







## FIGHTING BACK AGAINST FALL ARMYWORM IN BANGLADESH

Annual Report | October 2019 - September 2020











### **Report and Activity Details**

Project Name: Fighting Back Against Fall Armyworm (FAW) in Bangladesh

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Submitted by: The International Maize and Wheat Improvement Center (CIMMYT)

Grant Amount: \$696,717.00 Project Duration: October 1, 2019 to June 30, 2021 (note however that funding was made available only in October of 2019)

Report Period: October 1, 2019 to September 30, 2020
Report Due: October 31, 2020
Has this project been granted an extension? No.
Project Staff: A list of project staff can be found in Appendix I.

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Date Submitted: October 15, 2020

**Disclaimer:** This publication, was made possible through support provided the U.S. Agency for International Development via Michigan State University (MSU). The opinions expressed herein are those of the author(s) and do not necessarily reflect the views of CIMMYT, USAID or MSU.

#### **Executive Summary**

Fall Armyworm (FAW) is an invasive agricultural pest native to the Americas. A Lepidopteran insect, FAW has a wide host range but favors maize to feed on. FAW recorded for the first time in Bangladesh in late 2018 following incursion from India. Fall armyworm presents an important threat to farmers' income and livelihoods. Now found throughout Bangladesh and much of Asia, farmers' response has typically been to apply pesticides to control the highly apparent signs of damage caused by FAW's feeding. This is particularly problematic if highly toxic insecticides are indiscriminately used. Both USAID and Michigan State's Borlaug Higher Education for Agricultural Research and Development (BHEARD) responded to support the Fight Against FAW in Bangladesh. Their support enabled the Fighting FAW Activity, which works synergistically with the <u>Cereal Systems Initiative for South Asia</u> (CSISA) project. This first year Annual Report builds on the previous Semi-Annual report and provides updates for the period from October 2019 to September of 2020. Key achievements so far include the following:

- The Activity conducted a series of intensive three-day field trainings on integrated FAW management for 254 Department of Agricultural Extension (DAE) Agents in October – November of 2019. Follow-up surveys with extension agents indicated that this group conveyed IPM advice to farmers for controlling FAW in during their regular rounds of meeting with farmers and in farmers' groups and clubs. Monitoring and evaluation data indicate that IPM was extended to 74,132 farmers, among whom 22% were women.
- Surveys also clarified that the trainings were extremely effective. A total of 239 DAE Sub-Assistant Agricultural Officers (SAAOs) set up and maintained pheromone traps in demonstration FAW IPM plots in farmers' fields after the training. In addition to regular and informal passing of information to farmers during extension visits, 129 SAAOs also pro-actively and independently arranged formal farmer field days. During these field days they discussed conservation biological control and demonstrated how most safely apply insecticide and maintain spray refuges to maintain natural enemy presence in fields. 216 SAAOs scouted fields and advised farmers to <u>not</u> apply pesticides three times more frequently than they did, indicative of success of the trainings that focused on reducing unnecessary pesticide spraying.
- During the reporting period, the Activity supported Bangladesh's FAW Task Force by printing 100,000 copies of the nationally endorsed FAW integrated Pest Management (FAW) fact sheet that were widely distributed by public agencies and the private sector throughout Bangladesh.
- Through synergistic activities in the CSISA Project, a video produced by Michigan State University's Scientific Animations Without Borders (SAWBO), USAID and CIMMYT on FAW management was shown to over 130,000 farmers 21% of whom were women throughout much of the maize growing areas in Bangladesh in village and road-side video shows during. These showings doubled as an opportunity for light training as farmers were encouraged to ask questions with answers provided by subject experts associated with CSISA in between runs of the video. In addition, these activities galvanized support for use of the SAWBO video, with the Government of Bangladesh electing to post the SAWBO video on FAW management on all governmental websites, shown prominently alongside other videos highlighting health topics such as dengue and COVID. This can viewed on this link.
- In In addition, the Activity completed the production of two additional Bangla language videos to raise awareness on FAW IPM. The video "<u>Best practices to manage Fall Armyworm</u>" provides information on

the advent of the FAW migration to Bangladesh, its pest status, and how farmers can use monitoring and scouting procedures, as well as methods to identify and understand FAW and its basic biology and IPM methods. The second video, "*Jamal conquered his dream through maize farming*," is an informational training video filmed in the format of an entertaining fictional drama. Due to restrictions imposed by COVID-19, in-person screenings of these videos is however not possible. Rather, the Activity has begun working with cable television stations in their dissemination. Through October 2020-January 2021, cable television operators in 195 sub-districts in 25 maize growing districts will begin airing the videos in accordance with the time during which maize tends to be sown by farmers.

- In late 2019, the Fighting FAW activity has developed an app the <u>Bangladesh Fall Armyworm</u> <u>Monitor</u> – that is custom designed based on the requests of the National FAW Task Force and DAE in particular, to monitor the FAW population in the 9 major and 16 minor maize growing districts. Extension agents collected data on FAW populations and damage to maize from 777 fields weekly from across Bangladesh, with all data uploaded and analyzed automatically in a dashboard format to enable policy makers and extension staff to make better decisions and advise farmers more appropriately. This is the first time that digital tools were used for large-scale surveillance of pests in Bangladesh, and widely seen as a major contribution of the project. The monitoring tool has also been expanded to Myanmar through an investment from the CGIAR Research Program on MAIZE. In addition, partnerships with the Bangladesh Agricultural Research Institute and Bangladesh Rice Research Institute enabled similar monitoring in cabbage, tobacco, rice and tomato crops.
- In Bangladesh, the registration process for pesticides typically takes a long time. Efficacy field tests are required for two year-seasons (24 months) and in two locations, in addition to a battery of lab toxicity tests and verification by BARI scientists to assure data quality. Although designed to assure farmer and public safety, this system presents challenges to the release of appropriate pesticides including biological and botanical pesticides in emergency situations such as FAW invasion. With the direct involvement of the Activity, two relatively safe and effective pesticides, including *Spodoptera frugiperda* nucleopolyhedrovirus (Fawligen, SfNPV, produced by the Texas-based AgBitech and sold locally by Ispahani) and Cyantraniliprole (Fortenza, a seed treatment produced by Syngenta) were registered in less than 8 months and are now being made commercially available to farmers in Bangladesh. The Activity's market systems facilitation resulted in this achievement, which serves as a benchmark example of what can be achieved then public and private sector efforts are coordinated in emergency invasive species pest response.
- The Activity has embarked on an ambitious set of research support activities targeting FAW to better
  understand how farmers across Bangladesh responded and managed damage in their fields, while also
  initiating cooperative research with the Bangladesh Agricultural Research Institute (BARI), Bangladesh
  Wheat and Maize Research Institute (BWMRI), and the Bangladesh Rice Research Institute (BRRI).
  Research topics respond to key expert-defined needs for FAW studies in Bangladesh and include:
  Screening studies to evaluate the effectiveness of new pest control materials (led by BARI), FAW
  severity, incidence and management surveys to inform mitigation (led by CIMMYT with BWMRI and
  DAE), studies to characterize natural enemies of FAW in Bangladesh (led by BARI), intercropping
  and agroecological management of FAW (led by BWMRI) and FAW digestibility of rice to assess risk
  damage to an alternative host (led by BRRI).

- In a synergistic activity co-supported by 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 from January to February of 2020. These trainings were deployed by partnering with the Agricultural Input Retailer Network (AIRN) in Bangladesh. A total of 1,047 retailers from nine districts participated in these hands-on trainings. Each of the retailers trained by the AIRN master trainers reached at least 50 farmers with information on FAW management. Extrapolating these results, more than 52,000 farmers were able to access enhanced advice on FAW management through trained dealers. In addition, agricultural input dealers distributed 109,000 infographics on FAW.
- The project facilitated a one and half day long training program for pest control product companies on 20-21 November of 2019. This training program was arranged during 20-21 November 2019 at Hotel Shahid, Chuadanga. A total of 30 participants participated in the training program. All of the participating companies followed-up after the trainings and further extended information to their staff, dealers, and farmers, in addition to investments in low-toxicity and biological pesticides.



**Above:** Dr. Muyeed, Director General of the Department of Agriculture taking part in Fighting FAW project trainings and giving media interviews in farmers' fields in Southern Bangladesh in late 2019 during the reporting period.

#### Introduction

Fall Armyworm (FAW), an invasive pest native to the Americas, was identified in Bangladesh for the first time in late 2018 following migration from southern India. FAW feeds on more than 80 species of plants, but maize (*Zea mays*) is its preferred host. The migration of FAW from North America has been unprecedented. FAW destroyed more than 13.5 million tons of maize worth \$3 billion in Sub-Saharan Africa before reaching South Asia<sup>1</sup>. In Bangladesh, early attack affected 14 districts in the winter 2018-19 seasons. Experience in Africa indicates that the two years following FAW establishment can result in crop losses as populations establish.



In response, this project takes an integrated pest management

(IPM) approach that can be sustainably implemented by resource-constrained farmers. This project tackles these issues by generating evidence and developing educational strategies to facilitate FAW IPM training for the public and private sector, while also addressing institutional issues needed for efficient FAW response. In addition to support from the Borlaug Higher Education for Agricultural Research and Development (BHEARD) at Michigan State University (MSU), which is supported by USAID and is the primary funder if the Fighting FAW project, activities reported here have benefited from synergistic co-investment by the Cereal Systems Initiative for South Asia (CSISA) Phase III Project (supported by USAID and the Bill and Melinda Gates Foundation). This report highlights primarily Fighting FAW and thus MSU contributions, though some activities that had significant in-kind support from CSISA are also identified appropriately and discussed.

#### **Project Objective Summary**

This project is comprised of six inter-related objectives that as follows:

Objective I.	Develop educational materials to aid in reaching audiences with information to improve understanding and management of FAW						
Objective 2.	Assist the Department of Agricultural Extension (DAE) in deploying awareness raising and training campaigns						
Objective 3.	Institutional change to improve crop protection and integrated pest management						
Objective 4.	Prepare the private sector for appropriate FAW response						
Objective 5. Objective 6.	Standing multi-threat pest emergency taskforce supported Generate data and evidence to guide integrated FAW management						

<sup>&</sup>lt;sup>1</sup> Abrahams, P. Bateman, M, Beale, T. Clottey, V., Cock, M., Colmenarez, Y., Corniani, N., Day, R., Early, R., Godwin, J., Gomez, J., Gonzalez Moreno, P., Murphy, S.T., Oppong-Mensah, B., Phiri, N., Pratt, C., Richards, G., Silvestri, S., Witt, A. 2007. Fall Armyworm: Impacts and Implications for Africa Evidence Note (2). UK AID and CABI. London, UK.

Progress on each of these objectives during the October 2019 – September 2020 relative to the project workplan are detailed in the below sections of the report

#### **Detailed project objectives**

# Objective I. Develop educational materials to aid in reaching audiences with information to improve understanding and management of FAW

#### I.I. Educational material development and dissemination

A technical fact sheet developed in Fall Armyworm Task Force meetings supported by this Activity was validated and approved in the 5th National Task Force meeting held on 27 January, 2020. A key output from this meeting was the decision to print 100,000 copies of the fact sheet. This was completed by the fifth of February, 2020. Printing was supported by the Fighting FAW Activity, with factsheets distributed to the users in the Department of Agricultural Extension (DAE, 50,000 copies), the Bangladesh Wheat and Maize Research Institute (BWMRI, 20,000 copies), the Bangladesh Agricultural Research Council (1,000 copies), the Bangladesh Agricultural Research Council (1,000 copies), the Bangladesh Agricultural Research Council (1,000, the remainder were distributed largely to private sector partners (e.g., companies such as Ispahani, Syngenta, and ACI that are advising farmers on FAW management). These in turn were distributed to farmers via various channels within the reporting period.



**Above:** Distribution of Fall Armyworm Task Force approved FAW management fact sheets printed by the Activity in early 2020 and their distribution by partners in Bangladesh.

#### **1.2 Production of Bangla Language Educational Videos (Activity Set I)**

The existing <u>Scientific Animations Without Boarders</u> (SAWBO) FAW training video, that was produced with support and technical input from USAID and CIMMYT, provides farmers with good preliminary information on how to identify and scout for FAW. However, although the SAWBO video is useful, it does not provide detailed FAW management information, and is also focused on situations most applicable to agroecosystems in sub-Saharan Africa. As such, activity 1.2 in the Fighting FAW project aimed to produce Bangla language and context-appropriate training videos that can later be shown through mass media campaigns and as complements to trainings conducted by the public and private sector. Two videos have now Bangla language videos have been completed. One video is mainly technical and educational, while and another one is an entertainment drama also with technical information.

**Technical video:** The video "Best practices to manage Fall Armyworm" provides information on the advent of the FAW migration to Bangladesh, its pest status, and how farmers can use monitoring and scouting procedures, as well as methods to identify and understand FAW and its basic biology, and IPM methods. The I2-minute video that features CIMMYT and BWMRI scientists is available here: https://youtu.be/iBECvAwbngl

**Entertaining drama video with educational material:** The video "Jamal conquered his dream through maize farming" features the story of Jamal Mia, a maize farmer. He has only one daughter who is a good student who passed her Secondary School Certificate and is waiting for higher study. Jamal cultivated several hectares of maize and was hoping for a bumper crop; with that money he had been hoping to send his daughter for higher studies.



**Above:** Screen shot from the "Best practices to manage the Fall Armyworm" video produced by the Activity placed prominently on the <u>CIMMYT homepage</u>.

Unfortunately, his crop was severely infested with FAW. However, he consulted with his local DAE agent, who assisted by providing him training about FAW identification, scouting and how to manage the pest in both cost-effective and environmentally sound. He followed all the guidance and managed to overcome the FAW challenge, resulting in a bumper crop and fulfilling his dream to send his daughter for higher studies. The 23 minutes video also includes biological information on FAW, including its identification, life cycle, scouting and key management techniques. This video can be found here: <a href="https://youtu.be/zkGmoOXHGzM">https://youtu.be/zkGmoOXHGzM</a>".

**Dissemination of videos:** The production of both the videos was delayed approximately three months due to COVID-19 lockdowns in Bangladesh, during which the vendor assisting the Activity in video production shut down their operations. Also as a result of national lockdowns, dissemination of the videos during the summer *kharif* maize season could not be completed, though this is a comparatively minor season for maize cultivation and thus FAW in Bangladesh. However, both videos were shared widely on the CSISA website, uploaded to the popular online platform "Krishi Bioscope" and Facebook and Twitter. Because of lockdowns and COVID-19 safety procedures, the Activity has suspended large-scale rural video shows that generally attract a large audience. Rather, since the release of the videos, the Activity has worked to assure their airing on Bangladesh's cable TV networks operated by the local cable operators in eight key early sown maize growing Upazilas in three districts, Chuadanga, Meherpur and Jheneidah, targeting around 40,000 farmers by airing the videos at times that these channels are widely watched in the evening times at local tea stalls that frequently have televisions. Through October 2020-Janiary 2021, an additional 195 Upazilla of 25 maize growing districts will also begin airing the videos in accordance with the time during which maize tends to be sown by farmers.

**Video on Biological Control of FAW produced with CABI:** In addition, the Activity is collaborating with Cambridge Agricultural Biosciences International in the production of a Bangla language video on the biological control of FAW.



Above: Screen shot of the FAW biological control video developed by CIMMYT and CABI with support from this Activity.

Video production commenced in August and is on-going, with an anticipated completion date within November 2020. After completion of the biological control video, dissemination will be completed also using cable television networks, as well as social media and websites.

# Objective 2. Assist the Department of Agricultural Extension (DAE) in deploying awareness raising and training campaigns

### 2.1 Deploy FAW Master Trainer of Trainers for DAE (Activity Set I)



**Above:** Trainees in the field scouting for FAW in Chauadanga, Bangladesh in November of 2019 (Photo: Timothy J. Krupnik/CIMMYT)

Training Program Development: With the guidance of external consultant on FAW, Dr. Dan McGrath, Emeritus Professor, Oregon State University, USA and active participation of project's staff and the FAW National Task Force, technical content for a three day long Training Program entitled "Fighting back against Fall Armyworm with Integrated Pest Management" (Appendix II) was developed in during September-October of 2019. The training curricula focuses on and management of Fall monitoring Armyworm for a series of Master Trainers courses (including primarily high-level

officials of DAE) delivered in Chauadanga in October-November of 2019 (see below). In the same way, another training program was formulated for the front line extension agents of Department of Agricultural Extension, Sub-Assistant Agriculture Officer (SAAO). A detailed account of the trainings is found in the Semi-Annual report; for this reason, only key take-home messages are reported here.

