



Managing the Fall Armyworm Threat Using the Push–Pull Technology



The peace and quiet of the early morning...



...is broken by an agonised scream.



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 in the farm?

Can't you see the destruction on our maize crop?



This is witchcraft! Our crop has been destroyed by hailstones yet we have had no rains recently!



We have to find the witch or wizard responsible for this!



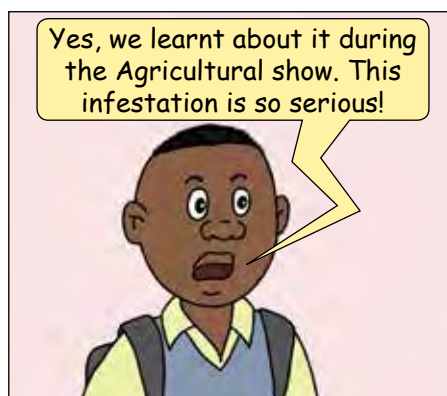
See, they have even poured sawdust onto the crop. This is a punishable offense!



Look! These must be the symptoms of damage by Fall armyworm pest.




Yes, we learnt about it during the Agricultural show. This infestation is so serious!



What did you learn at the Agricultural 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 into half. If the pest is not controlled, it can cause up to 100% yield loss.




What about the sawdust?



That is not sawdust. It is frass, which is caterpillar poo. Look! the Agricultural extension officer who taught us about the Fall armyworm 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 cereal crops and other important cultivated plants.




The Fall 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

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



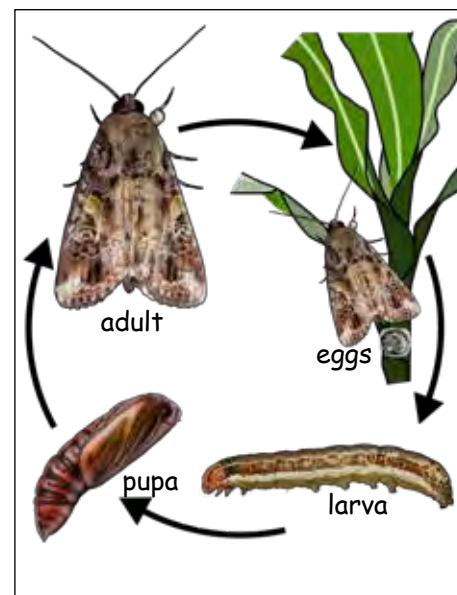
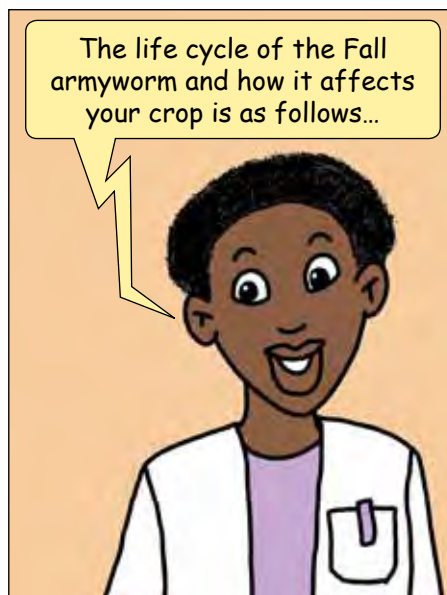
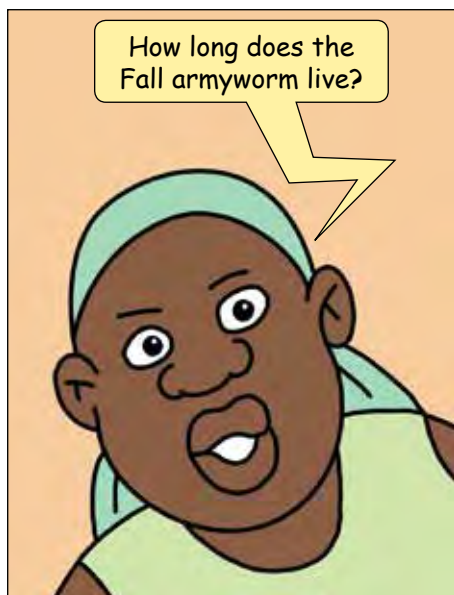
The eighth abdominal segment has four dark spots



