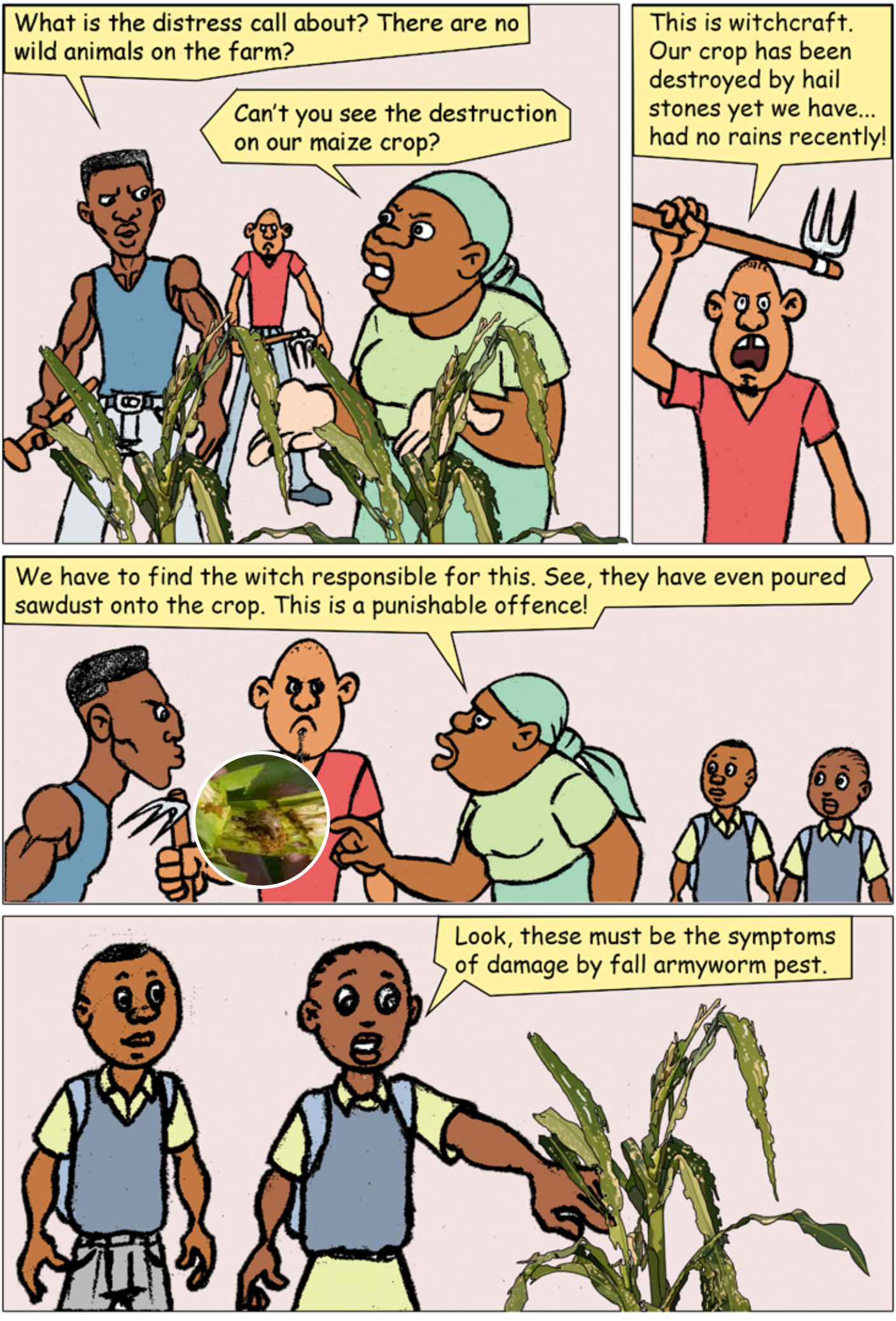
Managing the Fall Armyworm Threat Using the Push–Pull Technology


The peace and quiet of the early morning...
....is broken by an agonized scream.
woi! woi! woi!
The villagers respond in arms ready to chase the normal threat to their farms. Elephants and baboons.
At the farm, there are no wild animals attacking their crop.
??