The Activity conducted a series of intensive three-day field trainings on integrated FAW management for 254 Department of Agricultural Extension (DAE) Agents in October – November of 2019. These training programs were formulated in a unique way. For the first two batches, where the senior level officials were participated from Department of Agricultural Extension, Scientists from National Agricultural Research System (BARI, BRRI, BWMRI), academicians from different universities (as they will work as the Master Trainer for FAO funded project), the day wise training program was as described below.

During first day of the training program after half day briefing on the introduction, identification, primary monitoring and scouting system, all the participants were went to a pre-selected nearby maize field having a considerable amount of infestation of FAW to have practical experience on what they learn during morning. In the 2nd day the participants learned on the details monitoring, scouting as well integrated management of the pest through different practical power point and video shows. The participants also discussed among themselves and alternatively debriefing on the lessons they learned during the closing of the day and during next morning before starting

the day works. During the third day, all participants again went to the field and all of them worked as individual trainer and they taught SAAOs as a master trainer by giving lectures as well as by taking practical sessions on the monitoring and scouting and to take decision about the management options of the FAW.



**Above:** Key officials from numerous organizations in the Government of Bangladesh participated in the October-November 2019 trainings on FAW integrated pest management in Chauadanga. Left to right: Mr. Md. Yousuf Mian, Coordinator of the IPM Innovation Lab in Bangladesh, Sufi Muhammad Rafiquzzaman, District Training Officer, DAE, Chuadanga, Kbd. Md. Ali Hasan, Deputy Director, DAE, Chuadanga, Kbd. Mohammad Ali, Additional Director, DAE, Jashore, Dr. Timothy J. Krupnik, Country Rep., CIMMYT, Bangladesh, Dr. Md. Abdur Rouf, Additional Secretary, Ministry of Agriculture, Kbd. Chandi Das Kundu, Director, Field Service Wing, DAE, Khamarbari, Farmgate, Dhaka, Dr. Shafiqul Islam Khandakar, Hub Coordinator, CIMMYT, Jashore, Dr. Md. Akhtaruzzaman, Deputy Director, DAE, Maherpur

Another important session in the training was practical learning on the use of the smart phone applications for monitoring of FAW developed by the Activity for the National FAW Task Force and DAE, as described in subsequent sections of this report. The participants learn about the apps as well as how to entry data and how to monitor the SAAOs who will be directly involved in the data entry system. In this way the trainer developed self-confidence on different aspects of FAW, especially on the introduction, identification, monitoring and integrated management of the devastating pest FAW. For the last three batches, where the field level extension personnel, Sub-Assistant Agricultural Officers (SAAOs) participated, the program was more field oriented then the first two batches.

The day wise training program was as follows. During first day of the training program after half day briefing on the introduction, identification, primary monitoring and scouting system, all the participants were went to the nearby maize field having a considerable amount of infestation of FAW to have practical experience on what they learn during morning. In the 2nd day, participants learned about monitoring, scouting as well integrated management of FAW through different lectures and video shows. In addition, SAAOs were given hands on training on the monitoring app developed by this activity, discussed in Objective 2. On the second day, participants engaged

in intensive training in the field rather than the classroom. During the third day, all participants went again went to the field and acted as trainers for lead farmers and other DAE staff, teaching learners how to monitor and take decisions about FAW management. As such, the training was highly practical. In this way the trainees developed self-confidence to work as master trainers on different aspects of FAW, especially on the biology, identification, monitoring and integrated management of this pest.



**Above:** Mutasim Billah (Data Analyst), Asif Al Faisal (Data Analyst) and Maruf Hossen (Agriculture Development Officer) assisting trainees to learn how to enter population and FAW damage monitoring data into custom-designed smartphone apps in October-November of 2019 (Photo: Timothy J. Krupnik/CIMMYT)

#### 2.2. Assist DAE in organizing training rollout on large scale basis

The main objective of the aforesaid training programs were to develop a cadre of equipped master trainers, who can individually teach the extension personnel as well as the farmers on the introduction, identification, monitoring, scouting and the integrated management of the devastating pest Fall Armyworm. Soft and hard copies of all the presentations, videos and handout shown in the training program were handed over to the participants for their use as Master Trainers.

The DAE officials and SAAOs have been involved in the local training programs of DAE during the remainder of 2019 and into 2020.

DAE has different national and international projects at the field level organizing training programs for different stakeholders is possible, especially for farmers. Most of these projects, especially the NATP Phase II and Production of Safe Food through Environmentally Friendly Technologies, all allocated time in each of training session for the trained DAE personnel to convey knowledge on FAW identification, monitoring and management. In addition to DAE staff, eight university professors from different educational institutions in Bangladesh received the training program, with their attendance supported by FAO from 1st week of December 2019. The FAO staff trained by this Activity during in Chauadanga subsequently organized day-long training programs for 3,000 SAAOs all over Bangladesh in 120 batches (25 SAAOs in one batch) on FAW monitoring and integrated management. Lastly, a documentary featuring the training program was also aired in December of 2019 multiple times on Bangladesh National Television (BTV) on the popular farmers' educational program *Mati-O-Manush*.



**Above:** Dewan Shiraj from interviews FAW IPM trainees for production of the <u>documentary</u> that aired multiple times on Bangladesh National Television in December of 2019 (Photo: Timothy J. Krupnik/CIMMYT)

The Activity also conducted a followup study of SAAO knowledge retention from the trainings. This was accomplished by giving participants (a) a pre-test before trainings, (b) a posttest 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.

Considering responses to the knowledge retention questions, clear patterns of increased and sustained

knowledge were observed. Key take-home results and the impact from the from the training efforts are as follows:

- A total of 239 out of 241 SAAOs set up and maintained pheromone traps in demonstration FAW IPM plots in farmers' fields after the training.
- 129 SAAOs conversely arranged farmer field days and discussed conservation biological control and demonstrated how most safely apply insecticide and maintain spray refuges to maintain natural enemy presence in fields.
- Although most SAAOs passed on their knowledge informally during their regular rounds of interacting with farmers, seven SAAO organized 22 additional formal batch trainings in their respective working areas. These efforts resulted in 721lead farmers getting advanced FAW training (246 farmer participants were women).
- 168 SAAOs advised 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.



**Above:** Pre-, post-, and six-month after training follow-up surveys of SAAOs who participated in FAW IPM trainings in Chauadanga between October-November of 2019.



**Above:** Some key outcomes and impacts from the Activity supported Training of Trainer sessions conducted in October-November of 2019 in Bangladesh.

- In addition and more importantly, 216 SAAOs scouted fields and advised farmers to not apply pesticides 3,613 times.
- The 241 SAAO all indicated that they used their learnings and had conveyed IPM advice to farmers for controlling FAW in during their regular rounds of meeting with farmers and in DAE formed farmers' groups and clubs. On average, follow-up survey data indicated that SAAOs shared the FAW IPM advice to a total of 74,132 farmers (~307 farmers per SAAO on average), among which 22% of the farmers were women. The intensity of the feedback to farmers is dependent on intensity of maize growing in different districts, with SAAOs in Nilphamari, Thakurgaon and Chuadanga districts reaching the most farmers.

In addition to these efforts, four sets of refresher training courses for DAE staff in maize growing areas of Bangladesh (25 districts and 199 upazilas) and field level extension officials will commence from next 19 October 2020 through continued till November 19, 2020. For COVID-19 safety, the total training program will be arranged virtually. Special video curricula have been developed with international FAW expert Dr. Dan McGrath in collaboration with local experts. There will be eight virtual sessions supplemented by Bangla language power point videos. Later on those master trainers will conduct training field level new extension workers with the same curriculum and using the same videos.

#### 2.3. Media campaign to raise farmers' awareness on FAW IPM (in-kind, synergistic activity)

Increasing awareness of the principles of IPM among farmers is among the best ways to fight back FAW. Together, Agricultural Advisory Society (AAS), staff involved in the Fighting FAW activity cooperated with the CSISA project to organize total 975 video shows in 71 upazilas of 18 districts

from 17 October 2019 to 18 January 2020. More than 75, 141 of these participants were registered (with names and contact information tabulated into a database; of these participants, 22% were women. However, these numbers are fewer than the actual participation in events. Using head counting, 132,358 farmers participated in the video showings and discussions on FAW. The difference between these figures results simply from the sheer difficulty of recording information on all farmers attending events of this size. The districts and upazilas in which video shows took place were based on maize growing history and threat of FAW infestation. In addition, a total of 34,686 sets of FAW leaflets (four leaflets amounting to 138,733 leaflets) on FAW integrated pest management principles were distributed among the audience.

Through synergistic activities in the CSISA Project, this video was shown to over 130,000 farmers throughout many of the maize growing areas in Bangladesh in village and road-side video shows during the reporting period. These shows were demonstrated in 38 upazilas of 16 maize growing districts covering 124 villages of 85 unions. 21% of the audience participants were women. These showings doubled as an opportunity for light training as farmers were encouraged to ask questions with answers provided by subject experts associated with CSISA in between runs of the video.

Before the video show implemented in the field, CIMMYT invited the AAS team in the FAW TOT in November 2020 at Chuadanga, where the team learnt the FAW management systems, followed by a special mentoring session was conducted for the AAS field team with the support of Dr. Pandit and then AAS team moved in the field to successfully completed the event with the closed cooperation of CIMMYT hub office.



**Above:** Distribution SAWBO videos shown by the Activity in coordination with CSISA by district between the fall of 2020 and early spring of 2020 in Bangladesh. 21% of the audience participants were women.

A telephonic survey conducted in March of 2020 aimed at improving an understanding of the knowledge retention level and effectiveness of the training topics among the farmers who saw the SAWBO videos. A total of 794 calls were made among the randomly selected farmers who saw the video shows. 401 (51%) were maize growers, and of these, 49% were able to recall at least one of the recommended IPM practices, with most recalling the principle of action scouting of fields and quantification of crop damage before a spray or no-spray decision should be made for FAW management intervention. Among the maize farmers, 78 (18%) farmers already started scouting in "W" pattern and mathematically assessing FAW damage and population in their fields – impressive as farmer to farmer knowledge dissemination also takes place in these circumstances. 22% of the surveyed audience recalled at least three principles, for example, scouting, asking extension agents for advice, or the importance of controlling FAW early in the maize crop season, rather than when the crop is older.

In addition, these activities galvanized support for use of the SAWBO video, with the Government of Bangladesh electing to post the SAWBO video on FAW management on all governmental websites, shown prominently alongside other videos highlighting health topics such as dengue management, etc. This can be seen below, and linked to <u>here</u>.



**Above:** Placement of the SAWBO video link on all Government of Bangladesh websites in all 64 districts, an activity that can be partly attributed to the Fighting FAW project. The video has been viewed >156,000 times.

In addition, the Fighting FAW Activity worked to distribute <u>Fall Armyworm infographics</u> in Bangla to the private sector, NGO and USAID implementing partners during the reporting period. The table below provides information on the distribution of these infographics by key partners.

Partner name	Number of FAW IPM infographics distributed
Bayer Crop Science Limited	40,000
Auto Crop Care Limited (ACCL)	20,000
Petrochem Bangladesh Limited	80,000
NAAFCO	28,000
Supreme Seed Company Limited	20,000
Xplore Business Limited	12,000
Konika	4,000
Agro Input Retailers' Network (AIRN)	109,000
Agricultural Advisory Services (AAS)	80,000
Abt/BNA	4,000
US Trade Fair	1,000
Total	398,000

In summary, the Activity has found that rural or road-side and market video shows to be a quick and easy tool to access farmers and keep them up-to-date on key issues in pest management. Farmers enjoy watching the videos can ask questions of trained video-showers competent in informing them on FAW management. As such, while the Activity has provided training to DAE and private sector personnel, this synergistic activity carried out with CSISA support has led to additional benefits. However, video showings planned for the second, third and fourth quarters of 2021 have been put on hold due to COVID-19 risks. Alternatively, further showings of the SAWBO video may take place alongside other video dissemination efforts through cable television operators as described in 'Dissemination of videos' under Objective I.

## **Objective 3.** Institutional change to improve crop protection and integrated pest management

#### 3.1. Expand FAW population monitoring efforts

As in the 2019-20 winter season, the Activity will continue its support to DAE to monitor FAW population and damage from more than 700 maize fields across Bangladesh during rabi 2020-21 and kharif 2021 seasons.

Effective and integrated management of Lepidopteran pests like FAW requires robust systems to monitor ambient populations across locations over time. Time-series population data are indispensable for identifying patterns in population growth, decline, and local extinction and recolonization. Following field scouting and quantification of crop damage by FAW, information on the upward or downward trends in populations are crucial for making the final decision to

spray or not spray to control the pest. Workstream 3.1 responds to this situation by involving DAE in the network of data collection for FAW population dynamics.

Since December of 2019 and onward, monitoring of Fall Armyworm in Bangladesh has been ongoing in efforts led by DAE following the development of the app, '<u>Bangladesh Fall Armyworm</u> <u>Monitor</u>' developed by the activity. During the winter season of 2019-20, FAW monitoring data were recorded from 777 maize fields of 259 unions of 199 upazillas of 25 districts. 259 DAE field staff collaborated with the 777 farmers to collect these date from their fields according to the protocol provided in Appendix III.

The field level data collection is completed in two ways: (a) through weekly moth counts of adult male moths attracted to and killed in sex pheromone traps, and (b) through weekly scouting for the feeding signs crop damage caused by young larvae, infestation of whorls, and also damage to maize cobs. The data has been monitored and recorded every Monday in with FAW catch number as well as scouting in the field by the Sub-Assistant Agricultural Officers.

Based on the data collected the percentage of FAW attach varied as a function of location. However during the early cropping (mid-October planting) season, FAW moth counts and damage high, estimated amount 20-25% attack by small worms (1-3 instar larvae infestation with small fresh windowpane symptoms in the early vegetative stages,  $V_S$ - $V_6$  stage). Attach declines thereafter, a trend which appears to be correlated with cooling temperatures during the winter, which FAW populations only partially returned from as the spring time began. Notably, though, much of the maize crop appears to have 'escaped' from attack as populations declined (as did damage trends) as the crop grew to maturity. National level FAW population fluctuation/infestation data are as follows:

**National level aggregated FAW population/infestation**: Data collection was started from December 9, 2019 and continued till May 18, 2020. Trapping of FAW moths were slightly higher during the initial period, December 2019 (0.5 moth catch/trap/day), which declined later on and was around 0.25 moth catch/trap/day throughout the remainder of the monitoring period.

The highest levels of FAW small worms (% SFW, 1-3 instar larvae infestation with small fresh windowpane symptoms in the early vegetative stages,  $V_s$ - $V_6$  stage) were also recorded during the initial period of the crop (14% during 15 December 2019); thereafter that there was a continuous downward trend till 18 May 2020 (around or less than 3% leaf damage). The same trend was also observed in case of older larvae (4-6 instar larvae infestation with Infested whorl symptoms in the late vegetative stages,  $V_3$ - $V_{12}$  stage)) infestation. There appears to have been a minimum or almost no infestation of cob has been recorded during winter maize.

It is important that this is not to be read as an indicating that FAW is not a problem in Bangladesh. Higher temperature regimes in future growing seasons could result in an increase in FAW development, more rapidly cycling and overlapping populations, and increased risk of attacks in the future. Considerably more will be learned in the monitoring efforts that are now being planned with the same protocol and set up in >700 farmers in the 2020-21 season, with efforts again led by DAE in cooperation with the Activity.



**Above:** National level aggregated FAW population trends and damage data collected from 777 fields in Bangladesh during the 2019-20 winter maize growing season.

In addition to the last winter season, during the summer season of 2020, monitoring data were recorded from 282 maize fields of 94 unions of 56 upazillas of 07 districts by DAE. However, because of the advent of COVID-19 lock-downs, monitoring by DAE was not always possible and hence observations slowed considerably during last week of March to the last week of May. As such, no reliable data could be collected in this period, although anecdotal evidence also indicated that attack levels were low. The summer maize crop in Bangladesh is very minor, representing <5% of all maize grown on an annual basis.