Dorsal view of the fall armyworm

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

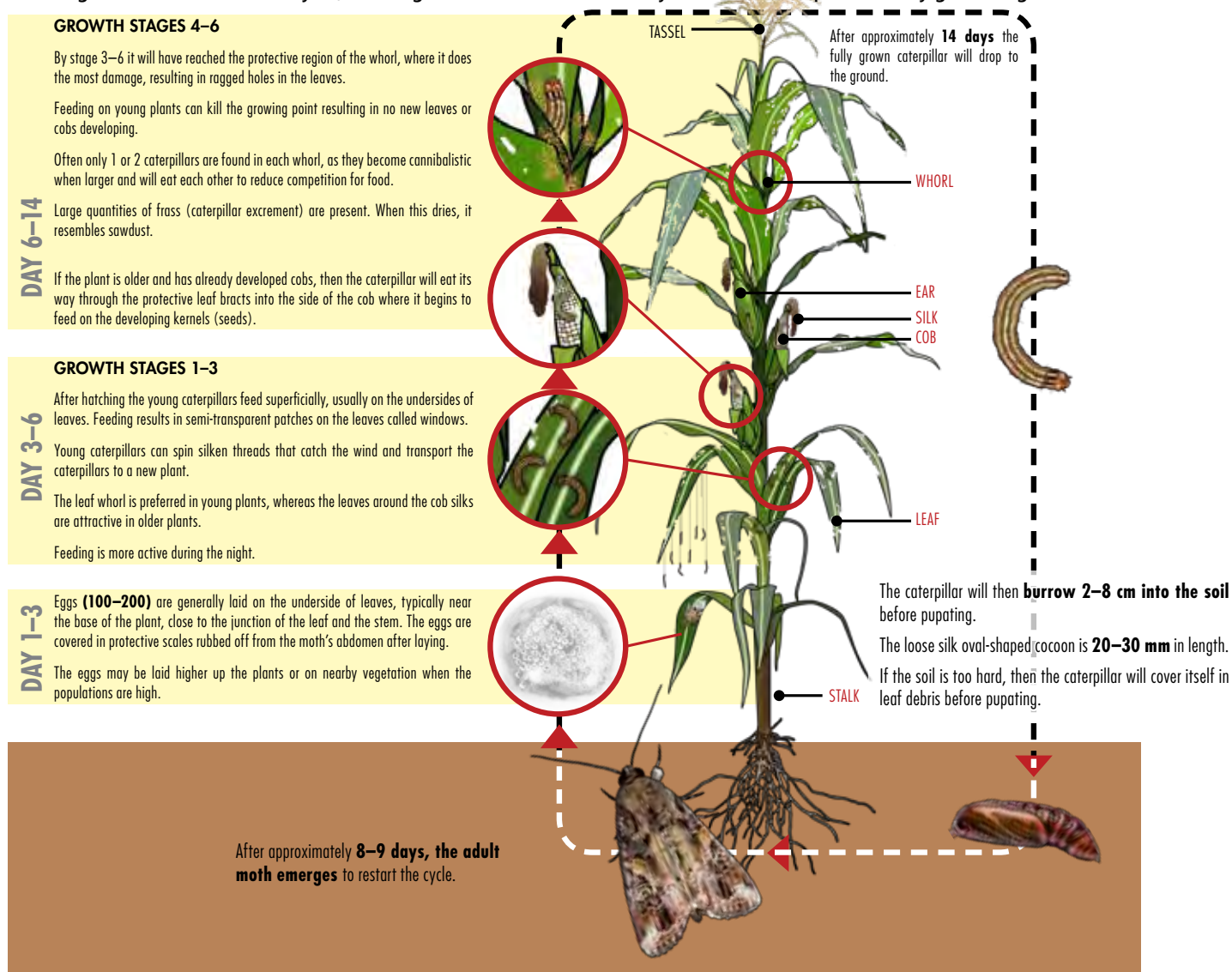




Fall armyworm: Life cycle and damage to maize

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.



