

# Identification, biology, ecology, damage symptoms and signs of FAW



## FAW-IPM

Africa-specific, science-led, sustainable and integrated management of the fall armyworm



# What is Fall armyworm?

- ❖ The Fall armyworm (FAW), *Spodoptera frugiperda*, is a new pest in Africa
- ❖ It is native to tropical and subtropical regions of the Americas
- ❖ In 2016, it was reported for the first time from the African continent, in Nigeria, Sao Tomé, Benin and Togo (IITA, 2016; IPPC, 2016)
- ❖ It has been confirmed in Ghana (CABI, 2017), Zimbabwe (FAO, 2017) and Swaziland (IPPC, 2017) and there are preliminary reports of the pest in Malawi, Mozambique, Namibia, South Africa and Zambia (BBC, 2017).
- ❖ It has spread to: Tanzania, Uganda, Kenya, Burundi, Rwanda and Ethiopia

# FAW classification and host range

→Lepidopteran pest

→The larvae prefer feeding on maize, but can be found in millet, sorghum, rice, wheat, sugar cane, wild grasses and vegetables

→Feeds on large numbers on leaves and stems of more than 80 plant species:

- Maize
- Rice
- Sorghum
- Sugarcane
- Vegetable crops
- Cotton
- Tobacco

# Fall armyworm Identification



*Dark head and Y-shaped pale marking on the front*



FA  
W



Stemborer

Fall Armyworm (*Spodoptera frugiperda*)

### Fall Armyworm Identification



Broad, pale band along top of body, contrasted by dark striping at the sides

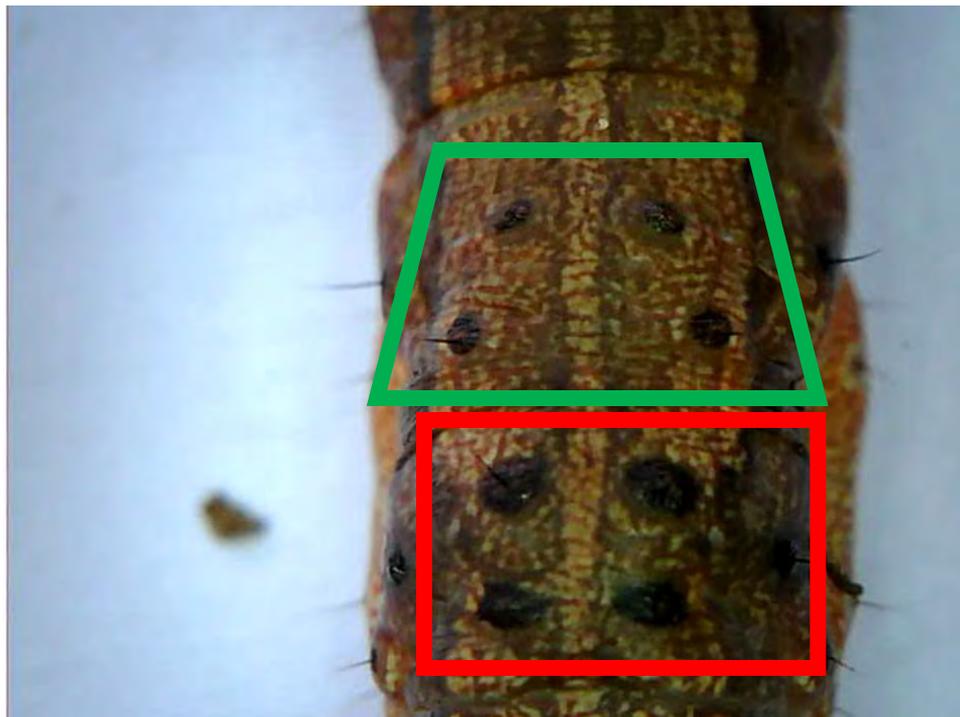
Eighth abdominal segment with four dark spots

Head with dark net-like pattern and upside-down, white "Y" marking



Four Dots

Fall armyworm



**Four dark spots forming a square on the second to last segment**

# Fall armyworm photo guide-identification



Adult females lay 100-200 eggs on the lower leaves. They change from green to light brown before hatching.



Eggs are covered in protective scales rubbed off from the moths abdomen.



After hatching, the young caterpillars begin feeding on the leaves.



As they grow, caterpillars change from light green to brown.



Fall armyworms have four dark spots forming a square on the second-to-last body segment.



Fall armyworms have a dark head with a pale, upside-down Y-shape on the front.



