



## AGRHYMET Regional Centre



### SPECIAL BULLETIN

June 2017

**Warning : the Fall armyworm *Spodoptera frugiperda*, the new maize pest in West Africa, has reached Niger**

#### Geographical Distribution

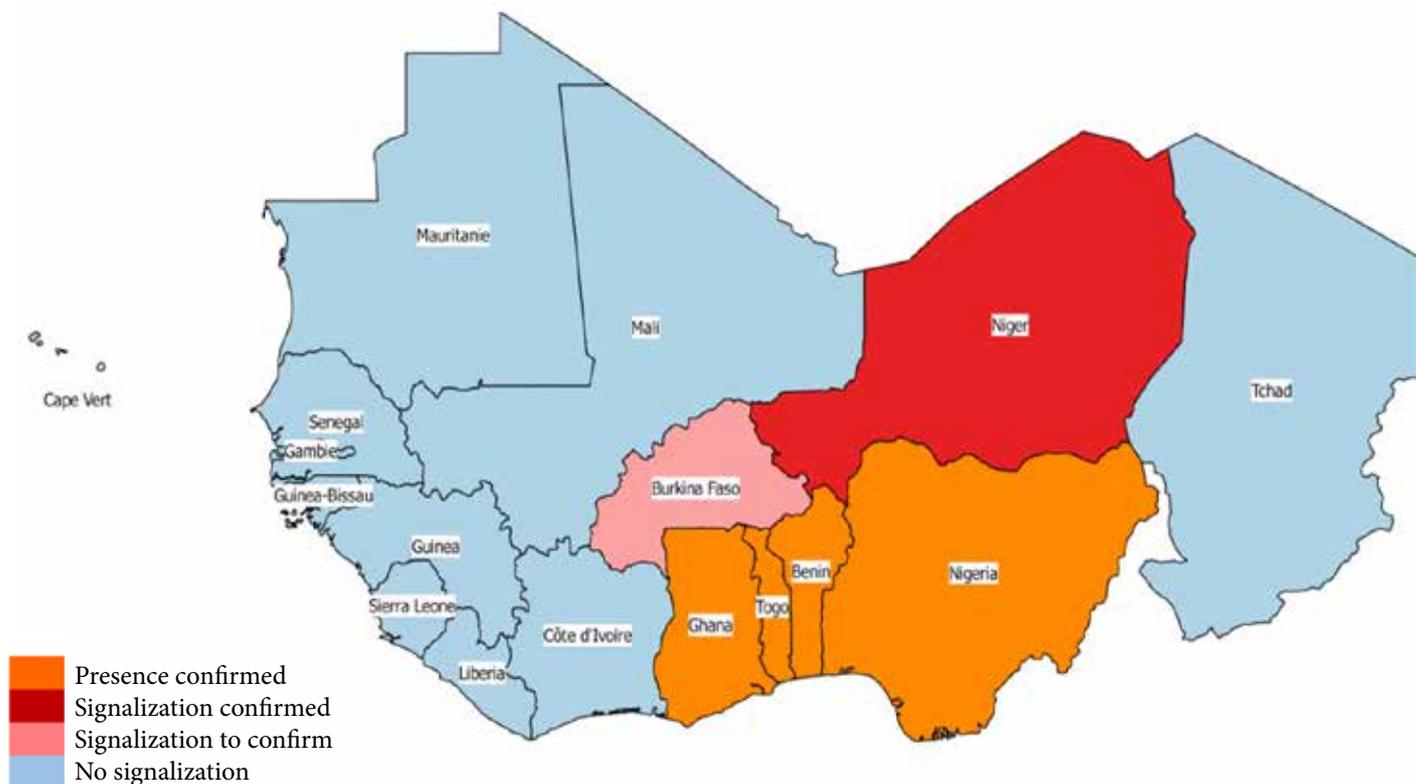


Figure 1: Occurrence of *S. frugiperda* in West Africa

The Fall armyworm *Spodoptera frugiperda* J.E. Smith from the tropics and subtropics of the Americas feeds on leaves and stems of more than 80 plant species (CABI, 2017). It was reported for the first time in 2016 in Africa, in Nigeria, Sao Tome, Benin and Togo (Goergen, G. et al., 2016, CIPV, 2016) and causes significant damage on maize crops. The presence of this pest has been confirmed in Ghana (CABI, 2017) and Zimbabwe (FAO, 2017) and reports have been recorded in Malawi, Mozambique, Namibia, South Africa and Zambia (BBC, 2017). Most recently, it has also been reported in Ethiopia.

