

# Push-Pull Technology Transforms Small Farms in Kenya

by Zeyaur Khan, David Amudavi and John Pickett

“If it worked in my neighbour’s farm,” Agnes Ambuvi reasoned, “it was also going to work on mine.”

The 40-year-old widow was immediately impressed by “Push-Pull”—the hugely successful ecological pest and weed management approach that has been adopted by thousands of farmers across Eastern Africa and is spreading rapidly through Kenya. Agnes lives on a half-acre plot in Mushikukhu village of Vihiga District, in Kenya’s Western Province, some 180 miles northwest of Nairobi. She is among thousands of smallholder farmers whose production of staple food is constrained by small land sizes, low soil fertility and pests like striga weeds and stemborers. In an average year, Agnes would harvest little more than 100 kilograms (220 pounds) of maize—not enough to feed her family of five.

Agnes adopted the Push-Pull technology in 2002, following the example of her neighbor, Consolata James. In her first year, Agnes tripled her harvest to 661 lbs, sufficient to feed her family for six months. By 2007, her yields had doubled again to 1323 lbs—enough to feed her family for a year, with some left over to sell.

Consolata, a mother of four living on three and a half acres in Ebuchieba, was one of the first farmers in Vihiga District to learn about Push-Pull. Consolata used to harvest about 99 lbs of maize per season from a quarter-acre plot. After she introduced Push-Pull in 2002, her harvest increased six-fold to 595 lbs. “I don’t have to buy a lot of maize from the market to feed my family,” Consolata beams. “Push-Pull has also enabled me to have more live-

stock.” She was soon able to expand her Push-Pull fields and purchase a dairy goat, which she now feeds on home-grown fodder.

## Push-Pull: How it works

Kenya’s International Centre of Insect Physiology and Ecology (ICIPE) and Britain’s Rothamsted Research collaborated with partners in Eastern Africa to develop the Push-Pull technology. The technique involves intercropping silverleaf desmodium, a fodder legume, with maize, napier and Sudan grass to provide both immediate and long-term benefits. Aromas produced by the desmodium repel (push) pests like the maize stemborer while scents produced by the grasses attract (pull) the stemborer moths and encourage them to lay eggs in the grass instead of in the maize. Napier grass produces a gummy substance that traps the stemborer larvae so, once they hatch, only a few survive to adulthood, thus reducing their numbers. Desmodium roots produce chemicals that stimulate germination of striga seeds, but then prevent them from attaching successfully to maize roots. The striga eventually dies and the number of seeds in the soil is also reduced. Besides being a good ground cover, desmodium is a nitrogen-fixing legume that improves soil fertility.

Agnes Ambuvi used to graze three zebu cows on weeds growing along roadsides and footpaths. Now with her napier grass and desmodium providing quality fodder, she has two new cows that produce 15 litres of milk day, earning about 2,520 Kenyan shillings (\$35) per week. She can meet most of her household expenses including school fees, food,

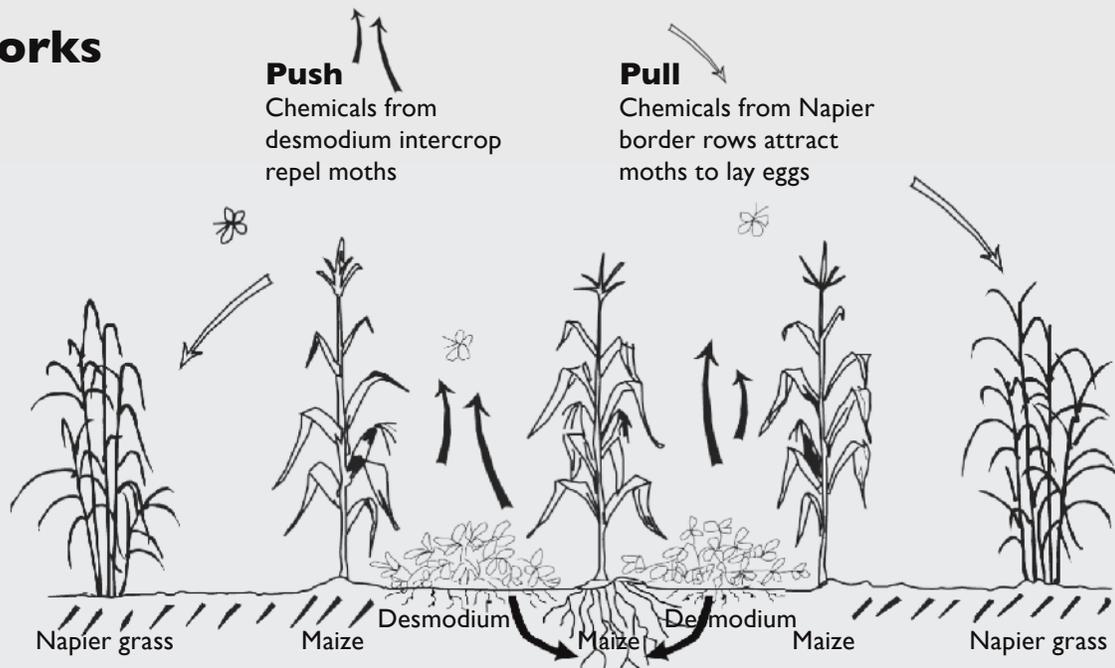
Consolata James (center) tripled the production of maize on her small farm in western Kenya using Push-Pull, intercropping maize with repelling and attracting plants (left). Fred Omokatu and Agnes Ambuvi (right) now raise more cows using fodder produced with Push-Pull methods. Photos: Jimmy Pittchar / ICIPE



