

## SAFE-World Project/Initiative Summary

**Country: Kenya**

Project/Initiative Title: ICIPE IPM Research

Nos. farmers: 300                      Hectares: 150

Agro-Ecological Zone: III

Improvement types

1x	2	3x	4	5x	6x	7	8	9
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### D. Contact Point for Project/Initiative

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### E. Project Narrative

## Kenya: *Vutu-sukumu* (Push -pull) pest management in smallholder systems

The work of ICIPE is explicitly focused on designing low-cost integrated pest management technology. It works closely with farmers to test and adapt technologies. It is also producing unexpected synergistic effects through manipulation of agricultural systems and the paradigms that define them. ICIPE approaches sustainable plant pest management on four major fronts:

- ?? biological control, using one organism to control another;
- ?? botanical agents, natural pest control compounds that are derived from plants;
- ?? habitat management, manipulating the cultivated and natural environment to preserve the pest-natural enemy balance and richness of species;
- ?? pest-tolerant varieties of major food crops that deter insect damage.

One activity is investigating novel habitat management approaches to suppress cereal stem borer and *Striga* populations in maize and sorghum. This project is developing novel 'push-pull' strategies to repel stem borers from the cereal crop and attract them to intercrop or barrier forage grasses. It has found extra-ordinary multi-functionality in a range of fodder grasses and legumes in cereal systems.

The strategy involves trapping pests on highly susceptible trap plants (pull) and driving them away from the crop using a repellent intercrop (push):

1. The forage grasses, *Pennisetum purpureum* (Napier grass) and *Sorghum vulgare sudanense* (Sudan grass), attract greater oviposition by stem borers than cultivated maize.
2. Non-host forage plants, *Melinis minutiflora* (molasses grass) and *Desmodium uncinatum* (silver leaf) repel female stalk borers (*Chilo spp*).
3. Intercropping with molasses grass (*Melinis minutiflora*) increases parasitism, particularly by the larval parasitoid, *Cotesia sesamiae*, and the pupal parasitoid *Dentichasmis busseolae*. *Melinis* contains several physiologically active compounds. Two of these inhibit oviposition (egg laying) in *Chilo*, even at low concentrations.
4. Molasses grass also emits a chemical, (*E*)-4,8-dimethyl-1,3,7-nonatriene, which summons the borers' natural enemies.
5. Napier grass also has its own defence mechanism against crop borers: when the larvae enter the stem, the plant produces a gum-like substance kills the pest.
6. Sudan grass also increases the efficiency of the natural enemies (the parasitism rate on larvae of the spotted stemborer, *Chilo partellus* more than tripled, from 4.8% to 18.9% when the grass was planted around maize in a field and from 0.5% to 6.2% on *Busseola fusca* another important pest).
7. ICIPE has found that intercropping maize with the fodder legumes *Desmodium uncinatum* (silver leaf) and *D. intortum* (green leaf) reduced infestation of parasitic weed, *Striga hermonthica* by a factor of 40 compared to maize monocrop. Reduction in *Striga* infestation by intercropping maize with the two species of *Desmodium* was significantly more than intercropping maize with soybean, sun hemp and cowpea.

Researchers from ICIPE and IACR-Rothamsted have found that such 'push-pull', using the attractive plants as trap crops and repellent plants as intercrops, reduces stem borer attack and increases levels of parasitism of borers on protected maize, resulting in a significant increase in yield. Farmer participatory trials in 1997 and 1998 have shown significant yield increases in maize. The aim is now to develop a maize-based cropping system that will reduce yield losses due to both stem borer and *Striga* and at the same time improve soil fertility due to nitrogen-fixing action of *Desmodium*. Such a redesigned and diverse system has many of the characteristics of 'traditional' farms in Kenya.

Further ICIPE research is showing the effectiveness of neem to control weevils in bananas, diamondback moth in brassicas, and fruitborers in tomatoes; is developing resistant cultivars based on traditional germplasm; is showing the value of sterile male release for fruit fly control; and is demonstrating control of the stemborer, *Chilo partellus*, through identification of a natural enemy from Pakistan, the parasitic wasp *Cotesia flavipes* (*Chilo* was accidentally introduced from Asia in the 1930s, and has no co-evolved local natural enemies), which has now been released in Kenya, Mozambique, Uganda, Zambia and Somalia.

*Sources: Hans Herren, John Pickett, ICIPE annual reports; Pickett, 1999; Khan et al, 2000*

Further data for this project is in hard copy format and is not currently available electronically. If you would like further information please contact Dr Hans Herren at the above address or refer to ICIPE Website at <http://www.icipe.org>