Although routes are not yet identified, its introduction in Africa in 2016 reveals the level of threat to other African regions and tropical or subtropical regions of the world. Figure 1 shows the current or potential distribution of *S. frugiperda* in West Africa.

In August 2016, the Beninese press advanced the figure of 30,000 to 40,000 ha of corn destroyed in the regions of North Benin. The caterpillar has also caused significant damage in Togo and Nigeria. Even though it has only been present for less than a year, producers in Nigeria have already nicknamed it «Boko Haram» because of the extent of its damage. Attacks of *Spodoptera* genus have also been reported in the Central North region of Burkina Faso without any confirmation yet available on the offending species.

*S. frugiperda* has been reported in Torodi department and the Dosso region (RECA, 2016) and continues to spread rapidly as it has been reported in other areas in Niger (Figure 2) where damage has been reported. This propagation seems to continue even during the dry season on the irrigated crops as the insect do not observe any diapause during its cycle (Figure 3) and continue its reproduction as long as the conditions are favorable:

- In the Department of Torodi (Tillabéri region), damages were observed on leaves, flowers before their outings, and cobs on irrigated corn at Torodi (13.08833 ° N / 1.79250 ° E) and Kobadie (13.21972 ° N / 1.86472 ° E). The leaves carry many holes and tears, characteristic of the damage on the leaves while they are still wound in cornea.
- In the Tahoua region, according to sources from the Niger General Directorate of Plant Protection (DGPV), *S. frugiperda* has been reported on maize in the Taddis valley (14.91721 ° N / 5, 25417 ° E) in Tahoua and in the department of Konni (13,80336 ° N / 5,25242 ° E) with medium damages.
- More recently, the presence of the species is reported in the Department of Tillabéri on the irrigated perimeter of Tillakaina (14,24977 ° N / 1,43103 ° E) and the seed farm of Lossa (13,97621 ° N / 1.55348 ° E) respectively on maize and on millet crop grown for seeds production. With the support of the DGPV and the Regional Crop Protection Service of Tillabéri, the emergences resulting from the breeding by AGRHYMET of caterpillars samples harvested at Tillakaina confirmed that it is indeed *S. frugiperda*.

