Brachiaria cv. Mulato is already there – CIAT does not need to bring it back to Africa!

Trip report by Brigitte L. Maass (CIAT-Kenya), 13 August 2013

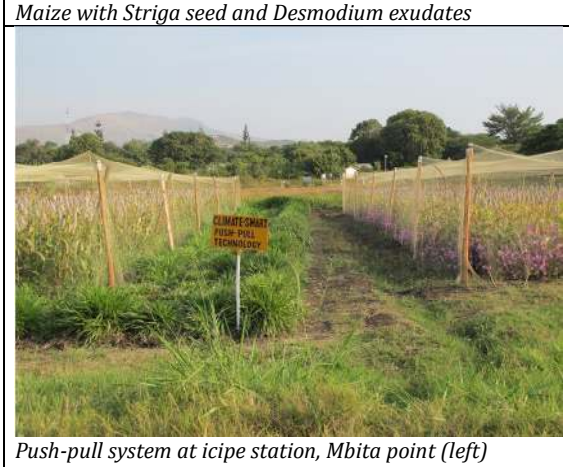
Summary

Brigitte Maass participated in a trip together with executive staff from Grupo Papalotla/Tropical Seeds, to icipe Mbita-station and various farmers' fields in the Kenyan Lake Victoria zone in July 2013. The purpose of Eduardo Stern's visit was to explore East African market opportunities for *Brachiaria* hybrid cultivars. Within their ADOPT project (*Adaptation and dissemination of the 'push-pull' technology*) icipe is now promoting *Brachiara* cv. Mulato II (instead of Napier grass) as the trap plant for maize stem borer. To date, about 9,500 farmers in Tanzania, Kenya, Uganda and Ethiopia – half of them in Kenya – have planted cv. Mulato II since 2011. Farmers like the grass because it is highly palatable, stays long green and productive into the dry season and has helped to substantially increase milk yield, mostly of dairy goats in the Kenyan Lake Victoria zone. Apparently, there are also new pest and disease challenges coming up that may require research attention in the near future. Implications for CIAT: potential accompanying research for uptake and document evidence for impact.

Some visual impressions

Maize with Striga seed and Desmodium exudates

Maize with Striga and only water



Push-pull system at icipe station, Mbita point (left)

Push-pull system on farm in Migori area; Brachiaria overgrown

Sorghum shoot fly damage on Brachiaria cv. Mulato II

Disease challenges for Brachiaria cv. Mulato II

Push-pull system with Brachiaria cv. Mulato II in Migori area

Visiting push-pull system with cv. Mulato II with farmers in Migori area (Eduardo Stern left with orange cap)

Dairy goats feeding on cv. Mulato II mixed with Desmodium intortum (cv. Greenleaf) in Migori area

Cow feeding on cv. Mulato II mixed with Greenleaf desmodium in Homabay area

Hay bale of cv. Mulato II in Homabay area

Dairy goat feeding on cv. Mulato II hay in Homabay area

On farm demonstration of push-pull system in Homabay area (right Melenia Otieno, farmer)

Brachiaria cv. Mulato II for push-pull system on Melenia's farm in Homabay area

Participants of the trip

Name	Function	Email contact
Eduardo Stern	Director Tropical Seeds, Florida, USA	esn749@gmail.com ; eduardo@tropseeds.com
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People met

Prof. Zeyaur R. Khan	Icipe – Mbita point	zkhan@mbita.icipe.org ; zkhan@icipe.org ; zkhan@mbita.mimcom.net
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Alfred Busolo Tabu	Kenya Seed Company Ltd., Kitale – Deputy Managing Director	alfredt@kenyaseed.co.ke

Itinerary

Sun 14 July 2013	Travel Nairobi-Kisumu-Mbita point (morning); Visit of icipe's demonstration fields and glasshouses by Drs. Wasonga and Owade
Mon 15 July 2013	Meeting with Prof. Khan and Dr. Midega; Field visit to farmer Samuel NN in Lambwe and NN in Migori; Visit to a group of farmers in Nyabisawa area of Migori district
Tue 16 July 2013	Presentation about Grupo Papalotla/Tropical Seeds by Rony Chaves; Field visit of farmers in Homabay, Rachuonyo, Rodi, Rangwe and Rachuonyo; Visit to farmer field day hosted by Oriang's women group in Kolweny area, Nyakach District – Melenia Akinyi Otieno's Farm
Wed 17 July 2013	Meeting with Mr. Alfred Busolo Tabu, Kenya Seed Company Ltd. in Kisumu; Return travel Kisumu-Nairobi (afternoon)

