Push-Pull Technology in Ethiopia
Progress and Challenges

Sue Edwards, on behalf of colleagues
in Melkassa Research Station (MARC),
and
Institute for Sustainable Development (ISD)
The ADOPT Project, 2011-2014

• Adaptation and Dissemination of the ‘Push-Pull’ Technology (ADOPT): a conservation agriculture approach for smallholder cereal-livestock production in drier areas to withstand climate change
• Funded by the European Union, and
• Coordinated by ICIPE
• 3-year project started in January 2011 with a ‘no-cost’ extension into 2014
• MARC focused on research aspects, including with farmers through Farmer Research Groups, and works in Eastern Haraghe and Lakes Rift Valley
• ISD focused on extension aspects, with some in-field research, and works in South Wollo Zone and Oromiya Special Zone (Kemissie) of Amhara Region, and Central and South Zones of Tigray Region
Ethiopia - environmental constraints and where PPT promoted since 2011

Environmental Constraints

- Dry and/or cold areas with low production potential
- Low soil suitability
- Low and erratic rainfall
- Steep slopes and mountains
- Severe and very severe land degradation
- Low to medium climatic production potential
- High climatic production potential

Where PPT has been promoted since 2011

Source: FAO
Major achievements of MARC 2012

• 6 FRGs were established in 6 ADOPT project sites
• These FRGs, (experts, DAs and research staff) trained on FRG concept, push-pull technology and ADOPT project
Push pull technology effect on stem borer and striga: consolidated data from 2012

![Bar chart showing % infestation, damage score, and striga count per m² for Push-Pull and Control groups. The chart indicates a significant reduction in infestation and damage in the Push-Pull group compared to the Control group.]

28.0 61.0
2.3 3.2
3.9 10.0

- % infestation
- Damage score (1-5)
- Striga count per m²

Push-Pull
Control
Stem borer infestation in the 3 research locations

<table>
<thead>
<tr>
<th>Location</th>
<th>Push-Pull</th>
<th>Control</th>
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% infestation vs Damage score (1-5)
Mean Number of *Striga* per square Meter at two-week intervals starting from the first emergence in 2012/Darolebu

- **Intercropping**
- **Monocropping**

![Graph showing the mean number of Striga per square meter at two-week intervals from the first emergence in 2012/Darolebu.](image)
ISD’s Experience
Result from ADOPT 2012 in South Wollo

- Orientation in push-pull given to 340 participants in the agricultural sector including 238 farmers
- 87 farmers had good demo plots (shortage of planting material restricted the number of farmers)
- 203 farmers, extension personnel and local policy makers made field visits in October and November 2012
- The records from the 10 best plots in farmers’ fields of maize and sorghum showed:
  - Maize yields were double or more the national average of 2.2-2.5 t/ha
  - Sorghum yields were 50% of more the national average of 1.7-2.1 t/ha
  - All farmers used their own preferred varieties
Maize yields from model farmers' plots, South Wollo, 2012

Farmers' name

- Awel Sied: 6.6 t/ha
- Belay Ali: 6.8 t/ha
- Tefera Yimer: 4.8 t/ha
- W/r Ayal Abera: 6.2 t/ha
Sorghum yields from PPT farmers' plots in 2012 in South Wollo

- Sied Eshetu: 3.7 t/ha
- Sisay Abate: 3.8 t/ha
- Gurshawu Teshome: 3.2 t/ha
- Eshetu Mekonnen: 3.4 t/ha
- Mohammed Yimam: 3.4 t/ha
- W/r Zewude Seid: 4.6 t/ha

Grain yield converted to t/ha
Opportunities of PPT reported by farmers and extension personnel

• Moisture retention in the soil over dry gaps and after the rains end

• Ready source of animal feed, particularly the Desmodium, in the growing season when grazing is restricted, but particularly in the dry season (hence, farmers are reluctant to allow Desmodium to produce seed)

• Builds on the advantages of row planting and provides weed control if the Desmodium establishes well (a productive form of conservation agriculture)

• Once a farmer has implemented and seen the advantages of PPT, she/he continues with it

• The 1:5 model farmer to neighbors is an effective means of promoting PPT
Controlling Orobanche in Faba Bean: piloted in South Wollo in 2014

Result of growing Desmodium or Mustard on Orobanche stem counts and Faba bean yield in Haroye FTC

Result of growing Desmodium or Mustard on Orobanche stem counts and Faba bean yield in Kedjo FTC

- Average Orobanche per plot
- Yield q/ha
CHALLENGES
For Farmers

• Need for flexibility in choice of crop and planting / growing method
  • To cope and respond to the way the rains start, e.g. replacing longer growing season sorghum/maize by shorter season tef if rains are delayed
  • To maintain basic crop rotation, the basis of traditional soil fertility maintenance and household food crop needs, cereal/pulse/oil crop
  • Dry season plowing for control of weeds and soil-borne pests and diseases

• Small size of cultivated fields, and most fields narrow and long

• Reluctance to risk household food security by putting even a minimal cultivated area (10 x 10 m) under a new technology
For Farmers cont.

- Germination and establishment of Desmodium (very small seed)
  - Germinate and grow seedlings in April – 6-8 weeks before rains expected

- Grass border rows
  - Take up essential crop growing area of small fields
  - Elephant grass can harbor rodents
  - Brachiaria attracts birds when it flowers and sets seed
  - Brachiaria roots are tough and interfere with plowing
For Extension

• Availability of planting material, particularly Desmodium seed
• High cost of Desmodium seed – a woman farmer in Rama sells Silver Leaf Desmodium seed @ 500 ETB/kg (US 45/kg)
• If farmers and FTCs produce seed,
  • who is going to pay them?
  • What is a reasonable price that farmers see as affordable?
• Training and supply of inputs must be well ahead of the start of the main rains, i.e. integrated into the overall extension schedule
• Integration of PPT with improved animal husbandry, particularly for dairy goats
For Extension cont

• Growing seedlings of Desmodium ahead of time to be ready for transplanting at the start of the rains (proven effective in 2014)

• Maintaining Desmodium through the dry season to supply cuttings to farmers at the start of the rains

• Campaigns, with appropriate incentives, for seed collection of Silver Leaf Desmodium naturalized in many places after it was introduced as a potential forage in the 1980s and 1990s.
For Research

• Alternative crops to grow with Desmodium in the dry season where irrigation is available, e.g. tomato, faba bean

• Farmers recognize the indigenous *Desmodium uncinatum* ‘tmero’ as a valuable weed to provide animal fodder

• Developing ‘tmero’ that is a non-climbing annual as an intercrop with tef where Striga infestation is developing

• Integration of PPT with improved animal husbandry
PPT demonstration field in Aksum University, 2012

Field visit to Farmer Sissay’s PPT field in South Wollo, 2013
Thank you for listening

Farmer Zewdie and her PPT sorghum field in Haik, 2012