They are at their most damaging when they are 3-4 cm long.



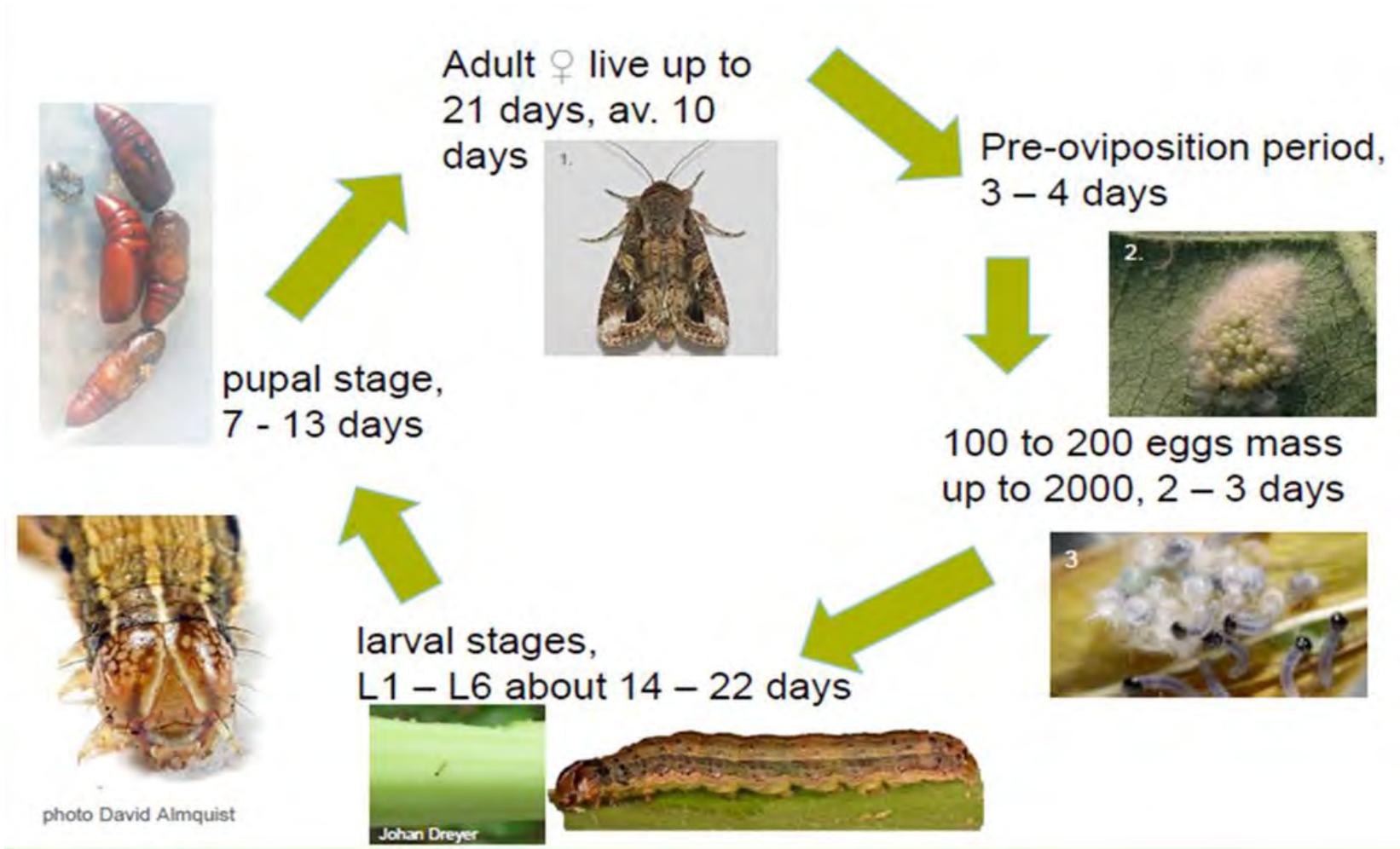
The pupa is shiny brown and usually found 2-8 cm into the soil.



Adult moths (top: female, bottom: male). The females are slightly bigger than the males.

# Life cycle of the fall armyworm

24-40 days



# FAW eggs



- ❖ The eggs are laid in masses (100-200 eggs)
- ❖ They are cream, grey or whitish in colour
- ❖ They have hairy-like covering
- ❖ Eggs are usually laid on the underside of leaves but sometimes on upper side of the leaves when not fully out of the whorl.

