



An integrated approach to combating fall armyworm

Fall armyworm is notoriously difficult to control, and early detection and regular scouting are crucial. This is according to **Prof Johnnie van den Berg** and **Prof Hannalene du Plessis**, of North-West University's Integrated Pest Management programme, and **Dr Annemie Erasmus**, entomology researcher at the Agricultural Research Council's Grain Crops Institute.

The 2020/2021 cropping season will mark the fifth year since the first case of fall armyworm (FAW) was reported in South Africa.

Although the pest feeds on about 350 plant species across the world, its damage to crops in Africa is largely confined to maize and sorghum.

A VARIABLE THREAT

Because FAW evolved in a tropical environment, it does not have the ability to overwinter in some

parts of South Africa, such as the Highveld, where winter temperatures are too low. For this reason, the consequences of the pest differ between geographical regions and seasons.

Northern Limpopo, the Lowveld and northern KwaZulu-Natal are considered high-risk FAW areas, as the relatively high temperatures enable it to overwinter here. The regions bordering these high-risk areas are medium risk.

In other areas, such as the Eastern Cape and Western Cape,

ABOVE:

At this stage, fall armyworm larvae are already too big to be controlled effectively by chemical means.

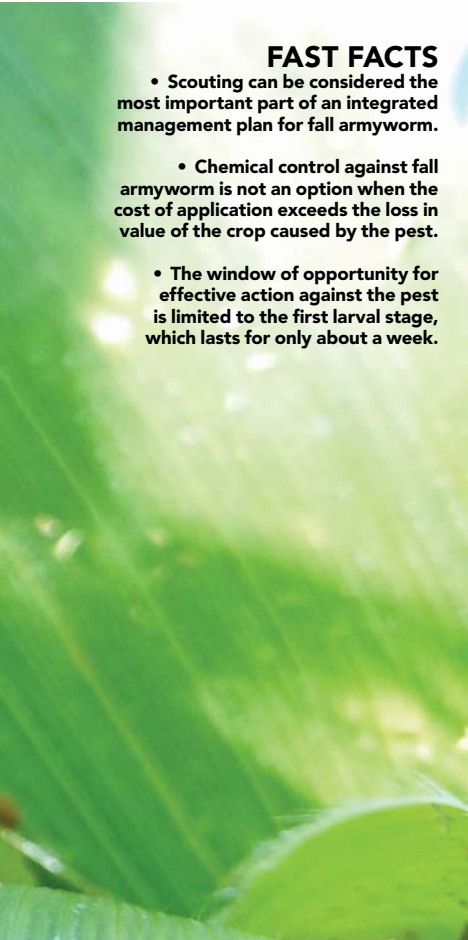
PHOTOS: PROF JOHNNIE VAN DEN BERG

infestations late in the cropping season indicate that, although pest attacks in these regions may be sporadic, maize farmers need to stay alert during the cropping season and monitor their maize lands regularly for FAW.

The pest status of FAW therefore differs between areas where it is permanently established and areas where it migrates annually. Maize planted in areas where the pest is permanently established is always at risk of infestation.

FAST FACTS

- Scouting can be considered the most important part of an integrated management plan for fall armyworm.
- Chemical control against fall armyworm is not an option when the cost of application exceeds the loss in value of the crop caused by the pest.
- The window of opportunity for effective action against the pest is limited to the first larval stage, which lasts for only about a week.



CHEMICAL CONTROL

Control of FAW on commercial maize and sorghum lands should be based on the risk of pest infestation and the plant growth stage at the time of infestation. Maize planted in a high-risk area may be continuously infested by FAW, and overlapping generations of the pest may occur.

It is extremely difficult to control FAW effectively with chemicals in areas where pest populations are permanent. This is because larvae of different sizes occur inside plant whorls and because insecticides are effective only when applied against larvae between one and eight days old (the L1 stage). There are six larval stages, lasting for 14 to 22 days in total.

In addition, insecticides should be applied in different ways to delay the development of resistance, especially where they are used frequently, such



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as high-risk areas where continual infestations occur. It is also important to start and stop applying the chemical precisely according to the larvae's developmental stage.

INTEGRATED PEST MANAGEMENT

FAW control programmes in medium- and low-risk areas should be guided by the principles of integrated pest management. As the pest cannot survive in these areas, it migrates from the overwintering areas to the medium- and low-risk areas during spring and summer.

It is impossible to determine when, or even if, an outbreak will occur. Preventative control is therefore not an option; it is no use applying insecticide against an insect that has not yet infested the crop.

The decision of whether to spray should be based on the results of regular scouting. The aims of scouting are, firstly, to determine whether the pest is present in the field or not,

and secondly, to ascertain the incidence of damaged plants. Maize farmers in medium- and low-risk areas should therefore stay alert during the cropping season and continually monitor their lands for pests.

The rapid appearance of damage symptoms often leads to indiscriminate spraying without regard to whether it

is necessary or effective. It is crucial to assess FAW infestation levels by scouting for damage symptoms before applying insecticide. Without monitoring, surveillance and scouting, farmers or service providers cannot make an informed decision on chemical control.

In areas of low and medium risk, farmers should avoid applying insecticide at the first sign of FAW symptoms. The degree of yield loss is determined by the crop growth stage at the time of infestation and by the incidence of infested plants. Research has shown that maize plants infested by FAW during the very early stages (one to three weeks after seedling emergence) and during the week prior to tasselling suffer the highest yield loss.

SPRAYING SHOULD BE BASED ON THE RISK OF INFESTATION AND ON THE PLANT GROWTH STAGE

Bearing this in mind, it may be possible to do away with one or two applications of insecticide if scouting is carried out and if the initial application, for example, is postponed by a week. It should also be kept in mind that spraying after flowering is minimally effective, as well as being dangerous to people if knapsack sprayers are used.

LIMITED PERIOD FOR SPRAYING

Regular scouting is crucial for another reason: the window of opportunity for effective control is small. This is due to the initial cryptic feeding behaviour of larvae inside plant whorls and because most of the damage caused by small larvae during the first seven-day period is hidden inside the whorl.



LEFT:
The telltale holes caused by fall armyworm are evident on the leaves of this maize plant.



BELOW LEFT:
Worldwide, fall armyworm feeds on approximately 350 plant species. In Africa, however, it is mostly limited to maize and sorghum.

During later growth stages (L4 to L6), the growth rate and feeding of larvae increase rapidly, and severely damaged leaves become apparent. Infestations are often not noticed until plants exhibit advanced levels of leaf damage.

Large larvae cannot be controlled effectively; they are less susceptible to insecticides than small larvae, and most insecticides are, in fact, registered for control of small larvae only. Moreover, the large larvae are deep inside the whorls, where they are protected from the chemical.

APPLYING INSECTICIDE AFTER FLOWERING HAS LITTLE TO NO EFFECT

Chemical control is warranted only if the cost of control does not exceed the value of the grain that would be lost due to damage from the pest.

Guidelines to action thresholds indicate that control should begin when 20% of plants in the mid-whorl stage and 40% of plants in the late vegetative growth stage show symptoms of FAW damage. The latter applies to maize plantings that will not be subjected to reinfestation.

CAUTION ADVISED

To conclude, pesticide application for FAW should be guided by integrated pest management principles. Misuse and indiscriminate spraying can have serious adverse effects on human health, the natural predators of this pest, and on the environment generally.

FAW is also known to develop resistance to insecticides as a result of indiscriminate spraying.

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