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Food and Agriculture Organization of the United Nations

ADVISORY NOTE

FAO Advisory Note on Fall Armyworm (FAW) in Africa

BACKGROUND

Fall Armyworm *(Spodoptera frugiperda)*, FAW, is an insect pest that feeds on more than 80 crop species, causing damage to economically important cultivated cereals such as maize, rice, sorghum, and also to legumes as well as vegetable crops and cotton. It is native to tropical and subtropical regions of the Americas, with the adult moth able to move over 100 km per night. It lays its eggs on plants, from which larvae hatch and begin feeding. High infestations can lead to significant yield loss. Farmers in the Americas have been managing the pest for many years, but at significant cost.

Nature of the threat and its spread in Africa

FAW was first detected in Central and Western Africa in early 2016 (Sao Tome and Principe, Nigeria, Benin and Togo) and in late 2016 and 2017 in Angola, Botswana, Burundi, Democratic Republic of Congo, Ethiopia, Ghana, Kenya, Malawi, Mozambique, Namibia, Niger, Rwanda, Sierra Leone, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe, and it is expected to move further.

Although it is too early to know the long-term impact of FAW on agricultural production and food security in Africa, it has the potential to cause serious damage and yield losses.

FAW's presence in Africa is irreversible. Large-scale eradication efforts are neither appropriate nor feasible. Gathering and analyzing experiences and best practices from the Americas will help design and test a sustainable FAW management program for smallholders in Africa.

FAO immediate response to FAW

FAO took immediate actions to support countries in responding to the threat of FAW in Africa.


Photo: ©FAO

A consultative meeting was held in Harare, Zimbabwe (14-16 February 2017) with government officials and stakeholders from Southern Africa to provide an update on the current situation, and support emergency preparedness and rapid pest management response. FAO undertook a series of quick actions such as the development and sharing with countries of a technical guide for FAW identification, protocols to assess levels of infestation and damage, and recommendations for management options including support to governments in the development of action plans.

Two further meetings on FAW, one for the SADC region as follow-up to the Harare consultative meeting and a second one (All Africa) jointly organized by FAO, AGRA and CIMMYT, were held in Nairobi (25-28 April 2017). The All Africa meeting gathered partners from governments, national, regional and international research and development institutions, academia and donor agencies as well as representatives from the private sector. The meeting came up with a set of action points and recommendations addressing research gaps, need for more knowledge on the pest's behavioural and biological adjustments to African ecological context, monitoring, early warning and forecasting, contingency planning, impact assessment, short-, medium- and long-term measures for management of the pest.

Photo: ©FAO/Lechoko Noko

The meeting participants also agreed that FAO should take a lead coordination role in FAW response in Africa.

FAO support to governments and farmers to manage FAW

FAO recommends and is taking leadership in helping member countries, farmers' organizations, and individual farmers to sustainably manage FAW through:

Short-term measures

In the short term, FAO through South-South Cooperation will bring the expertise and knowledge gained from relevant sources and adapt them to Africa.

From this knowledge, recommended components of a sustainable management program for farmers will be designed. Special attention will be paid to recommendations on targeted pesticide use and the use of biological control.

The recommendations will be tested and adapted to local conditions across Africa via the Farmers' Field Schools that FAO has supported: farmers and communities will carry out adaptive research to refine sustainable pest management recommendations.

Communicational and educational material in local languages will be produced and distributed, along with key messages for local radio transmission.