**FAW Monitoring of non-Maize crops:** Apart from maize crop monitoring, non-maize crops have was also conducted by the Bangladesh Agricultural Research Institute (BARI) and the Bangladesh Agricultural Research Institute (BRRI) in the 2019-20 winter season. These included cabbage, tomato, tobacco and rice (details in the Appendix IV). in Rangpur, Bogura and Jamalpur in farmer's fields. FAW population and damage of tobacco plants were only done at Gangachara, Rangpur. To date, no or only negligible attack has been observed in three alternative host crops, with no incidence at all in the latter.



**Above:** Observed but limited FAW attack in tobacco, cabbage, and tomato in the 2019-20 winter cropping season in Bangladesh. Levels of damage were largely negligible, with no feeding in rice observed.

Data of infested plants were collected in 'W' pattern, starting at least 2 m from the edge of each field. In each of the 5 places of every field, 10 plants were carefully examined for signs of new Fall armyworm damage for Fresh Windowpanes (FW) on leaves (fresh pinholes, window panes, leave damage etc.) and infested Plants (IP) (infested stem, infested fruits, infested panicle, fresh frass etc.). Data was collected at weekly intervals from early December 2019 and continued up to mid-March 2020.

No FAW symptoms (FW and IP) were observed in tomato or cabbage plants at Bogura. No FAW moth catch was observed in the pheromone traps in the studied fields at Bogura. However, in other two locations, Rangpur and Jamalpur, infested plants as well as trap catches of FAW moths were recorded. The number of fall armyworm captured per trap and percent fall armyworm infested plant in different crops at RARS, Burirhat and the farmers' field of Gangachora, Rangpur were calculated over the entire season. The highest number of captured FAW moths per trap were recorded in tobacco crop fields (59/trap), followed by tomato and cabbage crop fields (Figure IA). The highest percent of fall armyworm infested plant were observed on tobacco crop fields (11.2%), followed by tomato (2.8%) and cabbage (1.2%) crop fields. However, at Jamalpur

the highest number of captured FAW adult per trap as recorded in cabbage crop fields (54.5/trap), followed by tomato crop fields (41/trap). The highest percent of fall armyworm infested plant were also noticed in cabbage (22.8%) followed by tomato (2.9%) fields. Levels of damage were however largely negligible in terms of effects on overall yield, with no feeding in rice observed. Monitoring will continue in the 2020-21 winter season with technical support from the Activity to confirm these results.

**Ongoing use of the monitoring system:** The Activity has deployed continuous assistance from a technical standpoint for the collection of FAW data and use of the monitoring tool to SAAOs, Monitoring officers in the Plant Protection Wing (PPW), DAE and at the district level agricultural offices and the scientists of BARI, BRRI and BWMRI. Key topics include assistance deployed by telephone on a 24 hour basis in the first season of monitoring to assure standard data collection, data entry, and monitoring of the collected data. Over time, this service will be reduced as leadership of the monitoring system is turned over to national partners like DAE.

The monitoring app developed by this Activity with the support of USAID is a unique, where the weekly field level FAW population data throughout the country are now openly available – at any time and with the click of a button –for different stakeholders. After analyzing the data the increasing and decreasing trend of the FAW throughout the maize and non-maize crops, the project is now working to develop customized advisories on FAW management that can be translated delivered through SMS to both policy makers and SAAOs, in addition to farmers. In partnership with DAE, SMS advisories are anticipated to be deployed in the 2020-21 maize season as a function of the anticipated growth stage of the maize crop.

FAO and CABI have also implemented at a very small scale a separate FAW presence registration from February 18-21, 2020. This app and data collection are static, and do not present timeseries data, but do present instances of observed attack, represented as part of FAO's FAW Monitoring and Early Warning System (FAMEWS). FAMEWS was considered for use by the national FAW Task Force, but not adopted as it could not represent time-series data at a subdistrict level. As such, the Activity responded with the development of the FAW Monitor as descried in this report. In addition during the National FAW Task Force meeting of 27 February, 2020 participants concluded that there should be one monitoring system in Bangladesh in the form of the FAW monitor, as it was custom designed for Bangladesh's needs. Yet as the data from monitoring are freely available, the Activity is working with FAO technical experts in Rome to supply the Bangladesh data collected with the FAW monitor so locations where FAW presence was observed can be integrated into FAMEWS.

## **3.2.** Raise awareness among DAE's plant protection wing to improve registration processes for new pest management technologies

On 22<sup>nd</sup> September 2020, a Workshop on 'Fighting Back against Fall Armyworm in Bangladesh through Partnerships for Integrated Management' was held at the Bangladesh Agricultural Research Council (BARC) Auditorium at Farmgate, Dhaka. The workshop was organized by the National FAW Taskforce with support by the activity. The purpose of the workshop was to update stakeholders and describe how the Activity aided in the rapid registration of *Spodoptera fruigiperda* nucleopolyhedrovirus (Fawligen, SfNPV, produced by the Texas-based AgBitech and

sold locally by Ispahani) and Cyantraniliprole (Fortenza, a seed treatment produced by Syngenta). Both are reasonable products for use according to the USAID FAW USAID Pesticide Evaluation Report and Safer Use Action Plan (PERSUAP), and are now commercially available in Bangladesh through Ispahani Agro Limited (IAL) and Syngenta Bangladesh. The registration of these products came at an accelerated pace; normally, 22-26 months would be required for registration, though with coaching and advocacy by the Activity, and through endorsement of the FAW Task Force, these products were registered in less than a third of that time.

Product name	Dose	Total price per ha (BDT)
Fawligen	100 ml/ha	I,700
Spodo-NPV	l 50 gm/ha	1,912
Spinosad	0.4 ml/LOW	3,425
Coragen 18.5SC	0.5 ml/LOW	3,001
Proclaim 5 SG	l g/LOW	1,500

**Above:** Cost comparison of the anticipated market price for Fawligen in Bangladesh relative to other common pesticides suitable for FAW control.

The inaugural session of the workshop held at BARC was chaired by Dr. Shaikh Mohammad Bokhtiar, Executive Chairman, BARC and Dr. Md Abdur Rouf. Additional Secretary, MOA. Bangladesh was the chief guest. Mr. Kamalaranjan Das, Additional Secretary (Research), MOA, Bangladesh, Dr. Md. Nazirul Islam, Director General, BARI and Mr. Md Asadullah, Director, Field Service Wing was the special guests. A keynote paper "Fighting back against Fall armyworm (FAW) response in Bangladesh: partnerships and support to the maize farmers of Bangladesh" was presented by

Dr. Timothy J. Krupnik, Country Representative, CIMMYT, Bangladesh. The presentation focused on work undertaken by this Activity in FAW monitoring and integrated pest management, while also highlighting partnerships and USAID and Michigan State University's support.



**Above:** Workshop participants and chief guests from the Government of Bangladesh endorse the commercial launch of Fawligen and Fortenza, a bio-pesticide and low-toxicity seed treatment for FAW, on September 22, 2020 in Dhaka.

In the inauguration session, Fawligen and Fortenza were launched as products now available to farmers by the chief guest, followed by courtesy speech of Ms. Fawzia Yasmeen, Director, IAL and Kbd. Mohammad Abdul Aziz Khan, Head, Crop Protection Division, Syngenta Bangladesh. Both of them thanks Task Force and different government regulatory authority and international organization like USAID and CIMMYT to assist for the very quick registration of those two

products against FAW. The workshop's technical Session was chaired by Dr. Md Abdur Rouf, Additional Secretary, MOA, Bangladesh and four papers were presented in that session. One from FAO, one from CABI, one from BARI and in the last paper Dr. Syed Nurul Senior Alam. Consultant. CIMMYT showed the future initiatives for FAW monitoring, management and awareness especially during next winter 2020-21 and summer 2021 season.



**Above:** Dr. Shaikh Mohammad Bokhtiar, Executive Chairman, BARC address participants in the workshop launching Fawligen and Fortenza, a bio-pesticide and low-toxicity seed treatment for FAW, on September 22, 2020 in Dhaka.

### A total of 40 participants (two

from the Ministry of Agriculture, six from BARC, four from BWMRI, five from BARI, two from BRRI, five from DAE, one from the Krishi Gobeshona Foundation, one from the SAARC Agriculture Center, two from FAO, three from CIMMYT, one from CABI, four from Ispahani Agro Ltd. (IAL) and four from Syngenta Bangladesh Ltd.) were present in the workshop held in a large auditorium with ample social distancing to assure COVID 19 safety.

The workshop resulted in a number of key recommendations:

- All the activities undertaken on FAW monitoring, management and awareness growing by different organization in the next winter 2020-21 and summer 2021 season were approved by the Task Force members.
- Additional emphasis should be given on the efficacy and mass rearing of the locally available bio-control agents for FAW management.
- An effective bio-rational management technology against FAW should be developed and validated within the next winter season in 2020-21; the Fighting FAW Activity is leading efforts with BWMRI and BARI in this area.
- More training program should be arranged by CIMMYT and FAO through DAE to increase farmers' awareness of FAW management.
- Research organizations and DAE were requested to work in collaboration with the private sector to assure rapid deployment and use of appropriate products to aid in the fight against FAW.
- Ispahani Ago Ltd. and Syngenta Bangladesh Ltd were requested to arrange more demonstrations in farmer's fields with the newly registered products.

Lastly Dr. Shaikh Mohammad Bokhtiar, Executive Chairman, BARC and Chairman of the workshop ended the program by giving thanks to all participants.

#### **Objective 4. Prepare the private sector for appropriate FAW response**

#### 4.1. Build private sector capacity and awareness of FAW

During the third quarter of the reporting period, the Activity entered into a I:I matched fund agreement to support Ispahani Agro Limited to commercialize the registered biological recently product Fawligen, SfNPV, a highly specific natural pathogen against FAW. There are 10+ activities included in the agreement that aim for a rapid launching of the product. These include:

- Training of Trainers (ToT) of IAL 'Sales & Marketing' and 'Market Development' team
- Development of a video on Fawligen
- Video shows through TV networks
- A Crop Consultant Program, 500 local (where service providers will be trained on the identification, scouting, monitoring biological and management of FAW. Those local service providers will get all the retailer's benefit of the company after the training program)



**Above:** Distribution of Ispahani Agro Limited dealer locations (dots) in major maize growing areas of Bangladesh. Red dots indicate locations where data collected by DAE indicated most attack in the winter 2019-20 season; these locations are being prioritized for biopesticide product sales.

- Educational and marketing campaigns for Fawligen awareness
- Development of FAW learning materials, including leaflets, booklets, banners as part of product advertising campaigns
- Dealer's trainings,
- Lead farmers and retailer's trainings,
- An IPM championship competition
- A traveling roadshow for the advertisement of Fawligen.

The goal of this partnership is to assure that at least 30,550 farmers directly and 59,500 farmers indirectly become aware of Fawligen, resulting in the large-scale sales of the product where FAW is encountered. To achieve the last aim, CIMMYT is also working with IAL to make use data

collected in the 2019-20 winter season by DAE that indicated particular areas as 'hotspots' for FAW attack; IAL plans to double-down on extra advertising efforts in these areas, which have been mapped in relation to the distribution of IAL's input dealer networks (shown below).

Like IAL, activity is in the final stages of reaching a 1:1 matched agreement with Syngenta Bangladesh Limited aid in awareness raising to assist in the rapid commercialization of Fortenza 60FS (Cyntraniliprole) a low-toxic seed treating agent against FAW. The activity will also provide technical support to Syngenta by training their channel line dealers and village-level sales and commission agents on different aspects of FAW. Further details on this agreement will be provided in the next report.

#### 4.2. Train the private sector to deploy FAW management advice

During the reporting period, a one and half day long training program for pest control product companies was arranged at Hotel Shahid, Chuadanga on 20-21 November of 2019.

No.	Company	Activities conducted since the October 2019 training
Ι.	PretroChem Bangladesh Ltd	<ul> <li>Organized a training program for 35 maize business related sales officers</li> <li>These 35-trained officers shared FAW information to 800 Provokta (maize contract farmers)</li> <li>Distributed 70,000 infographics on FAW management (17,500 sets farmers and</li> </ul>
2.	Auto Crop Care Limited	<ul> <li>retailers</li> <li>Conducted FAW training for four branches of trainings on FAW for Dhaka, Cumilla, Jessore, Jheneidah staff, with a total of 40 participants.</li> </ul>
3.	ACI Formulations LtD.	<ul> <li>Conducted eight sharing meetings on FAVV with ~200 farmers each</li> <li>Organized trainings on FAW for 35 Regional Sales Managers (RMSs)</li> <li>These 35 RSM organized trainings for other sales staff, totaling 600 front-line sales officers</li> <li>One Tarritory Executive (TE) in Churdange reached 675 formers individual within</li> </ul>
		One Territory Executive (TE) in Chuadanga reached 675 farmers individual within one month following trainings
4.	Russell IPM BD Ltd	<ul> <li>Conducted trainings in three Upazilas for farmers and dealers: (1) Fulbaria Upazila in Mymensingh: 30 Farmers, (2) Shibpur Upazila in Norshingdhi: 40 Farmers, (3) Gopalpur upazilla in lamalpur: 70 Farmer and 20 Retailers</li> </ul>
5.	Corbell Int.	Organized FAW training for 11 staff in Dhaka
		<ul> <li>One expert staff member in Manikganj trained 50 farmers</li> </ul>
6.	Ispahani	Organized FAW trainings for 62 Sales and Market Officers
	Agro Limited	<ul> <li>Actively participating with the Fighting FAW project on registration and commercialization of biopesticides</li> </ul>
7.	Syngenta BD Ltd.	• Planning to start training program for their sales force along with their linked dealers and retailers soon.
		Collaborating with the Fighting FAW project to register and commercialize Fortenza     seed treatment: trainings will coincide with registrations
8.	Haychem Bd. Ltd.	<ul> <li>Organized trainings on FAW for 10 Area Sales &amp; Marketing Managers (ASMM) in Chuadanga and Rangpur. Each ASMM was self-estimated to have reached approximately 1,000 farmers with information on FAW management during product sales pitches</li> </ul>
9.	Bayer Crop	<ul> <li>Organized FAW trainings for 55 Market Development Officers (MDO)</li> </ul>
	Science Ltd.	<ul> <li>30 MDOs are working on FAW information and products to control FAW exclusively</li> </ul>
		Each MDO was self-estimated to have reached approximately around 450 farmers

A total of 29 participants (21 representatives from 10 different Pesticide and Bio-pesticides Companies and 08 lead trainers from Agricultural Inputs Retailers Networks, AIRN) participated in the training program. The outcomes of these trainings were described in the table below, which presents data collected in March of 2020 describing what the Activity's private sector companies did from October 2019 to March 2020 following their trainings.

Following March of 2020, and due to the risks imposed by and lockdowns that came as a consequence of COVID-19 much of the work conducted by the Activity's private sector partners on FAW were put on hold for a four to five month period. However, not all activities stopped. To track how these companies have continued to work on FAW, a telephone discussion/survey conducted in September 2020 by the Activity. The table below summarizes the activities of some of the trained private sector companies during this COVID 19 initiatives.

No.	Partner	Activities conducted after March and during / after COVID-19 restrictions
Ι.	Agricultural Inputs Retailers Networks (AIRN)	• Distributed 25,400 infographics on FAW management to 127 dealers and retailers in the district of Jashore, Chuadanga and Jheneidah
2.	Haychem Bd. Ltd.	• Conducted 100 meetings for 3,000 farmers prior to and after lockdown on FAW management
3.	Corbell International Development	• Conducted marketing campaigns for their product Emaron 50 WDG (Emamectin benzoate 10% + Lufenuron 40%), which is suitable for FAW control specially for FAW.
4.	Russell IPM BD Ltd	Continued collaboration with BAR on biological products.
5.	Bayer Crop Science Ltd	• Conducted FAW trainings for two subsidiary companies: Babylon Agri. Science and National Agri. Care
		• A total of 250 employees attended the trainings from both the companies attended in Jashore, Dinajpur and Bogura
6.	Ispahani Agro Limited	• Training module, promotional & creative materials development continued on FAW and biological control.
		• Virtual trainings for regional team members using materials from the Activity led training continued
		Fawligen registered and launched
		• Identification of targeted groups (dealer, retailers and farmers) was completed
		• Sales force trainers were hired to deploy training on Fawligen in September-November 2021.
9.	Syngenta BD Ltd.	<ul> <li>Fortenza was registered and launched</li> </ul>
		<ul> <li>Working for marketing Fortenza (seed treatment) in the rabi season</li> </ul>
		• Sales force trainers were prepared to deploy training on Fortenza in September-November 2021.

