

SAIRLA Story of Change: Ghana increases the use of bio-rational pesticides for Fall Armyworm management

Fall Armyworm (FAW) is a chronic pest that causes severe damage to food crops such as maize, sorghum, millet and soybean. It has become one of the major threats to food and nutrition security in Africa. FAW was first detected in Ghana in 2016 and it quickly spread to all regions in the country. Initially, FAW was primarily controlled and managed by the use of hazardous pesticides.

The SAIRLA Ghana National Learning Alliance (NLA) has worked closely with Centre for Agriculture and Bioscience International (CABI) to support the Ministry of Food and Agriculture (MoFA) to put in place planning and policy implementation processes and coordinating mechanisms at the national, regional, district and community levels to regulate the use of chemicals in managing FAW.

As a result of the Ghana NLA's intervention, there is evidence of a shift from the use of non-bio-rational pesticides to bio-rational products in the government's short, medium and long-term FAW infestation management measures.

The SAIRLA-funded Ghana National Learning Alliance (GH-NLA) was established in 2017 and is hosted by CABI. It comprises different stakeholders in the national agricultural system who bring their diverse experience and expertise to bear with the aim of informing decision-making processes that will develop equitable sustainable agricultural intensification (SAI).

CABI champions the efficient and safe use of chemical control and a gradual shift to increased use of bio-rational pesticides and biological control agents in an integrated pest management approach as a long-term solution to the FAW infestation. Working with CABI, the NLA identified an information gap on the sustainable management of FAW and initiated a programme of social learning around the safe use (and risks) of pesticides, as well as the use of biological control measures.

GH-NLA, along with CABI and other actors, succeeded in influencing MoFA, the national FAW Taskforce, policy actors and decision makers including technicians, farmers, the private sector and the media to jointly focus on better planning for FAW management as well as placing greater emphasis on the use of evidence to promote awareness of and reduce the excessive use of chemicals to tackle the infestation.

The changes described in this story took place from 2017 to 2019.

1. The challenge

Recognising the risks posed by FAW, the Government of Ghana established a National FAW Taskforce in 2017. The first FAW Management Plan produced by the Taskforce focused almost exclusively on the use of non-biorational insecticides to manage the infestation, despite the risks of long-term negative consequences for people, animals and the environment of this approach, all of which are exacerbated by incorrect application.

To supplement the Government's emergency stock of insecticides, farmers were buying both regulated and unregulated chemicals to control the infestation; many of which had not been proven to be effective in the fight against FAW. The absence of adequate education or access to information on the proper usage of agrochemicals, and weak enforcement of the regulatory regime, led to additional challenges linked to the timing, dosage and frequency of application. There was a risk of the pest developing resistance to active ingredients in the chemicals as a result of their improper application. The attendant health hazards to humans directly involved in the spraying of crops and indirectly through compromised food safety were also a concern.

An integrated pest management approach to tackle FAW with a major biological control component has better long term environmental, economic and social sustainability outcomes. Bio-rational products also minimise the risks of resistance developing in FAW. Characteristics of sustainable management of FAW include: scouting to assess pest pressure; crop monitoring to know if and when to intervene; research into the use of cultural methods (including field hygiene, manipulation of planting dates, and using land preparation methods that destroy pests in diapause), biological control options and resistant varieties; promotion of good agricultural practices and the use of chemical pesticides as a last resort.

2. The intervention

The GH-NLA identified the need for better information and knowledge sharing about the sustainable management of FAW and a corresponding opportunity to co-generate research evidence to inform the work of the government and other actors at regional, district and farmer level on the management of FAW.

The CABI regional representative for West Africa, a member of the NLA facilitation team was invited to join the 16-member Government FAW taskforce constituted in May 2017. This brought other CABI staff to work on the sub-committees of the taskforce. The taskforce was charged with the responsibility of leading the planning and management of FAW in Ghana and liaising with countries in the sub-region to harmonise management plans. Since its establishment, the taskforce has led the Government response in:

- the selection of insecticides for management and control of FAW
- the development of an Annual Action Plan for FAW management and associated budget
- sensitisation and awareness creation
- surveillance and monitoring
- implementation of prevention and control measures,
- research for long-term prevention and control measures, and
- co-ordination of collaborating institutions for effective planning and use of resources to combat FAW in Ghana.

The NLA worked through Directors of MoFA, media personnel and CABI staff membership to share evidence and information with the Taskforce and with farmers and extension agents about:

- The health hazards and environmental problems associated with pesticide abuse – often extensive, indiscriminate, and unguided. Risks include:
 - Environmental and human health issues: arising from both the initial application of hazardous chemicals and continued exposure to pesticide residues on consumed produce or in the production environment.
 - Reduced biodiversity: loss of natural enemies and predators of FAW and other major pests, further impeding sustainable management of FAW and other pests.
 - High risk of pesticide exposure for women and children at the farm level: as women primarily manage agricultural operations in Africa.
- Integrated pest management and responsible use of pesticides including a gradual shift from the use of hazardous pesticides to the use of bio-rationals which are less damaging to human and animal health and the environment.