Community-based Integrated Pest Management (IPM) programmes using an agro-ecosystems approach and using Farmer Field Schools will be implemented.
See Annex A on pesticide use

Medium-term measures

In the medium-term, FAO will support African countries' understanding and knowledge on how to sustainably manage FAW, based on area-wide monitoring, consolidated knowledge on the developing patterns and ecology of FAW in Africa as well as reliable data on yield losses and socio-economic impact:

- FAO to support African countries in designing appropriate pest management approaches on the FAW.
- Deepen South-South cooperation to fully integrate experience from the Americas in the long-term management of FAW in Africa. There are many farmers, researchers and extension workers who have large experience in managing FAW in the Americas.
- See Annex B on Genetically Modified Organisms (GMOs)

Long-term measures (incorporating relevant research results)

Development of long-term solutions must be based on using a truly agro-ecosystems approach to FAW management based on the experience from the Americas and integrating relevant research results. Develop sustainable farming systems using IPM and innovative technologies with an emphasis on preventive measures and particular focus on agronomic practices, use of adapted and tested tolerant/resistant varieties, comprehensive biological control programmes which combines importation and release of proven beneficial organisms from the Americas (provided pre-release investigations are successfully completed) and enhancing indigenous natural enemies, combined with innovative pest surveillance and forecasting technologies.

FALL ARMYWORM Q & A

Q1: What is Fall Armyworm (FAW)?

A1. Fall Armyworm (Spodoptera frugiperda), is an insect pest of more than 80 plant species, causing damage to economically important cultivated cereals such as maize, rice, sorghum, and also to vegetable crops and cotton. It is native to tropical and subtropical regions of the Americas. It is the larval stage of the insect that causes the damage. FAW reproduces at a rate of several generations per year, and the moth can fly up to 100 km per night.

Q2: What is the difference between Fall Armyworm and African Armyworm?

A2. They are closely related, but have different behaviors and ecologies. FAW rarely displays the "armyworm" behavior of larvae massing and "marching" across fields. As a native to Africa, the African Armyworm faces a complex of natural biological enemies (predators, parasitoids, diseases). The FAW probably arrived in African unaccompanied by its natural enemies, allowing their populations to increase even more unchecked than normal.

Q3. Is maize affected by FAW safe to eat?

A3. FAW mostly eats the leaves of maize. Occasionally it will infest ears as well. Usually such ears are not consumed by humans. While direct damage from FAW doesn't affect the food safety of the maize, it could make the maize more susceptible to aflatoxin presence.

Q4. Is the current situation going to get worse?

A4. The adult female moth of FAW is a strong flyer and will continue to spread across the continent, and possibly beyond. Populations of FAW may continue to build, as they find more host plants to multiply on, and in the absence of the complex of natural biological enemies (general predators like ants and earwigs, specialized parasitoids) and a host of entomopathogens (virus, bacteria and fungi).

Q5. Is there an impact on trade?

A5. Exports of crops that are host plants for FAW from African countries with confirmed presence of FAW will come under new scrutiny from importing countries that haven't reported FAW.

Q6. What can be done (by extension, agriculture department, the farmers etc.)?

A6. There are many experiences and recommendations for managing FAW from the Americas. African farmers will need access to information and resources to sustainably manage FAW.

FALL ARMYWORM Q & A

Q7. What alternative crops can farmers be advised to grow?

A7: Maize is the crop most infested now in Africa. As a staple crop, it is unlikely that farmers and their families will want to abandon maize. There are ways of managing FAW in maize, as demonstrated in the Americas.

Q8. What products can be used to control FAW, and when and how should they be applied?

A8: FAO is working with member countries from around the world to determine the recommendations for farmers' actions, including pesticides that are effective, yet with low risks to humans and the environment. These recommendations are made nationally.

Q9. Can FAW be eradicated from Africa?

A9: Unfortunately no. The adult female moth of the armyworm is a strong flyer and has rapidly spread across Africa, infesting crops (maize has been the most important to date) in probably millions of hectares of crops. It is far too widespread and numerous to be eliminated.

Q10: If the FAW is native to the Americas, aren't there experiences and practices that can be applied in Africa?

A10: Definitely. There is a wealth of management experience and research from the Americas that can be shared and tried in Africa. FAO is actively promoting South-South Cooperation to bring this experience and knowledge to Africa.

Q11: What pesticides should be used to control FAW?

A11: Pesticides may be needed to control FAW locally. The most effective, lowest-risk, economical, accessible and easily used by smallholders (without sophisticated machinery) need to be determined within each country and across the continent. It's not just a question of the most effective pesticide in a research station, the specific recommendations (active ingredient, formulation, type and timing of application), and their costs and benefits to smallholder farmers must be determined.