Report

I joined executive staff from Grupo Papalotla/Tropical Seeds in a very interesting field trip in the Lake Victoria zone of western Kenya. The trip was organized by Eduardo Stern and his collaborators from Tropical Seeds and Papalotla Seed Co.[2] in Florida and Mexico, respectively. The purpose of this visit was to explore East African market opportunities for *Brachiaria* hybrid cultivars. The *Brachiaria* hybrid cv. Mulato II is being used in icipe's push-pull system (Figures 1 and 2) to prevent maize or sorghum from infestation by lepidopterous stem borers (e.g., *Chilo partellus*, *Eldana saccharina*, *Busseola fusca*, and *Sesamia calamistis*) and parasitic African witchweed (*Striga hermonthica*).

The **push-pull system** was initially created by using Silverleaf desmodium (*Desmodium uncinatum*) to push the stemborer moths out of the maize field and pull them to the surrounding Napier grass (*Pennisetum purpureum*), where they would not be able to develop as well as in the maize and die prematurely. Prof. Zeyaur R. Khan from icipe has been developing and fine-tuning this system since the mid-1990s (and extensively published on it – see end of the report – although not yet on the involvement of *Brachiaria* in the system). Many different legumes have been screened for the allopathic effect, and it was found that many had the repelling effect, however, only some *Desmodium* species have the specific phytochemical that inhibits *Striga* to elongate and grow into the maize.

[1] 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.
[2] See: http://www.tropseeds.com/; or in Spanish: http://www.grupopapalotla.com/grupo-papalotla-directorio-tropical-seeds.html; http://www.tropseeds.com/mulato-ii/.

The **EU-funded project ADOPT** (http://push-pull.net/adaptation/) works in Kenya, Tanzania and Ethiopia and aims at scaling out the push-pull-system. However, due to drought as one of the major constraints in the region, many (44) different grasses were screened for drought tolerance (in pots, just letting the grasses grow for as long as they would without watering after an initial establishment phase – I did not get all the trial details and, unfortunately, nothing has yet been published). Once a grass subset was chosen, participatory selection was conducted with farming communities; interestingly, the farmers were generally conscious about the value of (the native) *Brachiaria* species. *Brachiaria* hybrid cv. Mulato, bred by CIAT's John Miles, stood out as very productive and drought-tolerant, but also as highly palatable ("sweet") for livestock. Consequently, cv. Mulato II is now being used in the ADOPT project, although its 'trapability' effects for stem borers are still under investigation; nevertheless, cv. Mulato II seems to be very good as the 'pull' component. Another reason for searching an alternative grass for Napier has been the prevalence of the Napier stunt disease, especially in the Lake Victoria zone. Similar to Napier grass, also Silverleaf desmodium is not outstandingly drought-tolerant; in the system with cv. Mulato II, therefore, now Greenleaf desmodium (*D. intortum*) is being used. The ADOPT project will end in November 2013, with a possible short no-cost extension.

When meeting with Prof. Z.R. Khan at icipe's Mbita station near Kisumu, he explained that more than 9,500 farmers have adopted the push-pull system with cv. Mulato II in Kenya, Tanzania, Uganda and Ethiopia in the past 1.5 years, about half of them in Kenya. He estimated that there could be 10 million farmers in eastern Africa that might benefit from planting this particular cropping system, 3 mio. in Kenya alone. Nevertheless, new challenges have been identified, such as the red spider mite (already known from KARI-Katumani and Kiboko stations) and the Sorghum shoot fly (*Atherigona soccata*, others?).

The system is slightly adjusted in that now cv. Mulato II is sown in 4 slightly denser rows, while Napier was planted in 3 rows; usually maize plots are about 30 x 30 m^2 (900 m^2, i.e. a little less than ¼ acre, the unit that farmers in the region are familiar with; 1 ha = 2.5 acres) and they are surrounded by the 4 rows of Mulato II. Farmers get packs of 250 g of grass seed for this area. The area is said enough to sustain a cow with 10 l/d milk production. It was found that the maize plot can be maximum 50 x 50 m^2 in order to still have sufficient 'pull' effect on the stem borers.