# FAW Larvae

- ❖ Larvae emerge within 3 to 5 days
- ❖ There are six larval instar stages. In the 2nd and 3rd instar stages, larvae are often cannibalistic
- ❖ Young larvae are greenish with a black head, the head turning orange colour in the second instar.
- ❖ Ballooning often occurs moving larvae by wind to other plants
- ❖ Mature larvae are 30 to 40mm in length and vary in color from light tan to green to black
- ❖ The face of the mature larva is marked with a light-coloured inverted "Y".



## FAW Larvae cont...



Some larvae move into the whorls while others “balloon” to nearby plants.

Young larvae hide in the whorl during the day but emerge at night to feed on the leaves at night or early morning



# FAW Pupae

- ❖ Pupation takes place in the soil, at a depth 2 to 8 cm;
- ❖ The larva constructs a loose cocoon, oval in shape and 20 to 30 mm in length;
- ❖ If the soil is too hard, larvae may web together leaf debris and other material to form a cocoon on the soil surface;
- ❖ Duration of the pupal stage is 8-9 days during the summer and 20-30 days during the winter



Pupae

# FAW adult –male & female



Typical adult male fall armyworm



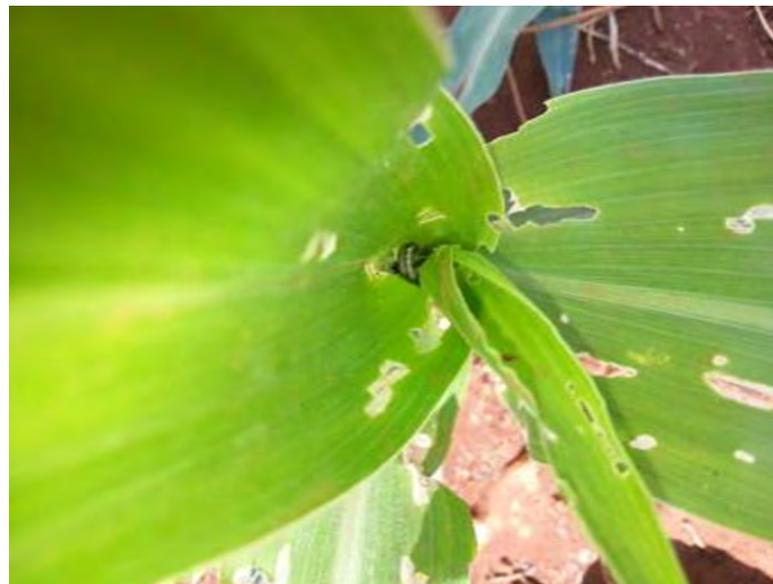
Typical adult female fall armyworm

# Conditions that favour survival of FAW

- ❖ Larvae growth depend of several factors e.g. diet, temperature and humidity
- ❖ Optimum temperature for larval development is 28°C and frost kills the insect
- ❖ Rainfall may wash off some of the immature stages of the insects and wind speed may help in dispersal of moths
- ❖ Soil type/conditions, tillage methods may influence pupal development
- ❖ Crop variety, agricultural practices, crop phenology, crop stage may influence development and survival of larvae

# Symptoms of FAW damage

- ❖ The pest affect the crop at different stages of growth, from early vegetative to physiological maturity
- ❖ Larvae of different stages can be found on the same plant
- ❖ Damage on young maize plants may call for replanting
- ❖ Damage on leaves disrupt the plant's grain filling ability
- ❖ Larval feeding causes extensive 'window-panes' on leaves



# Symptoms cont...

- ❖ Window paning damage is caused by young larvae
- ❖ Mature larval instars chew larger holes causing ragged whorl leaves
- ❖ Saw dust like larval droppings (frass) are signs especially with fresh feeding
- ❖ Heavily infested fields appear as if they have been hit by a severe hailstorm.



# Symptoms cont...

- ❖ Feeding inside the whorls destroys silks and developing tassels, thereby limiting fertilization of the ear.
- ❖ They also feed on the silks interfering with pollination.
- ❖ Damage to cobs may lead to fungal infection, aflatoxins and loss of grain quality.
- ❖ Emerging moths generally fly off to younger crops to oviposit.



# Larval damage



10 Feeding by young caterpillars results in semi-transparent patches on the leaves called windows.



11 Young caterpillars can spin silken threads which catch the wind and transport the caterpillars to a new plant.



12 Feeding through the whorl can cause a line of identical "shot" holes, when the leaf unfurls.



13 As they develop, Fall armyworm move permanently into the whorl. This means that it is difficult to detect early infestations.



