Fertilizer Sector Improvement (FSI+)

FALL ARMYWORM ACTIVITY

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Acronyms and Abbreviations

AI	Active Ingredient
AOR	Agreement Officer Representative
BFS	Bureau for Food Security
Bt	Bacillus thuringiensis
cc	cubic centimeter
COP	Chief of Project
DOA	Department of Agriculture
FAW	Fall Armyworm
FSI	Fertilizer Sector Improvement
g	gram
GAP	Good Agricultural Practice
ha	hectare
IFDC	International Fertilizer Development Center
kg	kilogram
m	meter
MMK	Myanmar Kyat
MOALI	Ministry of Agriculture, Livestock and Irrigation
MRTV	Myanmar Radio and Television
NGO	Non-Governmental Organization
PERSUAP	Pesticide Evaluation Report and Safer Use Action Plan
PPD	Plant Protection Division
PPE	Personal Protective Equipment
SUAP	Safe Use Action Plan
TOT	Training of Trainers
UDP	Urea Deep Placement
USAID	United States Agency for International Development

Fall Armyworm Activity



Summary

The United States Agency for International Development (USAID) requested that the Fertilizer Sector Improvement (FSI+) project provide extension services in the FSI+ regions affected by fall armyworm (FAW). USAID and the chief of party (COP) of the FSI+ project agreed to implement the FAW activity as an extension of the project, which originally concluded in August 2019. The extension team began preparing a training manual, poster, and pamphlets on May 14, 2019, based on a training manual of the International Fertilizer Development Center (IFDC) in Bangladesh. The team then liaised with the Plant Protection Division (PPD) of the Ministry of Agriculture, Livestock and Irrigation (MOALI) to ensure consistent delivery of technical information.

FAW retailer trainings were conducted in Pindaya, Aung Ban, Nyaung Shwe, and Taunggyi townships of **southern Shan State** at the end of May 2019. Twelve demonstration field schools were selected in six townships with active input retailers who were willing to lead. In June 2019, establishment of the demonstration field schools began, and by August 2019, one-time farmer trainings and five scoutings were performed. Sample plot harvesting of the demonstration field schools and random farmers' crop cuts were completed during October 2019.

The second edition of a training manual was produced during September 2019, and retailer training began in the **Delta Region** at Maubin, Zalun, and Letpadan townships. During October 2019, six demonstration field schools were established and scouting continued in five townships. Scouting was handed over to lead retailers and the Department of Agriculture (DOA) of each township and continued until the conclusion of the FSI+ extension activity at the end of November 2019.

Introduction

During the 2018-19 dry season, a new armyworm species, *Spodoptera frugiperda* (J.E. Smith) (Lepidoptera: Noctuidae), was detected on maize fields in Myin Chan Township (Mandalay Region); Nay Pyi Taw and Tat Kone townships (Nay Pyi Taw Region); and Nyaung-don, Zalun, and Hinthada townships (Ayeyarwady Region). At that time, the FSI+ extension team was overseeing retailer-led farmer trainings and demonstration plots for balanced nutrient management and urea deep placement (UDP) in Yangon, Bago, and Ayeyarwady regions. The extension team had already observed and reported FAW infestation on maize to the FSI+ COP, who then reported it to USAID.

The PPD decided to treat FAW for the long term by applying various techniques to keep the pest population under the economic threshold level, since experts noted that FAW can never be eradicated. Farmers must learn to manage it, as in North and South America and Africa. FAW infestation need not be crippling; while an incidence may look bad, the maize plant can compensate for significant foliar damage so that yield is not affected. Farmers must learn to minimize the impact on yield. This can be done by using best management practices and balanced application of fertilizer (without overapplying nitrogen), building natural enemies of FAW, and spraying insecticide only when the infestation is over the action threshold (which can be very high). Some reports indicate that an infestation of less than 25% of plants will have no impact on yield. However, a population explosion can be disastrous. Thus, farmers must be vigilant and continually scout for FAW.