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.

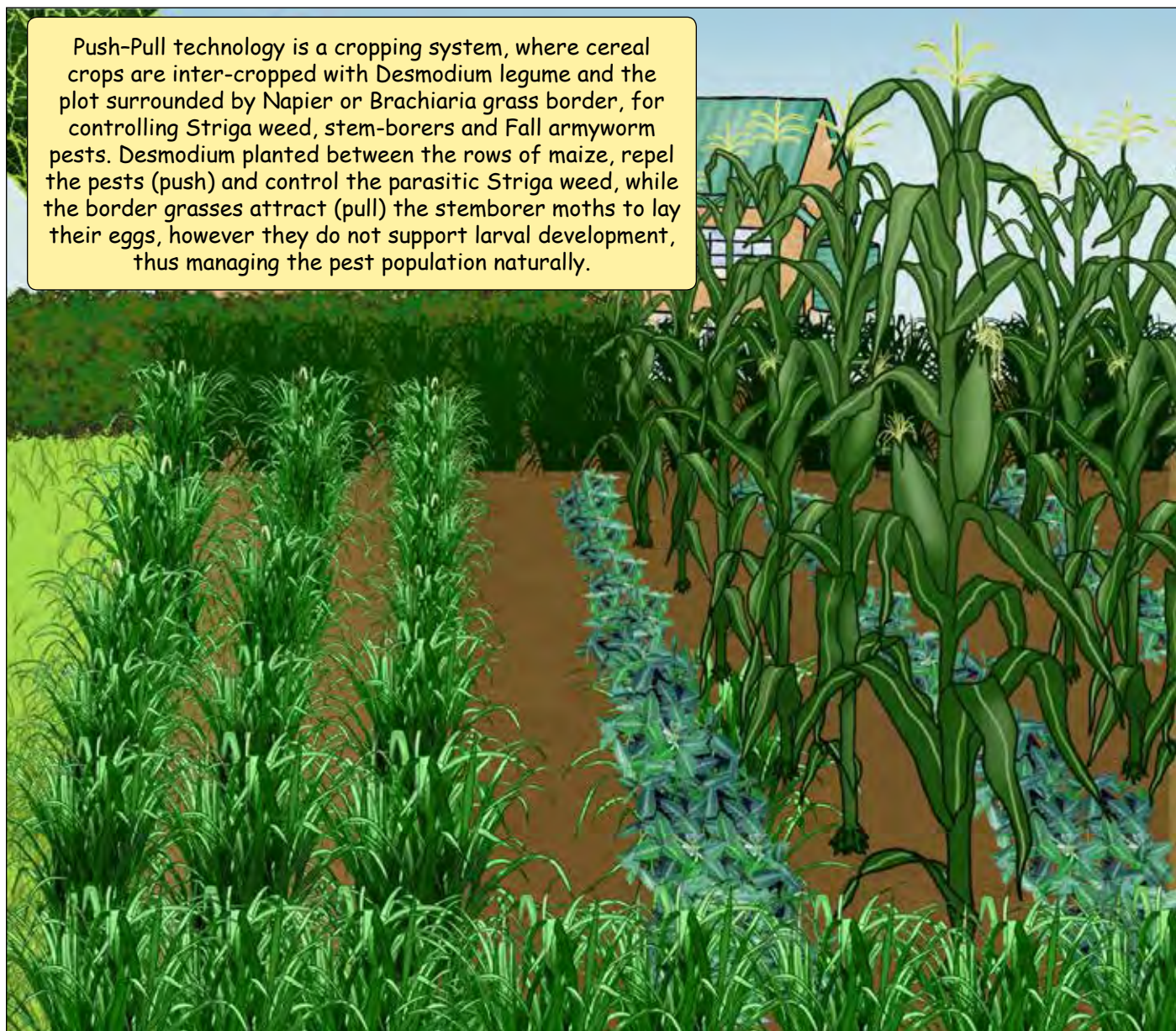


There is no need to worry though.
Fall armyworm can be managed using the Push-Pull technology.