The NLA has organised events for policy makers, Heads of MoFA Directorates, extension staff, input dealers and media to explain how resistance to pesticides develops in pests and how to manage it. The NLA developed information notes and additional educational material that were distributed online through social media networks. Additionally, events were organised and documents developed to sensitise stakeholders on precautionary measures to be taken when using chemicals. There was a focus on identification and interpretation of hazard symbols, precautionary pictograms and colour bands on pesticide labels and how to use that information to inform decisions related to purchasing, stocking, distribution and use of chemicals.

3. The change (result)

The intervention by the NLA has contributed to (i) a switch in focus away from non bio-rational control measures in the Government’s current FAW action plan (compared to that of the previous year), (ii) an increase in government expenditure on non-biorationals, and (iii) a change in rhetoric in the public debate about FAW.

There is evidence of a gradual shift from the use of harmful pesticides to bio-rationals that are less harmful to the environment as a result of the intervention by the NLA and other actors. As shown in Table 1 and Figure 1, the number of bio-rationals on the Government’s pesticides procurement list for FAW control in Ghana increased from a baseline of **three** in 2017 to **five** in 2018/2019 whilst the number of the more harmful active ingredients in the pesticides’ procurement list decreased from **six** in 2017 to **two** in 2018/2019. Similarly, over the same period, an increase in the quantities of bio-rationals purchased can be seen. For example, the quantity of *Bacillus thuringiensis* (55%) + Monosultap (45%) purchased increased from 1300Kg in 2018 to 13500Kg in 2019, and the quantity of Maltodextrin purchased increased from 1350L in 2018 to 20000L in 2019. The active ingredients of the more hazardous pesticides on the procurement list were also changed from year to year to avoid resistance building by the FAW.

This shift in focus (seen in spend and guidance) from non-biorational measures to biorational measures has been corroborated by the Director of Plant Protection and Regulatory Services at the Ministry of Food and Agriculture who has stated that *"in the long term, only biological control agents, microbial insecticides and botanicals/organic products will be used to manage FAW in Ghana."*

In addition, surveys conducted in 2017 and 2018 to assess the impact and implications of the FAW infestation confirm the trend. A major change from 2017 is the increase in the use of biopesticides, reflecting the country’s decision to promote biorationals through recommending and subsidising their use. The most common active ingredient used was *Bacillus thuringiensis* (Bt) - over half the users had received it for free (Rwomushana *et al.* 2018).

Table 1: Pesticides Procurement by Government of Ghana for FAW control

Key: = more hazardous pesticides, = bio-rational pesticides

2017	2018		2019	
Active ingredient	Active ingredient	Volume	Active ingredient	Volume
Bacillus thuringiensis (Bt)	<i>Bacillus thuringiensis</i> (55%) + Monosultap (45%)	26000 sachets x 50g (1300Kg)	<i>Bacillus thuringiensis</i> (55%) + Monosultap (45%)	270000 sachets x 50g (13500kg)
Maltodextrin	Maltodextrin	1350 L	Malthodextrin (282g/lit)	20000 L
Ethyl palmitate	Azadirachtin (1%)	3180 L	Azadirachtin (1%)	15000 L
Imidacloprid	Ethyl Palmitate	2500 L	Ethyl Palmitate	25049 L
Lambda-Cyhalothrin +Acetamiprid	<i>Peris rapae Granulosis Virus</i>	4350 sachets x 100g		

2017	2018		2019	
	<i>(PrGV) Bacillus thuringiensis</i> +	(4350kg)		
Chlorpyrifos (250) +Deltamethrin (6)	Lambda-Cyhalothrin +Acetamiprid	1500 L	Acetamiprid (50g/lit) + Emamectin-Benzoate (20g/lit)	20766 L
Chlopyrifos (400) + Deltamethrin (24)	Lambda-Cyhalothrin +Thiomethoxan	1250 L	Teflubensuron (50g/lit) + Cypermethrin (20g/lit)	10000 L
Emamectin Benzoate + Acetamiprid				
Indoxacarb +Acetamiprid				

