

Climate - Smart Push-pull Technology

Improving Livelihoods in Drier Areas



icipe

African Insect Science for Food and Health

It is early Saturday morning. Members of Busara Farmers Field School are arriving at Mama Mary's farm to meet Mr Timothy, the District Agricultural Extension Officer.



We are all gathered here today to discuss challenges we have faced in our Push-pull fields this season.



Mr John do you have anything to share with us?

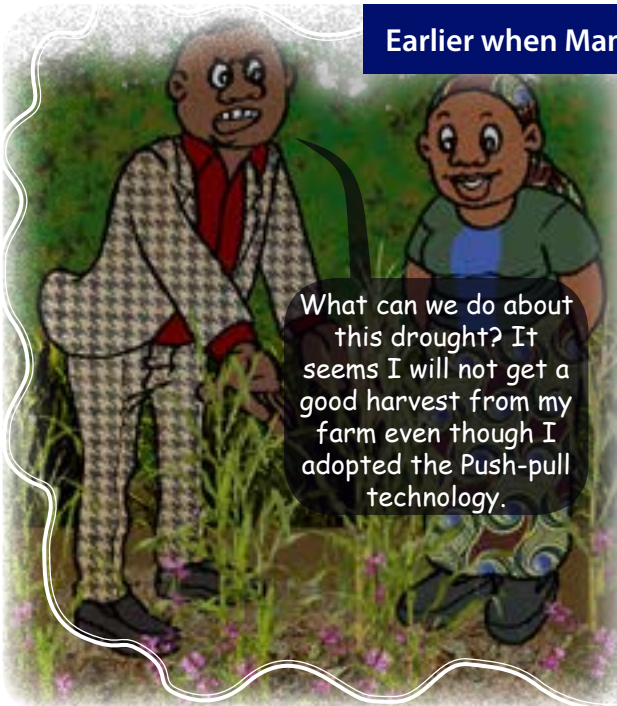
We have been planting Push-pull technology by inter cropping maize with silverleaf Desmodium and Napier grass at the border for control of striga, stemborer and improving soil fertility.



But they are drying up thereby not protecting our crops?

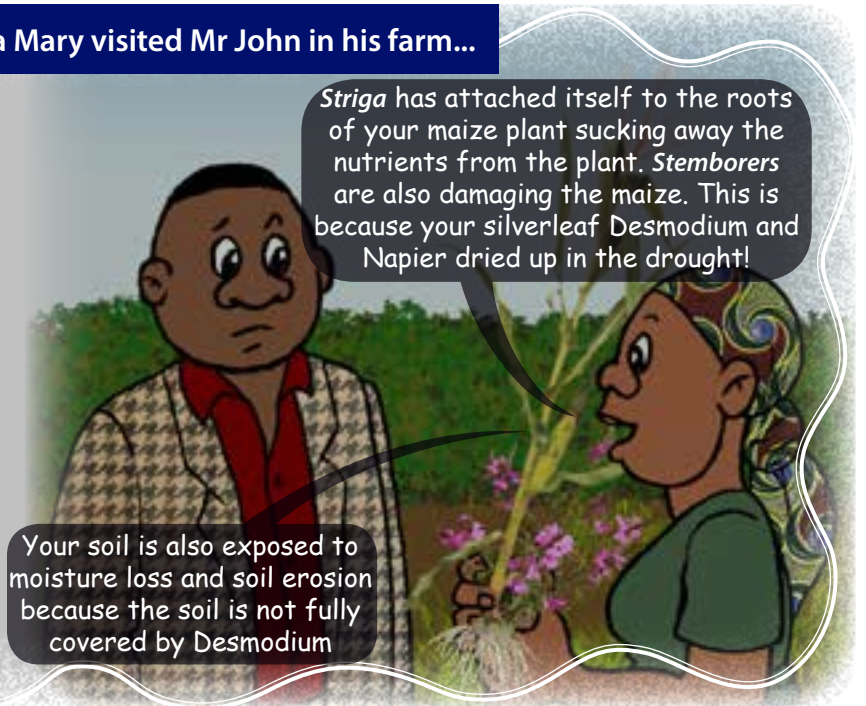
Earlier when Mama Mary visited Mr John in his farm...