What is push-pull technology?



Push-Pull technology is a cropping system, where cereal crops 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 attract (pull) the stemborer moths to lay their eggs, however they do not support larval development, thus managing the pest population naturally.



How do we establish a Push-Pull plot?

Members of the United Elite Farmer Field School will show you how to establish and maintain a Push-Pull plot.



THE UNITED ELITE FARMER FIELD SCHOOL DEMONSTRATE HOW TO ESTABLISH A PUSH-PULL PLOT

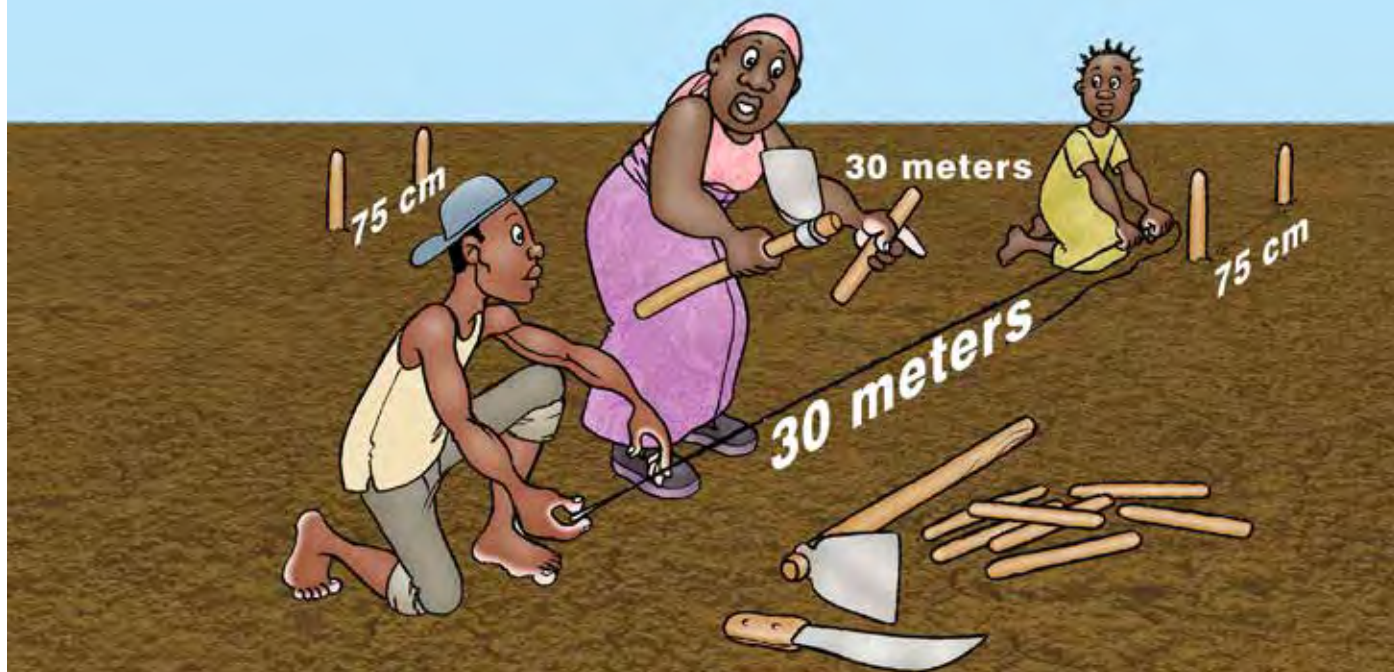
Clear the land and plough ...



