takes place primarily at a local level.

- Information addressed to farmers, advisory services, national and local leaders, media, and agro-input dealers must be relevant, appropriate, timely, and tailored to their specific needs.
- Understanding the information and communication needs of all stakeholders will help in the selection of the most appropriate tools and resources necessary to design, implement, and evaluate a communication strategy.

All three levels of planning involve the whole community. Through the three levels of the planning process—strategic, operational, and tactical—planners develop an understanding of threats, hazards, risks, and capabilities, which assist them in the development of plans and planning products that are based on mission, purpose, and stakeholders' needs.

## 4.2. Use of an Iterative Approach

During pest outbreaks such as FAW, farmers, agricultural supply chain providers and traders, and the general public rely heavily on rapid and consistent information that will enable them to adequately respond to the pest outbreak. Outbreaks are not linear events, so the communication plan will have to be adapted to the changing scenarios. In most cases, it is better to modify an existing plan rather than develop a new one that will have to be changed shortly thereafter.

The following elements are necessary to devise an appropriate and timely strategy:

### 4.2.1. Understanding of Farmer Needs

The climate of uncertainty during pest outbreaks generates confusion, disorientation, and misunderstandings among farmers and the services that support them. Communicating with farmers and the public on a regular basis not only ensures a smooth coordination of response efforts but also helps in reducing distress, encouraging public support, and increasing the perceived effectiveness of containment measures.

There is an urgent need to integrate ways to get feedback from farmers so that the communication work feeds into learning. Thus, it is important to establish communication channels in which there are more direct interactions with farmers on a regular basis. More dialogue will lead to clarity of knowledge and practice among farmers and will enable them to learn from extension workers the latest developments in FAW management and whether the approaches that they have adopted are appropriate. See BOX 4 below for examples of how such practices are being instituted to obtain better understanding of farmers' perceptions of FAW.

#### BOX 4. Training of Extension Agents and Communication with Farmers

CABI Plantwise has been instrumental in South Asia in promoting IPM practices through dissemination of action-based knowledge to farmers, thus enhancing IPM adoption and utilization for optimum results. This comprises capacity building of extension officers—whether governmental or from NGOs, the private sector, etc.—in building their skills for field diagnosis and giving good recommendations. Through this network of plant clinics, the pest management advisors are also able to detect new pests in the clinics from samples brought by farmers for diagnosis.

In 2019, 60 new knowledge centre (KC) managers were trained as pest management advisors in the Nay Pyi Taw area of Myanmar, with support of the International Fund for Agricultural Development (IFAD)-funded FARM (Fostering Agricultural Revitalization in Myanmar) project. The major objective of this activity was to train pest management advisors on how to create awareness of FAW and its management options. Plantwise clinics submitted farmer queries to the Plantwise online management system.

It was evident that in 2019 FAW was the major issue among the maize queries (74 out of 112). In parallel with Plant Clinic activity, which aims at advising farmers on pest and disease issues, the KCs have been supported by learning platforms that can help smallholder farmers, field technicians, rural shopkeepers, and local communities to upgrade their knowledge on plant health issues. In 2019, the first learning plot was set up at KC#31 (Figure 2), with farmers reporting significant challenges when growing maize in the first months after detection of the FAW, which has since extended its spread throughout the country.



**Figure 2.** Visit of learning plot at KC#31 on FAW- 8 Oct 2019. Photo credit: CABI.



## 4.2.2. Bringing Research from Lab to Field through Communication

Results from ongoing research, such as pesticide efficacy trials and landscape and cultural management options, should be readily available to extension service providers in formats that are easily accessible and understandable to non-technical audiences. This will enable extension agents to disseminate technical information to farmers who are on the front line of managing the pest outbreak.

The geographic spread of FAW is so vast that effective communication methods are needed that can reach large numbers of people across countries and continents. For example, by employing digital tools, it is possible to connect practitioners regardless of distance (see BOX 5). This may result in bringing new technologies to be tested or applied to a new pest in-country in a time-appropriate manner (see BOX 6).

### BOX 5. FAW Research Collaboration Portal

In order to accelerate efforts to manage FAW, CABI established a “Fall Armyworm Research Collaboration Portal” (<https://faw.researchcollaborationportal.org/>) that brings together FAW researchers and encourages open working and collaboration across the global research community. The portal aims to identify and develop a global network of researchers working on FAW research and management, and to increase collaboration via an online resource where participants can share research data, insights, and outputs. A steering committee drawn from leading FAW research groups, including CIMMYT, defined the scope of the portal, including various host plant resistance, biocontrol, agro-ecological management, and environmentally safer pesticides.