What can we do about this drought? It seems I will not get a good harvest from my farm even though I adopted the Push-pull technology.



Striga has attached itself to the roots of your maize plant sucking away the nutrients from the plant. Stemborers are also damaging the maize. This is because your silverleaf Desmodium and Napier dried up in the drought!

Your soil is also exposed to moisture loss and soil erosion because the soil is not fully covered by Desmodium



Do you have the same challenges in your farm?

Not any more. Please don't miss our group meeting next month at my home. The District Agricultural officer will be visiting to discuss with us on how to address these challenges.

A month later

Today, I want to share with you about climate-smart Push-pull technology, which can help address these challenges

The conventional Push-pull technology was introduced when rainfall was reliable. However, rainfall has become unreliable over time.

In response, scientists at *icipe* developed the Climate-smart Push-pull technology which works well in areas with unreliable rainfall.

Mama Mary adopted the climate-smart Push-pull Technology. Let us go and learn more from her farm. The local primary school children will also come to learn about this technology.

At Mama Mary's farm

This is my climate-smart Push-pull farm. I used to have the same challenges you are facing with conventional Push-pull.

Look at how green the whole farm is! Is that *Desmodium* too?! It looks different

Well, it does look like Push-pull, but this is not *Napier* grass.

Does climate-smart Push-pull also address the problem of Striga and Stem borer?

Yes, ever since I started practicing the climate-smart Push-pull Technology, my Desmodium remains green and lush even in dry periods, also this border grass withstands long drought, providing fodder for my animals



In a climate-smart Push-pull field, we plant more drought tolerant plants which include; sorghum or drought-tolerant maize, Greenleaf Desmodium and Brachiaria grass. Unlike in conventional Push-pull where we used Napier grass, silverleaf Desmodium and maize.