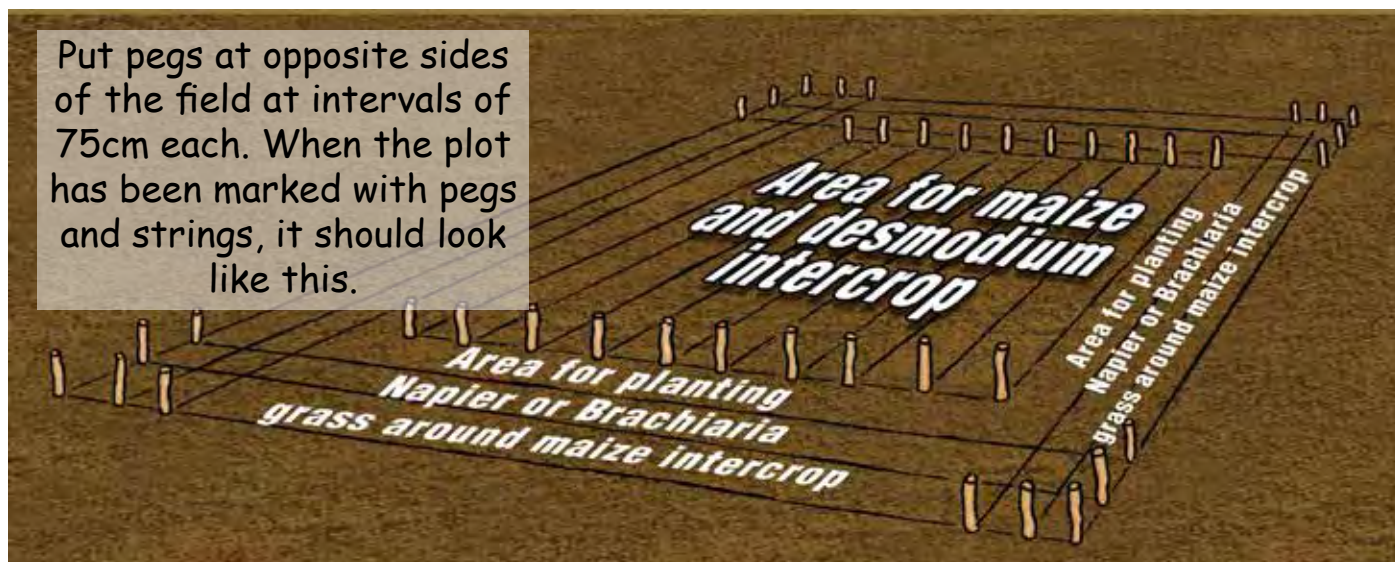
... then break down the soil until it is fine.



Using pegs and ropes, measure a plot of 30m x 30m. A Push-Pull plot can be as small as 20m x 20m, or as big as any cultivated plot of ground.



Put pegs at opposite sides of the field at intervals of 75cm each. When the plot has been marked with pegs and strings, it should look like this.



PLANTING 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.



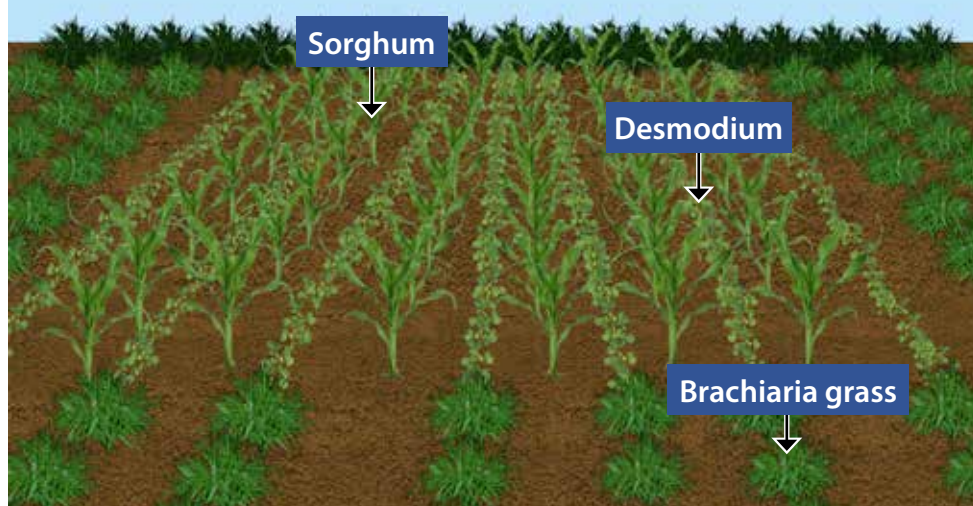
2 Apply two hand-fulls of well decomposed farmyard manure in each hole.