Initial Activity

FSI+ responded to a request for action regarding **Fall Armyworm**, which was predicted to infest the maize crop in the coming season. A meeting was held with USAID and Impact Terra on May 10, 2019. At the same time, the extension team prepared a training manual and materials as well as posters and pamphlets.

On May 16, 2019, a meeting was held with Daw Ni Ni Hain, Senior Researcher (Bio Control), PPD, to discuss a workplan and messaging. The pamphlets, poster, and training manual were reviewed in detail and approved.

U Aung Kyaw Oo, Director, PPD, authorized placement of the PPD logo on FSI+ FAW Activity training materials.

A training of trainers (TOT) workshop was held on Wednesday, May 22, 2019; representatives from PPD, FSI+ project, Impact Terra, Awba, and BASF attended.

FAW Retailer Training in Southern Shan State

The FSI+ team met with the State Manager and the responsible staff member of the PPD, DOA, southern Shan State, on May 28, 2019. The explanation that was sent in advance from IFDC was discussed. Their extension staff were invited to attend the FSI+ FAW retailer training.

FAW retailer training then began in southern Shan State. Details are provided in the following table.

				Attendance					
Sr	Date	Location	FSI+	Impact Terra	BASF	Borderless	DOA	Total	
1	5/29/19	Taunggyi	16 (4+12)	1 (1+0)			17 (3+14)	34	
2	5/29/19	Aung Ban	24 (16+8)	5 (5+0)	1 (1+0)		10 (1+9)	40	
3	5/31/19	Nyaung Shwe	16 (10+6)			2 (2+0)	15 (2+13)	33	
4	5/31/19	Pindaya	28 (21+7)				15 (8+7)	43	
		Combined						150	

Numbers in parentheses are male + female.

Two staff members from Awba, two from Impact Terra, and six from BASF, as well as Daw Ni Ni Htain, Assistant Director, PPD, participated in the trainings.

Myanmar Radio and Television (MRTV) recorded the training in Taunggyi and then made a field trip to capture footage for broadcasts.

A discussion was held with attending retailers about establishing demonstration field schools in widespread maize areas as well as about farmer training. The demonstration field schools are designed to offer a practical learning experience for retailers and farmers. Demonstration field school procedures were explained as follows:

- Retailers select a suitable location for the demonstration field school.
- The crop is established with hybrid seed using good agricultural practices (GAPs) for maize.
- Balanced fertilizer, with urea as UDP, is applied.
- Scouting begins one week after emergence and is repeated each week until the crop is shoulder high:
 - Retailers and farmers gather together.
 - Video is shown.
 - Scouting record sheets are distributed.
 - Each farmer scouts individually.
 - Results are compared.
 - Action threshold is discussed.
 - A course of action is determined.

- The demonstration farmer applies the treatment using personal protective equipment (PPE).
- A crop cut is taken at harvest in this field and an adjacent "farmer practice field."

A. Retailer-Led Farmer Training

Active retailers invited their customers to attend their farmer training and shared knowledge about the FAW life cycle, scouting method, and recommended pesticides.

		Lead		
Sr	Retailer	Shop Name	Township	Village
1	Daw Mar Lar Myint	Hein Htet	Lawksawk	Inn Taw
2	U Maung Maung	Khit Thit	Lawksawk	Htee Kham
3	U Hla Myo Zaw	Village shop	Lawksawk	Taw Yar
4	U Nay Lin	Ko Nay Lin	Pindaya	Hlay Htoe Kone
5	U Nay Lin	Ko Nay Lin	Pindaya	Hpaung Pyar
6	U Aye Thein	Pyae Phyo Thar	Ywar Ngan	Nyaung Kone
7	Daw Nyo Nyo Htwe	Mi Ba Myit Tar	Taunggyi	Taung Ni
8	U Thein Han	Ko Thein Han + Ma Me O	Nyaung Shwe	Sam Kar
9	Daw Nan Ma Aye	Village shop	Hsihseng	Sike Khaung
10	Khun Win Min Thein	Win Min Thein	Hsihseng	Pong Long
11	U Zin Min Oo	Naung Mon	Hsihseng	Pan Gan
12	Daw Nan Sai Hmwe	Daw Nan Sai Hmwe	Moenai	Hsun Mayun

The following 11 retailers led demonstration field schools in seven townships.