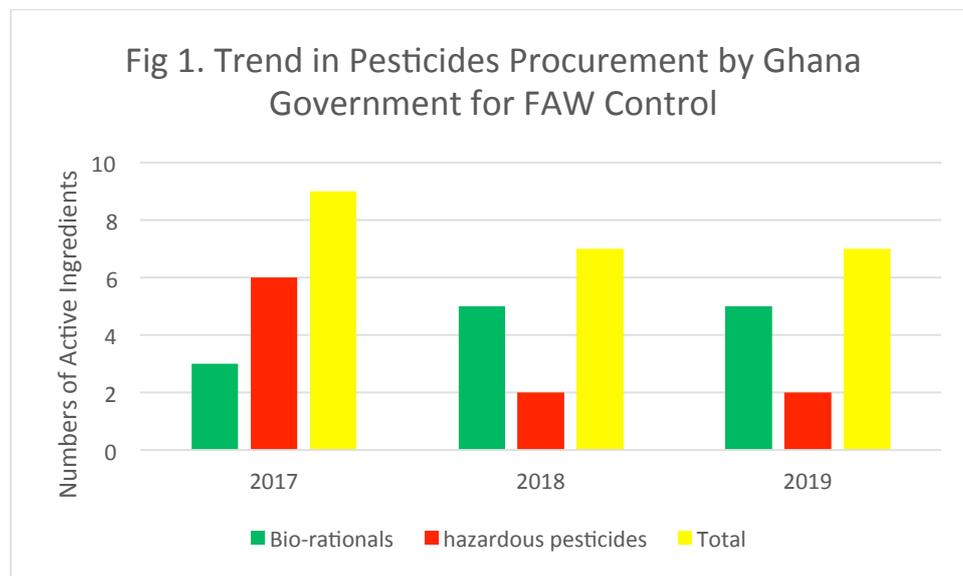


Figure 1: Trend in pesticides procurement by Ghana Government for FAW control

Social learning events organised and hosted by the NLA to share information and evidence about FAW entry, spread, and management led to a change in rhetoric about FAW in the media and amongst politicians. Rhetoric initially focused on the unrealistic aim of exterminating FAW whereas now a more informed discussion about the need to manage FAW dominates.

In addition to the change in policy, Ghanaian farmers and extension agents who participated in the field demonstration on the safe use of chemicals and hazards associated with agro-chemical abuse learnt about right dosage, right time and frequency of use of chemicals, proper storage of chemicals, disposal of containers and the use of Personal Protective Equipment (PPE) when using pesticides for FAW control. Input

dealers were also targeted in the sensitisation and awareness creation campaigns about proper storage of chemicals the dangers of agrochemical abuse and the possibility of pest developing resistance to active ingredients.

5. SAIRLA's contribution to the change

The control of FAW in Ghana was a multi-stakeholder effort by development partners, private sector investors, policy makers, farmers, media, civil society and NGOs among others. The effort was partly funded by DGIS, DFID, the Food and Agricultural Organisation (FAO), and USAID. SAIRLA's contribution through the CABI-hosted NLA was significant due to the key role it played in the development of a national action plan for FAW focusing on the use of bio-rational measures.

In addition;

- On the basis of evidence generated by the Taskforce on the management of FAW, the government is considering the development of a framework for contingency planning to address other pest problems when they arise.
- The section on rapid response and control of plant pests and diseases in the Ghana Agricultural Investment Plan (2018-21) - a review of the Medium-Term Sector Investment Plan II - has been informed by lessons on implications of excessive use of chemicals in pest control.

6. Conclusions

The shift from the use of hazardous insecticides to biological control measures in the management of FAW requires continuous sensitisation and awareness creation bringing together all groups of stakeholders affected, capacity building and research into integrated pest management and other biological control methods. The NLA information sharing and social learning approach was therefore appropriate and played an instrumental role in bringing about the change.

Another key factor that was critical in the change effort is the commitment by the Government of Ghana and other policy actors to understanding the situation; building capacity and committing resources for the development and the implementation of the FAW Action Plan.

7. Looking forward

The NLA will continue to engage policy makers and contribute to capacity building for effective implementation of the FAW Action Plan in Ghana. NLA strategic partners from the media (journalists) are in the process of conducting an analysis of changes in public rhetoric on FAW among stakeholders.

8. Sources of Evidence

Clotley VA, Duah S., Akufobe M, Quaye W, Karbo N, and GO Essegbey (2018) Resistance and Management in Pesticide Use, SAIRLA Ghana NLA Information Note.

Ghana FAW Action Plan www.graphic.com.gh/business/business-news/we-ve-learnt-from-faw.html

MOFA educates journalists on fall army worms

<https://www.ghananewsagency.org/science/mofa-educates-journalists-on-fall-army-worms-127676>

FAW taskforce with sub-committee for awareness creation, surveillance, management and research and coordination <http://www.fao.org/ghana/news/detail-events/en/c/1054061/>

Rwomushana, I., Bateman, M., Beale, T., Beseh, P., Cameron, K., Chiluba, M., Clotley, V., Davis, T., Day, R., Early, R., Godwin, J., Gonzalez-Moreno, P., Kansime, M., Kenis, M., Makale, F., Mugambi, I., Murphy, S., Nunda, W., Phiri, N., Pratt, C., Tambo, J. (2018). Fall armyworm: impacts and implications for Africa. Evidence Note Update, October 2018. www.invasive-species.org/fawevidencenote2018