



## REPORT ON THE PLENARY OF THE ASEAN ACTION PLAN ON FALL ARMYWORM

**Title:** Report on the Plenary of the ASEAN Action Plan on Fall Armyworm

**Date:** 28 May 2020

**Time:** 10:00 to 12:30 (Singapore)

**SUMMARY:** An online Plenary was held over two hours and thirty minutes to provide expert advice and guidance on the control of Fall Armyworm (FAW), as well as to introduce the ASEAN Action Plan on Fall Armyworm for the first time to the public. 173 people attended the session with a high level of interest recorded across the length of the meeting on the Go to Webinar platform. Over 100 comments and questions were received from participants.

Four keynote presentations were followed by a Panel session where experts were asked questions from plenary participants. Experts and keynote speakers were chosen to help bring different perspectives to FAW control (e.g. from government, research, independent practitioner, and industry sectors). The ASEAN Action Plan on FAW was also presented. Participants made comments on the Action Plan and indicated their strong support. FAO provided a summary of the Global Plan and regional work on FAW and their support of the ASEAN regional approach. Finally, a vital next phase of securing funding, and initiating implementation of the plan, was also outlined.

Agenda item	Key points
<b>1. Official Opening:</b> Dr Nguyen Quy Duong, Vice General Director Plant Protection Division, MARD	Due to technical difficulties, Dr Duong was unable to give opening address online. However, Dr Duong has kindly provided his remarks in writing (Annex 1).
<b>2. Introduction:</b> Grahame Dixie, Executive Director, Grow Asia.	Grahame Dixie provided the background to the development of the Action Plan. Work started when FAW first arrived in Southeast Asia, and the serious economic impact to the region was noted. A regional approach was suggested, which was taken further by Grow Asia and MARD. This proposal was then presented to SOM-AMAF in October 2019, and further developed over 2019-2020. The Covid-19 situation made a physical meeting impossible, so a comprehensive virtual consultation process was launched in March 2020. This consultation process, involving many experts and stakeholders, and including final approval by a special meeting of the ASWGC, has resulted in the ASEAN Action Plan in FAW which is presented at this Plenary.

<p><b>3. Keynote speaker</b> Dr Paul Jepson, Professor, Oregon State University</p>	<p><b>TITLE: PESTICIDES, IPM &amp; FAW: MATCHING ASPIRATIONS WITH REALITY</b></p> <p>Dr Jepson talked about the new reality of pest control globally as pests spread rapidly and have huge impacts on the agriculture sector. A new emphasis on pest management is now needed that focuses on preventing or limiting pest outbreaks using IPM practices with an emphasis on biological pest management methods before pesticides. There is a big challenge to move from high risk and hazardous pesticides and identify and enable other practices that are safer and more environmentally friendly. Some pesticides can be a barrier to IPM – the aim is to remove those in a deliberative way. There is a need to talk to farmers directly about their needs and experiences. A <a href="#">project in Malawi</a> provides recommendations for working with farmers on FAW control. Simple communication to farmers on FAW control and IPM is not currently reaching farmers. Direct measurement and consultation can help identify pesticides that can be used by farmers in an efficacious and safe way. There is also an art to effective pesticide application – with different treatments and methods of application needed for different stages of development. Several gaps and opportunities for better pesticide management need to be addressed and these will need to be tackled through common goals, consensus on evidence needed, and collective action.</p>
<p><b>4. Keynote speaker</b> Dr Bui Xuan Phong, Head of Plant Protection Division, MARD, Viet Nam</p>	<p><b>TITLE: SUMMARY OF FALL ARMYWORM CONTROL IN VIETNAM</b></p> <p>FAW was first identified in Viet Nam in April 2019 in Nghe An province and quickly spread to 58/63 provinces after 3 months. Viet Nam has 4 maize growing areas with over 1.1 million ha maize crop per year over 3 seasons. Viet Nam has worked internationally and regionally to help drive cooperation and find solutions on managing FAW. Much focus has been given to testing for effective pesticides and methods of controlling of FAW. Sweet and sour baits (Molasses bait trap) have been used. The aim is for farmers to have a simple way of controlling FAW. Pheromone traps are also being used. Seed-coated seeds have also helped farmers control FAW up to the initial 21 days. Different methods must be used across different stages of FAW, including parasitoid, destruction by hand, pesticides, sweet and sour baits etc. One important component is working with farmers and providing information, training, and resources. For example, through communication campaigns on radio, television, videos, and posters as well as agricultural extension forums. Farmers cannot manage on their own, however. Countries need to work together to effectively manage FAW and a range of management measures are needed. International cooperation is important. This includes on research and technology transfer.</p>