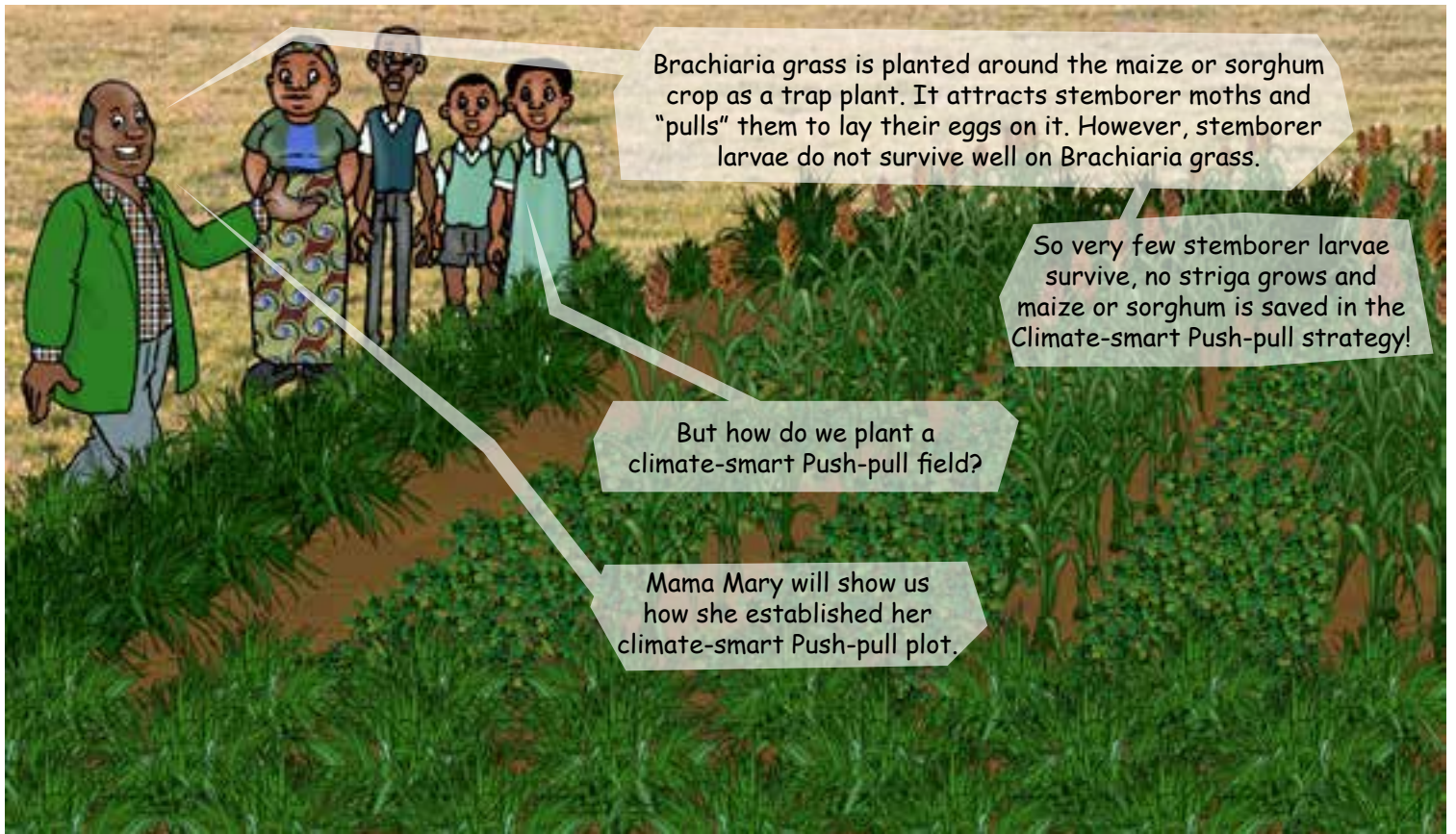


Greenleaf Desmodium is planted in-between rows of maize or sorghum. The smell it produces "pushes" away the stemborer moths from the maize or sorghum crop.

In areas with unreliable rainfall, drought-tolerant Greenleaf Desmodium and Brachiaria enable farmers to better manage striga and stemborer moths in maize or sorghum fields.



Desmodium roots produce a chemical that stops striga weed from growing and attaching itself to maize or sorghum roots. Desmodium improves soil fertility by fixing nitrogen and adding humus to the soil. It also covers the surface of the ground and prevents soil erosion.



Brachiaria grass is planted around the maize or sorghum crop as a trap plant. It attracts stemborer moths and "pulls" them to lay their eggs on it. However, stemborer larvae do not survive well on Brachiaria grass.

So very few stemborer larvae survive, no striga grows and maize or sorghum is saved in the Climate-smart Push-pull strategy!

But how do we plant a climate-smart Push-pull field?

Mama Mary will show us how she established her climate-smart Push-pull plot.

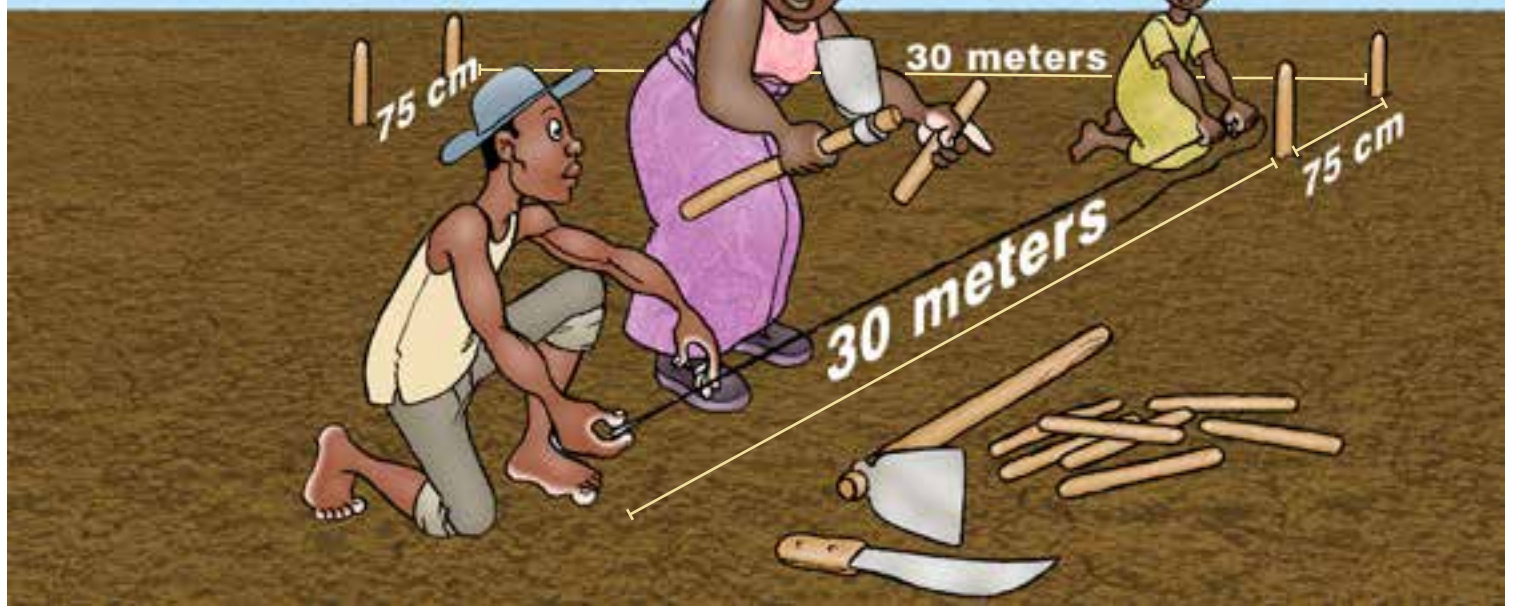
ESTABLISHING A CLIMATE-SMART PUSH-PULL PLOT