Twelve retailer-led farmer trainings were conducted in seven townships.

			Training	A	Attendance	;
Sr	Township	Village	Date	Male	Female	Total
1	Lawksawk	Inn Taw	6/13/19	9	12	21
2	Lawksawk	Htee Kham	6/14/19	31	9	40
3	Lawksawk	Taw Yar	6/13/19	18	4	22
4	Pindaya	Hlay Htoe Kone	6/14/19	26	2	28
5	Pindaya	Hpaung Pyar	6/13/19	15	0	15
6	Ywar Ngan	Nyaung Kone	6/16/19	15	0	15
7	Taunggyi	Taung Ni	6/15/19	13	2	15
8	Nyaung Shwe	Sam Kar	6/16/19	14	1	15
9	Hsihseng	Sike Khaung	6/13/19	6	9	15
10	Hsihseng	Pong Long	6/14/19	15	0	15
11	Hsihseng	Pan Gan	6/26/19	11	9	20
12	Moenai	Hsun Mayun	6/15/19	5	5	10

Farmer trainings were attended by 178 male farmers and 53 female farmers, totaling 231 trained farmers.

B. Establishment of Demonstration Field Schools

Objective:

Demonstration field schools led by retailers were established to demonstrate systematic scouting, action thresholds, and decision-making for control of fall armyworm in maize.

Methods:

- 1. Good agriculture practices on maize.
- 2. Scouting, action thresholds, and decision-making for control of fall armyworm.
- 3. Toxicity and hazards associated with the recommended treatment.
- 4. Safe use for application of recommended pesticides.
- 5. Proven balanced fertilizer application on maize.
- 6. Encouragement to repeat the lessons learned in their own field.

In each demonstration plot, basal fertilizer of triple superphosphate (50 kg/acre), potash (25 kg/acre), and gypsum (10 kg/acre) was applied. Hybrid seed was used with spacing at 30 inches * 10 inches. At 25 days after sowing, UDP was applied with urea briquettes at 58 kg/acre rate.

Retailers selected suitable locations for demonstration field schools. Twelve demonstration field schools were established; 10 demonstration plots could be harvested.

C. Regular Scouting

Scouting in demonstration field schools began seven to 10 days after germination. Retailers and interested farmers attended field visits for scouting. Scouting information was recorded five times until the two-month growth stage. At every scouting, farmers who attended were educated about the life cycle of FAW, symptoms of FAW infestation, recommended pesticide, and safe use of pesticide. All farmers then participated in weekly scouting (using a W-type pattern), recorded scouting results, and decided whether pesticide use was appropriate. Farmers received a FAW pamphlet and poster. A list of recommended pesticides to apply was delivered to retailer shops.

See data on demonstration field schools, weekly attendance, and percentage of FAW infestation in southern Shan State in Attachment 1.

Scouting Attendance, Results, and Pesticide Application D.

1. Inntaw Town, Lawksawk Township

		Infestation	Pesticide	Attendance		е
Scouting	Date	(%)	Application	Male	Female	Total
1 st scouting	6/25/19	23.75	(Hnet Kyee Taung)	8	7	15
			Indoxacarb+ Emamectin			
			benzoate			
2 nd scouting	7/6/19	22		10	6	16
3 rd scouting	7/17/19	24	(Hnet Kyee Taung)	2	8	10
			Indoxacarb+ Emamectin			
			benzoate			
4 th scouting	7/27/19	7.14	None	7	18	25
5 th scouting	8/9/19	12.83	None	9	8	19

Scouting Dates and Attendance

On July 27, 2019, the Inntaw demonstration plot had controlled the FAW infestation.