	<p>Due to technical difficulties, Dr Phong was unable to answer questions from participants. A selection of written questions received from participants for Dr Phong have subsequently been answered and are provided in Annex 2.</p>
<p><b>5. Keynote Speaker</b>  Dr Jedeliza Ferrater,  Head of Plant  Pathology, East-West  Seed Philippines</p>	<p><b>TITLE: RESPONDING TO FALL ARMYWORM ATTACK IN THE PHILIPPINES</b></p> <p>East-West Seed has been working on information and education before the FAW arrived in June 2019. The East-West Seed Knowledge Transfer platform has posted a Pest Alert Advisory on its Facebook page since March 2019. At the same time, they prepared materials in different local dialects and circulated this to farmers. Corn Learning Centers for the sweet corn and waxy corn were launched where farmers were trained on corn production, cultural and pest management, including on FAW identification and management. Training on Insecticide Resistance Management was also emphasised. In June 2019, East-West Seed also started the “#NotToScareButToCare” FAW awareness campaign with a strong message that, “the reality is that FAW is here, but there’s no need to be scared, as we will help the farmers know the enemy and how to beat it.” East-West Seed also visits cornfields and trains farmers on how to spot FAW damage and identify FAW itself. Several control methods are being investigated including use of natural enemies (e.g. earwigs), and commercial bioinsecticides such as neem, <i>Beauveria bassiana</i> and <i>Bacillus thuringiensis</i>. Pheromones are also used to help monitor FAW. Apps from IRAC and FRAC are encouraged to help farmers make sound decisions when using synthetic pesticides. Many gaps and opportunities remain including: the use of an organized and centralized tracking and monitoring system; more awareness campaigns for the farmers and agriculture technicians; multi-stakeholder partnerships; further communication strategies; improvement of IPM practices, and the development of a potential web-based forecasting model for FAW.</p>
<p><b>6. Keynote speaker</b>  Dr Rob Bertram,  Chief Scientist for the  USAID Bureau for  Resilience and Food  Security, USAID  representative on the  FAO FAW Global Task  Force</p>	<p><b>TITLE: FALL ARMYWORM – A GLOBAL CHALLENGE: ASEAN RESPONSE IS CRUCIAL</b></p> <p>The ASEAN region has a strong history and critical role related to IPM, and now, in the context of FAW, with this Action Plan. There is a lot of knowledge about FAW but there is a shift required to learn about FAW in new contexts. FAW is here to stay in the region. FAW is a complex pest because there are different impacts at different stages – which brings multiple problems to food and feed supply chains, including food safety. Mobilising at national and regional levels is important. USAID has partnered with organisations to convene workshops in the region – and these regional approaches are useful because countries can share knowledge and work together. This can also be connected to</p>

	<p>the global approach in the FAO Global Action. Characterizing losses at all stages of agricultural supply chains is important along with evidence-based approaches to decision-making. Tools, knowledge and policy are useful IPM concepts (triangle) and these should include a wide range of methods. The validation of practices should be undertaken for both traditional and new control measures. <a href="#">Virginia Tech University IPM Innovation Lab</a>, as well as landscape management approaches, are also useful to consider. These tools all require a high knowledge content and need to be translated for local/national context. Linking global/regional approaches down to the field is crucial. There are good examples, like that presented by the Philippines and Viet Nam today. Another example is the SAWBO training videos. Science-based regulatory environments and regional harmonization are highly valuable and a big opportunity for ASEAN. Keeping agricultural supply chains open in the Covid-19 situation will also be a challenge. And policymakers need to be supported to help enable action (e.g. legal analysis, technical capacity building, operational &amp; process mgmt., guidelines, communications). Responsible and functional regulatory systems are critical to achieving food security, reducing risks, supporting farmers and realizing sustainable livelihoods.</p>
<p><b>7. Panel Discussion</b></p>	<p>Four experts were invited to a Panel session to ask questions from the audience and to provide different perspectives on FAW control. These were:</p> <p><b>Dr Kongming Wu</b> - Head of IPM programme at CAAS, Asian Chair on FAO Global Action (Research/China/FAO Committee Chair). Dr Wu talked about measures in China to address FAW as part of an extensive national research and monitoring programme. He also talked about seasonal migration.</p> <p><b>Chris Dale</b> - Assistant Director, Australian Department of Agriculture, Water and the Environment (Govt./IPPC/Australia). Mr Dale talked about how Australia is now responding to the arrival of FAW. Considerable work is being done to move to the management phase of the pest. Coordinated communication and engagement was an important element of the work.</p> <p><b>Dr Joe Heusing</b> - International FAW expert, independent consultant, experience in Africa leading programme for USAID (Africa/Practitioner). Dr Heusing outlined the importance of engaging with farmers at the field level and explained that the window of opportunity to manage this pest effectively at field-level is narrow. The implementation of training programmes with farmers, however, can be very successful, including helping them to apply different tools. Prioritization of farmer actions is critical. One example was of the</p>