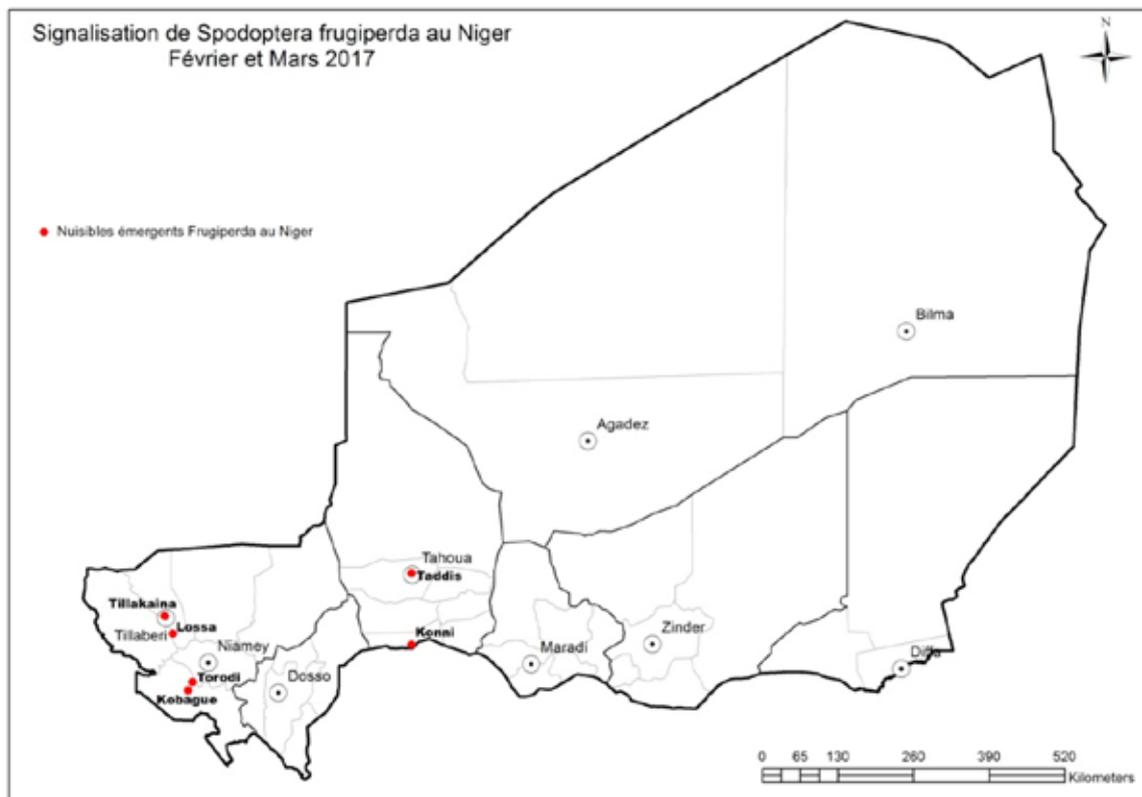


Figure 2 – Location of reports of *Spodoptera frugiperda* in Niger

## Description and life history of the insect



Picture 1 – *S. frugiperda* Caterpillar (source CABI)

In the adult, the forewing is marbled (light brown, gray, straw for the male (picture 2); and dark brown, gray in female) with a disc cell containing straw color on three quarters of the area and dark brown on a quarter of the area. The stems are straw colored with a dark brown margin. The length of the male's body is 1.6 cm and the span of 3.7 cm while the female measures 1.7 cm with a wingspan of 3.8 cm.



Picture 2 – Adult male of *S. frugiperda* (source CABI)

The eggs are laid overnight on the leaves of the host plant, glued to the underside of the lower part of the leaves, in tight clusters of 100-300 and sometimes in two layers, commonly covered with a protective layer of abdominal hair. Hatching requires 2 to 10 days (usually 3 to 5) (figure 3). Young larvae feed deep into the spiral (cornea); the first two larval instars feed gregariously on the underside of the young leaves, causing a characteristic skeleton or fenestration effect, and the plant's growth point can be destroyed.

Larvae of larger size become cannibalistic and therefore one or two larvae per spiral (cornea) are usual. The rate of larval development across the sixth stages is controlled by a combination of diet and temperature conditions, and usually takes 14 to 28 days. Larger larvae are nocturnal, unless they enter the legionary caterpillar stage when they are swarming and dispersing, seeking other sources of food.

Pupation takes place inside a soft cocoon in a soil cell, or rarely between the leaves on the host plant, and 7 to 14 days are required for development. Adults emerge at night and usually use their natural pre-oviposition period to fly several kilometers before settling for egg-laying, sometimes migrating over long distances. On average, adults live 11 to 14 days.

It has been reported that the optimum temperature for larval development is 28°C, but is lower for egg laying and pupation. In the tropics, breeding may be continuous with four to six generations per year, but in the northern regions only one or two generations develop; at lower temperatures, activity and development cease, and when the gel occurs, all stages are usually killed. In the United States, *S. frugiperda* only spends winter in southern Texas and Florida. During mild winters, pupae can survive in more northern locations.