14 Feeding can cause the whorl and upper leaves to be a mass of holes, ragged edges, and caterpillar poo (called "frass").



15 The caterpillars usually burrow into the side of the cob.



16 Fall armyworm infestation causes stunting and destruction of developing tassels and kernels, which reduces grain quality and yield.



17 When the caterpillars burrow into the side of the cob, damage to grains can lead to rot.



18 Holding a maize plant damaged by Fall armyworm.

Source: FAO/CABI

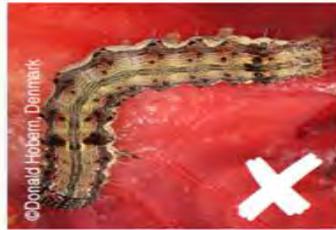
# Symptoms of damage on leaves and ears



# Differentiating FAW from other worms

- ❖ Eggs are not laid in masses and are not covered with hairs
- ❖ The common cutworm lays eggs singly, its larvae are grey, they cut seedlings
- ❖ The eggs are laid behind the leaf sheath or between the stem and leaves unlike FAW
- ❖ Younger larvae of *Busseola fusca*, *Chilo partellus* and *Sesamia calamistis* feed in the whorls but the older larvae bore into the stems unlike FAW
- ❖ In other worms, pupation occurs in an earthen cell in the soil.

# Differentiating FAW from other worms



The **cotton bollworm** (*Helicoverpa armigera*) often shows a similar pattern of dots on its back, but its head is usually paler, and although they can also show an inverted Y this is usually a similar colour to the rest of the head. Unlike the fall armyworm they feel rough to the touch due to tiny spines.