2. Htee Khan Village, Lawksawk Township

0

couting Dates and Attendance										
	Infestation Pesticide		Attendanc							
Date	(%)	Application	Male	Female						
6/26/19	0	None	14	5						
7/7/19	32	Alarm (Emamectin	13	3						
7/18/19	22	benzoate+	16	5						
		Lambda-cyhalothrin)								
7/30/19	7.12	None	21	3						
	Date 6/26/19 7/7/19 7/18/19 7/30/19	Infestation Date (%) 6/26/19 0 7/7/19 32 7/18/19 22 7/30/19 7.12	tes and AttendanceInfestationPesticide ApplicationDate(%)Application6/26/190None7/7/1932Alarm (Emamectin7/18/1922benzoate+ Lambda-cyhalothrin)7/30/197.12None	tes and AttendanceInfestation (%)Pesticide ApplicationA Male6/26/190None147/7/1932Alarm (Emamectin benzoate+ Lambda-cyhalothrin)137/30/197.12None21						

None

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8/10/19

On July 30, 2019, this plot was the best of the 11 plots. The FAW infestation was controlled, and the plants were tall and strong.

5th scouting

lance

0

15

24

15

3. Taw Yar Village, Lawksawk Township

		Infestation	Pesticide	Attendance		e
Scouting	Date	(%)	Application	Male	Female	Total
1 st scouting	6/26/19	38	(Byter Kaung San) Bacillus	11	0	11
2 nd scouting	7/6/19	32	thuringiensis 120 g/acre	8	2	10
3 rd scouting	7/19/19	40	(Program) Emamectin	7	0	7
			benzoate 140 cc/acre +			
			(Tiger Aid) Chlorpyrifos			
			140 cc/acre			
4 th scouting	7/29/19	0	None	11	0	11
5 th scouting	8/8/19	12.9	None	11	0	11

Scouting Dates and Attendance

FAW was controlled in this plot, but plant growth was not equal due to the low amount of rainfall.

The decision was made not to apply pesticide due to zero infestation at the fourth scouting. Infestation had increased to 12.9% at the fifth scouting but was within the standard threshold (40%).

4. Taung Ni Village, Taunggyi Township

Scouting Dates and Attendance

		Infestation	Pesticide	Attendance		е
Scouting	Date	(%)	Application	Male	Female	Total
1 st scouting	7/30/19	22	Hnet Kyee Taung	11	3	14
2 nd scouting	8/10/19	6	None	7	0	7

This plot was sowed late on July 9, 2019, and fertilizer application was not completed yet due to the lack of rainfall.

5. Hpaung Pyar Village, Pindaya Township

		Infestation	Pesticide	Attendance		е
Scouting	Date	(%)	Application	Male	Female	Total
1 st scouting	6/25/19	52	(Byter Kaung San) Bacillus	14	0	14
			thuringiensis 120 g/acre			
2 nd scouting	7/6/19	7.4	None	12	0	12
3 rd scouting	7/19/19	22.23	None	11	8	19
4 th scouting	7/29/19	14.3	None	11	0	11
5 th scouting	8/8/19	32	None	10	4	14

Scouting Dates and Attendance

This is the second best plot of the 11 demonstration plots. Plants were tall and strong, and the FAW infestation was controlled.

At the fourth scouting, infestation was only 14.3% (threshold is 40%), so no pesticide was applied. Infestation rose to 32% at the fifth scouting (still below the threshold but increased infestation). Plants were not suitable for pesticide application.