### BOX 6. Promoting Novel Technologies through Effective Communication

#### ***Bt* maize as a part of IPM solutions: Vietnam**

To manage FAW effectively, Vietnamese agriculturalists implemented FAW management strategies focused on farmer education, use of pesticides, *Bt* maize technologies, biocontrol, maintaining plant diversity on farms, and habitat management. Moreover, FAW-effective insecticides were assumed to be the first line of defense, with careful guidance on temporary use as many of these chemicals were yet to be approved. The country’s acceptance of biotechnological advancements, with the approval of *Bt* maize back in 2015, also supported the fight against FAW. Vietnam approved the commercial cultivation of *Bt* maize including single- and double-gene *Bt* along with herbicide-tolerant varieties, then targeted to control lepidopteran pests such as Asian maize stem borer (*Ostrinia furnacalis*) and provide effective management of weeds. *Bt* maize technology was certified for biosafety by Vietnam’s Ministry of Natural Resources and Environment as well as food-feed safety and hybrid registration by the MARDC, Government of Vietnam. In the past four years, Vietnam significantly increased cultivation of biotech maize. For more information on use of *Bt* crops to control FAW in Asia, see **Chapter 4**, Host Plant Resistance.)

## 4.2.3. Content Development and Updating

- Content development workshops bring people together to contribute to key messages, thus avoiding conflicting messaging.
- In order to be effective, technical information must be translated and adapted into local languages, using expressions and idioms that farmer communities can relate to (CABI 2019).
- An approach that has been used effectively in the response to the FAW outbreak has been the development of “technical briefs”, which are developed collaboratively by bringing stakeholders together to debate knowledge available on pest identification, monitoring, and management, and factor in the latest research outcomes, taking account of licensing and availability of inputs and farmer insights on management approaches (CABI 2019; FAO 2018, 2019).

#### 4.2.4. Web-based Resources on FAW Management

Another significant development that contributed to effective dissemination of FAW-related information was development of several FAW-focused websites, which serve as repositories for relevant information and communication resources. A few examples are listed below.

- The CABI Fall Armyworm Portal ([Fall Armyworm \(FAW\) Portal | CABI](#)) has relevant news, research publications, practical extension materials, videos and other communication resources on FAW.
- The websites of Project Safal (<https://www.fallarmyworm.org.in>) and CABI Plantwise Knowledge Bank ([Plantwise.org | Knowledge Bank Home](#)) also support farmers and other plant health stakeholders with relevant information on FAW management.
- The Grow Asia website ([Fall Armyworm Control | Grow Asia](#)) facilitates regional responses, especially in the Association of Southeast Asian Nations (ASEAN) countries, to outbreaks of FAW through its Action plan ([ASEAN Action Plan on Fall Armyworm Control | Grow Asia Exchange](#)).
- Another website that supports the FAW Action plan in South East Asia is [Sustainable Agriculture | ASEAN FAW Action Plan | Singapore](#).
- CIMMYT's FAW site: <https://www.cimmyt.org/tag/fall-armyworm/>
- FAO's Global Action Plan on FAW: <http://www.fao.org/fall-armyworm/resources/en/>
- SAWBO (Scientific Animation Without Borders): <https://sawbo-animations.org/708>
- Training modules on FAW management: <https://agritraining.co.za/fall-armyworm-faw-free-learning-modules/> (see Section 5.3)
- Feed the Future Tools to Combat Fall Armyworm (on Agrilinks): <https://agrilinks.org/post/feed-future-tools-combat-fall-armyworm-africa> (see Section 5.3)

In addition to the above, open-access portals like YouTube also host useful information on identification and management of FAW.

### 4.3. Evaluation to Support Improvement of the Communication Strategy

The communication strategy should be complemented by a Monitoring, Evaluation and Learning (MEL) Framework (BOX 7; CABI 2019). This framework is used to assess whether activities are consistent with the strategy that has been communicated, whether they are having the desired effect, and whether any adjustment is needed. Evaluation starts from the beginning: given the dynamic nature of an outbreak, activities need to be constantly assessed and refocused if necessary. Reviewing the strategy frequently will help in understanding whether activities are successful and on track or need to be changed. Therefore, planning for the communication activities should be done in conjunction with identification of the variables to be monitored. Focus group discussions and key informant interviews are the tools through which communication can be evaluated. The practices in use by farmers and other stakeholders and their level of awareness will demonstrate how effective the communication strategy has been.

#### BOX 7. Farmer Focus Groups

CABI in Bangladesh conducted a rapid rural appraisal in seven subdistricts of four districts using focus group discussion (FGD) and key informant interview approaches during November 2019. Through eight FGDs conducted at eight villages in five upazilas in three districts, 166 maize farmers provided information on their awareness and preparedness to manage FAW. Most of the farmers said that the pesticide sprays they were using were only partially effective against FAW infestations in maize, and they expressed appreciation for guidance and support in management of FAW. The highest proportion of the respondents appreciated guidance on pesticide usage (88%), which was followed by diagnosis of FAW (11%), cultural practices (11%), hand picking of larvae (10%), and pheromone trap use (6%).