What is the distress call about? There are no wild animals on the farm?
Can't you see the destruction on our maize crop?
This is witchcraft. Our crop has been destroyed by hail stones yet we have... had no rains recently!
We have to find the witch responsible for this. See, they have even poured sawdust onto the crop. This is a punishable offence!
Look, these must be the symptoms of damage by fall armyworm pest.

yes, we learnt about it during the Agriculture show. The infestation is so serious..

.What did you learn at the Agri-show? Are you saying this maize has been destroyed by some pest?.

Yes, the hailstone like damage you see on the maize has been caused by a pest known as the fall armyworm (*Spodoptera frugiperda*).

Yes, they cause elongated, ragged holes and may cut leaves in half. Like this one. If the pest is not controlled, it can cause upto 100% yield loss.

What about the sawdust?

That is not sawdust. It is frass (caterpillar poo). Look ! the Agriculture officer who tought us about the fall army is coming, she can explain more.

Well done children, I am happy to know that you are sharing the lessons you learned about the fall armyworm with your parents!

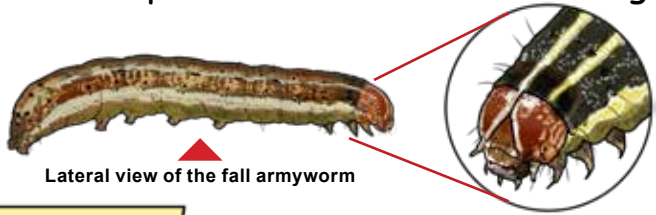
If you inspect the whorls of the affected plants, you will see fall armyworm caterpillars

I see a caterpillar

Fall armyworm is a highly destructive pest on cereals and other important cultivated plants

The egg masses are covered in protective scales. After hatching, the young caterpillars begin feeding on the leaves.

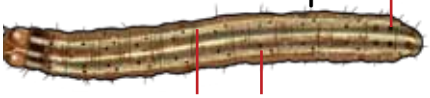
The armyworm head is covered with a dark net-like pattern and what looks like an upside down white 'Y' marking



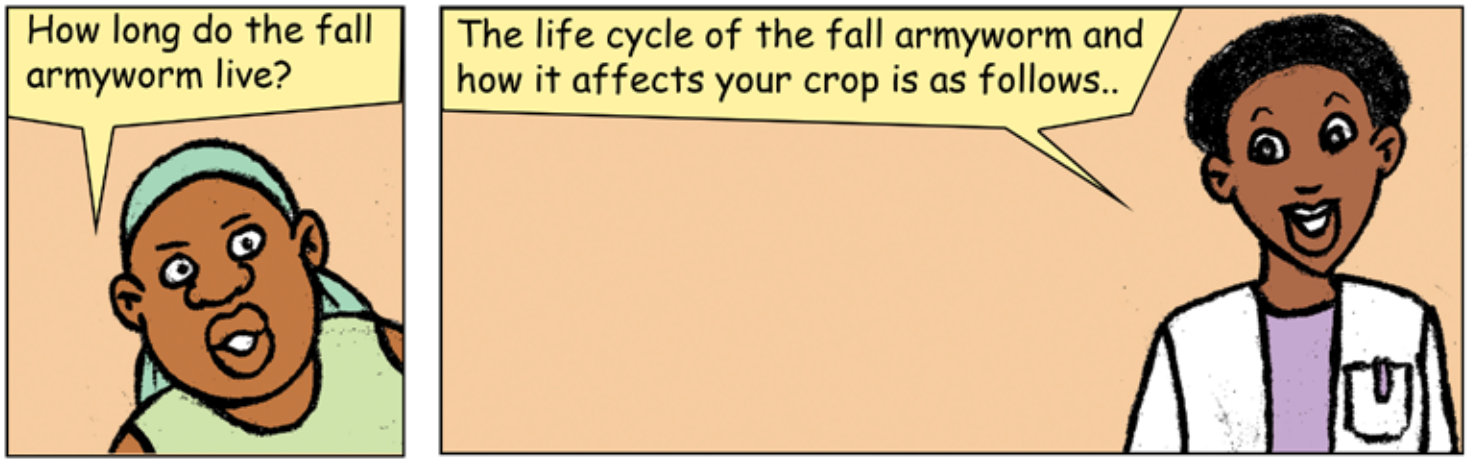
Lateral view of the fall armyworm

The eighth abdominal segment has four dark spots

Dorsal view of the fall armyworm



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



Fall armyworm: Life cycle and damage to maize

The fall armyworm life cycle includes four growth stages: egg, six growth stages of caterpillar development (instars), pupa and moth.