Q12: When should pesticide applications begin in maize to protect it from FAW?

A12: Only when justifiable. Low levels of infestation at certain stages of maize growth may not cause much yield loss. The economic or action threshold must be determined and recommended for each stage of maize growth and for each type of pesticide and application techniques. Costs can vary tremendously. To economically justify their use, the costs of pesticide use must be equal to or less than the value of the additional yield that farmers receive for taking the action. The prices that farmers receive for their harvest must also be correctly valued.

FALL ARMYWORM Q & A

Q13: Are aerial applications of pesticides recommended for the FAW?

A13: No. The destructive life stage (the larva) digs deep into the whorl of maize occasionally, making aerial applications of very low efficacy, while spreading pesticides over large areas of non-target habitat.

Q14: Is the use of biological control a possibility for the FAW in Africa?

A14: There are many biological organisms that can help control FAW. Some can be applied as semiochemicals, some may be naturally occurring in Africa (general predators, parasitoids and some entomopathogens), and some might need to be introduced from the Americas (specialized parasitoids, predators and certain strains of entomopathogens). The use of botanicals is also an appealing option.

Q15: Is GMO maize the solution to FAW in Africa?

A15: While GMO maize is already being used in South Africa, it is generally only accessible by larger commercial farmers who have access to capital, resources and stable markets for their maize. Over 98% of maize farmers in Africa are smallholders, growing maize on less than 2 ha of land and typically saving seed to plant the next crop. The use of purchased inputs, including seed, is low. Given the high cost of transgenic maize seed, the lack of adequate supply channels, and lack of economic incentives for smallholders to grow maize (due to the low and volatile prices received) there is a low probability that the technology would be used in a sustainable manner by smallholder maize farmers in Africa. Even for commercial maize farmers in Africa, the long-term benefits of transgenic maize were put into doubt when, within two years of deployment, the maize stem borer began to show resistance to Bt maize in South Africa, and was later confirmed.

Q16: What are the next steps for FAW work in Africa?

A16: FAO is currently supporting the design and testing of a sustainable pest management program for smallholders in Africa. First steps are to look at experiences of farmers and researchers from the Americas. Then, the best recommended practices will be tried and adapted in the field via Farmers' Field Schools. The best recommendations will then be communicated and shared with farmers, farmers' organizations and governments across Africa.

Fall Armyworm in Africa: FAO Position on the Use of Pesticides

Pesticides play an important role in managing pests such as the Fall Armyworm; however they can also pose unacceptable risks to human health and the environment. Pesticide risk reduction and risk management are essential to the responsible use of pesticides.

The FAO/WHO International Code of Conduct on Pesticide Management provides a framework on pesticide management for all public and private entities engaged in, or associated with, production, regulation and management of pesticides. The Code provides standards of conduct and serves as a point of reference in relation to sound pesticide life cycle management practices, in particular for government authorities and the pesticide industry. The Code emphasizes the importance of the role of Integrated Pest Management or IPM[1] where pesticides are considered as the only one of the options available.

IPM emphasizes the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms. IPM programmes have demonstrated that it is possible to significantly reduce pesticide use without reducing crop yield or farmer profit.

FAO is developing a long-term IPM-based strategy for the sustainable management of fall armyworm, which includes forecasting, crop monitoring, use of biological control options, resistant varieties and promotion of good agricultural practices and, as a last resort option, the use of pesticides.

The inappropriate use of pesticides can result in adverse effects on agricultural production, health and the environment. It can also result in pesticide residue levels in treated commodities that represent a hazard to consumers and that constrain the marketability of products both on domestic and export markets.

Where pesticides are used to combat Fall Armyworm they should be managed in accordance with the national legislation and with international norms, such as the Code of Conduct and its technical guidelines. Only pesticides that are nationally registered and labelled according to national standards should be used.

