



## Implementation of fall armyworm management plan in Ghana: outcomes and lessons

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### Summary

The invasive pest, fall armyworm (*Spodoptera frugiperda* J.E. Smith), was confirmed as being present in Ghana in 2016. By 2017, research studies estimated that maize yield losses in Africa due to fall armyworm would range between 8.3 and 20.6 million tonnes per year if management measures were not put in place. In Ghana alone, the value of the 2018 annual maize crop lost due to fall armyworm was estimated at US\$177 million. In response to the fall armyworm outbreak, CABI – through its programme on Action on Invasives – launched fall armyworm-specific activities in Ghana in 2017. The programme supported the development of a national fall armyworm management plan; a collaborative effort with the Plant Protection and Regulatory Services Directorate (PPRSD) of the Ministry of Food and Agriculture (MOFA), and other stakeholders. The fall armyworm management plan focused on four priority areas: co-ordination and collaboration; awareness-raising; monitoring and surveillance; and control, management, and research. Most importantly, the national management plan aimed at ensuring coordinated efforts between public, private, and civil society organisations in the management of fall armyworm. A national multi-stakeholder task force was created, and charged with advising the Minister of Food and Agriculture and coordinating the response to fall armyworm. A review of the implementation of the national fall armyworm management plan was undertaken in late 2018 and early 2019 through a stakeholder workshop and key informant interviews. The review showed evidence of stakeholder collaboration at various levels, leading to increased public awareness of fall armyworm and management practices, research into low-risk management options, and contribution to policy and practice on how threats from invasive species could be managed more effectively in future.

## Key highlights

- A national fall armyworm management plan was developed and a multi-stakeholder taskforce established to oversee and coordinate the implementation of the plan.
- Public sensitisation activities were launched by various partners using SMS, radio, TV broadcasts, printed materials, and video screening, to increase awareness of fall armyworm and management practices.
- Research activities and impact studies provided evidence that shaped policy discussions, particularly on the type of pesticides to use for fall armyworm control, with the government focusing its efforts on the use of biorationals<sup>1</sup>.
- Collaborative research and validation trials were launched for various pesticides and other cultural methods for control of fall armyworm.

## Context

Fall armyworm (*Spodoptera frugiperda* J.E. Smith), a pest species native to the Americas, was confirmed as being present in Ghana in November 2016. The pest is native to the Americas and has been reported to feed on up to 186 host plants (Casmuz et al., 2010). The main hosts are maize, wheat, sorghum, and rice, which constitute the main staple food crops for most African countries (Day et al., 2017). It causes particular damage to maize as it burrows into the stem and cob at various stages of its lifecycle, making it hard to control, and rendering the maize useless (Prasanna et al., 2018). Indeed, it has been estimated that fall armyworm could potentially reduce Africa's maize supply between 8.3 and 20.6 million tonnes per year if management measures are not put in place (Abrahams et al., 2017). Furthermore, in Ghana, the lost value of the 2018 annual maize crop due to fall armyworm was estimated at US\$177 million (Rwomushana et al., 2018). In addition to a reduction in income as a result of crop losses, impacts on farmers' livelihoods are compounded by increased labour and management costs needed to manage the pest.

In response to fall armyworm, CABI's Action on Invasives (AoI) programme facilitated the implementation of a series of activities in Ghana, including research to provide evidence of the impacts of fall armyworm in Africa, awareness campaigns, training of frontline technical staff on fall armyworm management, and research on best practice solutions. These activities aimed to prevent or reduce crop losses due to fall armyworm by deploying effective crop protection measures (McLeod et al., 2015).