This diagram illustrates the life cycle, showing where to find the fall armyworm on maize plants at any given stage.

DAY 6–14

GROWTH STAGES 4–6

By stage 3–6 it will have reached the protective region of the whorl, where it does the most damage, resulting in ragged holes in the leaves.

Feeding on young plants can kill the growing point resulting in no new leaves or cobs developing.

Often only 1 or 2 caterpillars are found in each whorl, as they become cannibalistic when larger and will eat each other to reduce competition for food.

Large quantities of frass (caterpillar excrement) are present. When this dries, it resembles sawdust.

If the plant is older and has already developed cobs, then the caterpillar will eat its way through the protective leaf bracts into the side of the cob where it begins to feed on the developing kernels (seeds).

DAY 3–6

GROWTH STAGES 1–3

After hatching the young caterpillars feed superficially, usually on the undersides of leaves. Feeding results in semi-transparent patches on the leaves called windows.

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

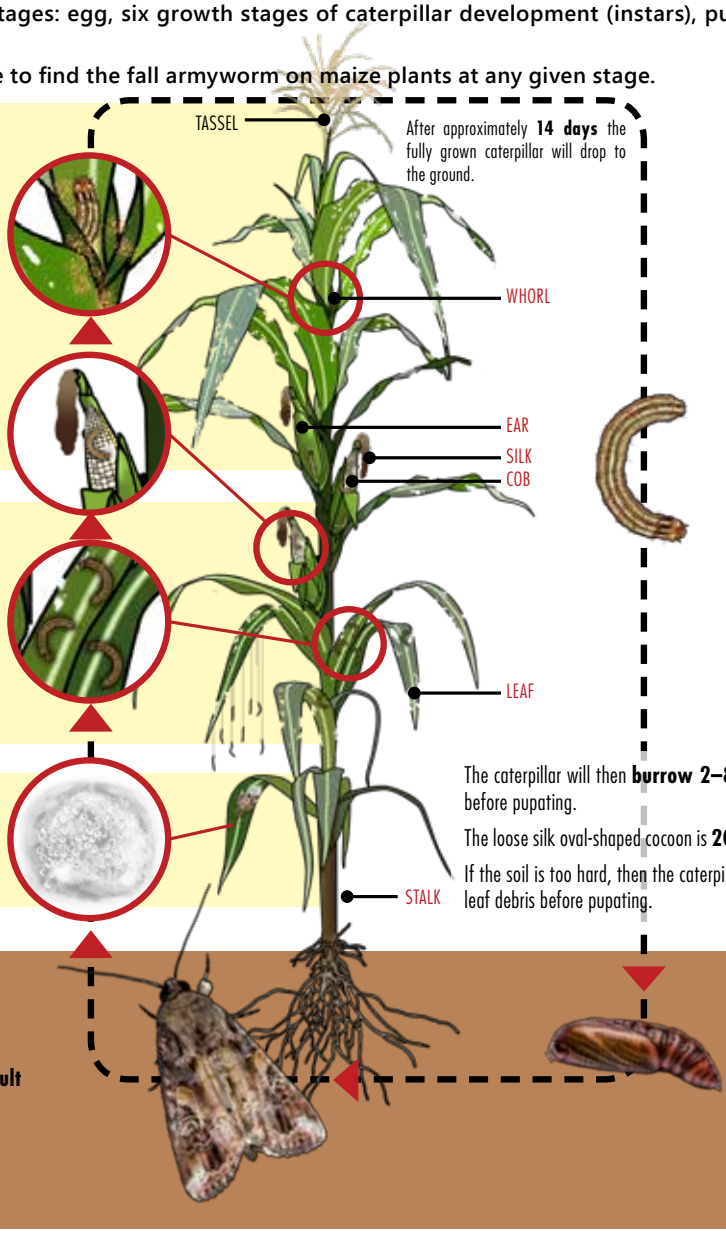
The leaf whorl is preferred in young plants, whereas the leaves around the cob silks are attractive in older plants.

Feeding is more active during the night.

DAY 1–3

Eggs **(100–200)** are generally laid on the underside of leaves, typically near the base of the plant, close to the junction of the leaf and the stem. The eggs are covered in protective scales rubbed off from the moth's abdomen after laying.