We cleared the land and ploughed ...

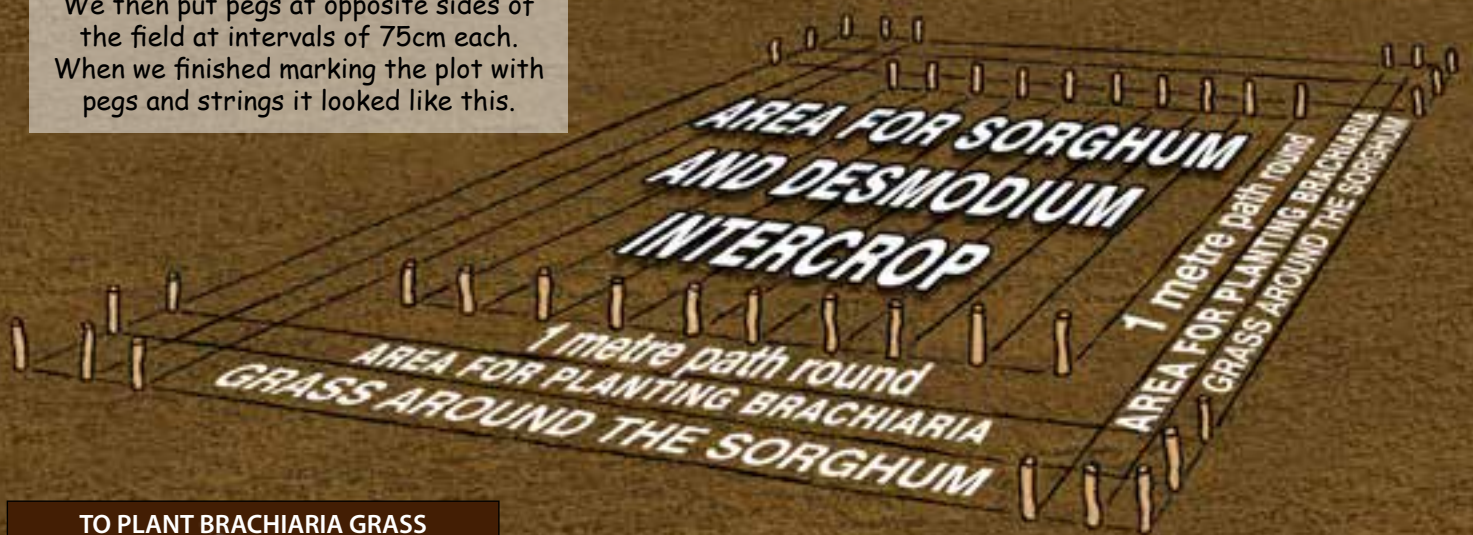


... then we broke down the soil until it was fine.

