

Herbicide Technology Can Reduce Massive Crop Losses to *Striga* in Africa

International Pesticide Benefits Case Study No. 50, December 2011

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The parasitic *Striga* species are considered the greatest biological constraint upon the cultivation of cereal crops (sorghum, millet and maize) in sub-Saharan Africa. Two species of *Striga* infest 22-40 million hectares of farmland [1]. The most deleterious effects occur on maize, where about 2.5 million hectares suffer grain losses of 30 to 80% [1]. Up to 40% of total farmland in some areas has been abandoned for maize and sorghum because of *Striga* infestation [2].

Striga seeds germinate only when they are stimulated by the presence of a specific chemical, usually an exudate from the root of a suitable host plant growing nearby. *Striga* plants attach onto and penetrate the roots of the host plant. In addition to drawing water and nutrients from the host plant, *Striga* injects toxins that adversely affect the growth of their host. The parasite's purple flower spike appears and between 50,000 and 200,000 seeds per plant are set. These seeds can remain dormant in the soil for twenty years [1]. Damage from *Striga* cannot be prevented by hand pulling because the weed is attached to the crop plant.

International research efforts have focused on the development of *Striga*-resistant varieties. One problem is that in some cases resistance to *Striga* has been associated with low grain yield and poor grain quality [3]. Because of the longevity of *Striga* seeds in the soil and the variability within and between *Striga* species, there is a tremendous potential for the parasite to adapt to host plant resistance.

Over the past few years, a promising technology has been developed by the International Maize and Wheat Improvement Center (CIMMYT) in collaboration with the Weizmann Institute of Science and the chemical company BASF. A natural mutant of maize provides the maize with resistance to imidazoline (IR) herbicides. Seed coating of the IR-maize varieties with imazapyr, a systemic herbicide from that group, provides the plant with protection from *Striga* [4]. *Striga* seeds, stimulated to germinate by maize roots, attach and are killed by imazapyr in the maize seedling before any damage is inflicted. Additionally, imazapyr from the seed coat diffuses into the surrounding soil and kills ungerminated *Striga* seeds. Research has demonstrated that seed coating with imazapyr gives season-long *Striga* control in most cases, resulting in a 3-4 fold increase in maize yield when *Striga* density is high [5]. In June 2011, the Bill and Melinda Gates Foundation announced funding for a four-year project which includes determining efficient methods to provide access to the IR seed coat technology for African farmers.



Striga weed



Seed treated maize in background, untreated in foreground

References

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