	<p>importance of buying high-quality seed and preparing seedbeds and fertiliser appropriately which is very effective in managing FAW. Safety considerations with the use of pesticides are also essential.</p> <p><b>Dr Srinivas Parimi</b> - Chair of the CL-Asia Insect Resistant Management Committee. (Industry/CLA representative). The private sector has an important role in FAW management, and the industry has worked hard to provide effective, safe, and sustainable products but also agronomic advice for farmers. Education and training have been emphasized with internal and external stakeholders. The industry has leveraged on experience in other parts of the worlds, while still fine-tuning approaches for Asia. The private sector can bring knowledge, partnerships, and help build capacity to bring long-term solutions to combat FAW.</p> <p>Many questions were asked by Plenary participants.</p>
<p><b>8. Presentation:</b> ASEAN Action Plan on FAW</p>	<p>Dr Alison Watson presented on the ASEAN Action Plan on FAW. A pdf copy of the Action Plan can be downloaded.</p>
<p><b>9. Feedback from Stakeholders</b></p>	<p>Stakeholders made interventions of support on the Action Plan, either verbally or by writing, including:</p> <ul style="list-style-type: none"> <li>• Thailand Department of Agriculture</li> <li>• Corteva</li> <li>• IRRI</li> <li>• CIMMYT</li> <li>• JIRCAS</li> <li>• IFPRI</li> <li>• Vietnam National University of Agriculture</li> <li>• CABI</li> <li>• EMBRAPA (Brazil)</li> <li>• Virginia Tech University IPM Lab</li> <li>• Dr Kris Wyckhuys</li> </ul> <p>Comments focused primarily on support for the Action Plan and expressions of interest in working together in the region on helping to manage FAW. Corteva stressed the need to keep all options available, including treated seeds.</p>
<p><b>10. FAO Update</b> Mr Sridhar Dharmapuri, Group Leader of the Agriculture and Food systems team at the FAO Regional Office for the Asia-Pacific in Bangkok.</p>	<p>FAO thanked all organisers of the work, as well as speakers at the Plenary. FAO's response (Global Action) is led at Director-General level through the FAO Global Action on FAW Control. FAO has active projects across Asia, and these are based on improving knowledge, capacity and monitoring of FAW. An enabling environment is important, and FAO aims to help countries build capacity at the national level. Resources will be a challenge in the face of the COVID-19 situation but different ways of providing support, including in-kind support will be important. FAO is committed to partnering and bringing support to the ASEAN Action Plan.</p>

<p><b>11. Summary</b> Grahame Dixie, Executive Director, Grow Asia</p>	<p>Key takeaways from the Plenary were discussed. The opportunity to work together is a real opportunity for the region. There is a strong emphasis on IPM and keeping the balance between biological and chemical approaches and the need for cost-effective, safe, and actionable approaches. It is important to keep a menu of approaches available, e.g. sweet and sour, seed treatment, strong biological options, and natural predators of FAW. Different approaches to communication will be needed to get the messages out to farmers and other stakeholders. The Action Plan is now at a critical stage of raising funding and implementation. The two-pronged budget approach provides a way to approach funding in a Covid-19 world. The Action Plan brings a strong collective approach built on significant input from across a huge range of stakeholders. A community of practice in the region is now establishing itself – a network of stakeholders – that can help combat FAW.</p>
<p><b>12. Close</b></p>	<p>The meeting closed at 12.35</p>

*Grow Asia would like to thank the Ministry of Agriculture and Rural Development Viet Nam, and the ASEAN Secretariat for their leadership and support on the development of the Action Plan. As well, financial support from the Australian Department of Foreign Affairs and Trade, Bayer, Corteva and CP Crop was gratefully received.*

*Acknowledgement is made to the efforts and advice of the members of the Expert Working Group, convened to give advice of the Action Plan, as well as to officials under the ASWGC and EWG-PS.*

*Lastly, we would like to thank those experts who contributed their time and expertise as either a keynote speaker or panellist at the May 2020 Plenary.*

*Thank you.*

## ANNEXE 1: OFFICIAL INTRODUCTION

**Opening Speech by  
Plant Protection Department  
Ministry of Agriculture and Rural Development of Vietnam  
At the Plenary meeting on ASEAN Action Plan on Fall Armyworm (FAW)  
28<sup>th</sup> May 2020**

Mrs Dhaniek (ASEAN Secretariat),

Dr Grahame Dixie, Grow Asia,

Dr Alison Watson, Consultant,

Keynote speakers and distinguished participants,

On behalf of the Ministry of Agriculture and Rural Development of Viet Nam, I would like to extend my warmest welcome to all of you for attending the “First Plenary of the ASEAN Action Plan on Fall Armyworm.”