6. Hlay Htoe Kone Village, Pindaya

		Infestation	Pesticide	Attendance		е
Scouting	Date	(%)	Application	Male	Female	Total
1 st scouting	6/27/19	17.33	(Byter Kaung San) Bacillus thuringiensis 140 g/acre	15	0	15
2 nd scouting	7/7/19	10.6	None	12	0	12
3 rd scouting	7/18/19	47.6	Armo Cycrophos and Acephate were applied although these were not FSI+-recommended pesticides	11	0	11
4 th scouting	7/28/19	43.5	(Byter Kaung San) Bacillus thuringiensis 140 g/acre	11	0	11
5 th scouting	8/7/19	1.2		10	0	10

Scouting Dates and Attendance

This plot did not receive enough rainfall, and no pesticide was applied after the third and fourth scoutings. Thus, the percentage of infestation became high. However, with Bacillus application after the fourth scouting, the result was very good at the fifth scouting.

7. Nyaung Kone Village, Ywar Ngan Township

		Infestation	Pesticide	A	ttendanc	е
Scouting	Date	(%)	Application	Male	Female	Total
1 st scouting	6/28/19	5	None	10	0	10
2 nd scouting	7/8/19	20.16	(Byter Kaung San) Bacillus	11	1	12
			thuringiensis 120 g/acre			
3 rd scouting	7/20/19	40	(Byter Kaung San) Bacillus	9	1	10
4 th scouting	7/28/19	16	thuringiensis 120 g/acre	15	0	15
5 th scouting	8/7/19	6.8		10	0	10

Scouting Dates and Attendance

With scouting, FAW was controlled in this plot. The plot was in good condition. The demonstration farmer only applied Bacillus twice.

8. Hsig Khaung Village, Hsihseng Township

Scouting Dates and Attendance

		Infestation	Pesticide	Attendance		e
Scouting	Date	(%)	Application	Male	Female	Total
Training	6/13/19			6	9	15
1 st Scouting	6/25/19	87	Alarm 15 WP	8	7	15
2 nd Scouting	7/6/19	33	None	13	4	17
3 rd Scouting	7/17/19	84	Alarm	7	7	14
4 th Scouting	7/27/19	55	Profix (Prophenofos)	4	6	10
5 th Scouting	8/7/19	4		4	6	10

The only recommended pesticide that the demonstration farmer could find in his area was Alarm. He applied Profix (not recommended) as a rotation application. FAW infestation was controlled by the fifth scouting.

9. Pong Long Village, Hsihseng Township

Scouting Dates and Attendance

		Infestation	Pesticide	A	ttendance	•
Scouting	Date	(%)	Application	Male	Female	Total
Training	6/14/19			15	0	15
1 st Scouting	6/28/19	1	None	10	0	10
2 nd Scouting	7/7/19	34	None	6	4	10
3 rd Scouting	7/19/19	40	Alarm 15 WP	8	0	8
4 th Scouting	7/29/19	18	None	7	5	12
5 th scouting	8/9/19	8	Ongoing	14	0	14

10. Pan Gan Village, Hsihseng Township

		Infestation	Pesticide	Attendance		e
Scouting	Date	(%)	Application	Male	Female	Total
Training	6/26/19			11	9	20
1 st Scouting	7/9/19	6	None	6	3	9
2 nd Scouting	7/19/19	20	None	5	7	12
3 rd Scouting	7/30/19	15	None	6	4	10
4 th Scouting	8/9/19	20	None	3	9	12

Scouting Dates and Attendance

11. Sun Marum Village, Mongnai Township

		Infestation	Pesticide	Attendance		e
Scouting	Date	(%)	Application	Male	Female	Total
Training	6/15/19			5	5	10
1 st Scouting	6/27/19	10	None	3	11	14
2 nd Scouting	7/8/19	34	None	4	9	13
3 rd Scouting	7/18/19	34	Revo 505	4	9	13
4 th Scouting	7/27/19	46	Revo 505	1	9	10
5 th Scouting	8/8/19	28	None	2	10	12

Scouting Dates and Attendance

This demonstration farmer did not purchase additional pesticide for FAW because her retailer does not sell pesticide. She applied Revo 505 that she had on hand for her pea plots. The active ingredients of Revo 505 are Chlorpyrifos 50% + Cypermethrin 5%.