## 5. Communication with Intermediaries who Support Farmers

Keeping farmers and the public informed on a regular basis not only ensures a smooth coordination of response efforts but also helps in reducing distress, encouraging public support, and increasing the perceived effectiveness of containment measures (CABI 2019). As described in the following sections, there are several key groups of intermediaries who need to be considered during these efforts.

### 5.1. Government-Sector Influencers

These key individuals influence decision-making processes at the local and national levels during the management of a pest outbreak. Their capacity building, participation, and actions are important as a part of an effective communication strategy reaching out to the farmers with appropriate information. See BOX 8 for examples of action-oriented steps taken to mobilize these functionaries.

#### BOX 8. Mobilization of Extension Agents and Other Influencers

**India**—Following the reporting of FAW in India, cross-sector strategic communication and management activities were initiated at the national level by the Central IPM centers of the Department of Agriculture, Cooperation and Farmers Welfare (DAC&FW), State department of agriculture, Krishi Vigyan Kendras (KVKs) in different states, scientists and researchers from State Agricultural Universities (SAUs), AICRPs on Maize and Biocontrol, pesticide companies, CABI, South Asia Biotechnology Centre (SABC), NGOs, and other key stakeholders in the community. In the process, ICAR through its two research institutes, ICAR-IIMR and ICAR-NBAIR, provided technical inputs to the DAC&FW, who implemented the package of practices (POPs) through its network of IPM centers. ICAR institutes and AICRPs, along with SAUs and KVKs, played a crucial role in awareness creation and information dissemination. As of November 2019, since the reporting of FAW in India, ICAR institutes with their coordinating networks organized 589 major training programs across the country, benefitting over 15,000 personnel (Rakshit *et al.* 2019). Field visits were undertaken and biocontrol agents were distributed by NBAIR and its AICRP Centres for the management of FAW. Twenty-eight awareness programs were organized by NBAIR in coordination with AICRP Biocontrol centres, benefitting 3903 personnel. In addition to this, ICAR-KVKs have been actively involved with state functionaries and NGOs in organizing awareness programs on FAW management. A total of 407 training programs were conducted on awareness of FAW by KVKs in Zone X under the Agricultural Technology Application Research Institute (ATARI), Hyderabad. The community-based participatory efforts distilled down to educating farmers in effective IPM strategies to reduce damage in a sustainable manner. An initial baseline survey done by CABI jointly with UASB revealed that farmers were quite acquainted with FAW and its occurrence, and they relied heavily on the advice of agro-dealers.

**Bangladesh** has a network of over 10,000 front-line extension agents, each of which make rounds every two weeks to farmers' groups or producer's clubs; thus, working with the extension department can be a powerful mechanism by which farmers are provided with information on FAW management. Working with the FAW Task Force, CIMMYT developed curricula for intensive three-day field trainings of Department of Extension staff on the principles of IPM to control FAW. These curricula were based on the principles of the fact sheet and infographics described in BOX 9, and were developed to assure a healthy mix of intensive classroom training with field exercises. The Appendix to this chapter provides a summary of the key concepts included in the trainings.

Between October and November of 2019, 366 extension staff were trained using these approaches, in addition to six delegates from Nepal. The effectiveness of the training was assessed by giving participants (a) a pre-test before trainings, (b) a post-test at the conclusion of the trainings, and (c) telephone surveys during which 241 of the same trainees were asked the same post-test questions, in addition to several new questions about FAW management, six months after the trainings were completed. There were two key take-home results: (a) In the months following the trainings, 129 extension agents voluntarily arranged farmer field days at which they discussed conservation biological control and demonstrated how to most safely apply insecticides and maintain spray refuges to maintain natural enemy presence in fields. (b) Although most extension agents passed on their knowledge informally during their regular rounds of interacting with farmers, seven Sub-Assistant Agricultural Officers (SAOs) organized 22 additional formal batch trainings in their respective working areas.

These efforts resulted in 721 lead farmers receiving advanced FAW training (246 farmer participants were women). A total of 168 extension staff provided detailed customized advice to farmers on FAW management, giving direction on when and where to spray in FAW-infested maize fields. In sum, SAAOs advised farmers 1,231 times. In addition, and more importantly, 216 extension staff scouted fields and advised farmers to not apply pesticides 3,613 times. All extension staff indicated that they used their learnings and had conveyed IPM advice to farmers for controlling FAW during their regular rounds of meetings with farmers and in farmers' groups and clubs. On average, follow-up survey data indicated that SAAOs shared FAW IPM advice with a total of 74,132 farmers (~307 farmers per extension agent on average), among which 22% were women.

