Medicon Agriculture & Environmental Sciences
Volume 2 Issue 4 April 2022
Short Communication

Maize Fall Armyworm

Goodwill mgb Nyaane*

Bsc Agriculture, Sharda University, Southern Africa, Zambia

***Corresponding Author:** Goodwill mgb Nyaane, Bsc Agriculture, Sharda University, Southern Africa, Zambia.

Received: February 24, 2022; **Published:** March 29, 2022

Introduction

The autumn armyworm Spodoptera frugiperda is a fall armyworm moth species identified by its larval stage. It belongs to the Lepidoptera order. The term army worm may refer to a wide range of species, although it's most usually used to characterise the larval stage's widespread intrusive habit. It's classified as a pest because it can hurt or destroy a wide range of crops, causing severe financial losses. The fall armyworm, which is a member of the Lepidoptera order and the Noctuidae family, is more common at different periods of the year than the standard armyworm. The armyworm's principal feeding sources are grasses and field crops like maize, although it has been observed eating over 80 other plants, 50 of which are non-economic and 30 of which are economically valuable. (Spodoptera frugiperda) is a fall armyworm moth species identifiable by its larval stage. It belongs to the Lepidoptera order. The term "army worm" can refer to a range of species, but it's most typically used to characterize large-scale invasive behavior in the larval stage. It is considered a pest because it can harm and destroy a wide range of crops, resulting in significant economic losses. The fall armyworm, which belongs to the order Lepidoptera and the family Noctuidae, is active at a different time of year than the standard armyworm. The armyworm's primary food sources are grasses and grain crops such as maize, but it has been recorded to consume over 80 other plants (50 non-economic and 30 economic plants). Armyworms get their name from the fact that they swallow everything they come across in their vast dispersals, much like a large army. A few sweet corn varieties are moderately resistant to armyworms, but not completely. When fall armyworms or other larvae feed on maize, it creates a 33-kD proteinase that provides resistance. This protein has been demonstrated to significantly decrease the growth of fall armyworm larvae.

Pest of crop plants

Due to their dietary preferences, fall army worm larvae would have a negative influence on a number of crops. The first historical record of the fall army worm's extinction in Georgia was documented in 1797. Because the early stages of a caterpillar's life require very little nutrition, whereas the later stages require about 50 times more, the caterpillar can be destroyed very rapidly. Due of the rapid change in food consumption, larvae will not be detected until they have destroyed virtually everything in as little as a night. Cotton, tobacco, sweet corn, rice, peanuts, and even fruits such as apples and oranges have all been targeted. Agricultural impact can be significant due to the worms' ability to devour a wide variety of foods. Agricultural impact can be significant due to the worms' ability to devour a wide variety of foods. The larvae eat far too much of the plant that they have a big implications for agricultural survival and yield. Corn larvae may even get into the ear and devour the kernels.

The UN Food and Agriculture Organization forecasts that if S. frugiperda is not successfully managed, maize/corn yields will be lowered by 17.7 million metric tonnes (19.5106 short tonnes) per year. In many regions, the autumn armyworm has proven to be a problem, and control measures are still being researched.

Impact in Africa

Maize is Africa's most extensively produced crop and a staple for about half of the continent's population. It is grown in a variety of agro-ecological zones (AEZs), with more than 200 million people relying on it for food security. Maize provides over half of the calories and protein consumed in Eastern and Southern Africa, and one-fifth of the calories and protein consumed in West Africa (Macauley 2015).

In Ghana and Zambia, we performed a household socioeconomic survey in July 2017. Farmers' perceptions of losses due to FAW throughout the previous full growing season were studied through survey questions. According to the report, Ghana's national average maize loss was 45 percent (range 22-67 percent) and Zambia's was 40 percent (range 25-50 percent).