The eggs may be laid higher up the plants or on nearby vegetation when the populations are high.



How does fall armyworm spread?

The adult moth can fly between 30-100 km in one night. The female lays 1500-2000 eggs in her lifetime.

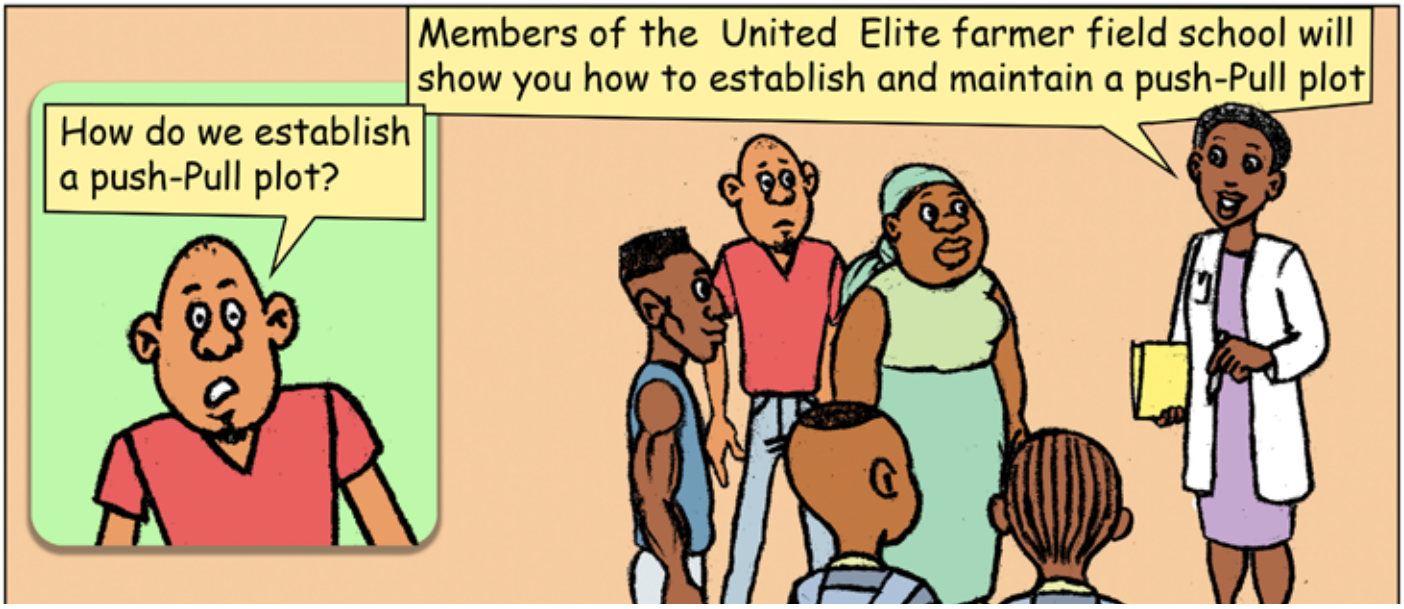
Does it feed on other crops?

Fall armyworm prefers maize, but can feed on more than 80 varieties of plants including sorghum, millet and rice.

There is no need to worry though. Fall armyworm can be controlled using the Push-pull technology.

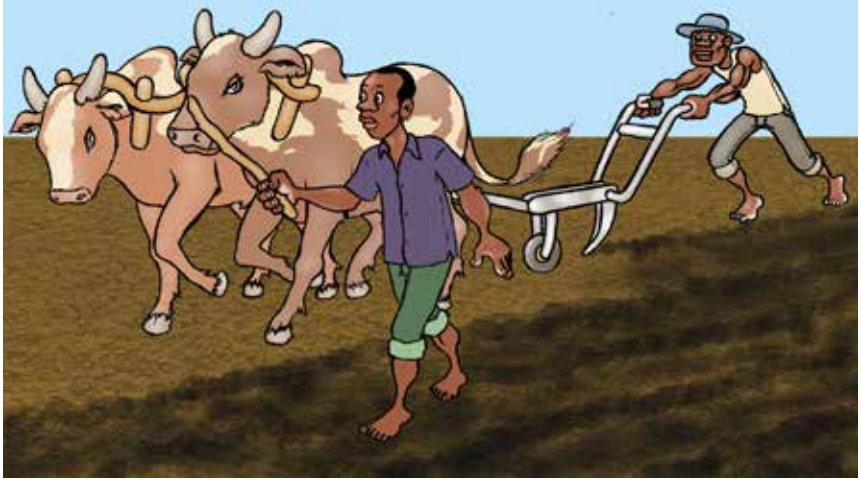
What is push-pull technology?