In the coming months after September 2020, in-person trainings of the private sector will no longer be possible due to COVID-19 safety precautions. For contingency planning, the Activity has planned to implement a virtual training workshop for the private sector to reflect on FAW management and to discuss management of other current and future invasive crop pests. The dates for this activity are tentatively to be in the last week November 2020. Around 40 participants (R&D and sales related officials) from 12-15 private pesticide companies are anticipated to take part in these training workshops.

#### 4.3. Assist the private sector to design crop consultant program(s)

In consecutive timing with Activities 4.1 and 4.2, the Fighting FAW project is working to provide technical and business back-stopping to the private sector to develop and implement pilot crop consulting programs in targeted maize growing districts at significant threat of FAW crop damage. In pursuit of these goals, in a 29<sup>th</sup> December 2019 FAW team meeting, it was decided to pursue such an agreement with Ispahani Agro Ltd (IAL), as a National biopesticide supplier, to develop consultant programs. Following an agreement reached with IAL in the third quarter of 2020, efforts to implement the crop consultant program have been deployed, with a target of reaching 500 pest management service providers who will be trained to encourage farmers to pay for FAW scouting services and advice (on an affordable fee-for-service arrangement) make spray or no-spray decisions. Where spraying is advised, IAL will support crop consultants to encourage use of Fawligen as a bio-pesticide prior to 'harder' materials. Activities to deploy trainings to are underway at the time of writing and should coincide with the onset of the maize cropping season.

#### **Objective 5. Standing multi-threat pest emergency taskforce supported**

#### 5.1: Institutionalize FAW task force model to tackle emerging and emergency threats

Fall armyworm was first detected and recorded in Bangladesh on 11 November, 2018 in the north of the Bangladesh. The first observation was made by the Bangladesh by BARI, and then circulated to Ministry of Agriculture and its related component organizations. However, before FAW was declared, CIMMYT-Bangladesh, with support from USAID via the CSISA project, arranged a workshop during last week of September, 2018. The purpose of this meeting was to begin pre-emptive preparations for a likely pest invasion.

After FAW was officially announced, a number of different actions and approaches to pest management were started by different national and international organizations, as well as the private sector, for awareness raising, monitoring and management of the pest. This cacophonous situation led to farmers receiving mixed messages



**Above:** Mohammad Ali, Additional Director of the Department of Agricultural Extension for Jashore Region, DAE, Jessore region Plant Protection Wing Director and member of the Bangladesh National Fall Armyworm Task Force, Sabbir Ibna Jahan, visited maize fields with Timothy J. Krupnik of CIMMYT in Chauadanga November of 2019 to inspect FAW damage. These activities were facilitated by the Fighting Fall Armyworm activity in support of the National FAW Task Force. (Photo: Shafiqul Islam/CIMMYT)

and at times improper information on what chemical spray techniques could be used against FAW.

As such, the Bangladesh Agricultural Research Institute, Bangladesh Wheat and Maize Research Institute, USAID and CIMMYT urged the Ministry of Agriculture form a national task force to provide guidance on appropriate Fall Armyworm monitoring, management, and communication and training procedures. Accordingly, a Task Force comprised of 16 membered was convened by the Ministry of Agriculture (memo number 12.00.0000.073.24.111.19-210 dated: 21 July, 2019). The task force is chaired by the Chairman, Bangladesh Agricultural Research Council. The Director General of the Bangladesh Wheat and Maize Research Institute is the Task Force's Member Secretary. Two additional secretaries of the Ministry of Agriculture participate as honorary members. In addition, representatives from BARI, BWMRI and BRRI, the Department of Agricultural Extension, several Universities (Bangladesh Agricultural University and Sher-e-Bangla Agricultural University) and international organization including CIMMYT, FAO and USAID are regular participants.

The main responsibly of the task force is to coordinate and facilitate FAW related interventions in Bangladesh, as the ultimate decision making authority on the type of technical information and communication modalities to be utilized in the response to FAW across the country. Starting from 31 July, 2019 the Task Force has met on roughly a monthly basis. CIMMYT, along with the Chief Scientific Officer, Entomology Division holds responsibility for convening the FAW Task Force's Technical Sub-committee. This Sub-committee is responsible for the provision of technical support on the development of the national monitoring and scouting system, technical messaging with respect to appropriate IPM procedures, and research and development on FAW management.

In mid-March of 2020, the Activity also collaborated with the FAO to bring FAW Task Force members to BWMRI headquarters in Dinajpur, northern Bangladesh, to learn about FAW and to meet with extension staff engaged in advising farmers on FAW control. This two day study tour concluded immediately prior to the commencement of COVID-19 lock-downs, but was nonetheless effective in raising awareness among FAW task force members through direct field experience. However, since the commencement of the COVID-19 crisis in late March, Fighting FAW project activities and modalities of support to the FAW Task Force have changed.



**Above:** Fighting FAW project team members explain the principles of FAW scouting to Dr. Md. Abdur Rouf, Dr. Md. Abdur Rouf, Additional Secretary, Ministry of Agriculture, in mid-March of 2020 (Photo: Mani Krishna Adikhari/CIMMYT)

Before the COVID-19 crisis struck, the project had intended to bring eight key Task Force members to participate in an international study tour (likely to South Africa) to learn how other

countries are working to mitigate the threat of FAW. This had been planned for late 2020, but are unlikely to be possible until 2021, if at all. At this point, the project is waiting to see if the COVID-19 situation changes and if travel will be possible. If travel is deemed infeasible, the Fighting FAW activity will consult with BHEARD and USAID to organize alternative use of these funds for appropriate activities, likely through tactical sub-granting to public and private sector partners.

In addition, the Activity will complete a document before April of 2020 providing a road map and sustainability plan for an ongoing multi-threat pest task force that could be implemented by various Ministries of relevance in Bangladesh. This document will be submitted to USAID, BHEARD, and relevant Ministries in a workshop that will facilitate discussion on this topic before April of 2020.

## 5.2: Institutional recognition and support of the FAW Task Force

During the September 2019-October 2020 reporting period, the Fighting FAW activity assisted the national FAW Task Force with financial support to convene meetings and cover costs for meeting expenses and logistics. Beyond these initiatives, the Activity also brought National Task Force members to inspect maize fields and learn about FAW during the October-November training programs held in Chuadanga. This support has been instrumental in assuring the regularity of Task Force meetings, and in assuring quick follow-up actions after Task Force decisions have been made. Although the Task Force has not extended its membership to the private sector, through activities undertaken in Objective 4, the Activity continued to act as a conduit facilitate information sharing between private sector and the Task Force. Such interactions for example assisted in the registration of Fawligen and Fortenza, as described in earlier sections of the report. The Activity also continues to advocate for the decisions of the Task Force and to create awareness on the threat posed by FAW in Bangladesh at high levels of the Ministry of Agriculture. This is possible through engagement in online meetings and workshops, and on calls with responsible members of government. Nonetheless, other plans for the project are now being reevaluated.

## 5.3 Assist the task force in influencing pest control product registration processes

Current regulations require at least two years of field testing and a battery of laboratory efficacy and ecotoxicology tests before new pesticides can be approved for roistered commercial use in Bangladesh. This is an appropriate measure given the dangerous nature of many insecticides. However, in the case of emergencies – such as the invasion of a highly problematic pest like FAW – alternative measures may be needed for temporary pesticide release permits or rapid registration of effective but low-toxicity pesticides. These include the products described in Objective 4, such as Fawligen and Fortenza. As such, the Fighting FAW Activity works to raise awareness among FAW Task Force members of alternative and new products – including but not limited to biological pesticides and bio-control agents – and to encourage rapid and fast track registration alternatives for demonstrated and low environmental and human toxicity risk products. In doing so, the Fighting FAW Activity has worked to assure that Task Force members and Plant Protection Wing leadership at the Department of Agricultural Extension have access to data and reports on product effectiveness from other countries. This is important as evidence from well-conducted scientific studies in other countries helps to 'broaden' the evidence base and create awareness of the numerous alternative products that could be more safely used in the response to FAW. The Activity does this will simultaneously advocating for conservation and augmentative biocontrol of FAW in Bangladesh.

In multiple FAW Task Force meetings, Fighting FAW project staff gave presentations on the need and efficacy of quick registration of different pesticides to control FAW effectively in Bangladesh. As a consequence, the task force took very positive attitude for fast-track registration for the effective pesticides against FAW. Between October 2019 to September 2020, the Activity focused intensively on achieving registration for comparatively safe and effective pesticides against Spodoptera frugiperda nucleopolyhedrovirus (Fawligen, SfNPV) and FAW, including Cyantraniliprole (Fortenza). This was achieved by reducing the time needed to clear the field test reports conducted by the BARI on these products by reducing the two-seasons of testing required and condensing them into two sequential plantings, the first in the winter season of 2019, the second in the early spring season in 2020. In addition, the testing of these products considered the growth of maize only until mid-stage in the crop lifecycle, as these are the most crucial stages of growth for FAW control. By doing so, researchers were able to complete each season early, allowing datasets to be completed, curated, and analyzed more quickly. In sum, this permitted a reduction of 18 months in what would normally be required for testing. In its 6<sup>th</sup> meeting of the task force a timeline for the completion of its efficacy test (done by the Bangladesh Agricultural Research Institute) and completion of the formalities of registration within March-April 2020 has been earmarked and with the direct involvement the Fighting FAW Activity.





What's next for the Fighting FAW Activity? Project scientists are currently discussing support to companies interested in similar approaches for testing the field efficacy of several other biopesticides. These include Spinosad, *Bacillus thuringiensis* (Bt) formulations, and *Celastras angulatas* 1%EW. The speed at which registration might be accelerated for new products is however somewhat hampered by the implications of the ongoing COVID-19 crisis, which for a period reduced the implementation of field work in Bangladesh, and also the ability of the activity to gather groups, hold meetings, and to advocate for accelerated but rigorous testing. The Activity has entered into an agreement with BARI providing seed funds for testing of some of the products indicated above, but it is unclear if registration will be possible before mid 2021, as national research centers and field activities are not being implemented as fully as normal given the risks of COVID-19. In addition to these efforts, the Activity is working to develop a policy white paper on approaches to fast track pesticide registration in case of invasive pest emergencies, alongside a strategy document for how the Government of Bangladesh could sustain a multi-threat pest task force. The first policy paper on fast track registration systems will describe potential avenues to expedite availability of effective bio- or less toxic pesticides to combat the invasive pests like FAW, while the standing pest task force road map will describe pathways towards the implementation and sustainable of an ongoing pool of experts in invasive and emergent pest management response and management including multiple Ministries of relevance in Bangladesh. An eminent local academician has been given a short term consultancy to develop those two policy papers. They will be prepared and validated by different stakeholders and finalized for submission by the first quarter of 2021.

# 5.4 Establish task force approved information portal on FAW linked to governmental website(s)

This activity was planned quarter three and four of the Fighting FAW project. Initial discussions have been held in the FAW Task Force on the development of a portal, with appropriate information on integrated pest management and FAW biology and ecology, although the inability of the project to actively convene in-person consultation meetings due to COVID-19 risks has delayed bringing this work to fruition. Work on this topic is likely to resume in December, with anticipated completion before the next semi-annual report.

#### **Objective 6.** Generate data and evidence to guide integrated FAW management

#### 6.1. Screening studies to evaluate the effectiveness of new pest control materials

As discussed in section 5.4, the Activity has partnered with and provided BARI with a small subgrant from the project to accelerate the field trials of low-toxic and bio-pesticides against FAW. At the time of writing, BARI is conducting multi-location trials of five more biological pesticides for efficacy including *Celastrus angulatus* 1% EW (Bio-Chamak), *Baccilus thuringiensis* var. Kurstaki (Bio-fighter), *Baccilus thuringiensis* var. Kurstaki (Bio-killer), Nimbicidine 0.03% (Azadiractin), Methoxyfenozide (Zylo 24SC, Maxzide 24SC) and insect growth regulators. Following the 2020-21 winter season trial completions, results will be submitted to the Pesticide Technical Advisory Committee (PTAC) for consideration for accelerated registration, although additional trials may be required in the case of any uncertain or unclear results. It is important to note that different private companies submitted these biopesticides to BARI with the request to test efficacy against FAW. BARI however lacked funds to implement tests and cannot receive funding from the private sector; as such, the activity has stepped in to provide support for proper testing and with an eye towards future registration of effective and affordable bio-pesticides.

#### 6.2. FAW severity, incidence and management surveys to inform mitigation efforts

Out of 777 farmers with pheromone traps located in their fields who permitted regular field monitoring for FAW damage assessments by SAAOs in the 2019-20 maize season, 70% (545) participated in a follow up survey. Because of COVID-19 restrictions, field level data collection through face-face interviews were avoided and data was collected through telephonic surveys in April-July of 2020 The survey was conducted by telephone to assure COVID-19 safety, and covered aspects such as awareness of farmers on FAW (ability to identify the worm) and management techniques used by farmers and how they reacted to the presence of FAW on their fields (what crop stage and what kinds of pesticides are sprayed, time of insecticide spray, rounds). These points were addition to their general agronomic practices (maize varieties, tillage, fertilizer, herbicide application intercrops, planting dates etc.) that may affect FAW severity. In addition, a sample of 498 farmers that did not have contact with DAE or whose fields did not have monitoring traps were surveyed to match each farmer in the previous sample, which provides an aggregate sample of 1,043 maize farmers. In this control sample also, socio-economic information, data on agronomic practices and farmers' decision making in relation to FAW were also collected. Unfortunately, however, conducting physical crop cuts to assess yield and potential yield losses due to FAW were not possible given COVID-109 safety risks; as such, surveys relied on farmers' reports of yield and impressions of crop losses.

Importantly, data from the survey generated information on the ability of farmers to identify larval stages of FAW, identify damage types and carry out appropriate chemical and integrated pest management measures. Farmers' confidence level in controlling the new pest was also assessed both for farmers in the monitoring scheme (who had more regular contact with trained DAE agents) and those who had no participated in the monitoring programme (the control group). The enumerators were Activity staff, which reduced the cost of surveys while utilizing the available staff time efficiently. Most of the farmers were responsive to the telephone calls and willing to share the information.



**Above:** For farmers who did apply pesticides as reported in the survey, these graphs depict farmers' spraying behavior of new pest control substances - SNPV and Spinosad in the left panel, and spraying of more toxic and non-effective chemicals such as Chlorpyrifos, Cypermethrin, Lambda Cyhalothrin among participating in the FAW monitoring programme who had contact with and were advised by DAE and the control sample.

Detailed information regarding farmers' use of recommended and available pesticides (for example Spinosad, Emamectin Benzoate, Chlorantraniliprole and Flubendiamide), as well the use

of ineffective and dangerous chemicals (such as Chlorpyrifos, Cypermethrin, Lambda Cyhalothrin) were collected to understand the effectiveness of the training programmes to SAAOs on the reduction in harmful pesticide use and the impact on FAW control.

The initial results show that the farmers who participated in the monitoring programme and who had advice from DAE had a greater use rate of low-toxicity bio-pesticides (SNPV and Spinosad) than the control population. Similarly, the number of rounds of more toxic synthetic pesticide application (Chlorpyrifos, Cypermethrin, Lambda Cyhalothrin) appears to have been higher for control farmers who did not participate in the monitoring programme. Data also indicated that that the farmers who participated in monitoring and had advice from DAE staff who had been trained by the Activity showed higher confidence in controlling the pest at lower rounds of pesticide use. This was also positively correlated with effective pesticide choice, pest recognition and handpicking of larvae, and negatively related to crop damage. That said, a tendency was still observed for farmers to react and spray when they observed even low levels of damage, indicating that there remains scope to achieve further pesticide reduction.



**Above:** Observed shifts in confidence levels in controlling FAW with respect to round of pesticide sprays among farmers who had contact with trained DAE staff compared to those who did not (left)m and correlation analysis among key FAW control actions and damage estimates (right).