Visiting icipe's **screening glasshouses in Mbita** was impressive, regarding the different effects investigated, i.e. drought-tolerance of a large range of grass species in pots, control effect on Striga in maize by desmodium. The push-pull system was also displayed in the field with Sorghum – covered by nets because of the potential bird damage.

The next two days were spent by visiting **individual farmers and farmer field days** in the Lake zone, around Migori and Homabay, West of Kisumu. A third day had been planned to the Siaya county, Northeast of Kisumu to visit more farmers' fields, however, this was cancelled as only 'more of the same' would have been shown. Some insights and lessons learnt from the field are:

- Farmers appreciate cv. Mulato II especially because it stays much longer green into the dry season and also is highly palatable and nutritious for their livestock. They also produce hay from it that seems to be highly palatable as well.
- When feeding dairy goats with the mix of cv. Mulato II and Greenleaf desmodium, some farmers claimed that milk yield increased from 1.5 to up to 4 l/animal/day. Goat milk is being sold for 30-

40 KES/l as compared to 24-26 KES/l for cow milk (prices from hawkers). Heifer International imported dairy goats from Ireland; the demand for kids is very high and they sell easily.

- New biotic challenges have shown up as a warning to not focus on the one genetic solution: the red spider mite and the sorghum shoot fly. Cv. Mulato II reacts to the latter in stronger tillering; apparently plants from vegetative propagation suffer less than those grown form seeds. Nevertheless, growth is slowed substantially down so that the pull-function may be hampered. Research is being conducted currently; nothing has yet been published on it. The spider mite dries grass leaves so that the plants get grey-brown. Overall, it is not surprising that pests chose cv. Mulato II as t may be the only 'green spot' in a landscape towards the end of the dry season.
- A management challenge seems to be that cut-and-carry systems are very extractive and usually manure produced from livestock goes to crops and not cultivated forage. We suggested combining the grass with another legume that needs to be stem borer-neutral in order to not 'confuse' the messages of pushing the insect out of the maize (by the desmodium). But also soil-fertility management should be promoted for the long-term sustainability of the system.
- The strongly increased forage availability close to the homestead has a major gender dimension as women can save greatly on time to collect forages; one farmer stated that before, during the dry season she would walk to a lowland area – 2 hrs/one way – to collect forage for the animals. Now, she just spends about 30 min. to feed her goats.
- Women empowerment has strongly happened through farmer-to-farmer training in the project.
- Maize yields often doubled or almost tripled in the push-pull system according to farmers' narratives. This will be a result from multiple effects: *Striga* control, stem borer control, N-fixation by the forage legume, improved water infiltration, improving soil organic matter, other?
- A highlight was a 'Mulato-Song' presented by a women's group near Migori town.
- Tropical Seeds considers releasing a cut-and-carry *Brachiaria* hybrid especially for Africa.

Seed issues

Several discussions were held around the importation of seeds into East Africa; a meeting was held with Alfred Busolo Tabu, Deputy Managing Director, Kenya Seed Company Ltd., Kitale, about future distribution of cvs. Mulato and other cultivars to come. When importing Mulato seed from Thailand, the cost is >20 US$/kg because of shipping by air. Greenleaf desmodium even costs 40 US$/kg. The calculation was that the package of Greenleaf and Mulato together, 250 g each, would be about US$10-15. There were many considerations about pricing that would still be attractive and affordable for the farmer.

Developments went fast; latest information from Eduardo Stern via email (4 Aug. 2013, summarized and translated from Spanish) is that Tropical Seeds is already importing 6 t of *Brachiaria* cv. Mulato II seed that can reach 12,000 smallholder farmers in Tanzania, Uganda, Ethiopia and Kenya. The cost for each 0.5 kg packet will be US$13, however, farmers will pay in 3-monthly installments of US$4.30 via MPesa – the mobile telephone-based system available in eastern Africa. This is the first time that farmers will pay for the seed as it previously was subsidized by the EU-funded ADOPT project. Tropical Seeds will sign an agreement with KARI to produce cv. Mulato II seed and investigate the adaptability of various hybrids, released and pre-release material. They hope that KARI will subsequently use the adapted grass materials in the various development projects existing in different agro-ecological zones of Kenya.