Fall armyworm is a dangerous transboundary insect with a high potential to spread rapidly due to its natural distribution capacity and opportunities presented by international trade. FAW represents a real threat to food security and livelihoods of millions of smallholder farmers. FAW has spread across all of sub-Saharan Africa, the Near East and Asia.

In Asia, FAW was first detected in India in July 2018 and by 2019, it had spread to many countries such as Sri Lanka, Bangladesh, China, and many of the ASEAN countries. The Ministry of Agriculture and Rural Development of Vietnam (MARD) officially announced the detection of Fall Armyworm (FAW) in April 2019. Since then FAW has spread rapidly throughout the country. It is estimated that over 50,000 hectares of corn has been affected by FAW in about 58 of 63 provinces in Vietnam

FAW damage has resulted in economic loss due to reduced yield and increased costs for insecticides and labour not only in Vietnam but also in many ASEAN and Asia countries. The Vietnamese government is working actively to control the outbreak and minimize the damage.

Although the Fall Armyworm is expected to become endemic in many of the ASEAN countries, experience from Central America demonstrates that the pest can be well managed.

Thus, following the ASEAN Special SOM AMAF in Hue city of Viet Nam, then ASEAN Prep SOM AMAF, the ASEAN Ministers of Agriculture agreed to mobilize regional efforts to tackle the spread of the pest in Southeast Asia. Viet Nam was requested to share experience in FAW control and develop a concept proposal for submission to ASEC. The SOM-AMAF also requested Grow Asia to work with the ASEC.

Over the past few months, MARD and Grow Asia have worked closely with ASEC, and FAO as a technical advisor, along with many public and private partners to develop an ASEAN FAW Action Plan. With this framework, we hope that all ASEAN members will join this regional effort to combat effectively this small but dangerous pest.

Once again, I would like to convey our appreciation for keynote speakers, including Grow Asia, FAO, ASEC and our many partners for your active contribution to developing the project.

Thank you!

**Presented by Dr Nguyen Quy Duong,**  
Vice General Director Plant Protection Division,  
Ministry of Agriculture and Rural Development, Viet Nam



## **ANNEXE 2: SELECTED QUESTIONS FROM THE PARTICIPANTS AT THE FIRST PLENARY OF THE ASEAN ACTION PLAN ON FALL ARMYWORM**

Over 100 questions and comments were received at the Plenary. A selection of written questions received from participants in the Plenary is therefore provided here, along with responses from speakers and experts who presented in the session. We would like to thank those speakers and experts for the additional time they have taken to provide these responses.

### **Questions and Answers with Dr Paul C. Jepson from the University of Oregon**



***Q1. Metarhizium and Beauveria fungal sprays have been around a long time. Adoption has been low. Efficacy is about fifty per cent. Are they an effective management strategy? What is your view on this?***

There are other bio-pesticides that seem to be more effective, but research on entomopathogenic fungi is needed to develop the most effective application methods, and use cases (i.e. crop growth stage, population pressure, FAW age structure etc). We also need far higher standards for the quality of evidence that we accept, and also the need for independent verification and field testing among farmers. I suspect that they will have an important place in FAW IPM among trained farmers, as long as formulations are affordable.

***Q2. Our experience in my country is there is a competition between the government effort and the pesticide industry. The industry has more resources for advertising their products while the government has limited resources. Is it possible therefore to agree on a common goal regarding pesticide use on FAW?***

Determining the most trusted sources locally is very important, and this will vary. Government and extension services can be helpful in publishing lists of registered low-risk products that have been found to be effective in farm use, and also available and affordable.

***Q3. Since chemical pesticides is a barrier to IPM, how do we best remove them from being used - since this is a very big industry with a very big influence?***

Broad-spectrum and highly toxic materials are barriers to IPM adoption and help to create dependency on pesticide use. But more selective and less toxic materials are more effective against fall armyworm, and also have a place in IPM programs that also include preventative methods and biological sources of pest suppression. Demonstration plots are very helpful in illustrating this, and if we include pesticide importers and salespersons in the group that we educate, there is a chance to establish a marketplace for less toxic materials - but this does require agreement and a coherent process at all levels.

***Q4. Dr Phong/PPD MARD proposes the use of insecticide seed treatment. Is there any risk that the use of pesticides at the time of planting kills off natural enemies, makes the crop more susceptible to pest attack and thereby interferes with IPM?***



There is very little evidence that seed treatments limit natural enemies, although it is possible to imagine pathways for them to be exposed. There is concern that industry is marketing formulations that are used against other pests that incorporate neonicotinoids (e.g. thiamethoxam) that are not known to be effective against FAW, and it is very important to address that problem. It is also important to use other modes of action in foliar sprays because widespread use of seed treatments can greatly amplify selection pressure for resistance.