## What we did

### Evidence notes on impacts of fall armyworm and implications for Africa

CABI undertook studies that provided evidence on the distribution and impact of fall armyworm in Africa, reviewed existing research and development on control methods, and made recommendations for sustainable management of fall armyworm (Abrahams et al., 2017; Rwomushana et al., 2018). Applying pesticides was the most frequent control method used by farmers, although farmers also applied indigenous practices such as the use of ash applied on the whorl, crushing egg masses and caterpillars, and the use of detergents. The two evidence notes (Abrahams et al., 2017; Rwomushana et al., 2018) further indicated that pesticides used by many farmers were recommended and/or supplied by African

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<sup>1</sup> A biorational pesticide is any pesticide that is not toxic for humans or animals, and does little or no damage to the environment.

governments. These would be effective if applied correctly but were often applied without appropriate safety precautions, and some farmers used illegal and highly dangerous chemicals. Another observation was that many stakeholders contributed to fall armyworm management, which necessitated a coordinated effort. These fall armyworm evidence notes helped to shape the research agenda on fall armyworm management practices, particularly research into indigenous methods. The notes were also critical early reference documents for donors to use as a basis for providing funding for fall armyworm control, and African governments to prioritise activities on fall armyworm control.

### **National fall armyworm management plan development**

In March 2017, in response to the threat posed by fall armyworm, and following recommendations from the evidence notes, CABI's Aol programme facilitated a stakeholder workshop co-organised with PPRSD in Ghana. The meeting aimed to develop a comprehensive fall armyworm management plan comprising short-, medium- and long-term strategies. The strategy was developed with concerned public and private sector stakeholders, as well as key donors investing in tackling Africa's fall armyworm problem and development partners. The plan, which aimed to coordinate efforts in the management of fall armyworm, focused on four key elements: i) co-ordination and collaboration, ii) awareness-raising, iii) monitoring and surveillance, and iv) control, management, and research. The plan also spelled out clear activities to be undertaken under each element. Stakeholder mapping of 'who is involved' and 'who has plans' with respect to the defined activities was done to understand areas of convergence, and gaps, and who was able to undertake the activities. The management plan was for one year, with the expectation that an annual review and planning for subsequent years would be possible.

### **National multi-stakeholder taskforce creation**

A national multi-stakeholder task force was created by the Minister of Food and Agriculture and operated with the support and facilitation of PPRSD and CABI. It was charged with advising the Minister, and coordinating the response to fall armyworm, based on the developed management plan. The task force members were drawn from various stakeholders – government agencies, development partners, research, media, agribusinesses, farmers organisations, and NGOs. The established task force was divided into three sub-committees each with a key responsibility; 1) to organise coordination, management and review meetings, 2) sensitise the general public, and iii) lead surveillance and research efforts. Taskforce members were assigned to specific regions and worked with PPRSD's regional officers and district Departments of Agriculture (DOA) to carry out monthly monitoring activities on research, surveillance and awareness campaigns across the country, and report back. The coordination committee was also responsible for overall monitoring of the progress of activities, with a three-tier (district, regional, and national level) reporting system.

## **What was achieved?**

### **Assessment methodology**

A review of the implementation of the national fall armyworm management plan was undertaken in late 2018 and early 2019 through a stakeholder workshop and key informant interviews:

**Multi-stakeholder meeting:** In late 2018, CABI facilitated a stakeholder meeting to review the national fall armyworm management plan with the following objectives: i) review implementation of the fall armyworm management and response plan, understand what worked well, and what challenges remain;

ii) understand current and new government strategies, support services and policies concerning fall armyworm management; and iii) understand the taskforce's effect on changes to the management of the country's invasive species. Forty-six people participated in the two-day stakeholder meeting in Accra, Ghana. A diverse range of stakeholders participated, including representatives from the government, private sector, NGOs, donor agencies, media, and academia. Presentations, reports, and discussions were transcribed for further analysis.

**Key informant interviews:** Key informant interviews with ten taskforce members were conducted by CABI in early 2019, in order to understand their views on the organisation, financing, coordination, and implementation of the management and response plan. Additional perceptions on the current policy environment with regards to the general management of invasive species were also sought. This information is being used to guide further development of the task force and its operations.