It is a cropping system, where cereals are inter-cropped with desmodium legume and the plot surrounded by Napier or brachiaria grass border, for controlling Striga weed, stem-borers and fall armyworm pests.Desmodium planted between the rows of maize, repel the pests (Push) and control the parasitic Striga weed, while the border grasses attracts (pull) the stemborer moths, but do not support larval development when eggs are laid and hatched and thus controlling the pest population naturally.



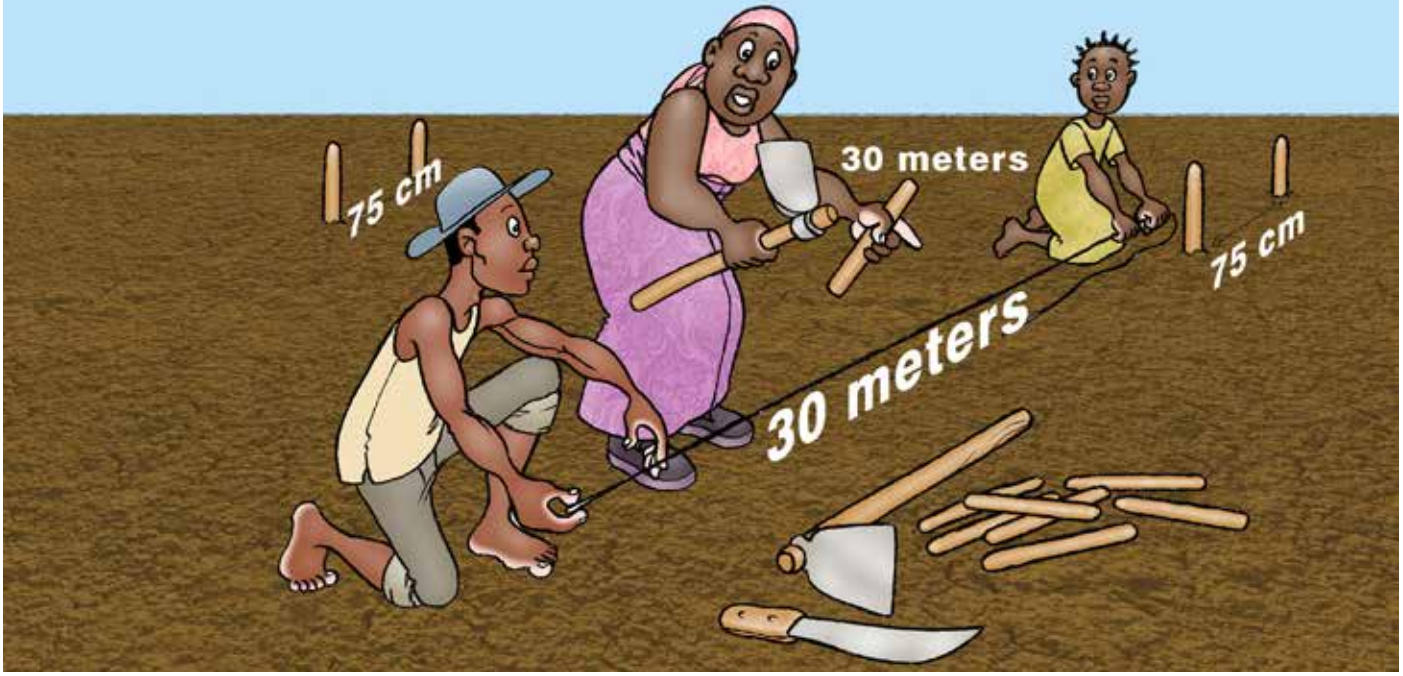
ESTABLISHING A PUSH–PULL PLOT

Clear the land and plough ...