E. Harvesting Demonstration Plots at Demonstration Field Schools

Harvesting of demonstration plots was completed during October 18-28, 2019.

Harvesting was done at **10 demonstration field schools** in Lawksawk, Pindaya, Ywar Ngan, Hsihseng, and Mongnai townships. The demonstration field school in Sam Kar Village, Nyaung Shwe Township, was discontinued in July 2019, since it only germinated 50% due to the drought in Nyaung Shwe Township. A similar circumstances occurred in Taung Ni Village, Taunggyi Township; fertilizer application was not completed, since there was insufficient rainfall until three weeks after sowing. Samples of the demonstration plots were harvested to compare with neighboring plots. These plots were in the same location but different fertilizers and pesticides were applied. The same good agriculture practices and systematic scouting method were practiced in the demo plots.

Township	Village	Variety	Field Type	kg/plot (6 m x 10 m)	(viss/acre	Yield (tons/ha)	Yield Difference (tons/ha)
Lawksawk	Taw Yar	Taw GT 822 Yar	Scouting field	54.77	2,258	9.13	1.39
			Neighboring field	46.41	1,914	7.74	
Pindaya Hpaur Pyar	Hpaung Pyar	Hpaung GT 822 Pyar	Scouting field	53.20	2,193	8.87	1.14
			Neighboring field	46.36	1,911	7.73	
Ywar Ngan Nya Kon	Nyaung Kone	Nyaung NK 621 Kone	Scouting field	40.16	1,656	6.69	0.22
			Neighboring field	38.79	1,599	6.47	
Hsihseng	Pong Long	NK 625	Scouting field	54.49	2,247	9.08	0.43
			Neighboring field	51.89	2,139	8.65	

The sample yield results from four townships are listed in the following table.

See yield results in Attachment 2.

F. Random Sample Crop Cuts

Sample crop cuts were taken from random farmers' plots -33 from trained farmers and 33 from non-trained farmers - to compare the effectiveness of follow-up education in training, scouting, and systematic pesticide usage.

- Average yield of the 33 trained farmers was 6.799 tons/ha and average yield of the 33 nontrained farmers was 6.003 tons/ha.
- Average yield of the 33 trained farmers was 1,682 viss/acre and average yield of the 33 nontrained farmers was 1,484 viss/acre. The difference in yield was 198 viss/acre, which will bring 59,400 MMK more in profit (at a maize price of 300 MMK/viss).
- Trained farmers can reduce pesticide cost per acre and environmental toxicity.

- According to the crop cut survey, trained farmers mainly applied Bacillus thuringiensis (Bt) (its human toxicity and environmental toxicity rankings are Low). Alarm (Emamectin benzoate 5% + Lambda-cyhalothrin 10%) was also applied. The average pesticide cost per acre was about 12,000 MMK/acre.
- Non-trained farmers applied various pesticides, including Bt, Alarm, Hnet Gyi Taung, Cyclophos, Acephate, Eagle Brand, Poe Min Thar, and Harmony. The average pesticide cost per acre was about 15,000 MMK.
- Trained farmers can save 3,000 MMK/acre in pesticide cost.
- Trained farmers can share FAW knowledge with non-trained farmers and neighboring farmers.
- These results show yields are dependent on FAW knowledge, application of the scouting method, and follow up with the recommended pesticide.

See yield results in Attachment 2.

FAW Activity in the Delta Region (September 2019)

In the 2018-19 dry season, FAW infestation was serious in the Delta Region maize area. The maize area is very large in the dry season, and sowing is performed over an extended period of time, which can range from the last week of September to the beginning of February. There are three types of farmers, including: (1) those who grow maize after flooding recedes; (2) those who rely on irrigation; and (3) those who grow maize after paddy. These are high-risk situations, since they are ideal for FAW reproduction. The DOA cannot limit the farmers' cultivation and can only provide information.