## Outcomes

### a) Coordinated fall armyworm management activities

The creation of a multi-stakeholder taskforce and three-tier, monitoring, and reporting system helped to solidify existing relationships and create several new linkages between research, extension and communication organisations in the public, private and civil society sectors, to strengthen Ghana's coordinated response to fall armyworm. The coordinated effort, based on the management and response plan also helped to avoid duplication of activities, as partners undertook their assigned, distinct roles. The response activities were coordinated centrally by the taskforce coordination sub-committee, ensuring there was clear knowledge of what was happening where, any gaps were rapidly identified, and additional work by partners in the response plan was directed to those gaps. Through this task force, the government was able to track what was happening across the country and ensure the actions taken by partners complemented the activities they were taking across Ghana. A harmonised plan ensured that there was consistent messaging to the public, in particular to farmers, from the partners carrying out awareness-raising activities. It also facilitated collaborative research amongst partners, whereas previously there had been duplication of effort.

The taskforce monitoring and reporting system worked well because of short-term government backing, in the interest of reducing crop losses in the coming season. Indeed, in order not to let the fall armyworm emergency derail the launch of its flagship programme "Planting for Food and Jobs", the Ghanaian government acted quickly and decisively to implement the fall armyworm taskforce's immediate solutions for the upcoming growing season in 2017. This included allowing public and private enterprises to move quickly to supply and distribute low-risk synthetic inputs proven to reduce fall armyworm crop damage, at a national scale during the second growing season. The products supplied included Ethyl Palmitate, Maltodextrin and *Bacillus thuringiensis*-based products. Progressively, more biopesticides were added to the list including Azadirachtin, Sophora plant extracts with *Emmamectin benzoate* and Pyrethrum products.

### b) Increased awareness of fall armyworm and management practices by farmers

Partners and communication professionals from leading research institutes, including CABI, who were part of the task force sub-committee with the responsibility of awareness-raising, coordinated their activities to disseminate local language video and audio recordings through television and radio. These were launched in Ghana's 216 districts using integrated communication approaches. The communication activities were based on a technical brief on fall armyworm, that was developed by the task force partners. The technical brief is a set of facts and messages about a particular subject that

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helps to ensure consistency in messaging to the public by various stakeholders. Public sensitisation was done via radio stations, in schools, worship places, and through plant doctors/extension workers. More than 227,000 flyers and posters were distributed alongside a multitude of articles published in the print and online media. Seminars and symposiums across academic and public places were also organised across the country to improve awareness of fall armyworm. Fall armyworm messaging focused on pest identification, field scouting for early detection, and management practices. Communication also focused on educating farmers about the benefits of using biorationals and other low-risk control measures for fall armyworm.

Indeed, the 2018 evidence note (Rwomushana et al., 2018) showed a marked increase in farmer knowledge and management practices for the fall armyworm, which can be attributed to the work done by the awareness-raising sub-committee and partners. There was another major change from 2017 which was marked by an increase in the use of biopesticides by farmers. This may reflect the country's decision to promote biorationals through recommending and subsidising their use, and also farmer knowledge and awareness of low-risk management options for fall armyworm. The most common active ingredient used by farmers was *Bacillus thuringiensis*; over half the users (in a survey of 467 farmers in Ghana) had received it free.

### **c) Enhanced technical capacity of frontline extension officers**

The sensitisation of extension personnel working directly with farmers was conducted rapidly throughout the country, with the availability of high-quality up-to-date information on Ghana-specific prevention, detection, and control measures for fall armyworm. Seminars and symposiums were also organised across the country to enhance awareness of fall armyworm of MOFA and DOA staff. Over 2,811 technical staff received training in fall armyworm identification, management, rapid assessment of infestation levels, and early warning efforts, coordinated and run by partners in the research and surveillance sub-committee. Subsequently, extension workers took the lead in systematic monitoring and surveillance activities (launched in all 216 districts through the installation of pheromone traps). The extension workers reported back to the task force at the district level on a weekly basis and the information cascaded to the national level through the three-tier system. A user-friendly communication and feedback system for extension officials in various communities was established utilising social media platforms – WhatsApp, Facebook – to enhance the speed of reporting and peer support should anyone require technical support.