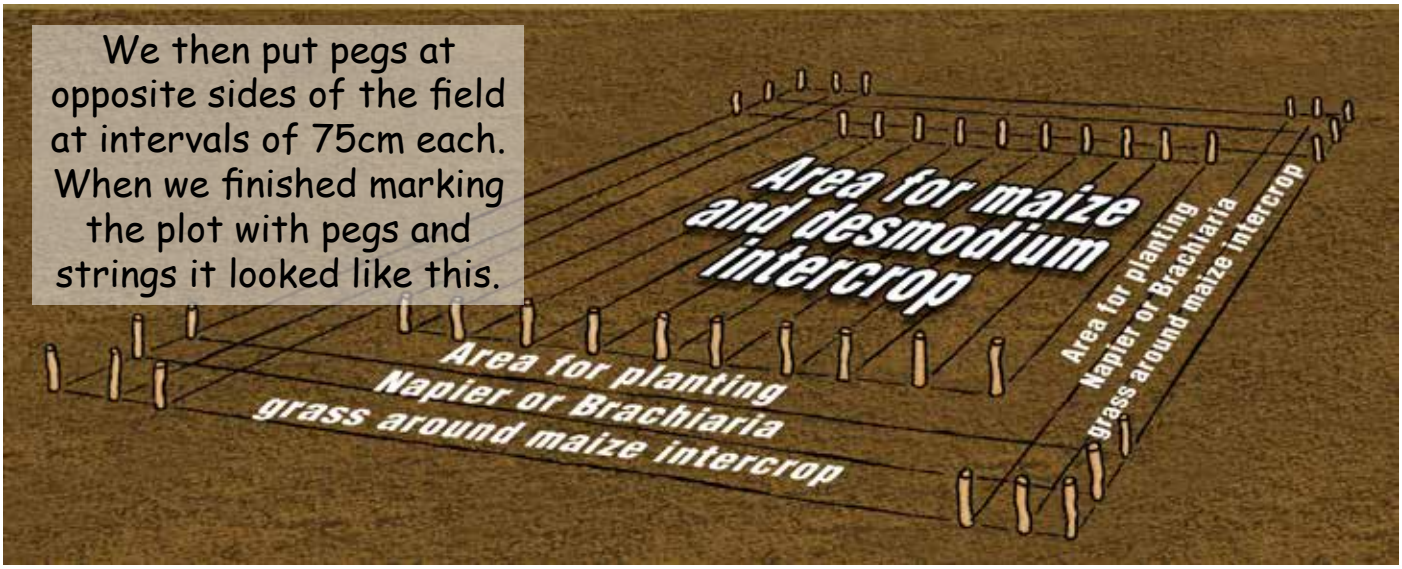


... then break down the soil until it is fine.

Use pegs and ropes, measure the first plot of 30m x 30m. A Push-pull plot can be as small as 20m x 20m, or as big as any shamba.



We then put pegs at opposite sides of the field at intervals of 75cm each. When we finished marking the plot with pegs and strings it looked like this.

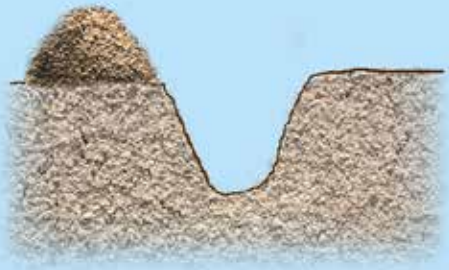


TO PLANT BRACHIARIA GRASS

Brachiaria can be planted by use of root splits or seed.

To plant brachiaria using root splits follow these steps.

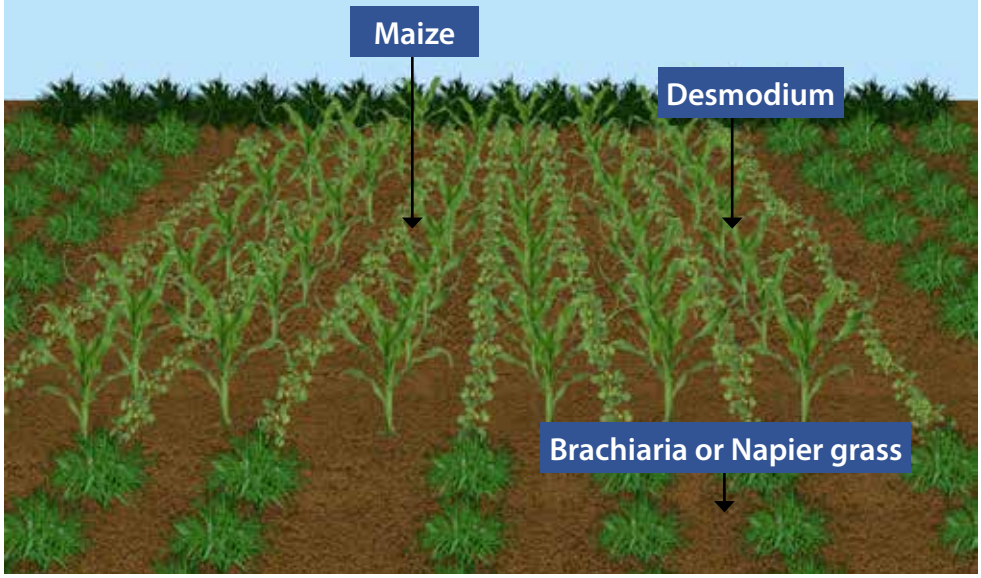
1. Dig holes along the demarcated lines ready for planting.



