



African maize stalk borers: Where do they overwinter?

BEFORE THE FALL ARMYWORM (*SPODOPTERA FRUGIPERDA*) INVADED AFRICA, THE AFRICAN MAIZE STALK BORER WAS REGARDED AS THE MOST IMPORTANT INSECT PEST THAT ATTACKS MAIZE. IF THE STALK BORER LARVAE EAT THE MAIZE EARS AND CAUSE FUSARIUM EAR ROT TO DEVELOP, PRACTICALLY THE WHOLE HARVEST CAN BE DESTROYED. THE PARTS THAT ARE HARVESTED IN SUCH A CASE CAN BE A HEALTH RISK TO PEOPLE AND ANIMALS.

It is generally accepted that approximately 10% of a total maize harvest is destroyed by the African maize stalk borer. Because of this type of

*Dr Annemie Erasmus, ARC-
Grain Crops, Potchefstroom.
The article was first published
in SA Graan/Grain, May 2020.*



damage, this insect species is still regarded as an important insect pest on maize.

In Africa, maize is attacked by a group of stalk borers that includes the African maize stalk borer (*Busseola fusca*), the Chilo borer (*Chilo partellus*), the pink stalk borer (*Sesamia calamistis*) and the

African maize stalk borers...



Calyx damage resembling little 'windows' after a stalk borer fed on the calyx.
Photo: Dr Annemie Erasmus



The diapause larva of the Africa maize stalk borer.
Photo: Dr Annemie Erasmus

sugarcane stalk borer (*Edana saccharina*). The African maize stalk borer is indigenous to Africa, which means that this stalk borer can be found only on this continent.

LIFE CYCLE

There are two to three clearly demarcated moth flights in every season. Depending on the planting date, the maize plants can be infected by either the first or the second generation. Female moths lay egg pockets behind the leaf sheath. Newborn larvae are dark brown in colour and become lighter as they mature. Shortly after the larvae hatch, they migrate upwards to the calyx to start feeding. Damage caused by these larvae appears like little 'windows' on the sepals (**Photo 1**). Bigger larvae eat straight through the calyx, so that the sepals appear to have a row of holes as they grow out. This type of damage is known as 'hail damage'.

If the growth point of the plant is damaged by the feeding larva, it leads to dead heart symptoms. Larvae stay in the plant calyx for approximately two to three weeks before they drill into the stem. The larval stage of the African maize stalk borer lasts approximately six weeks, after which they become pupae. The last generation of larvae of the growing season do not become pupae, but hibernate as diapause larvae (**Photo 2**) in stubble residue and are then the main source of infection during the subsequent season.

WHAT IS A DIAPAUSE PHASE?

Diapause is a form of resting phase in insects, similar to hibernation in some mammals. It enables insects to survive unfavourable environmental conditions. Diapause is a development response that only sur-

faces during a specific developing stage and it differs from one insect to the next.

If diapause occurs on the back of unfavourable environmental conditions, it is known as facultative diapause. However, if diapause occurs with every generation completed by the insect, it is called compulsory diapause. Facultative diapause is the most common form of diapause in insects and only occurs when a generation has to survive unfavourable conditions. However, compulsory diapause takes place at a determined time, regardless of the environmental factors.

During the third moth flight of the African maize stalk borer, which is also the final moth flight of the season, the moths lay eggs for the last time. Larvae hatching from these eggs do not complete the life cycle up to the moths, but prepare to survive the winter as larvae. The larvae that mature before the winter starts are the only ones that will survive as diapause larvae.

Factors that determine which part of the population will be mature by the winter include the location of the infestation, how soon winter conditions start during a specific year, and when the moths of the third moth flight flew and laid their eggs. The larvae that were able to mature before the winter later move to the base of the maize stalk (**Photo 3**) to overwinter.

During late autumn the larvae tunnel directly to the base of the stalk, where they then stay in diapause for the winter. During this time they do not feed on plant material anymore and they plug the tunnel behind them with frass. If there is more than one larva in the plant, the other larvae usually migrate to another plant, so that there is only one larva in each plant.



3

A diapause larva in the base of the maize stalk.
Photo: Dr Annemie Erasmus



4

The larva of an Africa maize stalk borer.
Photo: Dr Annemie Erasmus



A Chilo borer larva.
Photo: Dr Annemie Erasmus

5

African maize stalk borers...



The larva of a sugar cane stalk borer.
Photo: Dr Annemie Erasmus

6



7

The larva of the pink stalk borer.
Photo: Elrine Strydom

Diapause larvae hibernate in the base of the maize stalk for five months before they move on to the next development phase to become pupae. This means that larvae had to build up enough reserves to survive this period and to also be able to reproduce as soon as environmental conditions are favourable again.

HOW DO LARVAE EMERGE FROM THEIR WINTER SLEEP?

The first rain in spring (change in humidity), rising temperatures and changing day-night lengths (photo period) stimulate diapause larvae to become pupae. Larvae that were in diapause make holes in the stubble, a few centimetres above ground level – they look like little windows. The moths escape through these holes approximately two weeks after the pupae formed. While these larvae lie in the base of the stalk, they change into pupae and create the first moth flight of the new season. ■