Using pegs and ropes, we measured the first plot of 30m x 30m. A Climate-smart Push-pull plot can be as small as 21m x 21m, or as big as any shamba.

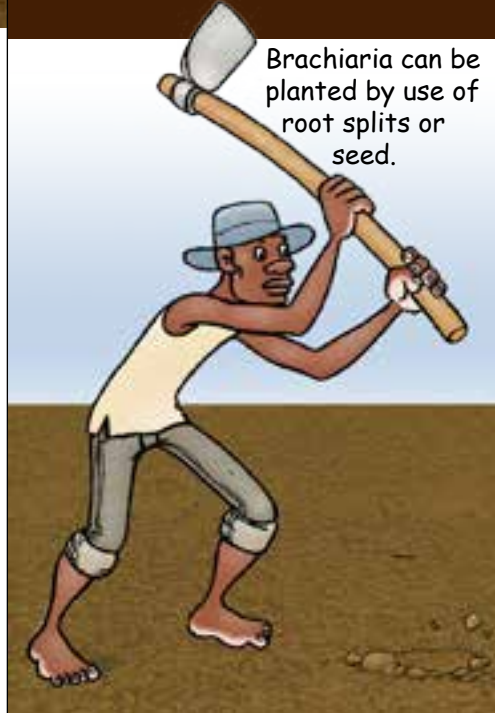


We then put pegs at opposite sides of the field at intervals of 75cm each. When we finished marking the plot with pegs and strings it looked like this.



TO PLANT BRACHIARIA GRASS

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



To plant brachiaria using root splits in our Climate-smart Push-pull plot, we followed these steps.

- 1 We dug holes along the demarcated lines ready for planting.
- 2 We applied 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.



TO PLANT BRACHIARIA FROM SEED

4 We dug shallow holes along the demarcated lines at each peg on the border. We added manure mixed with soil in the hole. We then Planted upto 7 seeds per hole and covered with light soil.



5 We repeated steps 1 to 4 for the second and third rows, ensuring that the rows were 75cm apart and 30cm between the plants within the rows.



We planted three rows of drought-tolerant Brachiaria grass all around the border of the cereal field at a spacing of 75cm between the rows and 30 cm within the rows, covering the seeds with light soil.

TO PLANT DESMODIUM

6 We Mixed the Desmodium seed with farm yard manure. Using about one handful of seed and two handfuls of manure.



7 When we didn't have manure, we mixed seed with fine dry sand, 3 parts sand to 1 part Desmodium seed.



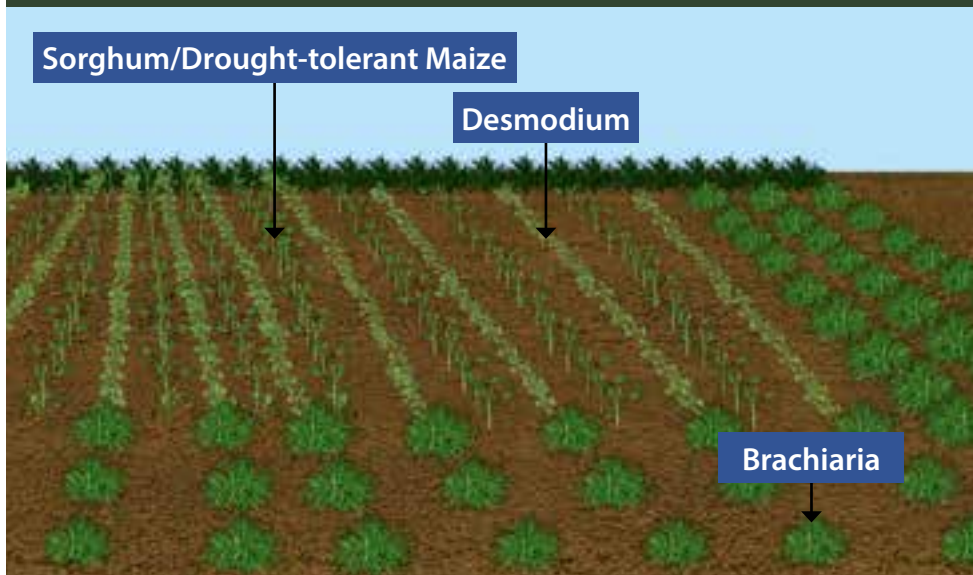
8 We then sowed Desmodium seed by drilling in furrows at 75 cm and covered with soil. This was during the rainy season for maximum germination.