If pesticide use is deemed necessary, preference should be given to pesticides that are target-specific, degrade rapidly into innocuous metabolites after use and are of low risk to humans and the environment. Due consideration should be given to the use of bio-pesticides. Microbials, botanicals or insect hormones as well as predators or parasitoids can help reduce Fall Armyworm population densities.

Clear instructions and training in the proper use of pesticides are required. This should include: handling and use according to label instructions; emphasizing that products should be used only for those crops and pests the product has been approved for; respecting of pre-harvest intervals; appropriate use of adequate protective gear; proper application; cleaning of application equipment and proper disposal of empty containers and left-over product, etc. In many cases, overall volumes of pesticides used can be reduced significantly through better selection, maintenance and calibration of application equipment.

[1] IPM means the careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically justified and reduce or minimize risks to human and animal health and/or the environment - FAO/WHO Code of Conduct on Pesticide Management.

Fall Armyworm in Africa
FAO Position on the use of Genetically Modified (GM) maize

General Considerations

- FAO recognizes that crop improvement through innovative technologies, including both conventional breeding and modern biotechnologies, is an essential approach to achieving sustainable increases in crop productivity and thus contributes to food security. Scientific evidence has shown that modern biotechnologies offer potential options to improving such aspects as the yield and quality, resource use efficiency, resistance to biotic and abiotic stresses and the nutrition value of the crops.

- FAO is also aware of the public perception and concerns about the potential risks to human health and the environment associated with genetically modified organisms (GMOs). FAO underlines the need to carefully evaluate the potential benefits and possible risks associated with the application of modern technologies.

- FAO emphasizes that the responsibility for formulating policies and making decisions regarding these technologies rests with the Member Governments themselves.

The responsibility for formulating policies and making decisions regarding GMOs lies with the individual Governments. FAO does not interfere in the policies or decisions, including those related to GMOs, of its Member Governments and so it has no position regarding the development, testing or commercial release of GMOs in any specific country. On request, FAO provides legal and technical advice to governments on areas such as development of national biotechnology strategies and development of biosafety frameworks.

Considerations related to Fall Armyworm

Regarding the potential use of GM (genetically modified) maize to control the Fall Armyworm in Africa, FAO considers that it is as yet too early to draw conclusions.

What is known so far is that the genetically modified insect resistant maize (popularly known as ''Bt maize'') has shown resistance to the Fall Armyworm in the Americas.

Hence, ''Bt maize'' may be one of the options for the control of this pest in Africa.

Nevertheless, more work still needs to be done including conducting trials and collecting data. It must be borne in mind that the Bt maize grown currently in some parts of Africa is aimed primarily at controlling the maize stem borer insect and not the Fall Armyworm.

Additional technical background information

Maize has been genetically engineered by incorporating genes from the bacterium Bacillus thuringiensis (Bt) that produce insecticidal proteins that kill important crop pests. The use of Bt maize has resulted in some cases in reduced insecticide use, pest suppression, conservation of beneficial natural enemies and higher farmer profits. However, such benefits may be short-lived. Insect populations are able to adapt to insecticides through the evolution of resistance. Despite efforts to delay the selection for resistance, many cases of field resistance evolution among maize pests have been demonstrated in Bt maize, including in the Fall Armyworm (Spodoptera frugiperda) in the Americas, and in South Africa in the maize stem borer (Busseola fusca).

While transgenic maize has provided some transitory benefits to commercial maize farmers, the context for the vast majority of African maize farmers is quite different. Over 98 percent of maize farmers in Africa are smallholders, growing maize on less than 2 ha of land and typically saving seed to plant the next crop. The use of purchased inputs, including seed, is low. Given the high cost of transgenic maize seed, the lack of adequate supply channels, and lack of economic incentives for smallholders to grow such maize (due to the low and volatile prices received) there is currently a low probability that the technology would be used in a sustainable manner by smallholder maize farmers in Africa. Even for commercial maize farmers in Africa, the long-term benefits of transgenic maize were put into doubt when, within two years of deployment, maize stem borers began to show resistance to Bt maize in South Africa.