**Burma\***—USAID partnered with IFDC to provide extension services in FAW-affected areas. The IFDC extension team prepared a training manual, information posters, and pamphlets in May 2019. IFDC liaised with the PPD to ensure consistency in delivery of technical information sharing. The Implementing Partner then conducted FAW retailer trainings in Pindaya, Aung Ban, Nyaung Shwe, and Taunggyi Township of Southern Shan State at the end of May 2019. From this group, they selected 12 demonstration field schools in six townships with input retailers who were willing to lead in demonstration field schools. These demonstration field schools started with an initial training in June 2019, followed by five rounds of scouting through August 2019. Sample plot harvesting in demonstration field schools and random farmers' crop cuts (small yield tests) were completed during October 2019. IFDC produced a second edition of the training manual during September 2019 and started retailer training for the Delta Region, at Maubin, Zalun, and Letpadan Township. During October 2019, they established six demonstration field schools and regular scouting in five townships. Scouting was continued until November 2019, when the activity ended.

## 5.2. Agro-dealers and Other Input Providers

A communication strategy considers a specific crop protection problem not just as the outcome of a crop–pest interaction but also within the context of the local agricultural system. Agro-dealers form a significant part of the extension system because most of the time they are the first point of contact for the farmers seeking advice. Hence, it is important that dealers have the right information. Consistent information can reach the agro-dealers if they are trained under one umbrella, which can be their network in the country. See BOX 9 for the trainings that were undertaken in Bangladesh.

### BOX 9. Agricultural Input Dealers and the Private Sector—Bangladesh

Farmers in Bangladesh get the vast majority of their pest management advice from pesticide dealers. Although many IPM programs eschew work with pesticide companies and their dealers, activities in Bangladesh embraced the reality that working with these groups is crucial in reaching farmers with appropriate information. Without engaging with the private sector—and village-level insecticide dealers in particular—farmers are likely to be given inappropriate advice to spray potentially dangerous insecticides that may not even be effective against FAW.

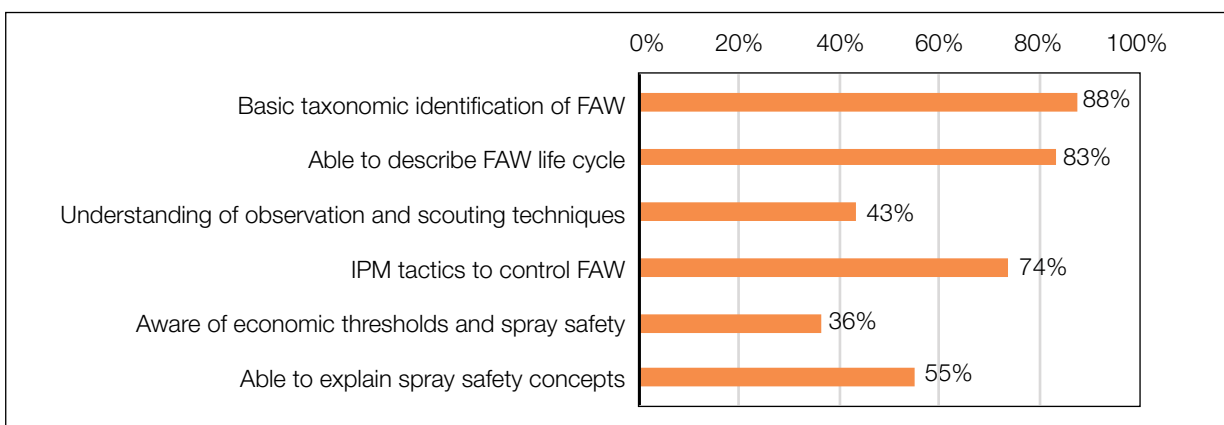
To this end, CIMMYT initiated work with AIRN to develop FAW IPM training materials—with emphasis on the moral hazards of selling dangerous and ineffective insecticides and business models for less toxic products—and plans to reach input dealers at a large scale. Between March and April of 2019, 755 input dealers were trained by AIRN. Follow-up telephone surveys of a subsample of 259 input dealers were conducted three months later, after the maize season had ended. Out of the 259 respondents, 54% gained at least basic and initial knowledge on IPM. Out of the 140 dealers who developed a basic knowledge of IPM, 125 (89%) provided IPM or pesticide-oriented messages to farmers. The types of information provided by these dealers to farmers depended on their learned competencies from trainings, and included information on identification of FAW, FAW biology, scouting, IPM techniques, pesticide safety, and basic concepts of economic thresholds. Dealers retained this information, as evidenced in post-training studies, but heterogeneously (Figure 3).

In mid-2019, shortly after the formal formation of the FAW Task Force, a “fact sheet” was developed cooperatively among task force members with recommendations for IPM techniques to control FAW. Information on the fact sheet was generated through review of scientific literature, research conducted

\* Information provided by Matt Curtis, Feed the Future Coordinator, USAID Burma.

in Bangladesh, the FAW infographics (described below), and experiences from other countries. Using nationally approved messaging on FAW, and based on learnings from the first round of trainings of input dealers described in Figure 3, a second round of training by AIRN was conducted in January-February of 2020 with another 1,000 additional input dealers trained, each of whom had been strategically selected as key dealers operating in locations with intensive maize cultivation. Follow-up surveys of the latter trainings found that each of the retailers trained by AIRN master trainers reached at least 50 farmers with information on FAW management. In this way, an estimated 52,000 farmers benefited from enhanced advice on FAW management. These results underscore the importance of strong monitoring and evaluation efforts in training and communications programs in order to adjust curricula and improve messaging based on participant's retention of knowledge.