Survey data are also being used to assess the damage levels caused by FAW using structural equation models. Initial different model configurations are showed below that are being refined at the time of writing with additional environmental and agronomic variables.

The initial models suggest that the yield loss due to FAW in winter 2019-20 as below one ton per hectare on average, a likely consequence of cool temperatures that may have limited FAW and also provided ideal winter season growing conditions. The further refinement of the model and the results are expected to be completed by December 2020. From March to May 2021, another round of assessment surveys for winter season 2020-2021 will be deployed among farmers participating to confirm preliminary results. The mode of survey will depend on the COVID-19 conditions during the survey period.



**Above:** Structural equation model with Variables that had significant influence of Maize yield and FAW control. PCP-Prevous crop, TLG- Tillage. DST-District, HRB-Herbicide, DSB-Decision to spray, IW- Infested Whorl, SFW -Small fresh windowpanes - INT- Intercrop, VAR-Variety, MWD-Manual weeding, WDG-Weather damage, CMT-Count of moths

#### 6.3. Studies to characterize natural enemies of FAW in Bangladesh

The Activity has awarded BARI a sub-grant to investigate the parasitoid complex of FAW in nonsprayed maize fields as well as in non-maize including tomato, cabbage and tobacco in Bangladesh. Will be initiated in the 2020-21 winter season and completed on research stations where infested eggs, larvae, and pupae of FAW will be collected from the non-chemical pesticide sprayed crops and reared to identify parasitoids, alongside trapping and quantification of predators. In addition, the Activity is supporting BARI to study on the efficacy of different native natural enemies including *Telenomus remus*, *Trichogramma* spp. and *Bracon habetor* to control FAW in laboratory and potentially in screenhouse settings with the leadership of the Entomology Division. Finally, both BARI and BWMRI will implement multi-locational field trials examining potential bio-rational management approaches against FAW (with emphasis on intercropping, use of pheromone disruption, and augmentative release of biocontrol agents, and application of bio-pesticides) in the coming winter 2020-21 season. BWMRI in particular has also been given a sub-grant for multi-locational field trials on agro-ecological management of FAW using intercropping techniques as part of a global set of trials ongoing in more than five African and four Asian countries. Further details will be provided in the semi-annual report.



**Above:** Views of the rearing and examination of the effectiveness of some of the natural enemies that will be evaluated with support of the Fighting FAW Activity with BARI in the winter season of 2020-21.

#### 6.4 FAW digestibility of rice to assess risk damage to an alternative host

The project is currently completing a collaborative research agreement with BRRI to assess FAW digestive capability of different rice cultivars (both high yielding and local) to conduct laboratory studies on this topic. Further details will be provided in the semi-annual report.

## News coverage of the Fighting Fall Armyworm Project

Media on reports on the Fighting FAW project can be found below.

#### International print media:

- New project strengthens capacity to fight fall armyworm in Bangladesh: Public and private partners join forces to mitigate voracious pest: <u>https://www.project.org/news/new-project-strengthens-capacity-to-fight-fall-armyworm-in-bangladesh/</u>
- Crowdsourced data feeds fall armyworm surveillance in Bangladesh: Web app helps extension agents and farmers monitor the spread of fall armyworm.: <u>https://www.project.org/news/crowdsourced-data-feeds-fall-armyworm-surveillance-in-bangladesh/</u>

#### National television media:

- ভূটা গাছে ফল আর্মিওয়ার্ম পোকা নিয়ন্ত্রণে প্রশিক্ষণে সিমিট বাংলাদেশ: https://www.youtube.com/watch?v=IwzRAO-hqrk&t=1408s
- FAW training: <u>https://www.youtube.com/watch?v=FoXKWEgsZ3U</u>

#### National print media:

- Government aggressive on Fall Army Worm as it might be threat to our food security if not controlled: <u>https://www.bangladeshpost.net/posts/govt-aggressive-on-fall-army-</u> worm-as-it-might-be-threat-to-our-food-security-if-not-controlled-19700
- Researchers, agro officials, pesticides company men trained to protect crops; <u>https://www.bangladeshpost.net/posts/researchers-agro-officials-pesticides-company-</u> <u>men-trained-to-protect-crops-18728</u>
- Prothom Alo (National Daily, Bangladesh):

Ispahani launches organic pesticides to control Fall Armyworm Ispahani Agro launches organic pesticides to control fall armyworm, known as cropdestroying insects. The product, called Fawligen or SFNPV, is marketed in conjunction with AgBiTech, a US organic pesticide manufacturer.

https://www.prothomalo.com/business/corporate/%E0%A6%AB%E0%A6%B2-

<u>%E0%A6%86%E0%A6%B0%E0%A7%8D%E0%A6%AE%E0%A6%BF%E0%A6%93%E0%A7%</u> 9F%E0%A6%BE%E0%A6%B0%E0%A7%8D%E0%A6%AE-

<u>%E0%A6%A6%E0%A6%AE%E0%A6%A8%E0%A7%87-</u>

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<u>%E0%A6%AC%E0%A6%BE%E0%A6%B2%E0%A6%BE%E0%A6%87%E0%A6%A8%E0%A6</u> <u>%BE%E0%A6%B6%E0%A6%95-%E0%A6%86%E0%A6%A8%E0%A6%B2-</u>

<u>%E0%A6%87%E0%A6%B8%E0%A7%8D%E0%A6%AA%E0%A6%BE%E0%A6%B9%E0%A6</u> <u>%BE%E0%A6%A8%E0%A6%BF</u> • Bangladesh Protidin (National Daily, Bangladesh):

Ispahani Agro has introduced organic pesticide 'Fawligen' in the market of Bangladesh

'The National Fall Armyworm Task Force' organized a day-long workshop on 'Fall Armyworm Monitoring and Suppression Management' at the BARC Auditorium on 22 September 2020.

The fall armyworm, whose scientific name is 'Spodoptera frugiperda', is known worldwide as a deadly harmful and destructive insect. It attacks about 80 crops, including maize, sorghum, cotton, nuts, tobacco and a variety of fruits and vegetables.

https://www.bd-pratidin.com/corporate-corner/2020/10/04/573348

• Manab Zomin (National Daily, Bangladesh):

Ispahani Agro brought 'Fawligen' to the market

To suppress destructive insects 'Fall Armyworm', Ispahani Agro launches effective organic pesticides called 'Fawligen or SFNPV' in local market. The National Fall Armyworm Task Force recently organized a day-long workshop on 'Fall Armyworm Monitoring and Suppression Management' at the auditorium of Bangladesh Agricultural Research Council (BARC), Dhaka.

https://mzamin.com/article.php?mzamin=245432&cat=1

• Priyo.com (A news-based web portal in Bangla language):

Ispahani Agro has introduced organic pesticide 'Fawligen' in the market of Bangladesh

'The National Fall Armyworm Task Force' organized a day-long workshop on 'Fall Armyworm Monitoring and Suppression Management' at the BARC Auditorium on 22 September 2020.

https://www.priyo.com/e/2527593-

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%E0%A6%9C%E0%A7%88%E0%A6%AC-

<u>%E0%A6%AC%E0%A6%BE%E0%A6%B2%E0%A6%BE%E0%A6%87%E0%A6%A8%E0%A6</u> <u>%BE%E0%A6%B6%E0%A6%95-</u>

<u>%E2%80%98%E0%A6%AB%E0%A6%89%E0%A6%B2%E0%A6%BF%E0%A6%9C%E0%A7%</u> <u>87%E0%A6%A8%E2%80%99-%E0%A6%A8%E0%A6%BF%E0%A7%9F%E0%A7%87-</u> %E0%A6%8F%E0%A6%B2%E0%A7%8B-

%E0%A6%87%E0%A6%B8%E0%A7%8D%E0%A6%AA%E0%A6%BE%E0%A6%B9%E0%A6 %BE%E0%A6%A8%E0%A6%BF-

<u>%E0%A6%8F%E0%A6%97%E0%A7%8D%E0%A6%B0%E0%A7%8B</u>

#### Picture of news published in different newspapers:



জৈব বালাইনাশক 'ফউলিজেন' এনেছে ইস্পাহানি এগ্রো

ফল আর্মিওয়ার্ম পোকা নিয়ন্ত্রগে ইউএসএ'র জেব বালাইনাশক উৎপাদনকারি প্রতিষ্ঠান AgBiTech-এর কার্যকরি জৈব বালাইনাশক 'ফউলিজেন বা এসএফএনপিভি' বাংলাদেশে নিয়ে এলো ইস্পাহানি এয়ো লিমিটেড। গেল ২২ সেপ্টেম্ব জাতীয় ফল আর্মিওয়ার্ম টাঙ্গ্রফোর্স বিএজারসি অভিটরিয়ানে দিনবাাণী 'ফল আর্মিওয়ার্ম পর্যবেঞ্চণ ও দমন ব্যবস্থাপনা' সংক্রান্ত কর্মশালার উয়েখনী অনুষ্ঠানে জৈব বালাইনাশকটির বাংলাদেশে বাণিজ্যিকীকরণ প্রক্রিয়া আনুষ্ঠানিক উয়েখন করেন প্রধান অতির্থি কৃষি প্রথালারে অতির্চিজ সচিব ও আবদুর রউড়। বিএআরসি'র নির্বাহী ফোর্যায়ান ড. শাহ মোহাম্বদ বধতির হার্যে জনুটানে স্কাণ প্রতিক্র সচিব ও আবদুর রউড়। বিএআরসি'র নির্বাহী ফোরাম্যান ড. শাহ মোহাম্বদ বধতি বৃষ্টানে সভাপতিত্ব করেন। সংবাদ বিজ্ঞান্তি

The daily Alokito Bangladesh, Page 7, Date- September 30. 2020

and the same

Ispahani Agro Limited contacted US organic pesticide manufacturer AgBiTech to provide Fawligen in Bangladesh for use in controlling f

## Ispahani Agro launches Fawligen organic pesticide

AGRICULTURE-BANGLADESH TBS REPORT The pesticide is approved for use in controlling fall

in controlling fall armyworm

force organised a day-long workshop on "Fall Amyworm Moni- T toring and Control Management" or recently at the Bangladesh Agritultural Research Council (BARD In Auditorium. The chief guest Dr Abdur Rauf, or

The chief guest Dr Abdur Rauf, cultura itional secretary of the Ministry for all vericulture officially inaugurated ganic communication and constraints of the second The second secon

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> riculture; Md Asad Ullah, director of Sorejomin Wing; Dr Md Nazirul Islam as the Guest of Honor, director general of BARI; Dr Md Israel Hossain, director general of BWMRI were present at the event. Approximately 35 high level officials working in various national and interarchional organizations at.

The business Standard, Page 14, Date- October 7, 2020

<u> ডোরের</u> পাতা

Date:05-10-2020 Page:06 Col:1-3 Size:12 Col\*Inch

বাজারে জৈববালাইনাশক 'ফউলিজেন' নিয়ে এলো ইস্পাহানি এগ্রো ■ নিঙ্গৰ প্রতিবেদক

জাতীয় ফল আর্মিওয়ার্ম টাঙ্কজের্দ ২২ সেপ্টেম্বর বিএআরসি অভিটরিয়ামে দিনব্যাপী 'ফল আর্মিওয়ার্ম পর্যবক্ষণ ও দমন ব্যবস্থাপনা' সংক্রান্ত একটি কর্মশালার আয়োজন করে। উক্ত কর্মশালার উদ্বোধনী অনুষ্ঠানে জৈব বালাইনাশক 'ফউলিজেন বা এসএফএনপিডি'র বাংলাদেশে বাণিজিরীকরণ প্রক্রিয়া আনুষ্ঠানিকভাবে উদ্বোধন করেন প্রধান অতিথি কৃয়ি মন্ত্রণালয়ের অতিরিক্ত সচিব ড, আব্দুর রউফ। ফল আর্মিওয়া যার কৈঞ্জানিক নাম ঝাড়ফফয়ুবধ তৎঁমরাকৃষণ্ডমের অতিরিক্ত সচিব ড, আব্দুর রউফ। ফল আর্মিওয়া যার কৈঞ্জানিক নাম ঝাড়ফফয়ুবধ ত ভংমরাকৃষণ্ডমের অতিরিক্ত সচিব ড, আব্দুর রউফ। ফল আর্মিওয়া যার কেঞ্জানিক নাম ঝাড়ফফয়ুবধ ত ভংমরাকৃষণ্ডমের অতিরিক্ত সচিব ড, আব্দুর রউফ। ফল আর্মিরা হার কেঞ্জানিক নাম ঝাড়ফফয়ুবধ ত ভংমরাকৃষণ্ডমের অতিরিক্ত সচিব ড, আব্দুর রউফ। ফল আর্মিরা হার কেঞ্জানিক নাম ঝাড়ফ ফয়ুবধ ভ ভংমরাকৃষণ্ডমে গুলা বাদাম, তামাক, বিভিন্ন ধরনের ফল ও সর্বজিমহ প্রায় ৮০টি ফসলে আফ্রমণ করে থাকে। তবে ভূটা ফসলে আক্রমণের হার সর্বাধিন পোকাটি কীয়া অবস্থায় গাছের পাতা ৪ ফল খয়ে ফসলের ব্যাপক ফটি করে থাকে। এই পোকা দমনে রাসায়নিক কীটনাশক তেমন কার্যকরী নয়। তবে সঠি সময়ে এবং সঠিক পদ্ধতিত জিব বালাইনাশক প্রয়োগ করে পোকটি কার্যকর্মরা লেবে সঠিক সময়ে এবং সঠিক পদ্ধতিতে জিব বালাইনাশক প্রয়োগ করে পোকটি কার্যকরে দমন করা যায়। এটি মূলত আমেরিকা মহাদেশের পোকা হলেও ২০১৬ সালে আদ্রুণ বিরা ২ ২০১৮ সালে বাংলাদেশে ফল আর্মিণ্ডমা পোজা নিয়ন্তেগে কর্যবন্ত জানো জিব বালাইনাশক না থাকায় ইস্পাহানি এগ্রো লেনেদেশ দেশ জার্ব্য পিলাক নিয়ন্তেগে করিবন্ধ তিনো জিব বালাইনাশক না থাকায় ইস্পাহানি এগ্রো লিমিটেড টেক্সাস, ইউএসএ-তে অবস্থিত জৈব বালাইনাশক উৎপাদনকারী প্রতিদের সাধে যোগাযোগ করে পোকটি নিয়ন্ত্রণে কার্যকর সকল ধরনের ল্যাব এবং মাঠ পরীক্ষায় যোস্তামকন কলাফলের ভিরেত এটি ফল আর্মিওয়ার্ম পোকা নিয়ন্ডেশে কার্যকর জন্দ বালার এবং ম্যাঠ পরীক্ষায় যোন্তায়কন বাজযিক্রনান দেশে আমে। এরপর রকল বার্যরেরে জন্য কলা ধরনের জন্য অবংম মঠ পরীক্ষায় যোস্তায়কে বালাইনাশকটি অনুসন্ধান, দেশে আমদানি যথাযথ পদ্ধতি অনুসরগপুর্ব বাণীজ্যিকিরবেনে অনুমতি লাছ ইত্যাদি কবল ক্ষেন্দেই জাতীয় ফল আর্বিয়ে স্বায্যা গুত্যা থোন্যা ইন্দিটিটিট, নিমিটা, ইউএসএইড এব ধর্যের্বের কার্য নেরখন্দান অবিস্প্ররে সহায্যতা কৃতজ্ঞতার গেথে যন্থা ব্যাগ্যা।