# How Push-Pull Works

Push-Pull is a novel approach in pest management that uses a repellent intercrop and an attractive trap plant. Insect pests are repelled from the food crop and are simultaneously attracted to a trap crop. Maize is intercropped with a legume, silverleaf desmodium (*Desmodium uncinatum*), and napier grass (*Pennisetum purpureum*) is planted around the intercrop. Both plants provide quality fodder for livestock. Therefore, farmers using Push-Pull technology for pest control not only reap three harvests (maize, napier grass and desmodium), they also dramatically reduce the devastating effects of the parasitic weed *Striga hermonthica* through the effects of desmodium.

Source: [www.push-pull.net](http://www.push-pull.net)



and clothing. Agnes has learned how to prepare farmyard manure for her maize field, minimizing the need for expensive synthetic chemical fertilizers. Push-Pull also promotes biodiversity by supporting a variety of plant and animal species on the farm.

Agnes' neighbour, Fred Omukatu, is a 74-year-old grandfather living with five orphaned grandchildren. He learned about Push-Pull from Agnes. "It rains on my field just as it does on hers," he jokes, but somehow "my neighbour's harvest was getting better each season from the same soil and weather." Fred adopted the technology in 2006 and harvested 661 lbs of maize from a quarter-acre plot. Previously, his entire two-and-a-half-acre farm only produced 551 lbs owing to competition from striga and stemborers. Now enjoying the benefits of quality livestock feed, Fred intends to expand Push-Pull to the rest of his farm.

## Pushing Push-Pull technology

Push-Pull provides several benefits to rural families, including reduced run-off and soil erosion, enhanced soil fertility, minimized use of agrochemicals, improved food security and increased household income. Because of its ability to expand small-farm incomes, Push-Pull is being promoted by the public sector, private sector and farmer groups across Eastern Africa. More than 12,000 farmers have adopted it and another 100,000 are expected to over the next three years as the program is promoted through mass media radio broadcasts, printed materials, agricultural shows, field demonstrations and Farmer Field Schools (FFS).

The Farmer Field School approach to crop and pest management relies on "learning by doing" through participatory ecological field studies that are undertaken by farmers, government extension services, researchers, NGOs and community-based organizations studying together. First developed by the UN Food and Agriculture Organization in Indonesia, the FFS approach has been successfully adopted in countries across Asia, Latin America and Africa. Kenyans are using FFS to disseminate Push-Pull training through 51 intensive weekly sessions that cover two growing seasons. ICIPE expanded the Push-Pull curriculum into western Kenya's Bungoma District in March 2007. There are now 38 FFS projects in the initial districts of Bungoma and neighboring Busia District to the west, bordering Uganda and 18 FFS in nine other districts in western Kenya.

To ensure that Push-Pull continues to enjoy a strong scientific base, researchers are studying soil nutrient dynamics to understand the technology's long-term effects—and working to identify emerging problems such as Phytoplasma disease that stunts Napier growth. Work is underway to explore the potential of integrating edible beans into the Push-Pull technology as this will bring farmers additional benefit from growing marketable legumes. Acre by small acre, Push-Pull is demonstrating how research based on sound agroecological principles can contribute to sustainable livelihoods.

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