Implications for CIAT

There is potential for accompanying research to document and understand uptake of the technology and the grass beyond the push-pull system alone. In addition, there is need to document evidence for impact regarding production/productivity, and social/gender and environmental impact.

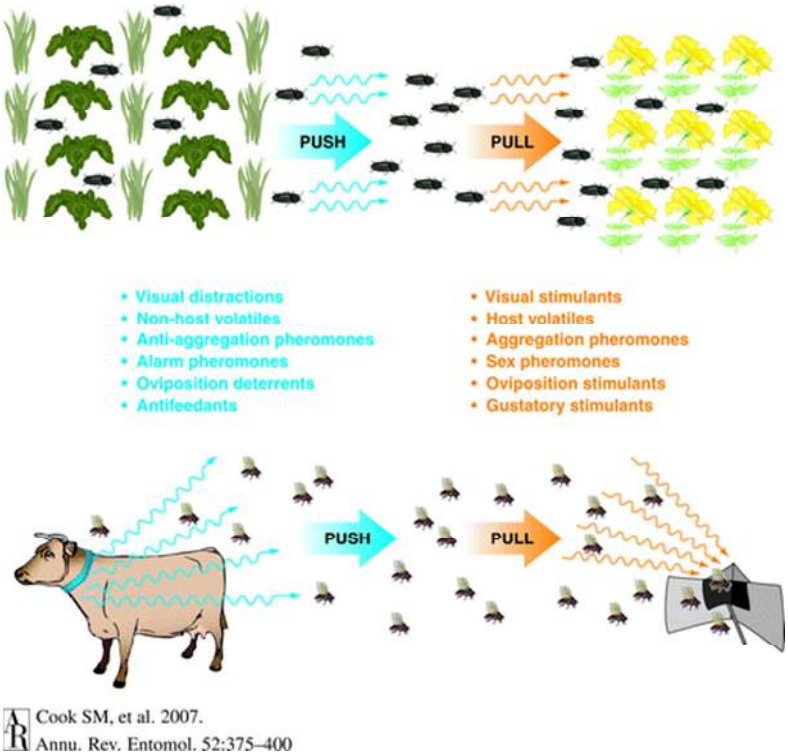

***Figure 1**. The push-pull strategy: diagrammatic representation of the components and generalized mode of action (from Cook et al., 2007).*

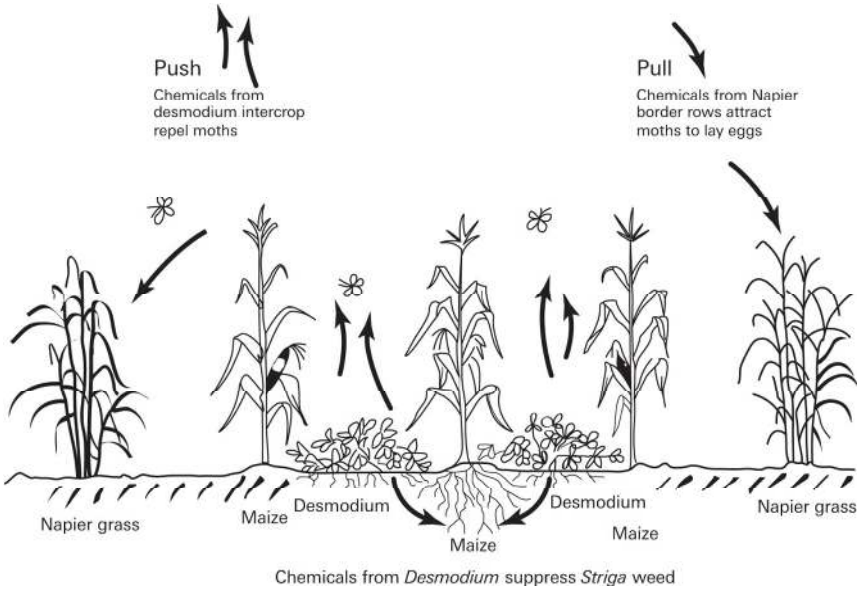

***Figure 2**. The push-pull system explained (from http://www.foodsecurity.ac.uk/research/impact/push-pull.html).*

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