***Q5. How to help in the regulation of biopesticides? (Sometimes it seems easier to bring new chemistries to a country, but that's not necessarily the case for biopesticides)***

First and foremost, they need to be effective, and good candidates for registration. But regulatory procedures do need to be addressed also, and USDA APHIS and USDA FAS have worked on procedures for biopesticide registration that may be helpful. The cost has been a major factor also.

***Q6. How do you apply Pheromone traps for FAW in Kenya and other places?***

Pheromone traps are used in monitoring, and it is important to service networks of traps and report findings quickly - trap density does not need to be high. I know USAID is coming up with a FAW manual for Asia that will include updated recommendations - use this site to see updates: <https://www.agrilinks.org/post/feed-future-tools-combat-fall-armyworm-africa>

***Q7. Considering the bioecology of FAW how can you include many smallholders farmers into an area-wide management plan? Any examples in Africa?***

Limited examples for true area wide IPM in Africa where contiguous populations of farmers employ similar IPM tactics and gradually expand zones of low pest population pressure. Mating disruption in cotton worked for a period, and I'm sure there are others I don't know about. There are many examples of government extension services catalyzing responses to plague and invasive pests. However, the increased coordination of monitoring and reporting, and maintenance of village networks of first responders, offers some hope.

***Q8. Is there a risk of our focusing too much on the management of FAW in corn and not enough on IPM of other pests in corn?***

Yes, and it is really important to place FAW in a wider maize IPM context - this is what farmers should expect us to do and it maximizes the opportunity for sustainable production and limited impact on food security. See our work in Malawi that documented management of pests, diseases and weeds: [https://www.agrilinks.org/sites/default/files/faw\\_malawi\\_ipm\\_strategy\\_072019\\_snglpg.pdf](https://www.agrilinks.org/sites/default/files/faw_malawi_ipm_strategy_072019_snglpg.pdf)

***Q9. Is pesticide registration a barrier for uptake of biocontrol (e.g. biocontrol agents) in Malawi?***

I don't think we have many options for importing and releasing biocontrol agents at present, and our priority is conservation and enhancement of local natural enemy populations. Broad-spectrum pesticides like pyrethroids, organophosphates and carbamates are often more harmful to natural enemies than they are to pests and pest populations often increase when they are used because natural enemy populations can take weeks/months to recover after spraying. Replacement of these pesticides with lower risk, more IPM compatible materials is a priority, and slow regulatory procedures

can limit options for farmers, and sustain the use of compounds that have virtually no benefits, and even negative impacts.

**Q10. Can the active ingredients recommendation be used for the basis of control method in other regions or is it only viable for strains in African countries?**

The progressive spread of FAW over such a short time is strongly indicative of a limited genetic diversity of insects that have wide dispersal and host ranges. So, as far as we know at present, before new invasions occur, and before local selection pressures dominate the selection of pest genotypes, then work in Africa where climate and maize varieties are similar at least, should provide an initial basis for crafting a response in Asia.

**Questions and Answers with Dr Bui Xuan Phong from Plant Protection Department, MARD, Viet Nam**



**Q1. Can you elaborate more regarding the control by stage of FAW in Vietnam?**

Most insect species have four stages of development, including: eggs - larvae - nymph - adult. Depending on each species there are different control measures. For example, to control FAW we can take precautions such as use of resistant varieties and seed treatment; for control at egg stage we can use egg parasitoids, or destroy eggs by hand; during the early larval stages we can use larval parasitoids and insect predators, *Bacillus thuringiensis* (Bt) preparations, nuclear polyhedrosis virus - NPVs, and chemical insecticides; At the nymph stage, we know that high level water can be used to kill nymph. In adulthood, FAW pheromone traps and sweet-sour baits (molasses) can be used. The use of control measures combined across the many stages can better help to manage FAW. This means that many options could be suitable, depending on the region and the tools, technology and natural predators available. Many farmers still rely heavily on the use of insecticides, so it is necessary to quickly expand non-chemical methods such as parasitoid release and biological products, molasses baits, and pheromone traps, etc.

**Q2. Did you identify the egg parasitoid species?**

Parasitoid eggs: *Trichogramma sp.*, *Telenomus sp.* Larval parasitoid: *Cotesia sp.*; *Beauveria bassiana*, *Metarhizium anisopliae*. However, the species have not all been identified yet.

**Q3. How serious is the damage caused by FAW in Viet Nam in terms of damage rates and yield loss on average?**

As soon as the FAW was detected, Vietnam immediately guided farmers to control it by using proactive methods, so that the damage was not too serious. Maize area infected was more than 50,000 ha, but it was basically effectively controlled. Some areas that were not sprayed, or sprayed too late, did lose about 30-50% of productivity. FAW is most affected on maize at 3-5 leaves stage. In high density, FAW eat leaves and stems requiring farmers to replant, although this area of maize loss represented only some few hectares.