Using Ghanaian and Zambian data was insufficient data available for these countries on agroecological zones, maize production and economic value. It's equally crucial to evaluate the effects on individual households. FAW will have an impact on various of areas of domestic life. FAW causes damage to both vegetative and reproductive structures by feeding on them. Because the plant can compensate for at least some loss of leaf area, feeding maize leaves does not always result in yield loss. This could lead to erroneous loss estimates and perhaps costly measures. When the growing point is damaged, the unfolded leaves die of "dead heart," wilting, and death.

Young larvae hide in the maize funnel during the day, but emerge at night to feed on the leaves. As a result, spraying during dawn or dusk is more likely to be effective. Older larvae (which cause more damage) prefer to stay inside the maize funnel, where they are protected from leaf spraying. The use of pesticides should be coordinated with the appearance of the younger larvae. On small farms, pesticide application expenses might be reduced by merely spraying damaged plants. Farms that planted later in Latin America had a more even distribution of larvae and sustained higher levels of damage.

Several synthetic insecticides, including several that are licensed and recommended in Latin America, can kill FAW. Pesticides with varied modes of action are listed, spanning the major WHO hazard categories, including numerous highly hazardous pesticides (WHO Class 1b).

Controlling Fall Armyworms

At least 16 entomopathogens, as well as viruses, fungi, protozoa, bacteria, and nematodes, are vulnerable to the FAW (Agudelo Silva, 1986; Fuxa, 1982; Gardner & Fuxa, 1980; Molina Ochoa et al., 1996), however their presence and dispersion may vary depending on their habitat. Furthermore, geographic location, agricultural practises, and insecticide use all have an effect on the occurrence of natural control agents that can help manage fall armyworm populations (Fargues & Rodriguez-Rueda, 1980; Mitkiewicz, Dzigielewska, & Janowicz, 1998; Sosa-Gomez & Moscardi, 1994; Vänninen, 1996).

Infections such as Bacillus thuringiensis, Metarhizium anisopliae, and Beauveria bassiana can cause significant death in FAW populations while simultaneously lowering crop leaf defoliation (Molina-Ochoa et al., 2003).

According to these researchers, biological entomopathogens and parasitic nematodes caused 3.5 percent FAW larval mortality in Mexico. As a result, only 1.5 percent of Mexican agricultural land is treated with microbiological insecticides (Blanco et al., 2014).

Several microbial diseases have been studied in the hopes of limiting the spread of fall armyworms. Viruses have had only limited success against the fall armyworm, which is not temporally effective, allowing the insect to cause substantial damage before dying (Sparks, 1986).

The following approaches can also be used:

- Rather than relying simply on pesticides, a multi-pronged approach should be employed.
- It's best to avoid using products with the same mode of action on subsequent generations.
- Pesticides should only be obtained from licenced dealers and applied according to the manufacturer's specifications, rather than being used as a prophylactic or preventative precaution. IPM emphasises the need of preserving the pest's natural adversaries. In Latin America, a large number of parasitoids, predators, and FAW illnesses have been discovered. Research understanding what natural enemies are attacking FAW in Africa, how much mortality they can cause, and how they can be cultivated is urgently needed.

Integrated Pest Management (IPM), which employs a variety of management strategies, is the best solution for FAW control. In Latin America, IPM is most commonly utilised in smallholder systems, which are more similar to African farming practises than vast monocultures that use GM crops and/or calendar spraying. Conservation is a crucial component of IPM. The pest's natural opponents must be preserved. Instead of just relying on pesticides, a variety of control measures should be employed.

- It's best to avoid using products with the same mode of action on subsequent generations.
- Rather than being used as a prophylactic or preventative strategy, pesticides should be applied based on monitoring and thresholds.
- Pesticides should only be obtained from licenced dealers and used according to the label.