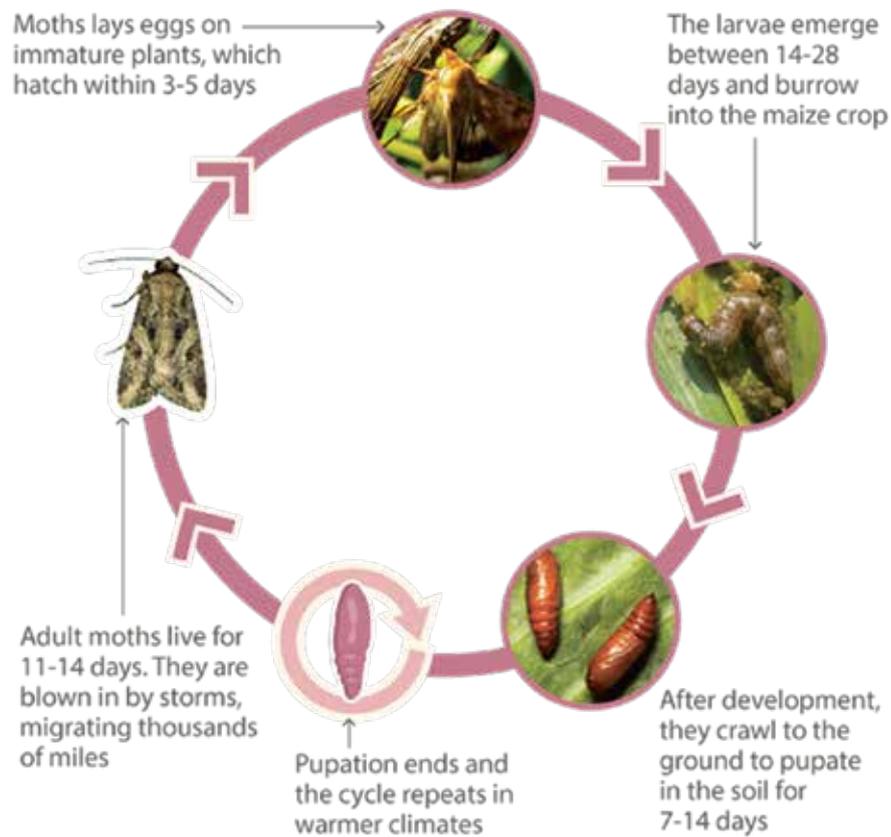


Figure 3 - *Spodoptera frugiperda* development cycle (IMWIC source)

### Damage and host plants

*Spodoptera frugiperda* causes significant damage to economically important cultivated grasses including maize, rice, sorghum, sugar cane, but also vegetables and cotton. Infestations during the mid-to-late corn stage may result in yield losses of 15-73% when 55-100% of the plants are infested (Hruska and Gould, 1997).



*S. frugiperda* caterpillars (Photos 3 to 7) appear to be much more damaging to maize in West and Central Africa than most other African *Spodoptera* species (IITA, 2016).

Picture 3: *Spodoptera frugiperda* caterpillar causing damage on corn cob (Source CABI)

According to Roger Day, Coordinator of the Center for Agriculture and Biosciences International (CABI), a conservative estimate indicates that maize losses could amount to US \$ 3 billion for the African continent in the coming year because of the Fall armyworm.



Picture 4 and 5: *Spodoptera frugiperda* damage in corn fields (right in North Benin and left in Tillakaina in Niger) - Sources: DPV Benin and DGPV Niger



Picture 6 and 7: Damage on corn plant (left) and on spur (right) in Torodi - Source: DGPV Niger

## Control

The control method used up to now by producers are essentially chemical control using organophosphorus and pyrethroid insecticides and mechanical control by manual picking of caterpillars.

## Urgent recommendations

The eminent risk of the Fall armyworm on food security in Africa is real and the issue will have to be tackled through the implementation of an integrated control program. For an effective integrated pest management strategy, a first step will be to conduct surveys to accurately determine the pest distribution and to estimate losses on crops of economic importance in West Africa. Information must also be obtained on its dynamics, its hosts plants and its propagation.

Regarding the rapid spreading capacity of the species and the potential risk for food security of its establishment in the region, the following urgent provisions should be taken:

- (1) Strengthen the capacities of national Crop Protection (PV) and extension services as well as farmers in order to accurately identify the species involved;
- 2) Implement a prospecting and trapping program to identify and determine affected areas;
- (3) strengthen the control of plants and plant products on borders and points of entry into the west African region;
- 4) Provide affected producers with effective equipment and means of treatment to identify reported and / or detected outbreaks and their control. This option, in addition to being costly, has often yielded mixed results. Therefore, it should be a palliative and should not be privileged because of the risks of the species resistance. Insecticides applied in most affected countries act by contact and inhalation and are therefore ineffective;
- 5) Establish a communication network and develop an information and sensitization program for the population, technicians and decision-makers by means of the press (audio-visual spot, press release, etc.) and teaching materials (posters, leaflets , Etc.).

### Short and medium term prospects

In the short to medium term, surveys should be continued to map the infested areas. It is also a matter of determining the sensitivity of insects to the most used insecticides for better targeted control.

In the long term, integrated pest management should be developed with biological control as a central focus, which will reduce insecticide requirements on the one hand and anticipate (and / or cope with) possible resistance to insecticides on the other. This work will have to be done with the collaboration of the entire scientific community.

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### Bibliography:

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**Photos:** RECA, CABI, University of Florida, DGPV Niger

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