3 Place Brachiaria root splits upright into the planting holes and cover with soil.



Brachiaria grass is used in the climate-smart Push-Pull technology that is recommended for dry areas. A well established climate-smart Push-Pull plot should look like this after 5 weeks.



IF PLANTING NAPIER GRASS.

Dig holes along the demarcated lines ready for planting.



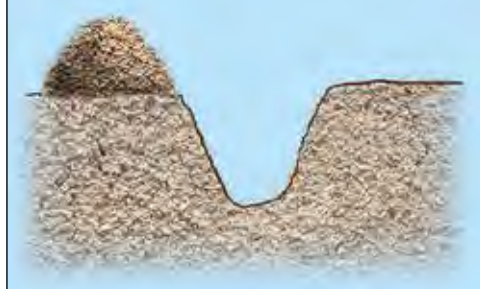
SELECT HEALTHY NAPIER GRASS



Select healthy Napier grass for planting. Do not plant Napier grass that has stunt disease.

FOLLOW THESE STEPS WHEN PLANTING NAPIER GRASS IN YOUR PUSH-PULL PLOT.

- 1 Dig holes at each peg on border of the marked plot.



- 2 Apply one teaspoonful of triple super phosphate fertilizer or 2 hand-fulls of well decomposed farmyard manure in each hole.



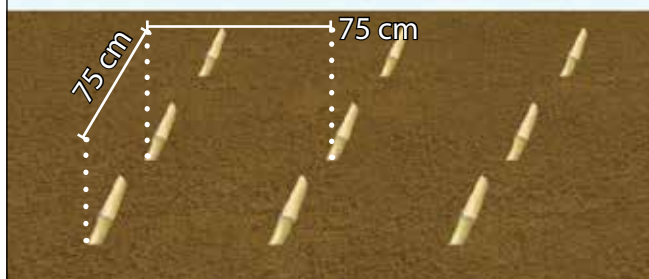
- 3 Place a three node cane into each hole at an angle of 30° to 40° all facing one direction.



- 4 Cover with soil ensuring that two nodes of the cane are well covered.



- 5 Repeat steps 1 to 4 for the second and third rows, ensuring that the rows are 75cm apart and 75cm between the plants within the rows.



- 6 If you are using root splits, place them upright into the planting holes and cover with soil.



HOW TO PLANT DESMODIUM WHEN ESTABLISHING A PUSH-PULL PLOT

After planting Brachiaria or Napier grass, you need to plant Desmodium next. To plant Desmodium, mix 250g of Desmodium seed with fine sand; one part desmodium to three parts dry sand.