**African armyworm**  
*Spodoptera exempta*



**Beet armyworm**  
*Spodoptera exigua*



**African cotton leafworm**  
*Spodoptera littoralis*



**Spotted stem borer**  
*Chilo partellus*

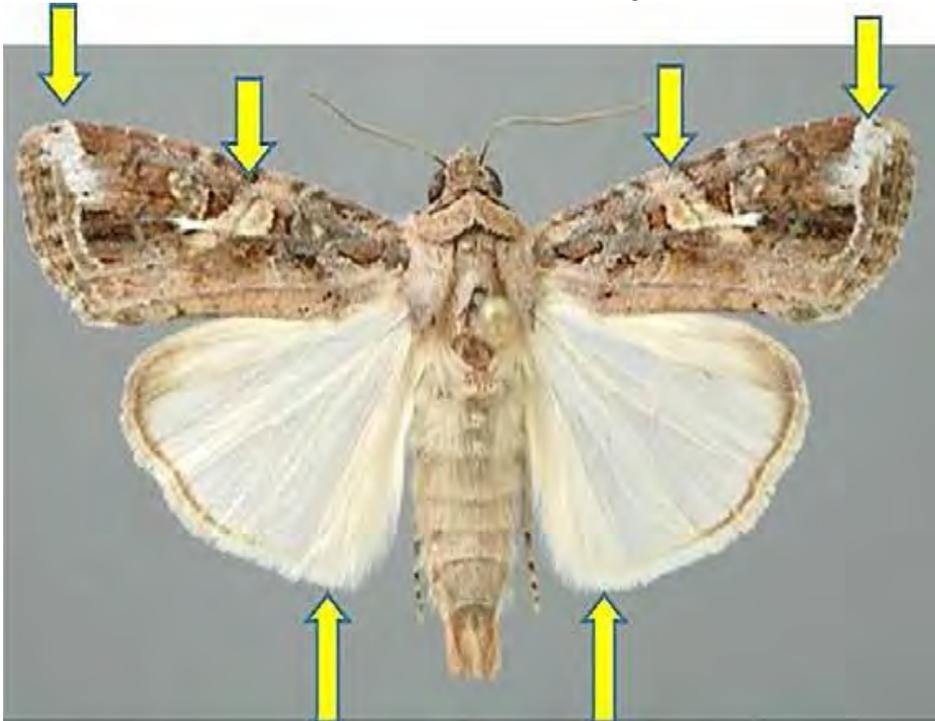


**African maize stalk borer**  
*Busseola fusca*

Source: FAO/CABI

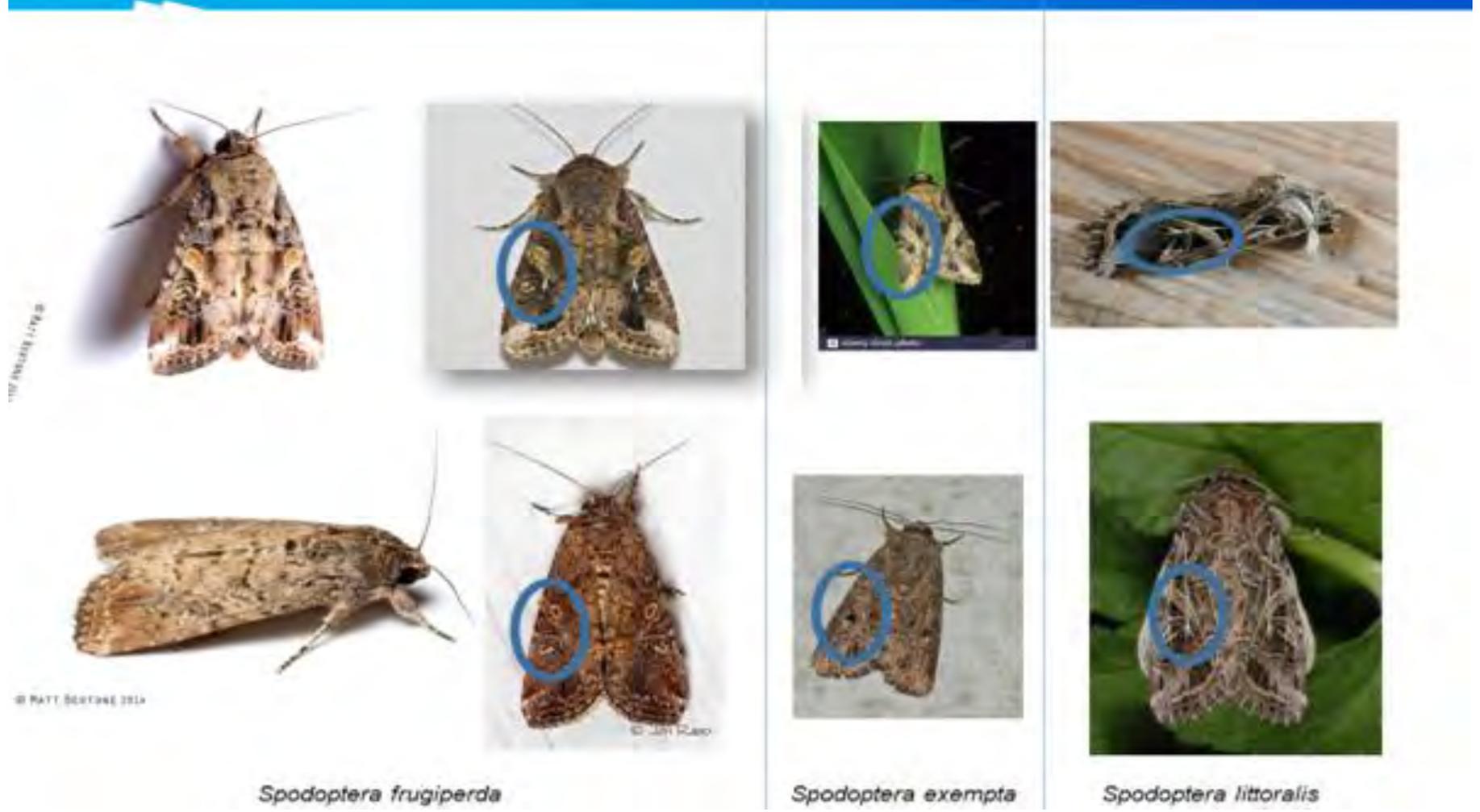
# Differentiating FAW from other worms

Yellow arrows indicate key characters



The African armyworm, not to be confused with FAW

# Differentiating FAW from other worms



*Spodoptera frugiperda*

*Spodoptera exempta*

*Spodoptera littoralis*

Source: FAO/CABI

# Questions to ask to confirm if it is FAW

- ❖ Does it have a dark head with a pale, upside-down, Y-shaped marking on the front?
- ❖ Does each of the body segments have a pattern of four raised spots when seen from above?
- ❖ Does it have four dark spots that form a square on the second-to-last body segment?
- ❖ Is its skin smooth to the touch?
- ❖ Is the excreta of the larvae in the form of large coarse clumps?
- ❖ If the answer to these questions is yes, then it is FAW

# Thank you



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