The daily Vorer Pata, Page 6, Date- October 5, 2020



জৈব বালাইনাশক বাজারে আনল ইস্পাহানি অ্যাগ্রো

বাণিজ্য ডেস্ক >

ফল আর্মিওয়ার্ম, যার বৈজ্ঞানিক নাম Spodoptera frugiperda। পথিবীব্যাপী এটি মারাত্মক ক্ষতিকারক ্যাব্যাথা। এটে নায়াত্মক কাওকায়ক এবং বিধ্বংশী পোকা হিসেবে পরিচিত। এটি ভুট্টা, সরণম, তুলা, বাদাম, তামাকসহ বিভিন্ন ধরনের ফল ও সবজিসহ প্রায় ৮০টি ফসলে আক্রমণ করে থাকে। ভুষ্টা ফসলে এর আক্রমণের হার সর্বাধিক। এ পোকা দমনে রাসায়নিক কীটনাশক তেমন কার্যকরী নয়। তবে সঠিক সময়ে এবং কাবকরা শর। তবে গাঁঠক সময়ে এবং সঠিক পদ্ধতিতে জৈব বালাইনাশক প্রয়োগ করে পোকাটি দমর কার্যকরী কোনো জৈব বালাইনাশক না থাকায় ইস্পাহনি অ্যায়ো লিমিটেড টেক্সাস, ইউএসএতে অবন্থিত জৈব বালাইনাশক উৎপাদনকাবী প্রতিষ্ঠান AgBiTech-এর সঙ্গে যোগাযোগ করে ফউলিজেন বা এসএফএনপিভি বাংলাদেশে নিয়ে আসে। সম্প্রতি বিএআরসি মিলনায়তনে দিনব্যাপী ফল আর্মিওয়ার্ম পর্যবেক্ষণ ও দমন ব্যবস্থাপনা' সংক্রান্ত কর্মশালায় এসব তথ্য জানানো হয়। ফল আর্মিওয়ার্ম টাস্কফোর্স এ কর্মশালার আয়োজ করে। কর্মশালায় জৈব বালাইনাশক 'ফউলিজেন বা এসএফএনপিভির বাণিজ্যিক কার্যক্রম উদ্বোধন অনুষ্ঠানের প্রধান অতিথি মন্ত্রণালয়ের অতিরিক্ত সচিব আব্দুর রউফ। বিশেষ অতিথি ছিলেন কৃষি আলম্যের অতিরিক্ত সচিব কমলারঞ্জন দাস এবং সরেজমিন উইংয়ের পরিচালক মো. আসাদ



শোছানি : জৈব বালাইনাশক 'ফউলিজেন বা এসএফএনপিভির বাণিজ্যিক কার্যক্রম উদ্বোধন করেন কৃষি মন্ত্রণালয়ের অতিরিক্ত সচিব ড. আব্দুর রউফ

The Daily Kaler Kantho, Page 5, Date- September 30, 2020

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## **Financial Express**



A view of the National Fall Armyworm Taskforce-organised day-long workshop on "Fall Armyworm Monitoring and Control Management" at BARC auditorium in the city recently

## Ispahani Agro Ltd launches organic insecticide 'Fawligen' to fight fall armyworm

The National Fall Armyworm Taskforce organised a day-long workshop on "Fall Armyworm Monitoring and Control Management" at BARC auditorium in the city recently, said a press release. Dr Abdur Rauf, additional secretary of

Dr Abdur Rauf, additional secretary of the Ministry of Agriculture, inaugurated the commercialisation process of organic pesticide "Fawligen or SfNPV" in Bangladesh as the chief guest. Kamala Ranjan Das, additional secre-tary of the Ministry of Agriculture, Md Asad Ullah, director, Sorejomin Wing, Dr Md Nazirul Islam as a guest of honor, director general of BARI, Dr Md Israel Hossain director general of BWMRI

director general of BARI, Dr Md Israel Hossain, director general of BWMRI, attended the opening ceremony while Dr Shah Mohammad Bakhtiyar, executive chairman of BARC, Bresided over it. After official inauguration of 'Fawigen', fawiai Yasmeen, director of Ispahani Agro Limited, gave a short talk on the topic. Dr Timothy J Kropnik, country representative of Summit, Bangladesh, also presented the main article in the workshop. Fall Armwupen whose scientific name is

main article in the workshop. Fall Armyworm whose scientific name is Spodopterafrugiperda, is worldwide known as a deadly harmful and destructive insect. It attacks about 60 crops, including maize, sorghum, cotton, nuts, tobacco, and a vari-

ety of falls and vegetables. However, the attack rate of maize crop is the highest. Insects cause severe damage to crops by 'eating the leaves of trees.

Chemical pesticides are not very much effective in controlling these insects but the insects can be effectively controlled by

insects can be effectively controlled by applying organic pesticides at the right time, in the right way. Though this insect is mainly from American continent, in 2016 it was attacked in Africa and in 2018 it was attacked in different countries of South Aris includes Brancketh Ledis act Sci Asia including Bangladesh, India and Sri

As there is no effective organic pesticide As there is no effective organic pesticide for controlling fall armyworm insects in Bangladesh, Ispahani Agro Limited has contacted AgBiTech, an organic pesticide effective pesticide Fawligen in Bangladesh. It is then approved for use in controlling fall armyworm insects based on satisfactory results from all types of lab and field tests. The National Fall Armyworm Taskforce, Bangladesh Agricultural Research Council, Bangladesh Agricultural Research Counstitute, Bangladesh Agricultural Research Institute, Bangladesh Wheat and Maize Research Institute, Simit, USAID and above all, the Agricultural Extension are gratefully acknowledged for all aspects of the search for organic pesticides, import into the coun-try, permission for commercialisation fol-

Iowing due process. Approximately 35 high officials working in different national and international organisations attended the workshop.

The Financial Express, Page 20, Date- October 7, The Daily Observer, Page 15, Date- October 8, 2020 2020

## dailyobserver Date:08-10-2020 Page:15 Col:68 Ster:27 Col\*Inc Ispahani Agro launches organic pesticide Fawligen Business Desk applying organic pesticides gratefully acknowledged

National Fall The Taskforce Armyworm organised a day-long work-shop on "Fall Armyworm

Monitoring and Control Management" at the BARC Auditorium recently. Additional Secretary Dr. Abdur Rauf of the Ministry of Agriculture inaugurated the workshop as the chief

guest and introduced the commercialisation process of organic pesticide "Fawligen or SfNPV" in

applying organic pesticides at the right time, in the

right way. Though this insect is mainly from American continent, in 2016 it was attacked in Africa and in 2018 it was attacked in different countries of South Asia including Bangladesh, India and Sri Lanka.

As there is no effective organic pesticide for controlling fall armyworm insects in Bangladesh, Ispahani Agro Limited has contacted AgBiTech, an

gratefully acknowledged for all aspects of the search for organic pesticides, import into the country, permission for commen cialization following due process.

Additional Secretary Kamala Ranjan Das of the Ministry of Agriculture, Sorejomin Wing Director Md. Asad Ullah, Bangladesh Agriculture Research Institute Director General Dr. Md. Nazirul Islam and BWMRI Director general Dr. Md. Israel



Bangladesh. Fall Armyworm whose scientific name is Spodopterafrugiperda, is worldwide worldwide known as a deadly harmful and destructive insect. It attacks about 60 crops, including maize, sorghum, cotton, nuts, tobacco, and a variety of falls and vegetables.

The attack rate of maize crop is the highest and the age to crops by eating the leaves and falls of trees. Chemical pesticides are not very much effective in controlling these insects but the insects can be effectively controlled by

organic pesticide manufac-turer in Texas, USA, to provide effective pesticide "Fawligen" in Bangladesh. It is then approved for use in controlling fall armyworm insects based on sat isfactory results from all types of lab and field tests. It is to be noted that the National Fall Armyworm Taskforce, Agricultural Bangladesh Research Bangladesh Research Council. Agricultural Bangladesh Institute. Wheat and Maize Research Institute, Simit, USAID and above all, the assistance of the Department Agricultural Extension are

BARC Executive Dr. Sn. Bakhtiyar mening Chairman Mohammad presided over the opening ceremony.

Hossain

After the official inaugu-After the official maugu-ration of "Fawligen", Fawzia Yasmeen, Director, Ispahani Agro Limited, gave a short talk on the topic. Dr. Timothy J. Kropnik, Timothy J. Kropnik, Country Representative, Summit, Bangladesh also presented the main article in the workshop.

Approximately 35 high level officials working in various national and international organizations attended this workshon.



Dat e:30-09-2020

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### আর্মিওয়ার্ম দমনে বালাইনাশক 'ফউলিজেন' বাজারে নিয়ে এলো ইস্পাহানি অ্যাগ্রো

জাতীয় ফল আর্মিওয়ার্ম টাক্সফোর্স গত ২২ সেপ্টেম্বর, বিএআরসি অভিটোরিয়ামে দিনব্যাপী 1095 আর্মিওয়ার্ম পর্যবেক্ষণ ও দমন ব্যবস্থাপনা" সংক্রান্ত একটি কর্মশালার অয়োজন করে। উন্ড কর্মশালার উদ্বোধনী অনুষ্ঠানে জৈব বালাইনাশক 'ফউলিজেন বা এসএফএনপিন্তি' এর বাংলাদেশে বাণিজ্যিকীকরণ প্রক্রিয়া আনুষ্ঠানিক উদ্বোধন করেন প্রধান অতিথি কৃষি মন্ত্রণালয়ের অতিরিন্ত সচিব ড. আব্দুর রউফ। ফল আর্মিওয়ার্ম যার**িবেজ্ঞানিক নাম** Spodoptera পৃথিবীব্যাপী একটি frugiperda, মারাত্মক ক্ষতিকারক এবং বিধ্বংসী পোঁকা হিসেবে পরিচিত। এটি ভূটা, সরগম, তুলা, বাদাম, তামাক, বিভিন্ন ধরনের ফল ও সবজিসহ প্রায় ৮০টি ফসলে আক্রমণ করে থাকে। তবে ভুটা ফসলে এর আক্রমণের হার সর্বাধিক। পোকাটি কীরা অবস্থায় গাছের পাতা ও ফল খেয়ে ফসলের ব্যাপক ক্ষতি করে থাকে। এ পোকা দমনে রাসায়নিক কীটনাশক তেমন কার্যকরী নয়। তবে সঠিক সময়ে এবং সঠিক পদ্ধতিতে জৈব বালাইনাশক প্ৰযোগ করে পোকাটি কার্যকরভাবে দমন করা যায়। এটি মূলত আমেরিকা মহাদেশের পোকা হলেও ২০১৬ সনে আফ্রিকা এবং ২০১৮ সনে বাংলাদেশসহ দক্ষিণ এশিয়ার বিভিন্ন দেশ যেমন : ভারত, শ্রীলন্ধায় এদের আক্রমণ পরিলক্ষিত হয়। বাংলাদেশে ফল আর্মিওয়ার্ম পোকা নিয়ন্ত্রণে কার্যকরী কোনো জৈব বালাইনাশক না থাকায় ইস্পাহানি লিমিটেড টেক্সাস. আগো ইউএসএতে অবস্থিত জৈব বালাইনাশক উৎপাদনকারী প্রতিষ্ঠান AgBiTech-এর সাথে যোগাযোগ করে পোকাটি≣ ৪র্থ পৃঃ ৪-এর কলামে

আর্থিওয়ার্থ দমনে বালাইনাশক সংগ্রন্থার পর নিয়ন্ত্রখে কার্যকরী জৈব বালাইনাশক ফউলিজেন বা এসএফএনপিডি' বাংলাদেশে নিয়ে আসে। অতঃপর সব ধরনের ল্যাব এবং মাঠ পরীক্ষায় সন্তোষজনক ফলাফলের তিরিতে এটি

ফল আর্মিওয়ার্ম পোকা দমনে ব্যবহারের জন্য অনুমোদিত হয়। উক্ত উদ্বোধনী অনুষ্ঠানে বিশেষ অতিথি হিসেবে কৃষি মন্ত্রণালয়ের অতিরিজ সচিব কমলারঞ্জন দাস, মো: আসাদ উল্লা, পরিচালক, সরেজমিন উইং, ড. মো: নাজিরন্দ ইসলাম, মহাপরিচালক, বিএআরআই, ড. মো: ইসরাইল মহাপরিচালক হোসেন, বিভৱিউএমআরআই উপস্থিত ছিলেন। ওই উদ্বোধনী অনুষ্ঠানে সভাপতিত্ব করেন ড, শাহ মোহাম্মদ বর্থতিয়ার, নির্বাহী চেয়ারম্যান, বিএআরসি। 'ফউলিজেন'- এর আনুষ্ঠানিক উদ্বোধনের পর এ বিষয়ে সংক্ষিপ্ত বন্দ্রতা প্রদান করেন ইস্পাহানি অ্যাগ্রো লিমিটেডের পরিচালক ফৌজিয়া ইয়াসমিন। এ ছাড়াও ওই কর্মশালায় মূল প্রবন্ধ উপস্থাপনা করেন ড. টিমুথি জৈ ত্রুপনিক, কান্ট্রি রিপ্রেজেনটেটিভ, সিমিট, বাংলাদেশ। কর্মশালায় বিভিন্ন প্রতিষ্ঠানে কর্মরত প্রায় ৩৫ জন কর্মকর্তা অংশগ্রহণ করেন। বিজ্ঞপ্তি।

#### মূগ্যন্তর

 Deter 06-10-2020 Page: 15 Col 5-8 State: 04 Col<sup>0</sup> Inc ইস্পাহানি এগ্রো নিয়ে এল নতুন বালাইনাশক

জাতীয় ফল আৰ্শিঙয়াৰ্য চাৰমেন্সৰ্য ২২ সেন্টেম্বর বিএআরসি অভিটারিয়ামে দিনব্যাপী 'ফল আৰ্শিঙয়াৰ্থ পৰ্যদৈৰক্ষপ ও দমন ব্যবস্থাপনা' সহকাৰ একটি কৰ্মশালার অয়োজন করে। কৰ্মশালার উষেধন অনুষ্ঠানে জৈব ধালাইবালক 'ফউলিজেন বা এপএফএনপিডি'র বালাদেশে বাণিজি**ন্দিরপ প্রতিয়া** আনুষ্ঠানিক উষেধন করেন প্রধান অতিধি কৃষি অনুগালয়ের অতিরিক গতিন ড, আবনুর রউজ। অনুষ্ঠানে বিশেষ অতিধি **ছিলেন, কমলারন্ধন** দাস (অতিরিক সতিব, কৃষি মন্ত্রণায়া), আমাল উয়া পেরিচালক, সরেজমিন উইং) পের্ট যবে অবার হিসাবে এন নিজিন্দ ইসলার (মহাপরিচালক, বিপ্রবারঘাই), চে ইসরাইল খেলেন (মহাপরিচালক, বিভান্তিক সরেজমিন উইং) প্রশ্ব সংবাদ ক্রিছা। ত্রাজিলে হেন নিজিন্দ ইসলাম (মহাপরিচালক, বিপ্রবারঘাই), চা ইসরাইল খেলেন (মহাপরিচালক, বিভান্তিক মরেজমিন উইং) প্রশ্ব সংবাদ ক্রিছা।

The Daily Nayadiganto, Page 3, Date- September 30, The daily Jugantor, Page 15, Date- October 6, 2020 2020

#### Challenges encountered in the reporting period and future contingencies

In the first six months of this Activity, aside from the late disbursement of funds, no major challenges were encountered in the reporting period. Most activities were fully on, and those with delays are not seriously compromised. The advent of the COVID-19 crisis however seriously disrupted activities from March forward, with national and district and city level lockdowns preventing many activities. Monitoring of FAW in the summer maize season was rendered impossible as DAE staff were reluctant to enter the field and scout for pests. Farmers were also reluctant to permit visitors into villages. These issues - in addition to the delays encountered in coordination with governmental partners at the Dhaka level - presented a series of challenges detailed throughout this report. At the time of writing, CIMMYT still does not permit in-person gatherings of more than 10 people, and generally advises avoiding meetings wherever possible to maintain social distance. Field travel is very limited, and office attendance is on a phased and rotational basis. As a result, all in-person trainings for the duration of 2020 have been cancelled and have been moved to Zoom. In addition, international travel and field trips have been suspended until further notice out of an abundance of caution. For these reasons, the Activity will soon be submitting a revision to the budget structure for the Activity that reflects the need to pivot to more sub-granting to partners and alternative activities as articulated in the 2020-21 work plan.

