Researchers begin effort to reduce crop loss from parasitic weed attacking Africa's crops

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Scientists based in Nigeria and Kenya have begun a major push against parasitic weeds that have spread across much of sub-Saharan Africa, causing up to US$1.2 billion in damage every year to the maize and cowpea crops of tens of millions of small farmers.

The project, coordinated by the Nigeria-based International Institute of Tropical Agriculture (IITA), will introduce proven technologies for fighting Striga, or witchweed, and Alectra. Known by some as the "violet vampire" because of its bright purple color, Striga attaches itself to the roots of plants like maize and cowpea and sucks out nutrients, reducing yields and destroying entire harvests.

Witchweed primarily affects smallholder farmers who can't afford costly herbicides for fighting the parasitic plant. The most widespread Striga species is estimated to have infested up to 4 million hectares of land under maize production in sub-Saharan Africa, causing yield losses of up to 80 percent. According to researchers at IITA, this represents up to $1.2 billion in losses for farmers and affects approximately 100 million people in sub-Saharan Africa.

The parasitic weeds have spread widely in Africa in recent decades; their prolific seeds germinate in response to substances released by the roots of crop plants. Because crop plants have more difficulty competing with witchweed in poor soils, intensive farming and the expansion of farming into marginal soils have encouraged their spread. Furthermore, witchweed is difficult to control because each plant produces up to half a

million seeds that can remain dormant in the soil for decades.

"Africa is plagued by a plant 'vampire' that robs farmers of their harvest," said Hartmann, IITA director general. "Dedicated pursuit by farmers and researchers is delivering several ways to fight the parasite."

The $9.0 million Striga project is supported by a $6.75 million grant from the Bill & Melinda Gates Foundation to IITA. Its goal is to help 200,000 maize farmers and 50,000 cowpea farmers who work in areas with high rates of Striga infestation in Kenya and Nigeria. By project's end in 2014, organizers estimate that over 250,000 individual farmers will potentially see up to 50% higher maize yields and 100% higher cowpea yields.

The four-year project will focus on improving and expanding access to methods of Striga control, while supporting research to identify the most effective means of controlling the parasitic weed under varying conditions. The project will evaluate and implement four approaches: using Striga-resistant crop varieties; using a "push-pull" technology that involves intercropping with specific forage legumes that inhibit the germination of Striga; using herbicide-coated seeds; and deploying biocontrol of Striga. After a two-year evaluation period, the project will scale up the most effective approaches.

Project partners include the International Maize and Wheat Improvement Center (www.cimmyt.org), African Agricultural Technology Foundation (www.aatf-africa.org), International Centre of Insect Physiology and Ecology (www.icipe.org), and BASF Crop Protection.

Scientists expect that the integrated witchweed control interventions will generate an estimated $8.6 million worth of additional grain (maize and legumes) annually at the project locations—resulting in increased

incomes, better nutrition, and reduced poverty, as well as employment opportunities from grain production to food markets.

The project will work with farmers, seed companies, community-based organizations, extension workers, policymakers, and researchers. In pilot areas, it will supply witchweed-resistant maize and legume seed and chemically treated seed to private seed companies and community-based seed producers for production and distribution.

"Most farmers in the Striga Project target areas are highly resource-poor. The Project aims to integrate delivery of Striga-resistant maize and legume seeds with best-bet agronomic technologies to fight the weed menace, while raising farmers' awareness of the technologies, and supporting community-based organizations with technical assistance," said Prasanna Boddupalli, director of the Global Maize Program of CIMMYT, based in Nairobi, Kenya.

The project will also research new management techniques such as use of a biological control method. Biocontrol can help maintain the balance of nature, support biodiversity, and sustain complex and beneficial ecological interactions.

In addition, the project will provide lessons and strategies for scaling up in other areas of sub-Saharan Africa, where witchweed is a major problem for maize and cowpea production. The project will also generate scientific data on the biology of witchweed, including the plant's relationship with different hosts and methods for rapid screening for resistance to the weed in maize and other crops.

Each of the approaches to control Striga holds promise, especially when two or more options are employed at the same time. For example, in West Africa, IITA and partners have tested the combined use of Striga-resistant maize varieties in rotation with legumes that cause witchweed

seeds to germinate but fail to latch on to the host. This approach increased crop productivity by an average of 88 percent.

In East Africa, icipe and partners have developed a novel cropping system, known as "push-pull." It is an environmentally-friendly, economical approach that inhibits witchweed, and attracts insect pests to trap plants (pull) while driving them away from the main crop using a repellent intercrop (push).

"Increased uncertainty about the continent's vulnerability to climate change and its spin-off effects on parasitic weeds like Striga have created more demand for 'push-pull.' Farmers need more weapons in the fight against these threats," said Christian Borgemeister, director general of icipe. "Our partnership is a good example of donors and researchers responding to the needs of farmers by enabling their ability to withstand the increasingly adverse and highly-variable weather and other constraints at the farm level."

Approximately 80 percent of the population in sub-Saharan Africa depends on agriculture for food, income, and employment. However, average yields of maize and cowpea are very low. Approximately 300 million people live below the poverty line in the region, and in rural areas, roughly half the population encounters hunger and malnutrition.

Provided by IITA