2. Apply two hand-fulls of well decomposed farmyard manure in each hole.

3. Placing Brachiaria root splits upright into the planting holes and covering with soil.

After 5 weeks, your Push-pull plot should look like this.



BY THE FOLLOWING PLANTING SEASON, THE VILLAGE HAD ADOPTED THE PUSH ULL TECHNOLOGY AND HAVE THE FOLLOWING GAINS.

Agric extension officer meeting the group of farmers two seasons later.

you have been planting maize under the push-pull system the last 2 seasons what changes have you seen in your farms?

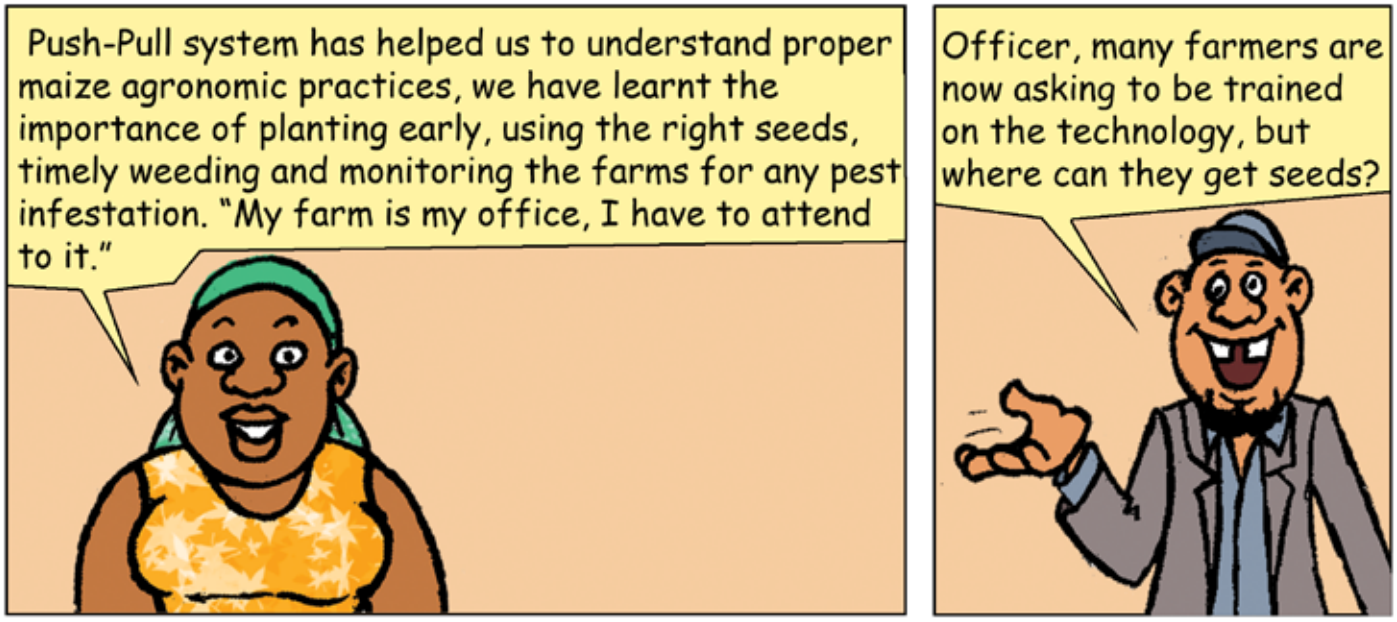
Fall armyworm did not damage maize in my Push-Pull plot.