**Q4. FAW has spread almost all over Vietnam. Is it in Cambodia?**

I do not know the current situation in Cambodia, although I do know FAW is present in Laos. However, Vietnam wants all the ASEAN countries to help and have the necessary support to combat FAW effectively. This is the aim of the ASEAN Action Plan on FAW.

**Q5. When FAW populations are high in the field, is it possible that populations of stem borer will decrease because of the presence of FAW?**

For over the last year, we have the same ecological questions as you have mentioned, for example, the maize stem borers (*Mythimna loreyi*) were present before FAW arrived, but since the FAW has invaded they have hardly been found. However, we have not answered this question yet. We hope to find the answer during this project.

**Q6. What are PPD recommendations for Vietnam farmers to manage FAW?**

PPD recommends the use of a comprehensive menu of prevention measures that can be applied using IPM. Committee and plant protection officers at local level, along with agricultural extension workers, help guide farmers to choose appropriate measures across each life-cycle stage of the FAW (see Q1).

**Q7. There appear to be a few provinces in Vietnam that are not affected by FAW currently, why is that?**

Some provinces do not grow maize or only grow in small areas. Although, where there is maize there is FAW, the difference is only more or less!

**Q8. Pyrethroid sensitive change has been confirmed - Why is there still so many pyrethroid products in the recommendation list?**

In some slides of my presentation I showed active ingredients in seed treatment and in baits, these use small amounts only and with no direct impact to natural enemies.

**Q9. Vietnam has been very active in managing FAW, what are your views on supporting new technologies like seed treatment that are successfully registered and working in other countries and regions?**

Vietnam has strongly supported enterprises to register for seed treatment pesticide to prevent FAW in Vietnam. From a technical point of view, seed treatment should be applied in places where many FAW infestation is high. The seed companies should treat seed before it is sold to help the reduce price.

**Q10. Do we have a comprehensive understanding of the range of natural enemies (parasitoids, predators, entomopathogens) in ASEAN region?**

At this point, we are only at the beginning of developing our understanding on natural enemies. We envision this as being a key project in the future.

## Questions and Answers with Dr Jedeliza Ferrater from East-West Seed Philippines



**Q1. Do I understand correctly, does a private sector seed company (e.g. EW Seed) establish and maintain a network of corn learning centers? Staffing? Cost?**

Yes. We established our own Corn Learning Centers (13 CLCs Philippine-wide before the lockdown) through our Marketing and Sales department. This includes funding costs and staffing.

**Q2. What are the natural enemies of FAW identified so far? Do we need to know them to screen pesticides that are safe for them?**

I have not conducted any actual lab tests or field surveys on natural enemies of FAW as I have focused on awareness campaigns. However, the National Crop Protection Center at the University of the Philippines Los Banos has on-going research and pesticide assays. You may find this webinar by NCPC's Scientist Mario Navasero helpful, <https://www.youtube.com/watch?v=I5AYE4m0XZY&feature=youtu.be>

**Q3. How about other predators, such as stink bugs to control FAW?**

I have no knowledge and experience on stink bugs on FAW. The National Crop Protection Center can best answer your question. This webinar by Scientist Mario Navasero might also be helpful: <https://www.youtube.com/watch?v=I5AYE4m0XZY&feature=youtu.be>

**Q4. How specific are earwigs against Fall armyworm? How effectively can they control FAW?**

As a generalist predator, it can feed on any pest that is present on corn. Earwigs can also feed on other insects not just on corn and other larvae of other crops as well. I relied on recommendations from a research institution. Earwigs are one of many IPM approaches that The National Crop Protection Center of the University of the Philippines recommends in the Philippines to which they endorsed to the government (November 2019).

**Q5. How big is the earwig population needed per hectare for effective and efficient control of FAW?**

About 10,000-20,000 earwigs for 1 hectare. For updates on NCPC's research on environment-friendly approaches, please find their webinar here, <https://www.youtube.com/watch?v=I5AYE4m0XZY&feature=youtu.be>

**Q6. How often do you release earwig for one crop season? How many of them per ha?**

From our experience with onion, earwigs can be applied weekly or every 10 days at 10,000 earwigs per hectare.

**Q7. Is there any best practice that is environmentally friendly and cost-effective that can be scaled up in the ASEAN region?**

Best practice consists of many different components (not just 1) from the IPM pyramid (neem, natural enemies and entomopathogenic fungi/nematodes) if we focused on environment-friendly approach. Please find some environment-friendly approaches here by NCPC. See: <https://www.youtube.com/watch?v=I5AY E4m0XZY&feature=youtu.be>

**Q8. It was said that FAW has 2 different strains? Will this also make a difference in IPM implementation?**

Yes, FAW has rice and corn strains but not morphologically different and can only be verified by molecular analysis. These strains can also interbreed according to some researchers. So, I do not think that we will customize our IPM implementation using the strains as a basis.