Append	lix I: I	Fighting <b>F</b>	<b>AW Key</b>	Leader	ship Sta	ff in alphab	etical order
First	Last	Role	Institution	Project	Address	Phone	Email
Name	Name			affiliation			
AFM	Alam	Communications	CIMMYT	CSISA	Dhaka,		NA.ALAM@cgiar.org
Nazmul		Coordinator		(Synergistic)	Bangladesh		
Syed Nurul	Alam	Senior	CIMMYT /	Fighting	Dhaka,	8801711907886.00	<u>alamsn09@gmail.com</u>
		Consultant	BARI	FAW	Bangladesh		TAMATUO
Amjath	Babu	Agricultural Economist		CSISA (Synergistic) + Fighting FAW	Dhaka, Bangladesh		<u>I.AMJATH@cgiar.org</u>
Shamim	Begum	Training	CIMMYT	CSISA	Dhaka,	8801712427145.00	SA.BEGUM@cgiar.org
Ara	.0.	Coordinator		(Synergistic) + Fighting FAW	Bangladesh		
Mutasim	Billah	Data Specialist	CIMMYT	CSISA	Dhaka,	8801824367257.00	M.BILLAH@cgiar.org
				(Synergistic) + Fighting FAW	Bangladesh		
Joe Edward	Dale	Regional Program Manager	CIMMYT	Fighting FAW	Kathmandu, Nepal		J.DALE@cgiar.org
Titus	Doffo	Project Assistant	CIMMYT	CSISA (Synergistic) + Fighting FAW	Dhaka, Bangladesh	8801710856025.00	<u>t.doffo@cgiar.org</u>
Shamim	Begum	Training	CIMMYT	CSISA	Dhaka,		s.begum@cgiar.org
Ara		Coordinator		(Synergistic) + Fighting FAW	Bangladesh		
Syed Mahmudul	Huq	Training Coordinator	CIMMYT	Fighting	Dhaka, Bangladesh	8801713031892.00	<u>S.HUQ@cgiar.org</u>
Gulam	Hussain	Consultant	CIMMYT	CSISA	Dhaka,	881715885608.00	<u>G.HUSSAIN@cgiar.org</u>
<b>.</b>				(Synergistic)	Bangladesh		
Shafiqul	Islam	Jashore Hub Coordinator		CSISA (Synergistic) + Fighting FAW	Jashore, Bangladesh	+880 171145 1064	<u>Shafiqui.Islam@cgiar.org</u>
Mustafa	Kamal	GIS and Remote	CIMMYT	CSISA	Dhaka,	8801713379944.00	M.KAMAL@cgiar.org
		Sensing Analyst		(Synergistic) + Fighting FAW	Bangladesh		
Timothy J.	Krupnik	Country	CIMMYT	CSISA	Dhaka,	+88 0175 556	<u>t.krupnik@cgiar.org</u>
		Reprehensive for Research and Boute such is a		(Synergistic) + Fighting FAW	Bangladesh	8938	
		Fartnersnips, Regional Strategic Team					
		Leader for Sustainable					
		South and					
	_	Southeast Asia.					
Dinabandhu	Pandit	Senior Technical Coordinator	CIMMYT	CSISA (Synergistic)	Dhaka, Bangladesh	+88 01712130599	d.pandit@cgiar.org

# Appendix II: Educational materials and curricula developed by the activity for the public sector (SAAO- Sub Assistant Agricultural Officer, DAE, ToT)

# Training of Master Trainers to respond to Fall Armyworm in Bangladesh

## Program

#### In house training program for Three-day

Dates: November 23-25, 2019 (Batch 1; arrive November 22), November 26-28, 2019 (Batch 2; arrive November 25) November 30- December 02, 2019 (Batch 3; arrive November 29)

**Location:** Hotel Shahid Palace, 12 Sheed Abul Kasem Sarak, Chuadanga (field and classroom)



Fighting back against Fall Armyworm with Integrated Pest Management

Time	Topics	Duration	Notes
9:00 AM	Inaugural Session	90 minutes	Hotel conference room
10:15 AM	Round of introductions	15 min	
10:30 AM	Tea break	15 min	
11:00 AM	Pre-test on FAW	20 min	
11:20 AM	<ul> <li>FAW Introduction:</li> <li>Identification, background</li> <li>Monitoring system introduction</li> </ul>	40 min	
12:00 PM	Scouting Introduction	20 min	
12:20 PM	FAW monitoring overview	40 min	
1:00 PM	Lunch break	60 min	
2:00 PM	Travel to field	45 min	
2:45 PM	General field reconnaissance	15 min max	• All 50 people enter and look at the field "I <sup>st</sup> Risk Assessment"
	Trap demonstration – all 50 people	45 min	• Set up, Placement, moth Identification, trap maintenance
	Simplified Scouting	45 min	<ul> <li>Split into 5 groups (count off). 5 'experts' assist each group and keep time</li> <li>V stages in maize</li> <li>Data recording</li> </ul>

### Day I: Classroom & Field

Time	Topics	Duration	Notes
	Advanced Scouting	40 min	<ul> <li>Maintain 5 groups</li> <li>Search Targets</li> <li>Action Thresholds</li> <li>Moths/Trap/Day</li> <li>3<sup>rd</sup> Risk assessment</li> <li>Management recommendation</li> </ul>
5:45 PM	Travel back to conference site	45 min	
6:30 PM	Debrief Field Training	30 min	Discuss report back the next morning
7:00 PM	Field Scouting Case Study	60 min	
8:00 PM	Dinner		

## Day 2: Classroom

Time	Topics	Duration	Notes
7:30 AM	Breakfast	60 min	
8:30 AM	Introductions, Orientation and Review of Day I	30 min	Each groups provides 5 min reflection of day 1
9:00 AM	Keys to FAW Biology	45 min	Questions & Answers
9:45 AM	Monitoring	60 min	Questions & Answers
10:45 AM	Tea break	15 min	
11:00 AM	Scouting	60 min	Questions & Answers
12:00 PM	Biological and cultural control options FAW outbreak	60 min	Questions & Answers
1:00 PM	Lunch	60 min	
2:00 PM	Safe and cost effective chemical control options during an FAW Outbreak	60 min	<ul><li>Rational alternatives</li><li>Questions &amp; Answers</li></ul>
3:00 PM	FAW risk assessment and appropriate advice for farmers: A participatory exercise	60 min	<ul> <li>Reduce Use. Control Costs</li> <li>Low dose application tactics</li> </ul>
4:00 PM	Monitoring and scouting data entry using tablets	60 min	<ul> <li>Principles of tablet use</li> <li>Presentation on ODK</li> <li>Presentation on entering data</li> </ul>
5:00 PM	Tea break	30 min	
5:30 PM	Data entry using tabs (contd.)	90 min	
7:00 PM	Planning Session - Field Training for Day Three	90 min	Discussion on how participants will train SAAOs
8:30 PM	Dinner		

7:00 AM	Breakfast	60 min	
8:00 AM	Travel to field	45 min	
8:45 AM	Introduction and general field reconnaissance	30 min	
	Introduction and general field reconnaissance Led by Day I and 2 trainees, who train new SAAOs. There will be I new SAAO per 2 trainees.	45 min	Split into groups of 3 (2 master trainers and 1 new farmers student).
	Trap demonstration – all 50 people Led by Day I and 2 trainees, who train new SAAOs.	30 min	<ul> <li>Set up, Placement, moth Identification, trap maintenance.</li> <li>Master trainers teach farmers students</li> </ul>
	SAWBO video by tablets Led by Master Trainers	30 min	
	Simplified Scouting Led by Master Trainers	60 min	Each group of three scouts fields and records data
	Data entry and upload into tablets Led by Master Trainers	30 min	Enter data from index cards into tablets and upload to the database
12:30 PM	Travel to conference venue	45 min	
1:15 PM	Lunch	60 min	
2:15 PM	Debrief Field Training. Each group summarize main observations in 5 min maximum.	30 min	• Question and answer
2:45 PM	Planning for the rabi season	30 min	<ul> <li>Monitoring, Scouting, and Reporting Protocols</li> <li>Plan of action for the coming weeks</li> </ul>
3:15 PM	Post-test exam	15 min	Master trainers take     sophisticated exam
3:30 PM	Building an IPM Program (part two)	60 min	<ul><li>Panel Discussion</li><li>Questions and Answers</li></ul>
4:30 PM	Closing ceremony	60 min	<ul> <li>Certificate distribution</li> <li>Awards for top five master trainers</li> </ul>
5:30 PM	ADJOURMENT		

Day 3: Training of Field Level Extension Officers by the Master Trainers

## Appendix III: Monitoring System for FAW Tier I & 2

## Monitoring System for Fall Armyworm in Bangladesh (Rabi 2019/2020)

The proposal is to develop three different types of protocols and systems for intensive monitoring of Fall Armyworm (FAW) populations, severity, and incidence levels in Bangladesh during the 2019/20 rabi season, with an ideal target start date in mid-November. Protocols may be refined and revised for monitoring after the completion of the rabi season in 2020 as modifications may be required for the kharif season.

The on-going system includes three levels of monitoring:

- I. Monitoring in locations of intensive maize production
- 2. Monitoring in locations of less intensive maize production
- 3. Monitoring in non-maize crops

Differences between Protocol I and 2 areas are based on maize acreage determined in the 2108/19 rabi season:



Each level of proposed monitoring is described below.

## FAW monitoring tier 1: FAW monitoring in major and intensive maize growing areas

**Locations**: Nine major maize growing districts excepting have been selected based on maize production statistics from the 2017-18 season. These include the following:

However, final selection of major maize growing areas has been finalized with DAE.

Key Upaz assuming 2020	ey Upazilas for monitoring of Tier I maize growing areas, ssuming monitoring from November I, 2019 through June I, 020						Total seasonal (32 weeks)	
Zila name	Upazila names and number	No unions upazila <sup>-1</sup> to be selecte d	No. traps and SAAO s union <sup>-1</sup>	Fields scoute d union <sup>-1</sup>	Total traps and SAAO s	Tota I fields	Moth counts (data points )	Fields observe d
Dinajpur	Biral, Birampur, Birganj, Bochaganj, Chirirbandar, Dinajpur Sadar, Fulbari, Ghoraghat, Hakimpur, Dinajpur District, Kaharole, Khansama, Nawabganj, Dinajpur, Parbatipur (13)	2	3	3	78	78	2,496	2,496
Chuadanga	Alamdanga, Chuadanga Sadar, Damurhuda, Jibannagar (4)	2	3	3	24	24	768	768
Lalmonirha t	Aditmari, Hatibandha, Kaliganj, Lalmonirhat, Lalmonirhat Sadar, Patgram (6)	2	3	3	36	36	1,152	1,152
Nilphamari	Nilphamari Sadar , Jaldhaka, Saidpur, Dimla, Kishoreganj, Domar (6)	2	3	3	36	36	1,152	1,152
Panchagarh	Atwari, Boda, Debiganj, Panchagarh Sadar, Tetulia (5)	2	3	3	30	30	960	960
Thakurgaon	Thakurgaon Sadar , Baliadangi , Haripur , Ranisankail , Pirganj (5)	2	3	3	30	30	960	960
Rangpur Manikganj	Badarganj, Gangachara Kaunia, Mithapukur, Pirgachha, Pirganj, Rangpur, Rangpur Sadar, Taraganj (9) Daulatpur, Ghior,	2	3	3	54	54	1,728	1,728
- <u>8</u> ,	Harirampur,	2	3	3	42	42	1,344	1,344

	Manikganj Sadar, Saturia, Shivalaya, Singair (7)							
Jheneidah	Harinakunda , Jheneidah Sadar , Kaliganj , Kotchandpur Upazi, Maheshpur , Shailkupa (5)	2	3	3	30	30	960	960
Total							11,520	11,520

### Trapping detail and data collection:

- I. Three (03) traps per Upazilla will be utilized (3 traps each in two selected unions within the upazila). Traps should be established following Appendix I.
- 2. Final union selection will be done in consultation with DAE
- **3.** The three traps will be placed in fields with maize being grown. These fields and traps should at least 50 m apart from each other as shown below:



- **4.** Traps will be monitored every Monday with FAW catch number recorded. FAW lures will need to be replaced approximately every two months (based on observation of trap condition)
- **5.** Trap catch will be recorded by the 'best' SAAOs of that Upazilla in a prescribed format developed by the Entomology Division, BARI and The activity. Data will be collected using tablets, with data and GPS of field locations automatically uploaded to a centralized database by each participating SAAO. This database will be maintained by DAE, BARI and The activity. Importantly, tablet users will receive automatic messages during use and by email reminding them to change trap lures every two months.
- 6. These data will be made available for viewing at union, upazila, and zila summary levels with graphs of the populations recorded available on a web-based dashboard. Access to the

dashboard will be provided to each participating SAAO and Fall Armyworm Taskforce members on a password protected basis.

- 7. In addition, the average of the 03 traps per each of the two upazilas will be recorded in paper format and send to the sent to UAO, DAO, RAO and Centrally to PPW & Entomology Division, BARI/BWMRI.
- **8.** The mobile numbers of the responsible persons in the Upazilla level will be recorded centrally so that in any misshapen or delays can be tracked.
- **9.** Within each district wise there will be one officer from DAE and one entomologist from BARI/BWMRI will be earmarked for the monitoring system. Their mobile number will also be available centrally.

## Scouting detail:

- I. In each of the above zilas, upazilas and unions, SAAOs will scout each maize field in which there is a trap (three fields per each of the selected unions).
- 2. Scouting will occur each Monday from maize sowing to harvest.
- **3.** Scouting will proceed using the following method:
  - **A.** SAAOs will scout maize fields in a W pattern, starting at least 2-3 m from the edge of each maize field.
  - **B.** SAAOs will look for signs of Fall Armyworm damage in 5 different places in each field as shown below:



**C.** SAAOs will Stop in 5 places that are not on the sides of the field (see above).

D. In each of the 5 places in each field, SAAOs will carefully examine 10 plants for signs of <u>new</u> Fall Armyworm damage (Fresh pinholes, window panes, whorl damage or cob damage). Signs of fall armyworm damage will look like those shown below:



Pinholes and window panes caused by FAW



Windowpanes caused by FAW on maize leaves



Cob penetration holes caused by FAW

- **E.** When maize is older, SAAOs will examine the top three leaves or cobs for signs of Fall Armyworm damage.
- **F.** SAAOs will next Write down how many plants out of 10 have Damage in each of the five locations on the W.
- **G.** SAAOs record the number of plants that do not have damage.
- **H.** SAAOs will count up the total number of plants out of 50 that have signs of new damage.
- I. Field scout data catch will be recorded by the 'best' SAAOs of that Upazilla in a prescribed format developed by the Entomology Division, BARI and The activity.
- J. Data will be collected using tablets, with data and GPS of field locations automatically uploaded to a centralized database by each participating SAAO.
- K. This database will be maintained by DAE, BARI and The activity.
- L. Importantly, tablet users will receive automatic messages during use and by email reminding them to change trap lures every two months.
- **M.** These data will be made available for viewing at union, upazila, and zila summary levels with graphs of the populations recorded available on a web-based dashboard. Access to the dashboard will be provided to each participating SAAO and Fall Armyworm Taskforce members on a password protected basis.