### **d) Enhanced collaboration in research on management practices**

Collaborative research involving the government, research institutions, and the private sector was implemented as part of the management plan. The research included the development of safer, non-synthetic control measures. Research evidence on pesticide use and fall armyworm management were shared with policy and decision makers through the activities of the DFID-funded [SAIRLA Ghana National Learning Alliance](#) to promote a biorational pest management strategy. Taskforce research aims were comprehensively linked to the country's biorational strategy, with the management of fall armyworm displayed as a key aim of this national approach. Research activities focused on: natural enemy scouting, efficacy trials for bio-pesticides and other pesticides, and the validation of indigenous methods and cultural practices (e.g. ash, sand, intercropping, push-pull system). Further, modelling was done to understand climatic relationships for fall armyworm occurrence and pest pressure to predict outbreaks. The government and partners established monitoring and early warning mechanisms in all 216 districts, supported by the taskforce field monitoring team.

## **e) Contribution to policy debate and formulation**

Results from research activities conducted as part of the management plan and the fall armyworm evidence notes, provided data that helped to shape policy discussions, particularly on the use of low-risk options for management of fall armyworm, following the widespread use of chemical pesticides across the country, and their associated health and environmental risks. In 2018, the government focused its efforts to promote biorational products for control of fall armyworm.

Further, CABI and the fall armyworm taskforce organised a national consultative meeting on invasives management. The meeting established the need to formulate a National Invasive Species Strategy and Action Plan (NISSAP). The government agreed that the development of the invasive species policy by Environmental Protection Agency (EPA), which had stalled, be re-formulated as a NISSAP. CABI worked with a consultant to develop a NISSAP, including a proposal for a cross-sectoral oversight/implementation mechanism. The NISSAP embeds policy recommendations from the task force, and focuses on key lessons for the future of invasive species management in Ghana: the need to be adaptable for the management of future invasive species; the need to harmonise and coordinate institutions' invasive species activities; the need to ensure effective national and regional collaboration; and the need to form a standing taskforce for a coherent holistic response to deal with general invasive species issues using experience gained from fall armyworm. The fall armyworm taskforce therefore was seen to have provided the opportunity to shape policy on how threats from invasive species could be managed more effectively in future.

## **Lessons learned and policy recommendations**

### **Task force financing**

A multi-stakeholder taskforce, whilst not a new concept in itself, was an innovative and collaborative approach that should have evolved with the fall armyworm emergency as it matured. However, in the opinion of taskforce members, self-evaluations and internal reviews were not conducted often enough, leading to a reduction of efficiency and effectiveness in many technical and administrative activities as the initiative progressed. This was largely affected by the lack of budget provision for staff time and direct costs. In particular, the task force committee responsible for coordination, management and review meetings, lacked funds to undertake these functions. This restricted taskforce meetings to Accra and as such there was limited engagement from regional and district partners beyond the first few meetings. The government allocated some financial resources to support taskforce activities such as monitoring and surveillance, but taskforce members considered the allocation inadequate for the required tasks. Other taskforce activities were funded directly by donors and partners. Besides, there was no budget for staff time, and therefore taskforce members found it very difficult to integrate taskforce work into their day-to-day schedules. This resulted in reduced motivation, and would have brought taskforce activities in certain regions to a standstill were it not for international or national development partners' initiatives in the area. Appropriate budgeting and resourcing of taskforce activities is key and is a vital element that needs to be improved to ensure that the government's future efforts to fight invasive species are successful, and particularly so in the wake of the recommendation to establish a standing invasive taskforce under the NISSAP.