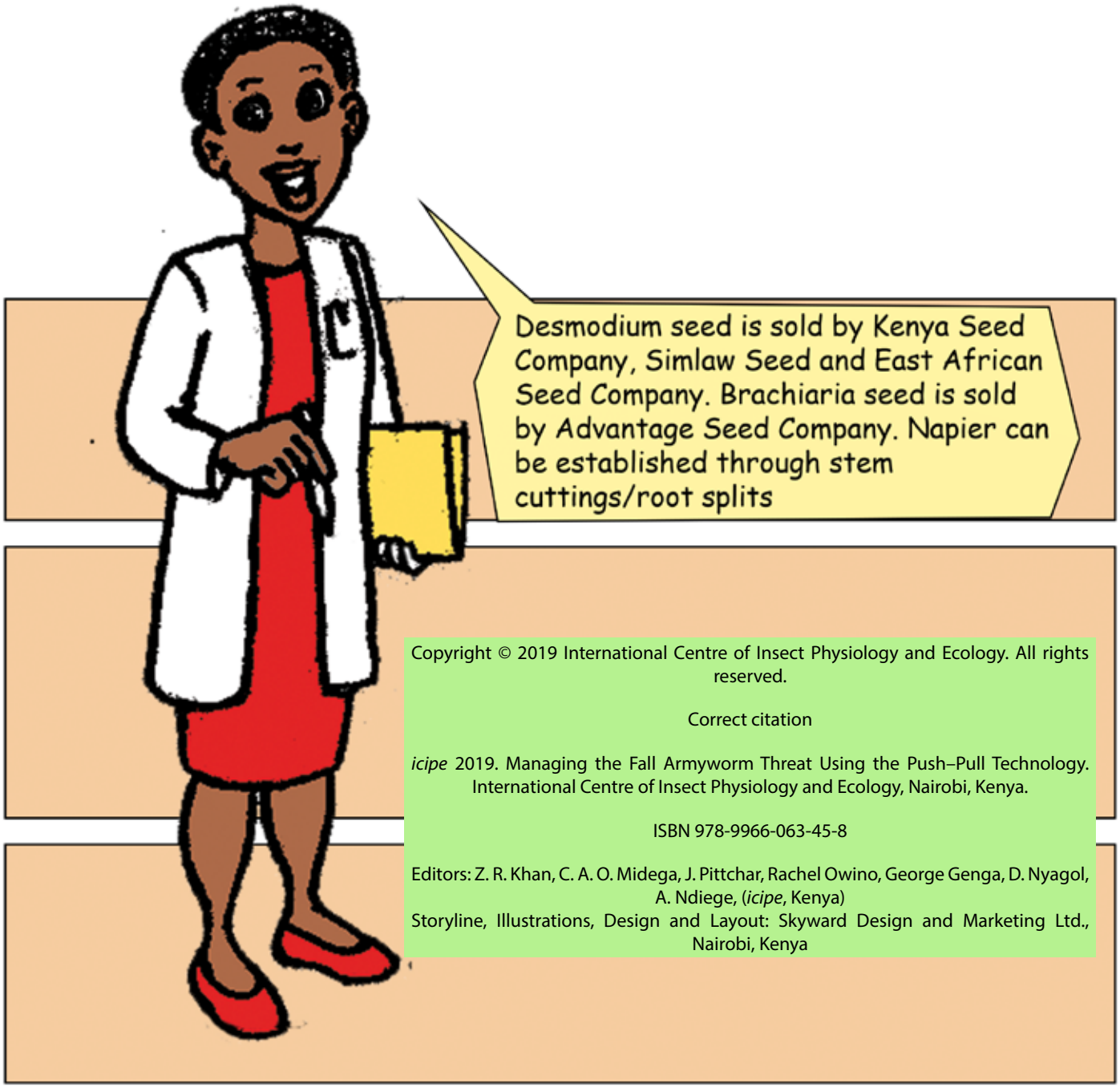
I harvested more maize in the second season.

I noticed that Napier or Brachiaria borders borders and the desmodium in my push-pull plot has controlled soil erosion significantly!

My dairy cows and goats feed on Brachiaria, Napier and desmodium from the Push-Pull plot, they produce more milk.

We also make Brachiaria and desmodium hay and sell to other dairy farmers. We make silage from Napier grass.





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