In addition to efforts to directly train input dealers and communicate key messages on IPM to control FAW, CIMMYT and USAID contacted key pest control product companies, and the National FAW Task Force was convened by USAID and CIMMYT at the US Embassy in Dhaka on August 5, 2019. During this meeting, pesticide companies willing to take part in multi-day field trainings on FAW management were identified. Nine companies received intensive 2-day residential trainings in October of 2019. Follow-up surveys of each company revealed that they had all taken subsequent action to further communicate the messages received during the trainings.



**Figure 3.** Technical competencies of insecticide input dealers following rapid 1-day trainings on integrated FAW management in Bangladesh when activities started in 2019 (data are from a survey of 259 dealers trained). (Figure credit: Tim Krupnik, CIMMYT).

### 5.3. Resources for Training the Trainers and other Reference Materials

USAID has prepared or funded several freely available web-based resources useful for training of extension agents and others involved in training farmers on FAW (BOX 10).

#### BOX 10. USAID-Sponsored Web Resources

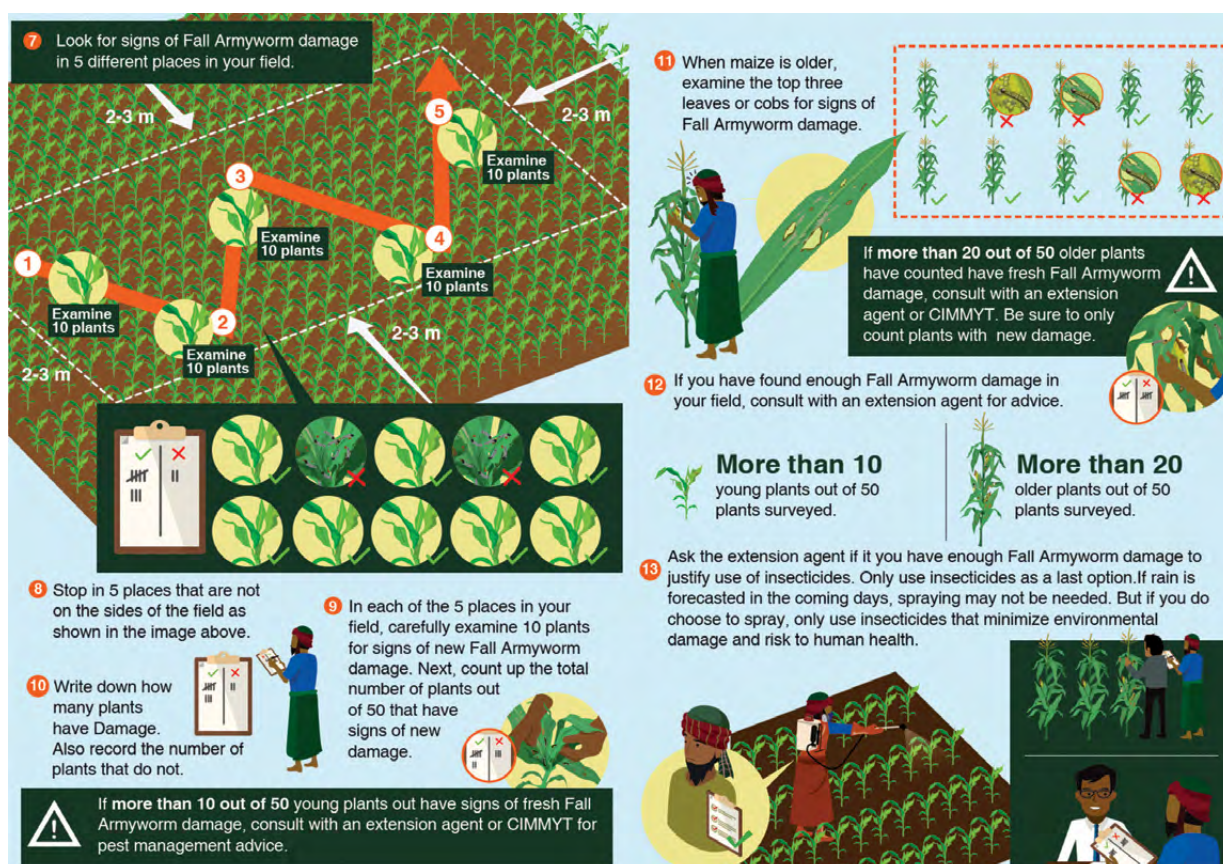
Agrilinks (<https://agrilinks.org/>) is part of the US Government's Feed the Future initiative that addresses the root causes of hunger, poverty, and undernutrition, and establishes a lasting foundation for change. Feed the Future strengthens the capacity of communities and governments to manage FAW through a range of IPM strategies that protect people and the environment (<https://agrilinks.org/post/feed-future-tools-combat-fall-armyworm-africa>). The FAW portion of the site houses the FAW IPM Guide for Africa (Prasanna *et al.* 2018) in several languages and will be the home for the FAW IPM Guide for Asia as well.