DOA extension staff also faced difficulties last year with FAW management. Farmers applied many pesticides on young plants and then used a drone to apply pesticides as FAW infestation was serious through the plants' adult stage. This is hazardous for humans and the environment. The ratio of one staff overseeing about 50 villages was insufficient to visit all villages. Most farmers also were not able to attend the trainings that DOA conducted during field visits.

Retailers already knew about FAW due to the 2018-19 dry season experience and were willing to transfer FAW management information to their customers. They needed TOT training and guidance from IFDC.

FAW training for retailers and customers is forward-thinking for advance protection and will reduce the environmental risks. FAW retailer training and demonstration field schools continued in the Delta Region in September 2019.

			Lead		
Sr	Township	Village	Retailer	Shop Name	
1	Zalun	Sein Kalay	U Hla Myint	U Hla Myint, Zalun	
2	Danubyu	Lin Lun Pin	U Tin Tun Win	Aung Si Phyo	
3	Danubyu	Let Pan Zin Kyun	U Pyae Sone Aung	Shwe-Taung-Thu, Pantanaw	
4	Pantanaw	Kalama Chaung	U Sein Win	Golden land, Pantanaw	
5	Moe Nyo	Pauk Kone	U Naing Aung Lin	Aung Nan Daw	
6	Letpadan	Taw Lat Tha	Daw Myint Myint Nwet	San Thit Sar	

Details of the six retailer-led farmer trainings in five townships are given in the tables below.

				Attendance		ce
Sr	Township	Village	Training Date	Male	Female	Total
1	Zalun	Sein Kalay	9/22/19	20	3	23
2	Danubyu	Lin Lun Pin	9/27/19	21	0	21
3	Danubyu	Let Pan Zin Kyun	10/4/19	20	4	24
4	Pantanaw	Kalama Chaung	11/5/19	21	3	24
5	Moe Nyo	Pauk Kone	9/26/19	16	0	16
6	Letpadan	Taw Lat Tha	9/27/19	17	17	34

Demonstration field schools were established in these six locations and regular scouting, like that in southern Shan State, was done.

Among the six demonstration field schools, two plots in Danubyu, one plot in Zalun, and one plot in Moe Nyo completed through the fourth scouting; one plot in Letpadan Township completed through the third scouting; and one plot in Pantanaw Township completed through the second scouting due to the staff contract completion on November 30, 2019. Field trips continued until November 23, 2019.

The FSI+ extension team transferred responsibility for the demonstration field schools to lead retailers and township DOA officers on November 25-26 by providing the 2019 pamphlets, posters, and attendance sheets of the demonstration field schools.

These demonstration plots will be harvested in January 2020.

See Delta FAW activity in Attachment 3.

Other Related Information on the FAW Activity

- The Fall Armyworm Global Programmatic Pesticide Evaluation Report and Safer Use Action Plan (PERSUAP) was received on May 31, 2019.
- A Safe Use Action Plan (SUAP) was prepared and submitted to USAID on June 11, 2019.
- On June 14, the FSI+ COP (Dr. Grahame Hunter) attended the Inception Workshop for the Food and Agriculture Organization of the United Nations project "Emergency Response to Enhance Technical Capacity for Early Warning, Monitoring and Management of Fall Armyworm in Myanmar."
- The FSI+ COP and Mr. Joey Goeb from Michigan State University (MSU) traveled to Sam Kar Village, Nyaung Shwe, on June 27 to observe the establishment of the demonstration school. Goeb had a discussion meeting with Htoo Htoo Aung on November 11, 2019, after crop cuts in southern Shan State.
- Assistant Director of the PPD, Daw Ni Ni Htain, participated in retailer trainings in southern Shan State after editing the training manual, poster, and pamphlets prepared by the FSI+ extension team. She also requested that FSI+ provide a soft copy of the poster and some photos from the FSI+ pamphlet. The poster was emailed on June 19, 2019.
- Mr. John Peters, BFS Agreement Officer Representative (AOR), USAID, visited the demonstration field schools in Lin Lun Pin and Let Pan Zin Kyun villages, Danubyu Township, on October 28, 2019, along with the extension team. He wrote a complimentary note regarding the FSI+ FAW program noting that he was able to see the level of infestation first hand so the activity was very timely.