### **Communication strategy**

The initial push to develop appropriate messaging was very successful in the first instance through the activities of a communication sub-committee created from the onset, that regularly updated the taskforce and partners on the latest findings and other emerging issues. However, task force members felt that

delayed training for media personnel regarding fall armyworm biology, potential impacts and management resulted in a lack of clear and consistent messaging, and the proliferation of over-sensitive and over-hyped stories in the media on the fall armyworm-related challenges facing farmers over the course of the fall armyworm emergency. This was despite government [public announcements](#) warning about over-hyped stories. A communications strategy is therefore important for ensuring harmonised media messages and should ensure that adequate training of non-technical and media personnel, concerning the pest being managed, is provided. Knowledge exchange is also a vital part of any research and development activity, and communication activities with the media must be considered in the initial stages of preparing an invasive species preparedness plan. This includes harnessing communications to respond to, manage, and mitigate future pest outbreaks.

### **Fall armyworm messaging**

While fall armyworm messages – identification, monitoring, and management – were considered adequate, task force members and partners indicated that an explanation of the need to use personal protective equipment when applying pesticides should have at least accompanied any messaging on pesticide use. It is recognised that while it was done for certain communication campaigns, this message was lost during other efforts to provide short-term control measures, or indeed the need to further educate and sensitise on the use of less toxic chemicals.

### **Financing the implementation plan**

Notwithstanding the experience and will of national government institutes to deal with invasive species, the evolving nature of the challenges posed by fall armyworm is a demanding financial burden to bear for any national administration. Certain activities in the fall armyworm management and response plan, therefore, had to be prioritised for short-term effectiveness, such as mass awareness-raising and national provision of curative measures. This meant that other, longer-term, measures such as the implementation of surveillance protocols to understand spread, or natural enemy surveys to develop sustainable biological control programmes, could not be conducted in-depth as initially planned. In addition, the donors and partners also had their priorities for which funding was allocated. It was not possible for these parties to reallocate their funding, even if the task force had identified more immediate priorities for action and therefore ones that required an allocated budget.

There was also a general agreement that some delays were experienced in the implementation of critical management plan activities, in particular, procurement and distribution of control products especially in 2017-18. Input dealers are responsible for the distribution of plant protection products, and early engagement could have increased stocking and the speed of distribution.

## **Conclusion**

This brief presents outcomes and lessons from the implementation of the national fall armyworm management plan, which was a multi-stakeholder process in Ghana. Results are based on a multi-stakeholder progress and assessment workshop, and key informant interviews. Overall, the review of the implementation of the national fall armyworm management plan pointed to positive outcomes, and to specific areas of the plan that were successfully executed. In particular, successes were recorded in quickly reaching a wide audience of farmers and extension workers with knowledge on fall armyworm identification and management options; fall armyworm surveillance that covered the whole country, and collaborative research on best practice solutions including exploration for natural enemies, and evaluation of low risk fall armyworm control measures. Research results contributed to shaping policy

and practice on control of fall armyworm with the government opting to promote biorationals. Multi-stakeholder engagements also contributed to shaping the invasives policy that culminated in the development of a NISSAP.

Feedback from stakeholders affirmed that PPRSD and CABI's approach of developing a national management plan and establishment of a multi-stakeholder taskforce was innovative and enhanced collaboration among stakeholders to jointly tackle the fall armyworm challenge. Although the plan was not fully resourced, the available resources were used optimally by avoiding duplication, focusing on areas where there was more need, and engaging in collaborative research activities to leverage the available resources. The approach can be adapted to the management of future invasive species by harmonising and coordinating institutions' activities, ensuring effective national and regional collaboration, and the formation of a standing taskforce for effective coordination and coherent response using experience gained from fall armyworm. The taskforce should be mandated with the development of a coordinated framework for prevention, early detection, eradication, and effective management of invasive species. Limited financing of the management plan as well as the task force committees affected some national and local processes to deal with fall armyworm in the short-term and highlighted the need for resourcing to deal with invasive species in the longer-term. The process to update the NISSAP provided an in-depth cross-sectoral analysis of invasive species management in the country. The newly developed policies will hopefully enable Ghanaian authorities to act quickly and decisively in future invasive species emergencies.

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