9 We planted sorghum in between the desmodium rows at a spacing of 75cm.



An established Climate-smart Push-pull plot.



WEEDING AND CROP MANAGEMENT

Early weeding is very important for the successful establishment of a Push-pull plot. The first weeding should be done when the sorghum is 3 weeks old, and second weeding when the sorghum is 5 weeks old. It is important to distinguish between Desmodium and weeds.



HAND WEEDING DESMODIUM AT 3 WEEKS

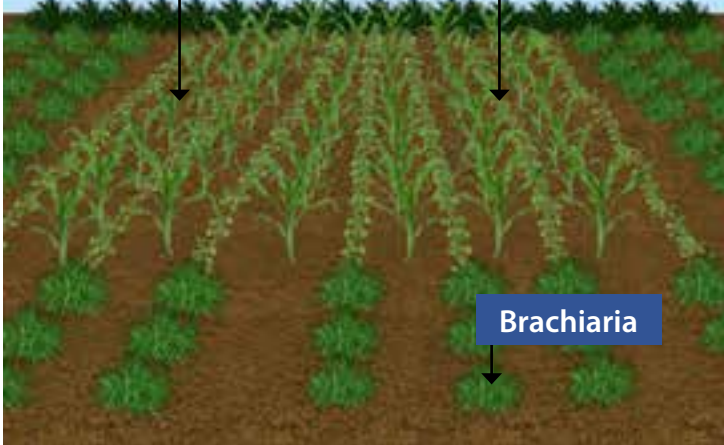


After 5 weeks, your Climate-smart Push-pull plot should look like this.

Sorghum/Drought-tolerant Maize

Desmodium

Brachiaria



From where do I get Desmodium and Brachiaria seeds?

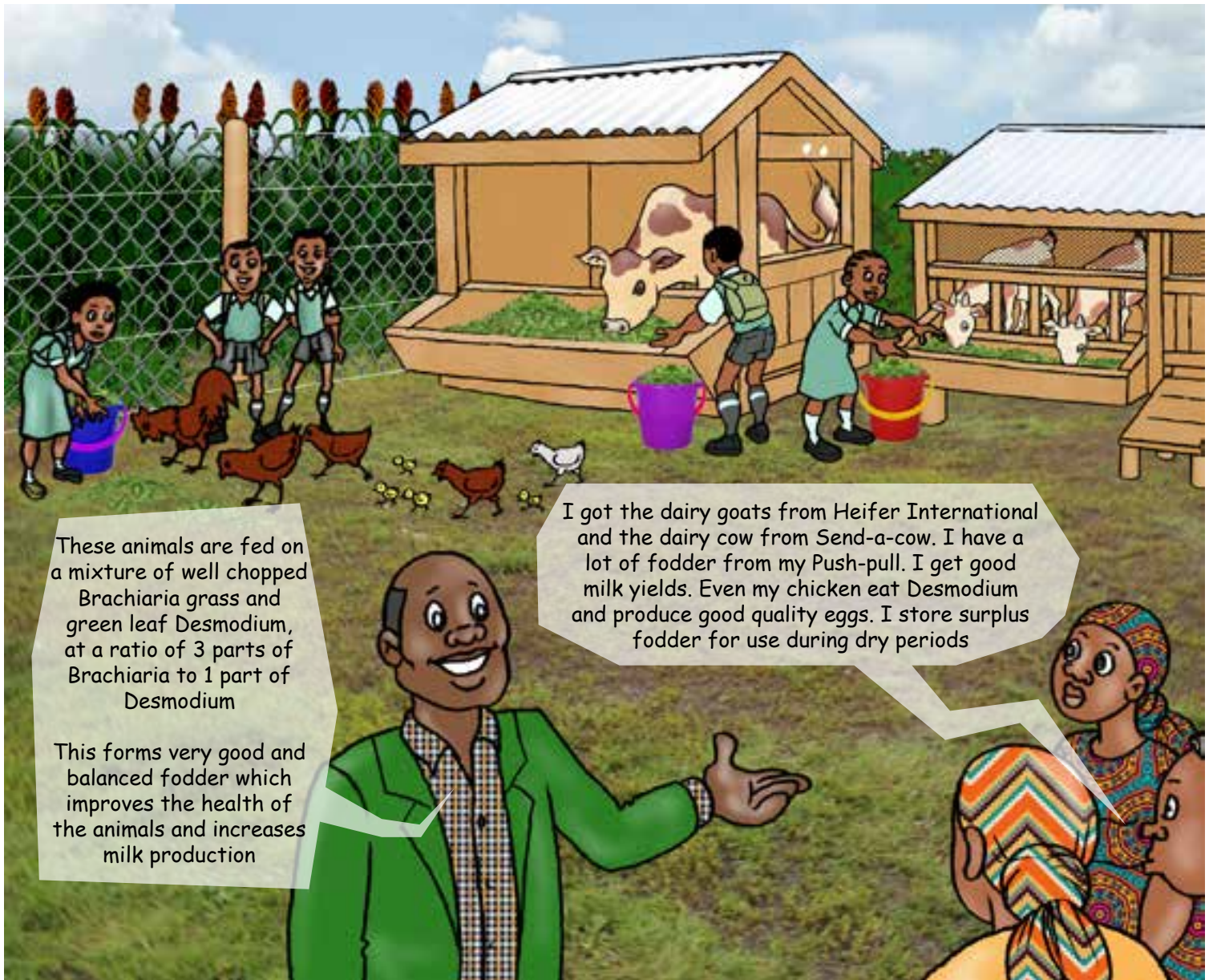
You can get:

- Greenleaf Desmodium seeds from Kenya Seed Company, agrovets and other farmers.
- Brachiaria seeds from Kenya Seed Company, EASEED, SEED Co., *icip*e and other farmers.
- Maize and sorghum from seed companies, other farmers and selected stockists.



I see Mama Mary has a healthy dairy cow and dairy goats which are confined! Can Brachiaria grass and green leaf Desmodium be fed to the animals?

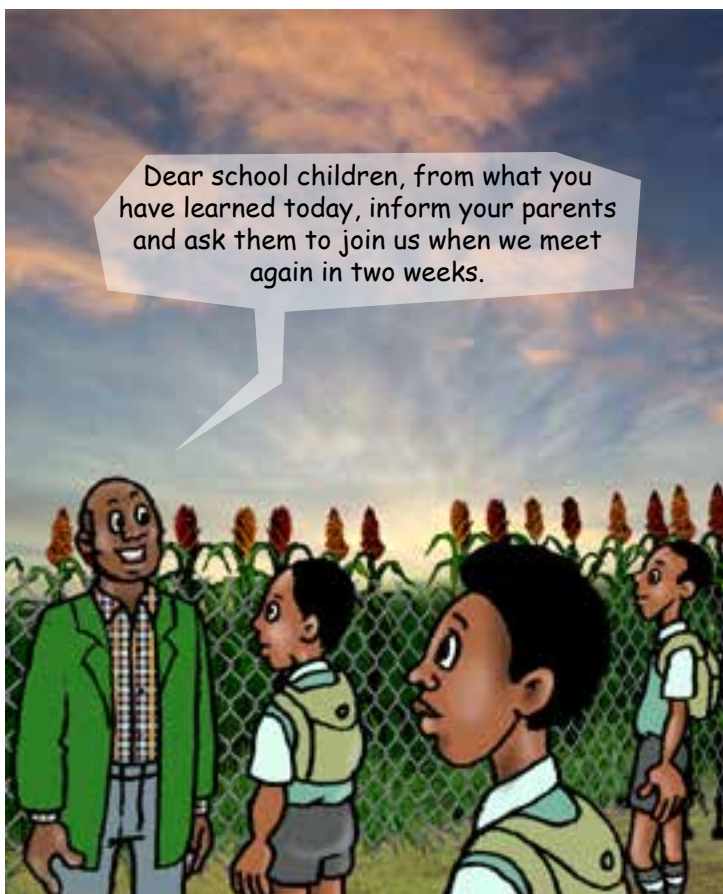




These animals are fed on a mixture of well chopped Brachiaria grass and green leaf Desmodium, at a ratio of 3 parts of Brachiaria to 1 part of Desmodium