## Main operating organizations:

• Department of Agricultural extension (DAE)

## **Collaborating organizations:**

- Bangladesh Agricultural Research Institute (BARI)
- Bangladesh Wheat & Maize Research Institute (BWMRI)
- International Maize and Wheat Improvement Center (The activity)
- Food and Agriculture Organization (FAO)
- CAB International

#### **Budget Sources:**

- Emergency Fund of FAO
- FAW project Fund of The activity (For training, technical back-stopping, database development and dashboards).
- Emergency funds within Government (applied for by DAE)
- Potential funds from KGF (need to be applied for)

# FAW monitoring tier 2: FAW monitoring in major and intensive maize growing areas

**Locations**: Seventeen (17) minor maize growing districts excepting have been selected based on maize production statistics from the 2017-18 season. These include the following:

Key Upazilas for monitoring of Tier 2 maize growing areas, assuming monitoring from November 1, 2019 through June 1, 2020								Total seasonal (32 weeks)	
Zila name	Upazila names and number	No unions upazila <sup>-1</sup> to be selected	No. traps and SAAOs union <sup>-1</sup>	Fields scouted union <sup>-1</sup>	Total traps and SAAOs	Total fields	Moth counts (data points)	Fields observed	
Gaibandha	Phulchhari, Gaibandha Sadar, Gobindaganj, Palashbari, Sadullapur, Sughatta, Sundarganj (7)	1	3	3	21	21	672	672	
Sirajganj	Belkuchi, Chauhali, Kamarkhanda, Kazipur, Raiganj, Shahjadpur, Sirajganj Sadar, Tarash, Ullahpara, Bagha (10)	1	3	3	30	30	960	960	
Meherpur	Gangni, Meherpur Sadar, Mujibnagar (3)	I	3	3	9	9	288	288	
Jamalpur	Baksiganj, Dewanganj, Islampur, Jamalpur Sadar,	1	3	3	21	21	672	672	

	Madarganj, Melandaha, Sarishabari (7)							
Cumilla	Barura, Brahmanpara, Burichang, Chandina, Chauddagram, Daudkandi, Debidwar, Homna, Laksam, Muradnagar, Nangalkot, Comilla Adarsha Sadar, Meghna, Titas, Monohargonj, Comilla Sadar Dakshin (16)	1	3	3	48	48	1,536	1,536
Kurigram	Bhurungamari, Char Rajibpur, Chilmari, Phulbari, Kurigram Sadar, Nageshwari, Rajarhat, Raomari, Ulipur (9)	Ι	3	3	27	27	864	864
Kushtia	Bheramara, Daulatpur, Khoksa, Kumarkhali, Kushtia Sadar, Mirpur, Shekhpara (7)	1	3	3	21	21	672	672
Naogaon	Atrai, Badalgachhi, Manda, Dhamoirhat, Mohadevpur, Naogaon Sadar, Niamatpur, Patnitala, Porsha, Raninagar, Sapahar (11)	1	3	3	33	33	1,056	1,056
Chandpur	Chandpur Sadar, Faridganj, Haimchar, Haziganj, Kachua, Matlab Dakshin, Matlab Uttar, Shahrasti (8)	1	3	3	24	24	768	768
Chapai Nawabganj	Bholahat, Gomastapur,	I	3	3	15	15	480	480

	Nachole, Nawabganj Sadar, Shibgani (5)							
Rajshahi	Bagmara, Charghat, Durgapur, Godagari, Mohanpur, Paba, Puthia, Tanore, Boalia, Matihar, Rajpara, Shah Mokdum (12)	1	3	3	36	36	1,152	1,152
Bogura	Adamdighi, Bogra Sadar, Dhunat, Dhupchanchia, Gabtali, Kahaloo, Nandigram, Sariakandi, Shajahanpur, Sherpur, Shibganj, Sonatola (12)	1	3	3	36	36	1,152	1,152
Natore	Bagatipara, Baraigram, Gurudaspur, Lalpur, Natore Sadar, Singra, Naldanga (7)	I	3	3	21	21	672	672
Dhaka	Dhamrai, Dohar, Keraniganj, Nawabganj, Savar (5)	I	3	3	15	15	480	480
Kishorganj	Astagram, Bajitpur, Bhairab, Hossainpur, Itna, Karimganj, Katiadi, Kishoreganj Sadar, Kuliarchar, Mithamain, Nikli, Pakundia, Tarail (13)	I	3	3	39	39	1,248	1,248
Tangail	Gopalpur, Basail, Bhuapur, Delduar, Ghatail, Kalihati, Madhupur, Mirzapur, Nagarpur, Sakhipur, Dhanbari, Tangail Sadar (12)	1	3	3	36	36	1,152	1,152
Total								13,824

However, final selection of major maize growing areas will be finalized with DAE.

### Trapping detail and data collection:

- I. Three (03) traps per Upazilla will be utilized (3 traps each in two selected unions within the Upazila). Traps should be established following Appendix I.
- 2. Final union selection will be done in consultation with DAE
- **3.** The three traps will be placed in fields with maize being grown. These fields and traps should at least 50 m apart from each other as shown below:



- **4.** Traps will be monitored every Monday with FAW catch number recorded.
- 5. Trap catch will be recorded by the 'best' SAAOs of that Upazilla in a prescribed format developed by the Entomology Division, BARI and The activity. Data will be collected using tablets, with data and GPS of field locations automatically uploaded to a centralized database by each participating SAAO. This database will be maintained by DAE, BARI and The activity. Importantly, tablet users will receive automatic messages during use and by email reminding them to change trap lures every two months.
- 6. These data will be made available for viewing at union, upazila, and zila summary levels with graphs of the populations recorded available on a web-based dashboard. Access to the dashboard will be provided to each participating SAAO and Fall Armyworm Taskforce members on a password protected basis.
- 7. In addition, the average of the 03 traps per each of the two upazilas will be recorded in paper format and send to the sent to UAO, DAO, RAO and Centrally to PPW & Entomology Division, BARI/BWMRI.
- **8.** The mobile numbers of the responsible persons in the Upazilla level will be recorded centrally so that in any misshapen or delays can be tracked.
- **9.** Within each district wise there will be one officer from DAE and one entomologist from BARI/BWMRI will be earmarked for the monitoring system. Their mobile number will also be available centrally.

#### Scouting detail:

- I. In each of the above zilas, upazilas and unions, SAAOs will scout each maize field in which there is a trap (three fields per each of the selected unions).
- 2. Scouting will occur each Monday from maize sowing to harvest.
- **3.** Scouting will proceed using the following method:
  - **A.** SAAOs will scout maize fields in a W pattern, starting at least 2-3 m from the edge of each maize field.
  - **B.** SAAOs will look for signs of Fall Armyworm damage in 5 different places in each field as shown below:



- **C.** SAAOs will Stop in 5 places that are not on the sides of the field as shown in the image above.
- D. In each of the 5 places in each field, SAAOs will carefully examine 10 plants for signs of <u>new</u> Fall Armyworm damage (Fresh pinholes, window panes, whorl damage or cob damage). Signs of fall armyworm damage will look like those shown below:



Pinholes and window panes caused by FAW on maize leaves



Windowpanes caused by FAW on maize leaves



Cob penetration holes caused by FAW on maize leaves

- **E.** When maize is older, SAAOs will examine the top three leaves or cobs for signs of Fall Armyworm damage.
- **F.** SAAOs will next Write down how many plants out of 10 have Damage in each of the five locations on the W.
- **G.** SAAOs record the number of plants that do not have damage.
- **H.** SAAOs will count up the total number of plants out of 50 that have signs of new damage.
- I. Field scout data catch will be recorded by the 'best' SAAOs of that Upazilla in a prescribed format developed by the Entomology Division, BARI and The activity. Data will be collected using tablets, with data and GPS of field locations automatically uploaded to a centralized database by each participating SAAO. This database will be maintained by DAE, BARI and The activity. Importantly, tablet users will receive automatic messages during use and by email reminding them to change trap lures every two months.
- J. These data will be made available for viewing at union, upazila, and zila summary levels with graphs of the populations recorded available on a web-based dashboard. Access to the dashboard will be provided to each participating SAAO and Fall Armyworm Taskforce members on a password protected basis.

## Main operating organizations:

Department of Agricultural extension (DAE)

## **Collaborating organizations:**

- Bangladesh Agricultural Research Institute (BARI)
- Bangladesh Wheat & Maize Research Institute (BWMRI)
- International Maize and Wheat Improvement Center (The activity)
- Food and Agriculture Organization (FAO)

CAB International

#### **Budget Sources:**

- Emergency Fund of FAO
- FAW project Fund of The activity (For training, technical back-stopping, database development and dashboards).
- Emergency funds within Government (applied for by DAE)
- Potential funds from KGF (need to be applied for)

## DESCRIPTION OF FAW SEX PHEROMONE TRAPS

## Sex Pheromone trap:

### What is sex Pheromone?

The sex pheromone lure (set in a trap) mimics the scent of female flies, attracts the male insects and traps them in a suitable trap in large numbers resulting in mating disruption. Pheromones are naturally produced chemicals or blends of chemicals that elicit a behavioral response from a member of the same species. The word pheromone is derived from the Greek word *pherein*, meaning to transfer, and hormone, to excite or stimulate. Sex pheromones for different insect pests (viz. Fall Armyworm, eggplant shoot & fruit borer, cucurbit fruit fly, common cutworm etc.) were at first identified from the natural sources (female moths), synthesized (combination of 1-4 chemicals) and make them available in the commercial form, known as "lure".

## Water trap

The sex pheromone lures attracts the specific insect, however, to kill or capture that insects a device or trap is needed. There are many pheromone traps, viz. Delta trap, wing trap, water trap etc. However among the traps, 'Water Trap' known as 'BARI trap' or 'Magic trap' has popularly been used by farmers of Bangladesh for deployment of the pheromones lures, as shown below:



Pheromone trap in a maize field



Pheromone trap in a bitter gourd field



Pheromone trap in cabbage field showing dead insects

The water trap is a rectangular plastic container have around 3-5 liter capacity and 20-22 cm tall. A triangular hole measuring 10-12 cm height and 10-12 cm base was cut in any two opposite sides of the trap. The base of the hole would be 3 cm above the bottom. Water containing two-three drops of detergent or soap powder would be maintained inside the bottom of the trap throughout the season. The pheromone lure was tied inside the trap with thin wire and hanged from the lead and down near the water level. The pheromone soaked cotton or lure (depend upon insect pest) was tied inside the trap with thin wire. Around 45-50 traps would be set per hectare of land at a distance of 30-40 m<sup>2</sup> starting from the seed sowing of maize and be continued till last harvest. The pheromone lure will be effective for 60-70 days in the field. After that period old lures should be changed with a new one in the same trap.

## Appendix IV: FAW Monitoring Protocol on Non – Maize Crops

## FAW monitoring on non-maize crops

### FAW monitoring tier 3: FAW monitoring on non-maize crops

Fall armyworm can also attack a diversity of crops other than maize. Some of the primary ones grown in Bangladesh include cabbage, tomato, tobacco and rice.

I. Target crops will be cabbage, tomato, tobacco and rice. Target locations will be around the Regional Stations and sub-stations (where severe infestation of FAW happened) of BARI, Central Research Station of BWMRI and Regional Stations of BRRI as follows:

Key Upa	Key Upazilas for monitoring of Tier 3 of non-maize crop growing Total seasonal									
areas, as	(24 weeks)									
2020	.uzu Crop BARS/ARS No. No. Fields Total Total Moth Fields									
Crop	Name	locations	INO. trans	scouted	trans	fields	counts	observed		
	Hame		location <sup>.</sup>	location	ci aps	licius	(data	observed		
		to be	1	1			points)			
		selected					. ,			
Cabbage	ARS, BARI,		F	E	E	E	E	E		
	Thakurgaon	1	5	5	5	5	5	3		
	RARS, BARI,	1	5	5	5	5	5	5		
	Rangpur	1	5	5	5	5	5	5		
	ARS, BARI,	1	5	5	5	5	5	5		
	Bogura	•				-	-	5		
	ARS, BARI,		_	_	_	_	_	_		
	Chapai	1	5	5	5	5	5	5		
	Nawabgonj									
	RARS, BARI,	1	5	5	5	5	5	5		
	lamalour	I	5	5	5	5	5	5		
	RARS RARI									
	Barishal	I	5	5	5	5	5	5		
	CRS. BARI.	_		_	_	_	_	_		
	Gazipur	I	5	5	5	5	5	5		
Total	1 1	I	I	1	1	1	40	40		
Tomato	ARS, BARI,	1	5	F	г	г	5	5		
	Thakurgaon	1	5	5	5	5	5	5		
	RARS, BARI,	1	5	5	5	5	5	5		
	Rangpur	1	5	5	5	5	5	5		
	ARS, BARI,		5	5	5	5	5	5		
	Bogura		<u> </u>	<b></b>	<u> </u>	<u> </u>	ļ <b>-</b>	-		
	ARS, BARI,		_	_	_	_	_			
	Chapai		5	5	5	5	5	5		
	Nawabgonj									

r	r				1			
	RARS, BARI, Jeshore	1	5	5	5	5	5	5
	RARS, BARI, Jamalpur	I	5	5	5	5	5	5
	RARS, BARI, Barishal	I	5	5	5	5	5	5
	CRS, BARI, Gazipur				5	5	5	5
Total	· ·	•	•	•	•		40	40
Tobacco	RARS, BARI, Rangpur	I	5	5	5	5	5	5
Total	· <b></b>	•	•	•	•		5	5
Rice	RS, BRRI, Rajshahi	I	5	5	5	5	5	5
	RS, BRRI, Kushtia	I	5	5	5	5	5	5
	RS, BRRI, Barishal	I	5	5	5	5	5	5
	CRS, BRRI, Gazipur	I	5	5	5	5	5	5
Total								20

- 2. At weekly interval the trap catch and field scouting data will be collected will be recorded by the assigned Scientific Assistant. Scientific Officer of BARI/ BWMRI in a prescribed format (given by Entomology Division, BARI) and the average number of all traps per locations will sent through web based apps & Entomology Division, BARI and The activity, Dhaka.
- **3.** Trap layout will be with at least 100m between traps (in separate fields). However the fields should be apart from the maize fields (at laest 200m) as follows:



### Scouting detail for Protocol 3:

- 1. In each of the above RS, ARS or RARS, BARI, BWMRI or BRRI scientists will scout minimum of five fields (of tomato, cabbage, rice, or tobacco) selected by the respective scientists (each of which have a trap located in it).
- 2. Scouting will occur each Monday from crop sowing to harvest.
- 3. Scouting will proceed using the following method:
  - **N.** BARI, BWMRI or BRRI scientists will scout tomato, cabbage, rice, or tobacco fields in a W pattern or ladder pattern, starting at least 2-3 m from the edge of each field.
  - **O.** BARI, BWMRI or BRRI scientists will look for signs of Fall Armyworm damage in 5 different places within the field.



- P. In each of the 5 places in each field, BARI, BWMRI or BRRI scientists will carefully examine 10 tomato, cabbage, rice, or tobacco leaves for signs of <u>new</u> Fall Armyworm damage for Fresh windowpanes (Fresh pinholes, window panes, leave damage etc.) or Infested Plants (infested stem, infested fruits, infested panicle, fresh frass etc.).
- **Q.** BARI, BWMRI or BRRI scientists will next Write down how many plants out of 10 have Damage in each of the five locations on the W.
- **R.** BARI, BWMRI or BRRI scientists record the number of plants that do not have damage.
- **S.** BARI, BWMRI or BRRI scientists will count up the total number of plants out of 50 that have signs of new damage.
- **T.** Data will be collected using tablets, with data and GPS of field locations automatically uploaded to a centralized database by each participating SAAO.
- U. This database will be maintained by BARI, BWMRI or BRRI scientists and The activity.

- V. Importantly, tablet users will receive automatic messages during use and by email reminding them to change trap lures every two months.
- W.These data will be made available for viewing by BARI, BWMRI, BRRI and The activity scientists web-based dashboard. Access to the dashboard will be provided to each participating organization and Fall Armyworm Taskforce members on a password protected basis.

#### Main operating organizations:

- Bangladesh Agricultural Research Institute (BARI)
- Bangladesh Rice Research Institute (BRRI)
- Bangladesh Wheat & Maize Research Institute (BWMRI)

#### **Collaborating organizations:**

• International Maize and Wheat Improvement Center (The activity)

#### **Budget Sources:**

• The activity & BARI

## Data collection sheet:

Location: -----

Field number: -----

SI. No.	Data co	llection dates	No. of Moth catch/trap/	Scouting date	Remarks	
	Week no.	Dates	week	Fresh Windowpanes (FW) (out 0f 50 plants)	Infested plants (IW) (out 0f 50 plants)	
01.	01					
02.	02					
03.	03					
04.	04					
05.	05					
06.	06					

07.	07			
08.	08			
09.	09			
10.	10			
11.	11			
12.	12			
13.	13			



## Maize and wheat science for improved livelihoods

#### Vision

CIMMYT contributes to the development of a world with healthier and more prosperous people — free from the threat of global food crises and with more resilient agri-food systems.

#### Strategic goals

CIMMYT's strategic plan provides the direction to deliver on our mission and contribute strongly to the wider development agenda. Key strategic goals:

- Increasing research impact
- Accelerating genetic gains through novel diversity and tools
- Developing and improving access to stress-tolerant varieties
- Sustainable intensification for improved livelihoods
- Enhancing nutrition and processing quality

It also marks a shift in our focus from commodity-based research to an integrated approach centering on agri-food systems – a change that we believe is critical for working more effectively to strengthen food security, reduce poverty and enhance human nutrition.

Beyond CIMMYT's "core research," this strategic plan assigns higher priority to:

- Reducing malnutrition
- Empowering female farmers
- Sharing knowledge with partners and farmers



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