**Q9. What are tricho cards – can you share how they work to control FAW? Also, where can they be purchased?**

Tricho cards are Trichogramma on cards. These are hung out in the field. When the eggs hatch and become adult Trichogramma, they parasitize eggs of FAW. I ask for these tricho cards for free from the Department of Agriculture office (limited supply though). Some private Biocon companies are also manufacturing these, but I have not contacted any of them yet.

**Q10. What do you know about egg parasitoids like Telenomus remus for control of FAW?**

My reference is the studies of the National Crop Protection Center which you can find here including Telenomus, see <https://www.youtube.com/watch?v=I5AY E4m0XZY&feature=youtu.be>

**Q11. What's the field situation now in terms of FAW damage in the Phil's? FAW is spreading to major corn-growing areas.**

Several provinces from north to south are already significantly affected by FAW.

**Q12. How is GM corn helping in managing FAW in the Philippines?**

So far, I am only dealing with sweet corn and waxy corn, so I have no first-hand experience on how effective the GM corn on FAW is in the Philippines.

**Q13. Do any of the speakers have experience on the impacts of intercropping, hedge cropping and weeding on the degree of damage seen?**

For intercropping and hedge cropping, I have not done any impact assessments. We open this possibility to the farmers, but some are not yet comfortable devoting some portion of their land to other crops. For weeding, we recommend to our farmers to avoid alternate hosts of FAW.

**Q14. Have anyone looked into the trend or effect of FAW population related to weather?**

Not yet but we have the Pessi's weather stations in placed on some areas, we can look into this in the future.

**Q15. The Philippines has many times observed new pest presence after a typhoon, is there a possibility that a new batch of FAW will re-invade the country after such events?**

*Spodoptera* moths are known to be carried by the wind even at a low jet stream. So, this is a possibility. But what is more important is our readiness when they arrived.

**Questions and Answers with Dr Rob Bertram from USAID, and Dr Joe Heusing, Independent Consultant**



**Q1. Is there a sense of how FAW might behave in more heterogeneous cropping systems in contrast to corn monocultures?**

FAW can feed on over 80 different crops but causes economic damage in just a few. The FAW strain introduced into Africa appears to be the 'maize strain' and causes economic damage on maize and sorghum -- those are the crops preferentially targeted. There is some evidence to support less damage in intercropped systems usually maize planted with a legume. Some researchers like the push-pull system but many practitioners question the utility and efficacy of that system -- it's complicated to implement but if a farmer wants to try to use it that's their decision. It's probably a safe assumption to state that the more diverse a system the greater the opportunity for less crop damage -- but managing the complexity can be an issue. How diverse you make the system as a function of the economics of farming is always the challenge.

**Q2. Do we have enough digital tools to assess FAW damage at different crop stages of corn? If not, what are the potential options?**



Yes. we have more than enough digital tools for this task. However, there may be a need to make these available in different languages. There is also the issue of content as mentioned below.

**Q3. Is there anybody in the panel who has already a protocol on how to manage FAW in sugarcane as well as how to assess for the damage?**

Yes. In general, we have not seen a lot of damage in sugarcane but there are protocols. The Australians would be a good source: <https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/crop-growing/fall-armyworm/impacts/sugarcane>

In addition, EMBRAPA and Dr Gregg Nuessly at the University of Florida can give advice.

**Q4. *Metarhizium and Beauveria fungal sprays have been around a long time. Adoption has been low. Efficacy is about fifty per cent. Are they really an effective management strategy?***

No, not really. It's always an issue of cost, efficacy and safety. I don't know of many farmers that would spend the money and labor for material that is 50% effective. Even biocontrol agents with 90% efficacy are not worth the cost in most practitioners opinions.

**Q5. *Considering the bioecology of FAW, how can you best include many smallholders, farmers, into an area-wide management plan? Were there any examples in Africa on this that USAID was involved in that illustrate this?***

As a general rule, FAW is not managed in an area-wide manner. It is managed at the farmer field level. Some technologies, like pheromone-based mating disruption, are a bit larger than field level, e.g., a few hectares, but that probably would not qualify as 'area-wide.' Low-density pheromone monitoring is an area-wide tool but that doesn't usually involve farmers.

**Q6. *Based on USAID experience, how did partnering with agrochemical company help in tackling the issue of FAW? Did they have buy-in on the business case?***

Every step of the way the private sector was leading with solutions. This is not surprising given the global value of maize and the fact that the private sector has been providing FAW control options for more than 100 years. Where USAID added immense value was i) advocating for an evidence-based approach to evaluating solutions and ii) in training farmers and extension in the proper assessment of damage and use of those control options.