Conclusions

The FSI+ project's FAW activity started in southern Shan State in May 2019 and was completed in October 2019. Sample crop cuts have been harvested from all demonstration plots and from 66 random farmers' plots.

Maize farmers had no experience with FAW, and they learned about the FAW life cycle and scouting method in FSI+ trainings and field demonstrations. They were taught the W-pattern scouting method and signs of FAW infestation, such as the window pane on leaves, egg mass, characteristic features of FAW, various sizes of larva and pupa, and large coarse clumps of FAW excreta. After gaining knowledge about FAW, the farmers can easily protect their own fields by applying the methods they have learned. Before training, they were unaware of the active ingredient in pesticide and spent a lot of money to purchase pesticide. After attending the FSI+ training and scouting days, farmers now know how to choose a suitable pesticide. They can save on pesticide costs and protect the environment as well as their own lives. FSI+ showed farmers that without scouting and systematic pesticide application FAW can remain inside the cob until harvest time. Initial FAW management is extremely important. Farmers who do not practice FAW management could find live larvae, pupae, and excreta inside cobs at harvest time.

Farmers as well as input retailers came to understand that pesticide will immediately kill the pests but can cause danger to farmers and the environment. They learned safe use practices for the coming seasons. Retailers also will share knowledge with customers.

Yields of trained farmers and non-trained farmers are different according to the crop cut results. The average yield of the 33 trained farmers was 6.799 tons/ha, while it was 6.003 tons/ha for non-trained farmers. These results show yields are dependent on FAW knowledge, application of scouting methods, and follow up with the recommended pesticide. FAW knowledge can be shared by trained farmers with non-trained farmers and neighboring farmers.

The FSI+ FAW activity continued in the Delta Region from September 2019 through November 2019.

One weakness was that farmers could not participate in five regular scouting events. Scouting time overlapped with farmers' field work. However, each demonstration field school could share FAW knowledge and safe pesticide use practices with between 15 and 100-plus farmers.

Delta Region maize farmers faced FAW damage in 2018-19 dry season maize, but they were unclear about correct pesticide usage. Now they have become knowledgeable about the recommended active ingredient in pesticide. By applying what they have learned, FAW damage can be mitigated. Although the project cannot continue sample crop cuts, farmers can apply their knowledge in the future.

Recommendations

- FAW management trainings and demonstration plots are effective for maize farmers and should be expanded to other maize areas.
- Proper trainings and practical field scouting allow farmers to reduce pesticide cost and maintain similar yields.
- Training on identification and scouting for FAW infestation is effective when observing the level of infestation before plant damage occurs, and it is very timely and needed.
- Systematic application of pesticide with the recommended active ingredient is critical for maize farmers.
- More agro-retailers need trainings to advise their customers on the use of correct pesticides.
- IFDC as well as other non-governmental organizations (NGOs) should continue to provide information on FAW management to maize farmers.

List of Appendices

Attachment 1:	Demonstration Field Schools in Southern Shan State
Attachment 2:	Yield Result of Demonstration Field School and Random Crop Cuts
Attachment 3:	Demonstration Field Schools in the Delta Region
Attachment 4:	Demonstration Plot Protocol for FAW Management
Attachment 5:	Recommended Active Ingredient and Pesticide for FAW
Attachment 6:	FAW Pamphlet
Attachment 7:	FAW Poster

Photos

FAW Retailer Training (Aung Ban, Taunggyi, Pindaya, Nyaung Shwe)





Retailer-Led Farmer Training

Delta

Southern Shan





Scouting

Southern Shan

Delta





Crop Cut during October 2019 (Southern Shan)





Mr. John Peters, BFS AOR, USAID, Visiting a Demonstration Field School in Let Pan Zin Kyun Village, Danubyu Township, on October 28, 2019



