Note

In addition to the outlined measures, natural control of fall armyworm should be enhanced by avoiding indiscriminate use of pesticides. This will allow predators, parasites and diseases of fall armyworm to naturally control the pest. Examples of existing natural agents include the following:

- Ladybird bugs that feed on eggs
- Lacewigs that feed on eggs and caterpillars at early stages
- Birds that feed on pupa and large caterpillars
- Fungal and viral diseases that cause deaths of fall armyworm caterpillars

Other management methods may also be considered, if confirmed to be effective against fall armyworm, e.g. use of biocontrol agents/biopesticides, application of botanical extracts, crop ecosystem management, etc.
Introduction

- Fall armyworm (FAW) [Scientific name: *Spodoptera frugiperda*] is an insect pest with moth as the adult stage and larvae (caterpillars) as the destructive stage.
- In Kenya, the pest was first observed in March 2017 on off-season, irrigated maize crops.
- Maize is the pest’s most preferred host but can also attack crop plants such as sorghum, rice and wheat.

Indicators of fall armyworm attacks

There are two ways of knowing whether a crop has a FAW attack:
1. Seeing the pest itself
2. Observing symptoms & signs

The pest appearance

FAW has 4 main stages of development: Egg, Larva, Pupa and Adult.

3. Use of insecticides

- Spray late in the evening or very early in the morning when the larvae are active (not hiding).
- Direct the spray to the plant whorls (funnel) and top leaves.
- Repeat spraying 2 to 3 times to target young larvae that emerge after earlier sprays – it can be at 2 weeks intervals or as guided by scouting observations.
- Ensure food safety, protection of human health and avoid environmental pollution; spray only when necessary on the basis of scouting observations and avoid spraying 2 months to maturity of maize.
- Choose an appropriate insecticide on the basis of experience or recommendation from agricultural extension agents.
  - Several insecticides are effective against fall armyworm, subject to appropriate application. These include:
    - Abamectin + Chlorantraniliprole (e.g. Voliam Targo 063 SC);
    - Lufenuron (e.g. Match 50EC);
    - Chlorantraniliprole (e.g. Coragen 20SC);
    - Emamectin benzoate (e.g. Prove 1.92EC);
    - Pyriproxyfen (e.g. Profen 10.8EC);
    - Acephate (e.g. Orthene Pellet), etc.
- Alternate products with different active ingredients, preferably after 2 applications, to prevent pesticide resistance development.

4. Restrict/prevent movement of infested plant materials

Destroy infested materials or feed them to livestock as close to the affected farm as possible. Be very careful when feeding livestock after disposal; particularly if spraying had been done recently, to avoid animal poisoning.
Management of fall armyworm

The following are the key measures, and should be applied in an integrated management approach (combining several intervention measures) since every positive action has an additive effect:

1. **Plant early in the season, avoiding late and off-season planting**
   Early planting allows maturity of maize before high pest population build-up.

2. **Use mechanical control methods**
   Examples include the following:
   - Handpicking and squashing egg masses.
   - Picking and crashing caterpillars or drowning them in soapy water.
   - Ploughing before onset of rains to expose pupae to predators and solar heat.
   - Application of suffocating materials such as wood ash, dry soil/sand in plant whorls.
   - FAW adult moths lay eggs in batches on maize plants, normally on fresh leaves.
   - The white egg masses are normally covered with wool/cotton-like material of the adult moth scales.
   - Larvae emerge from eggs and grow in size as they continue feeding.
   - There are 6 ‘stages’/sizes of larvae, called instars.
   - Young larvae (1st to 3rd instar) are greenish or yellowish brown in colour and have hair-like spikes. They are very small and not easy to notice.
   - Late-stage larvae are light to dark brown or even blackish, and the hair-like spikes are less-evident.
   - Larvae have 3 thin light-coloured stripes along the back.

**How to identify FAW caterpillars**

- They have a light-coloured “inverted” Y mark on the head, linking with the middle thin stripe.
- They have 4 black dots with a square arrangement on the second-last segment.
Symptoms and signs

- Young caterpillars (1-3 instar stage) feed on leaves and cause window pane-like damage, initially appearing to only “scratch” the leaf.
- As caterpillars grow, they feed on large amounts of leaf tissue causing large ragged and elongated holes on leaves, leading to a shredded appearance.
- The caterpillars can also feed on tassels and ears.
- Caterpillars produce a lot of frass (excreta) as they feed and grow. Stage 1-3 instar produce powder-like substance, stage 4-5 instars produce sawdust-like substance and stage 6 instar produces granular (pellet-like) substance.

Scouting and monitoring for timely action

- Early detection or observation of symptoms of fall armyworm is essential for its effective management.
- This is achieved by scouting, which involves walking in crop fields in a systematic pattern to physically look for larvae or damage by the pest every week (or more frequently), starting from crop emergence stage onwards. See example below.

Frass (excreta) produced by FAW caterpillars on leaves

Window pane-like damage (left) and shredding of leaves (right)

FAW damage on maize tassel (left) and ear (right)

Movement pattern for scouting in a maize field - inspect 10-20 plants at each stop point