Agri-Training (<https://agritraining.co.za/>), an effort funded by USAID and implemented by Land O'Lakes Venture37, provides a set of seven freely available modules covering various aspects of FAW identification and control (<https://agritraining.co.za/fall-armyworm-faw-free-learning-modules/>). These modules are designed as resources for individuals responsible for training smallholders. The modules include presentations that the trainer can use directly for training sessions as well as presentations and other materials for the trainer's own education.

## 6. Communication with Farmers

The strategy for communication with farmers should employ a multimedia, multi-channel approach that will allow for information to reach farmers across the country. The strategy must be informed by the socioeconomic status and communication capabilities of the target farmers. Range, transmission method or device (radio, TV, mobile phones, print, Internet, face-to-face), interactivity, and cost are just some of the considerations that the strategy must carefully consider when choosing the channel(s) to use.

For example, the sheer number of farmers in Bangladesh—who number over 60 million—makes it an extreme challenge to reach them with effective information on FAW. For this reason, initial efforts in Bangladesh focused on the development of easy-to-understand informational graphics (infographics) that could be mass-printed and distributed to farmers (Figure 4). Other communication strategies and examples are highlighted in the following sections.



**Figure 4.** Pages from one of four pocket-sized infographics developed in English, Bangla, and Lao (Krupnik and Dhungana 2019a-d). This infographic describes how to scout fields for FAW damage and make spray or no-spray decisions. Over 500,000 infographics have been printed and distributed to farmers across maize-growing areas in Bangladesh.

### 6.1. Community-Based Field Training

Community-based field training is ideal but has limited reach. It is most effective with small audiences since it entails direct, face-to-face interactions. The quality of the communication is very high since it allows audience feedback in terms of questions and comments, stimulates discussions, and enables active participation. Further awareness can be raised by mass extension campaigns, plant health rallies, and use of mass media (see BOX 11).

Surveys to determine the types of information needed, followed by meetings and workshops covering those topics, are effective methods of creating need-based awareness.

### BOX 11. Community-Based Training: Some Examples

In **Myanmar**, CABI intensified its support for managing FAW and building awareness given that FAW presence was confirmed in early 2019. On the request of the Deputy General of the Department of Agriculture, a large awareness program was organized that targeted more than 650 farmers in four key states and regions. The awareness meetings on FAW in Shan State (Taunggyi and Lashio) reached 236 farmers and extension staff, including 77 women and 159 men. There was considerable interest by farmers and extension staff as the majority confused FAW with other local armyworms, and its biological features were unknown. Most farmers and staff learned during the awareness program to identify the key morphological features of the pest and to diagnose FAW. Further in April 2019, PPD and CABI visited Ayeyarwady Region, Tatkone, Kayah State, and Sagaing Region and met with 421 farmers and extension staff, including 168 women and 253 men. Meetings were organized in each location with two key objectives: (1) to inform farmers regarding the key features of FAW and (2) to spread awareness of methods for FAW management.

**India** – From September 2018, ICAR-IIMR along with ICAR-NBAIR and AICRP-Maize initiated large interface meetings and training programs for extension workers, agriculture development officials, and farmers. These initial efforts, which helped to create widespread awareness, have been documented by Rakshit *et al.* (2019). Subsequently, a massive grassroots project, Safeguarding Agriculture & Farmers against FAW (Project SAFFAL), was launched in March 2019 by SABC, supported by FMC Corporation. Project SAFFAL was equipped with grassroots awareness programs, mobilization and engagement of government stakeholders, direct farmer training, and technology-based communication elements delivered through a dedicated web portal, [www.fallarmyworm.org.in](http://www.fallarmyworm.org.in). The web portal walked the user through a rich database of information such as informational posters in different regional languages, IPM plans, consolidated data on FAW research, and other rich sources of information on FAW. Moreover, a dedicated FAW network comprising volunteer scientists, researchers, and experts in the field was made available to help farmers through an interactive expert network on the FAW website (Mayee *et al.* 2021). Similar web portals on FAW are managed by FAO ([www.fao.org/fall-armyworm/en](http://www.fao.org/fall-armyworm/en)) and CABI ([www.cabi.org/ISC/fallarmyworm](http://www.cabi.org/ISC/fallarmyworm)) wherein information on FAW is being hosted and updated periodically. Project SAFFAL relied on animated videos on FAW, webinars with SAUs & KVKs, online media, and digital technologies to relay messages and meet the informational needs of key stakeholders including smallholder farmers during the COVID-19-induced pandemic in 2020. The project activities, both physical and webinars, traversed the Indian landscape while reaching 10 major maize-growing states. They included 15 awareness programs involving 35 public-sector institutions, providing direct training to almost 15,000 maize farmers and indirectly reaching out to almost 300,000 farmers, extension officials, and other key stakeholders on FAW management.