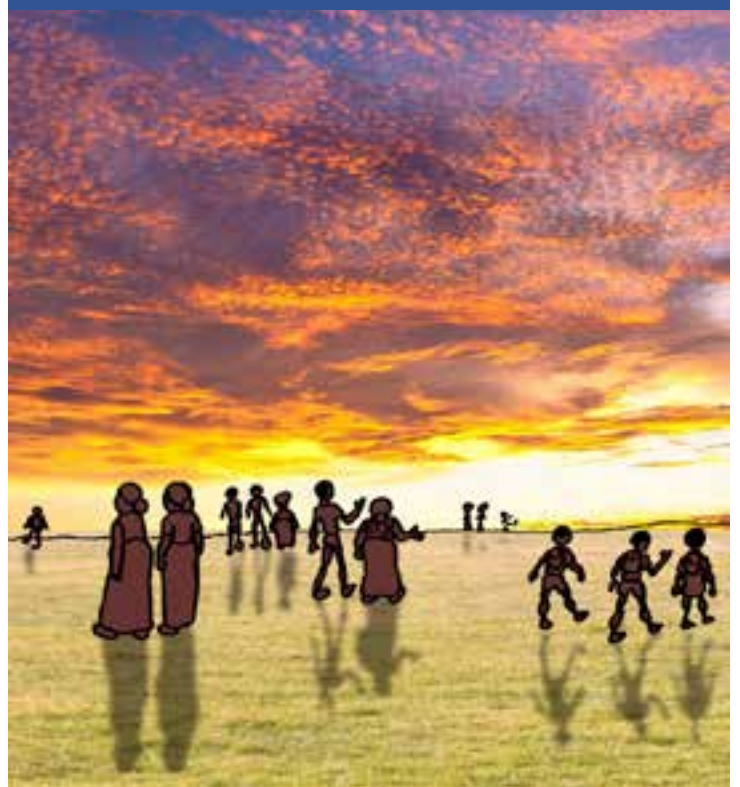
This forms very good and balanced fodder which improves the health of the animals and increases milk production

I got the dairy goats from Heifer International and the dairy cow from Send-a-cow. I have a lot of fodder from my Push-pull. I get good milk yields. Even my chicken eat Desmodium and produce good quality eggs. I store surplus fodder for use during dry periods



Dear school children, from what you have learned today, inform your parents and ask them to join us when we meet again in two weeks.

The group disperses. In readiness for planting climate- smart push-pull technology.



Four months later...

The group assembles to discuss their surplus yields from their climate-smart Push-pull plot.



THE END

icipe's mission is to help alleviate poverty, ensure food security and improve the overall health status of peoples of the tropics by developing and extending management tools and strategies for harmful and useful arthropods, while preserving the natural resource base through research and capacity building.

Copyright © 2016 International Centre of Insect Physiology and Ecology. All rights reserved.

Correct citation

icipe 2016. Climate-Smart Push-pull Technology: Improving Livelihoods in Drier Areas. International Centre of Insect Physiology and Ecology, Nairobi, Kenya.

ISBN 978-9966-063-15-1

Editors: Z. R. Khan, J. Pittchar, Rachel Owino, George Genga, D. Nyagol, A. Ndiege, E. Amondo (*icipe*, Kenya)
Storyline, Illustrations, Design and Layout: Skyward Design and Marketing Ltd., Nairobi, Kenya



STRIGA WEED



Adult
Chilo partellus

Adult
Busseola fusca



Larvae



Pupa

STEMBORER



BRACHIARIA GRASS



GREENLEAF DESMODIUM



For more information, contact:

Director General
International Centre of Insect Physiology and Ecology (*icipe*)
P. O. Box 30772-00100 Nairobi, Kenya
Tel: +254 (20) 8632000
Fax: +254 (20) 8632001, 8632002
E-mail: icipe@icipe.org

Or

Push-pull Program leader
icipe Campus – Mbita
Homabay County
P. O. Box 30, Mbita, Kenya
Tel: +254 (57) 2053285.



www.push-pull.net



The production of this comic was made possible by the kind donations of the European Union (EU), Biovision Foundation and UK aid.