For FAW control, Integrated Pest Management (IPM), which employs a number of management tactics, is the best option. Smallholder systems, which are more comparable to African farming practises than large monocultures that use GM crops and/or calendar spraying, are where IPM is most often used in Latin America. Conservation is an important part of IPM. IPM emphasises the need of preserving the pest's natural adversaries. In Latin America, a large number of parasitoids, predators, and FAW illnesses have been discovered. Research understanding what natural enemies are attacking FAW in Africa, how much mortality they can cause, and how they can be cultivated is urgently needed. Given the potential hazards of chemical pesticides, finding lower-risk FAW therapies employing biological pesticides is a top goal for the time being. The German Gesellschaft für Internationale Zusammerarbeit will publish a research of biopesticides licensed in 30 countries, such as those for the control of FAWs, conducted by CABI (GIZ). The report will include recommendations on regulatory issues affecting the availability and usage of biological pesticides, as well as prioritized biological pesticides.

Creating an adequate framework;

Successful FAW management in Africa necessitates a concerted effort from many stakeholders working within an enabling framework provided by national governments and regional or international entities. The following are some of the most crucial considerations:

- Work with extension agents and agronomists to develop particular instructions for farmers in order to improve knowledge of potentially beneficial agronomic practices.
- Work with agro-input suppliers to develop and communicate a list of recommended, controlled pesticides and biopesticides. They should be easily available and, ideally, already registered for use on both the crop in concern and other caterpillars. Highly toxic pesticides should never be proposed, however insecticides/biopesticides licensed for FAW control in the Americas could be utilized.Establishing an appropriate framework; Successful management of FAW in Africa requires unified effort from many stakeholders working within an enabling framework established by national governments and regional or international agencies. The following are some of the most important factors to consider:
- Develop specific instructions for farmers in conjunction with extension agents and agronomists to raise awareness of potentially beneficial agronomic techniques.
- Prepare and communicate a list of recommended, controlled pesticides and biopesticides in conjunction with agro-input suppliers. They should be readily available, and preferably already registered for the crop in question, as well as for use on other caterpillars. Pesticides/biopesticides approved for FAW control in the Americas could be used, although highly toxic pesticides should never be suggested.
- Arrange for efficacy testing on pesticides that have been recommended to be conducted by authorised national laboratories.
- Provide emergency/temporary registration for pesticides that are recommended, such as Bacillus thuringiensis microbial pesticides and botanicals like neem. Regulators should let supporting data from other sources be temporarily registered. Arrange for authorised national laboratories to undertake efficacy tests on pesticides that have been recommended.

Conclusion

Despite the fact that the fall armyworm Spodoptera frugiperda was just recently introduced to Africa, it has already spread to several countries, including Zambia. During the 2017/18 cropping season, the insect wreaked havoc on Zambia's maize harvest. Because maize is grown in Zambia during the hotter and drier summer months, the bug can quickly flourish and spread. As a result, effective control should be prioritised, as preventing this pest without long-term management techniques is impossible Furthermore, there is an immediate need to acquire more knowledge between many farming communities about the insect's life phases, scouting for the pest as well as its natural enemies, and awareness the stages of the crop where substantial economic damage may occur. At the same time, low-cost, environmentally safer, and effective technological interventions must be introduced, validated, and deployed.

References

1. McLeod Robin. "Species Spodoptera frugiperda - Fall Armyworm Moth - Hodges#9666". BugGuide (2020).
2. Abrahams P., et al. "Fall Armyworm: Impacts and Implications for Africa". Evidence Note (2). Report to DFID (2017).
3. Pannuti LER., et al. "Plant-to-plant movement of Striacosta albicosta (Lepidoptera: Noctuidae) and Spodoptera frugiperda (Lepidoptera: Noctuidae) in maize (Zea mays)". Journal of Economic Entomology 109.3 (2016): 1125-1131.
4. Pilkington LJ., et al. "Protected biological control"–Biological pest management in the greenhouse industry. Biological Control 52.3 (2010): 216-220.
5. Mahmoud M. "Biology and use of entomopathogenic nematodes in insect pests biocontrol, a generic view". Cercetari Agronomice in Moldova 49.4 (2016): 85-105.

Volume 2 Issue 4 April 2022