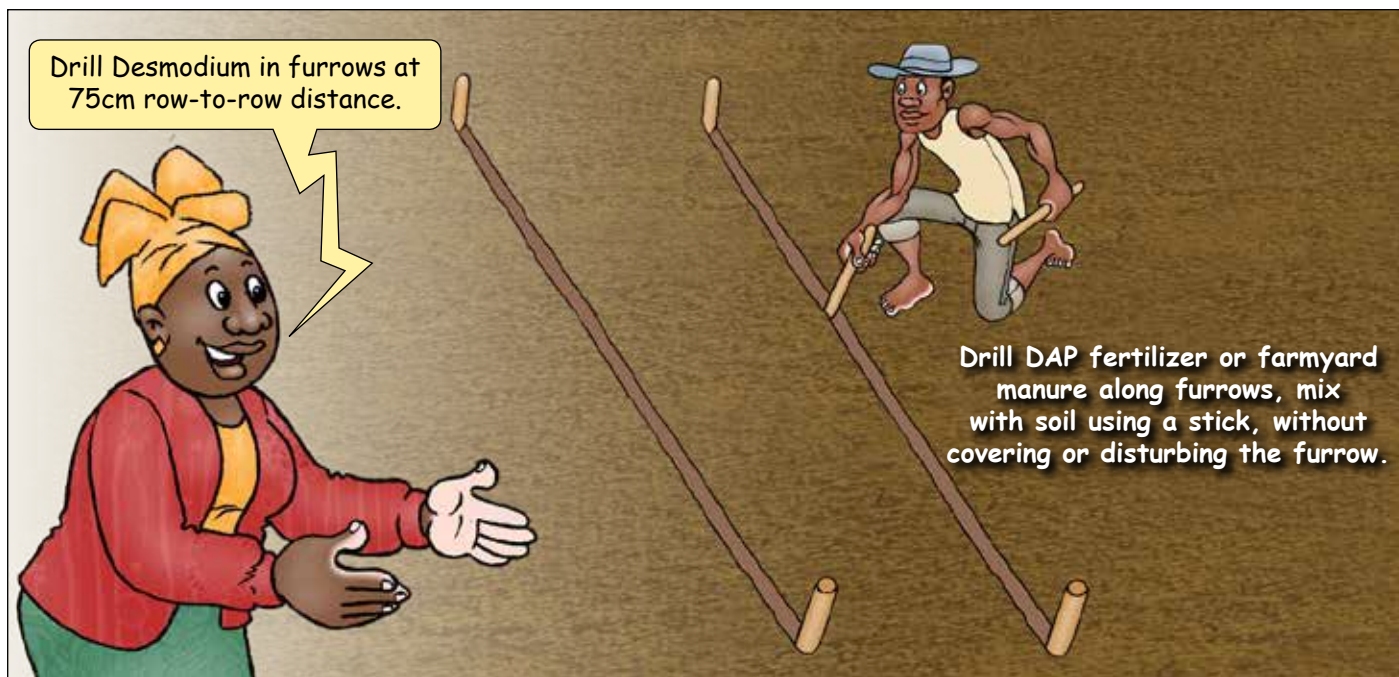
Mix 3 parts sand to 1 part desmodium seed.



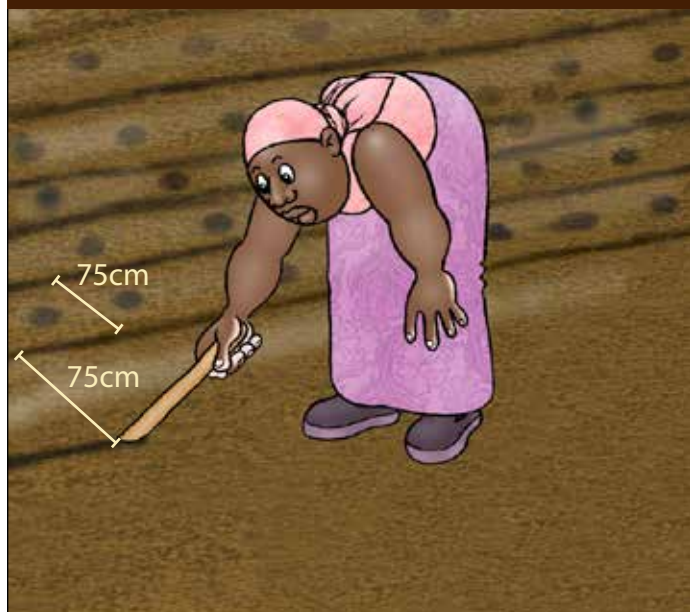
Desmodium

Fine Sand



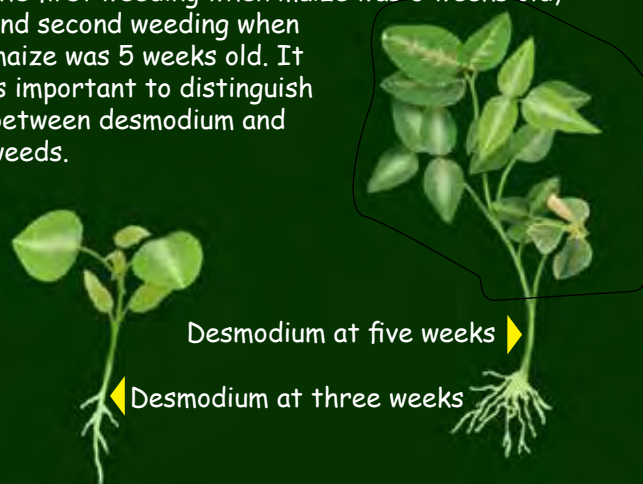


PLANT MAIZE BETWEEN THE DESMODIUM ROWS.