## 6.2. Remote Communication – Role of Mass Media

Mass media approaches are most suitable for reaching large audiences. They include:

- Print media – national, regional, and community newspapers, magazines, newsletters, posters, leaflets, booklets, and flyers
- Broadcast media – announcements and interactive programs on FM radio and TV. When using this tool, proper messaging is vital to complementing the government's overall efforts to effectively manage and mitigate the effects of the pest outbreak
- Video shows – especially those conducted in villages and in rural marketplaces – can be an effective tool to reach farmers with training information. Video shows are compelling and attractive, and when combined with an opportunity for farmers to ask questions and receive answers from experts after showing technical videos, these events can effectively double as informal training sessions.

Regardless of the medium used, the messages should be accessible and easy to understand but also validated for quality. It is important to ensure that the voices of farmers are represented in the messages. Messages should provide accurate and verified information on incidence and abundance of pests, the resultant damage to crops, and safe and effective control measures. See BOX 12 and BOX 13.

**BOX 12. Mass Media Strategy – India**

In India, following the FAW outbreak, different information, communication, and educational activities around IPM strategy were organized. These included regular meetings among stakeholders; continuous surveys, trainings, and sensitization of different stakeholders (589 countrywide training programs as of October 2018); distribution of pheromone traps and lures; distribution of extension folders, leaflets, and pamphlets; and dissemination of information through social media, radio, TV talks, and language-specific posters and audio-visuals. Moreover, the informational power of print media and newspapers was also harnessed by different stakeholders.

In collaboration, the different initiatives by Government agencies, NGOs, and private agencies addressed the farmer's informational needs in a targeted manner. The efforts appealed to the different information delivery channels, reaching the farmers through mass media, customized information material, demonstrations, active helplines, and expert networks. The active engagement of farmers and their demonstrated efficiency in controlling an exotic pest upon the first instance of infestation showed the efficient relay of information. Indian farmers also exhibited the tendency to actively uptake information when relayed effectively through different channels accessed by them regularly. Additionally, the regular assessment of conditions through surveys also facilitated the adjustment of recommendations.

Among the many valuable Government- and NGO-led initiatives, some of the key developments were the following:

- Awareness through educational programs for farmers in conjunction with Agri-University scientists, KVKs, NGOs, and agricultural department officers.
- Field visits and on-the-farm awareness programs.
- Workshops and training program for retailers, Agri-department & extension officials.
- Farmers' Advisory on FAW management in vernacular languages.
- Posters, video clips, pamphlets, and technology capsules on IPM of FAW in vernacular languages.
- Extension bulletins and online videos in all predominant Indian languages.
- ICAR-IIMR collaborated with CIMMYT, USAID, and MSU on translation of the SAWBO video on FAW identification, scouting, and management into different Indian languages (Hindi, Punjabi, Gujarati, Telugu, Kannada, Tamil, Odia, Bengali, Manipuri, Mizo, and Naga).
- Distribution of pheromone traps, lures, and safety kits to large numbers of farmers.
- FAW-dedicated website, maize expert network, eSAP (Electronic Solutions against Agricultural Pests), WhatsApp groups, and helpline for farmers.
- UAHSS developed a video clip on the present status of FAW, its identification, biology, and management in the Kannada language.

Moreover, the support from various international organizations was also extended to the farming communities in collaboration with Government agencies in the battle against FAW.

**BOX 13. Mass Media Strategy – Bangladesh**

CIMMYT has partnered in Bangladesh with various institutions, including the NGO Agricultural Advisory Society (AAS), for more than eight years to conduct mass media campaigns and rural video shows on a variety of topics. Shortly after FAW was identified in Bangladesh, CIMMYT and AAS developed plans to translate the SAWBO video on FAW identification and scouting (<https://sawbo-animations.org/708>) to suit the farming context in Bangladesh. This video, which uses cartoon-style information to explain FAW to farmers and train them on how to scout fields and make spray or no-spray decisions, was shown across key maize-growing areas of Bangladesh. Between February and April of 2019, 13,057 maize farmers had participated in 238 video show trainings across the country. After the formation of the FAW National Task Force and acceleration of efforts to respond to the FAW outbreak, CIMMYT and AAS resumed this activity in late 2019 and early 2020. These efforts reached 130,000 additional farmers throughout much of the maize-growing areas in Bangladesh through village and road-side video shows.