**Q7. *Can we also add the lack of multi-stakeholder partnerships to address the challenges? Because most of the time, you see individual action rather than collective actions. The same thing with farmers community, you see one farmer practising IPM, yet his surrounding farms are still doing the "business as usual"/conventional/pesticide-intensive practice. What do you think is the best approach to encourage collective action - not just collective talk?***

Joe: That is the nature of farmers. In my experience, particularly with low resource farmers, the overwhelming issue is that the farmers do not know fundamental Good Agricultural Practices or IPM. The challenge is one of education. Secondly, the amount of misinformation being driven by large well-intentioned, but misguided, organizations is staggering. How farmers can figure out what is the truth or not is a grand burden for them and their ministries.

Rob: USAID and CIMMYT placed a lot of emphasis in 2017 and 2018 on alignment between partners. The vision was to align to a "common protocol" for FAW management with the belief that a) alignment allows leverage across multiple partners of investments/knowledge which is critical given vast geographies and b) farmers and agricultural sector actors that support them were looking for the emergence of consistent messages and best practices on managing the pest. Given the panic related to the pest's rapid emergence and voracious appetite, clear, simple messages, reinforced by many voices is necessary to cut through the confusion and alarm.

There are a few components necessary to achieve increased collaboration - shared principles (e.g. science-based evidence to guide recommendations), relationships built upon trust, and agreement on shared outcomes each institution will contribute to. In terms of the latter, we each have core equities



or biases. Some institutions will only consider biological approaches; a private company is interested in sales of their product; governments often have cultural values that guide what they will consider. Unless stakeholders agree on a specific objective that they will commit to measure and then advance as part of a coordinated effort, which is a lot of work, people will end of talking at each other and, when they go back to their offices, they implement the plan and approach they are comfortable with.

**Q8. Is there a simple correlation between the number of plants attacked at one stage of crop growth and the impact on yield?**

There is not really a simple answer. We do have solid guidance on p. 25 of the [FAW IPM Guide](#) for action thresholds for FAW infestation. Please note that these are being currently revised. We originally recommended that smallholders not treat beyond the tassel stage because they didn't really have many options to do so safely. They now have options so control options will be available for all stages. The action thresholds are supported by expert opinion as well as data derived from controlled insecticide and variety trials.

### Questions and Answers with Dr Srinivas Parimi from CropLife Asia and Bayer



**Q1. Our experience in my country is there is a competition between the government effort and the pesticide industry. The industry has more resources for advertising their products while the government has limited resources. Is it possible to agree on a common goal regarding pesticide use on FAW?**

Use of pesticides as part of an IPM model are powerful tools to keep the FAW populations under check. Although I don't understand about the competition in your country, I believe no pesticide can be registered without governments approval.

**Q2. We recognize the potential risks to natural enemies and the environment of toxic pyrethroids and organophosphates, but our farmers still use them. I think there is an established strong bond between farmers and the pesticide stores/salesmen. What can you say about this?**

The industry has been working hard to provide solutions that are effective on FAW. The use of pyrethroids or organophosphates could be due to the knowledge among farmers about them. Key point is that education and awareness including on the correct use of insecticides is critical. Responsible use can be achieved through strong communication plans. If a farmer is well informed, he would not depend on stores/salesman.

**Q3. Since chemical pesticides is a barrier to IPM, how do we best remove them from being used - since this is a very big industry with a very big influence?**

All tools that help in managing pest populations at general equilibrium levels form part of a robust IPM program. We do not need to ban safe, useful and effective pesticides but educate people on responsible use. This again goes back to farmer education.

**Q4. Dr Phong/PPD MARD proposes the use of insecticide seed treatment. Is there any risk that the use of pesticides at the time of planting kills off natural enemies, makes the crop more susceptible to pest attack and thereby interferes with IPM?**



Seed treatments are one of the safest ways of pesticide delivery as the pesticide is on the seed and in soil. The seed solution mentioned fall under low-risk chemicals according to Jepson et al. Also, natural enemy activity is generally highest when the plant grows, and pest attack is seen. I am sorry but the crop is susceptible to FAW, whether there is a natural enemy or not - unless an effective Bt Corn product which can manage FAW has been used.

***Q5. In current lockdown situation due to COVID-19 pandemic what will be the best option to recommend for a farmer to adopt for FAW management, particularly if there is not easy access to recommended agriproducts including pesticides currently?***

Excellent question. There is very little a farmer can do in these situations. The 0-45 days period of crop growth is critical for managing FAW. Bringing in crop diversity where crops unsuitable or that attract FAW like a trap crop can be planted. Pesticides are likely the best solution until FAW populations reach general equilibrium levels.