WEEDING AND CROP MANAGEMENT.

Early weeding is very important for the successful establishment of a Push-Pull plot. We carried out the first weeding when maize was 3 weeks old, and second weeding when maize was 5 weeks old. It is important to distinguish between desmodium and weeds.



HAND WEEDING DESMODIUM



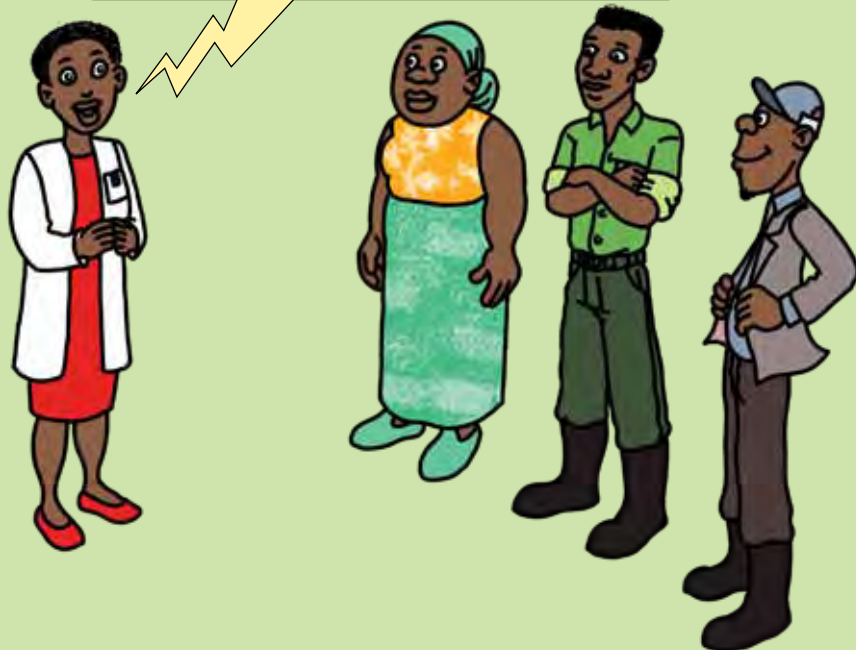
Napier grass and silverleaf Desmodium are used in conventional Push-Pull recommended for areas with adequate rainfall.



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

The agricultural extension officer meeting the group of farmers two seasons later.

You have been planting maize under the Push-Pull system the last two 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.



The Napier or Brachiaria borders and Desmodium in the Push-Pull plots have controlled soil erosion significantly!

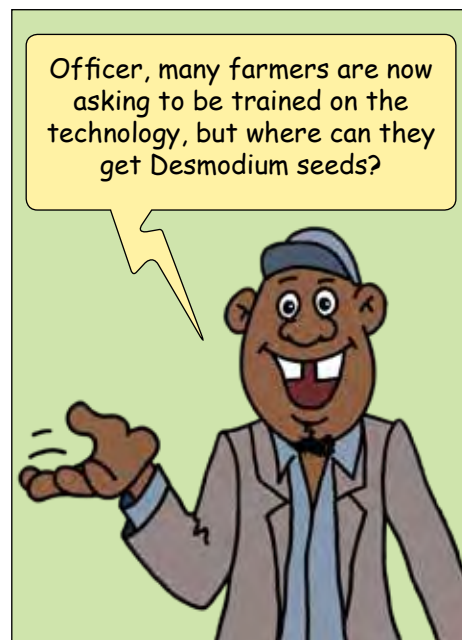


My dairy cows and goats feed on Brachiaria, Napier grass and Desmodium from the Push-Pull plot and now produce more milk.



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





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