## 6.3. Digital Technology

Digital tools are quite flexible in terms of message delivery. In addition, they are relatively inexpensive, allow interactivity, and can distribute messages to vast audiences rapidly and efficiently. Such tools connect field agents and experts so that there is effective and timely flow of information, knowledge, and expertise. Tambo *et al.* (2019) evaluated the unique and combined effects of three complementary ICT-based extension methods – interactive radio, mobile SMS messages, and village-based video screenings – on farmers’ knowledge and management of FAW in Uganda. The study concluded that: (a) participation in ICT-based extension campaigns significantly increases farmers’ knowledge about FAW and stimulates the adoption of agricultural technologies and practices for the management of the pest; (b) exposure to multiple campaign channels yields significantly higher outcomes than exposure to a single channel, with some evidence of additive effects; and (c) among the three ICT channels, radio has greater reach, video exerts a stronger impact on the outcome measures, and greater gains are achieved when video is complemented by radio. Although the study was done in Uganda, the results also hold potential relevance to communications on FAW management in Asia. Farmers who have access to smartphones can readily obtain free, accurate training and information on FAW (BOX 14).

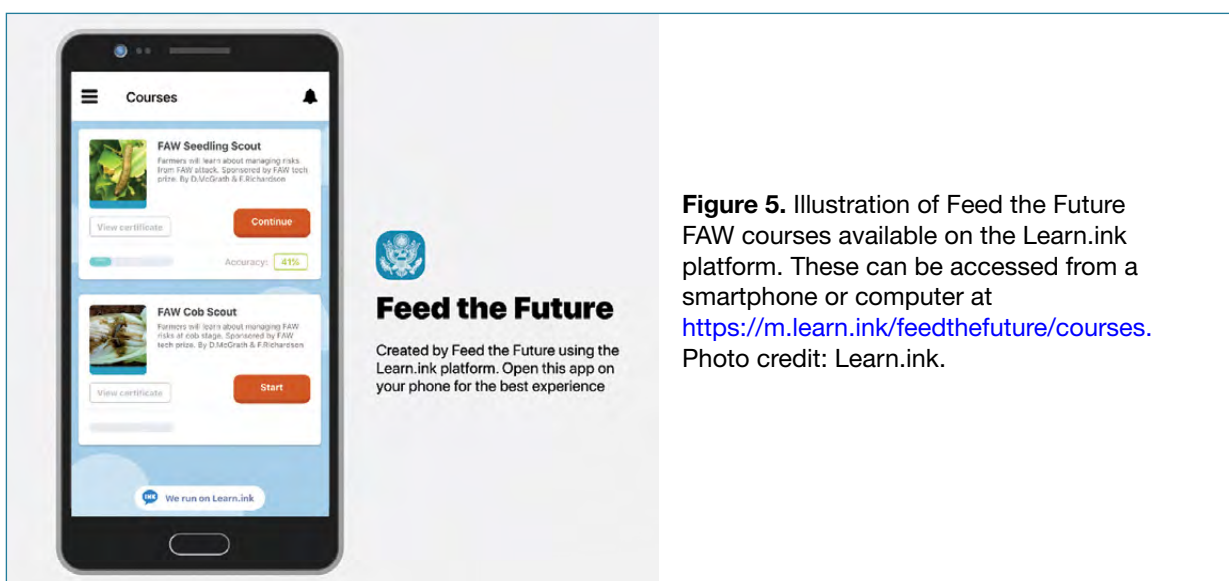
A few elements have to be kept in mind while using these tools for creating awareness.

- Integration of these tools can enable smallholder farmers or those who work with them to recognize and take effective action against the pest.
- Offline mobile communication technologies and applications are cheap and can be used by farmers in areas with poor Internet connectivity.

### BOX 14. Cellphone-Accessible Training for Farmers

As described in previous sections, the SAWBO platform (<https://sawbo-animations.org/home/>) provides freely accessible video animations on numerous educational topics. These animations are designed for low-literate learners and are often narrated in multiple world languages. The animation on identification and scouting of FAW (<https://sawbo-animations.org/708>) has been narrated in over 35 languages through the help of ICAR-IIMR (BOX 12) and many others.

For farmers and farm advisors with access to smartphones, two app-based courses, FAW Seedling Scout and FAW Cob Scout, have been developed by USAID FTF and are available on the Learn.Ink platform (Figure 5). The courses are freely available at <https://m.learn.ink/feedthefuture/courses>.



**Figure 5.** Illustration of Feed the Future FAW courses available on the Learn.ink platform. These can be accessed from a smartphone or computer at <https://m.learn.ink/feedthefuture/courses>. Photo credit: Learn.ink.

## 7. Conclusion

An efficient coordination and communication system can support FAW management while mitigating its social, economic, and environmental impacts. Development of a communication framework with the aim of providing a set of guiding principles and tools to assist the respective governments with country-level communication strategies for FAW and other major pests should be considered seriously by all countries affected by FAW. Through this framework, governments will gain a better understanding of the communication and other issues that must be considered when preparing a FAW preparedness plan and communication strategy. The FAW Communications Framework should be considered as a work in progress and should be periodically updated to reflect more recent developments and current practices in communications on invasive pests.

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