

Striga and the IR maize FREQUENTLY ASKED QUESTIONS



What is *Striga*?

Striga is a parasitic weed that attacks cereal crops, retarding plant growth, resulting in stunted and withered plants.

Are there different types of *Striga*?

There are several species of *Striga*. In cereals, only two species are of economic importance. These are the purple-flowered *Striga hermonthica* and red-flowered *Striga asiatica*. *Striga hermonthica* is the most destructive.

Which crops are susceptible to *Striga* infestation?

Striga infests cereal crops such as maize, millet, sorghum, upland rice and napier fields throughout Sub-Saharan Africa.

How does *Striga* damage the cereal crop?

Striga attaches itself to the roots of host plants and siphons the nutrients and water intended for plant growth. This stunts and discolours the plant, finally causing it to wither resulting in grain yield losses. *Striga* is most damaging to the crop before emerging from the soil. Early signs of *Striga* attacks are folded leaves and wilting even where there is sufficient soil moisture. Some crops act as trap crops or false hosts. They stimulate the *Striga* seeds to germinate. However, the *Striga* seedling cannot successfully attach to the trap crops in order to feed and hence it dies.

What are the other names of *Striga*?

Striga is also known as witchweed because of the twisted discoloured growth of affected plants. In west Kenya, farmers refer to it as *Kayongo* (Luo), *Oluuyongo* (Luhya), and *Imoto* (Teso). In Tanzania it is known as *Kiduha* in Kiswahili.

Which conditions encourage *Striga* to flourish?

Striga infestations flourish in conditions characterised by low soil fertility, and mono-cropping with cereals.

How does *Striga* spread?

Striga seeds are very small and are mainly spread through the use of contaminated seed and equipment, surface run-off, eroded soil, wind, animals and people. Uprooted *Striga* plants should be burned otherwise the weed easily spreads to other farms. Seeds may remain dormant in the soil for 15–20 years.

What is the impact of *Striga* infestation on maize production?

In Sub-Saharan Africa, *Striga* causes yield losses of between 30% and 100%, worth USD 1 billion and affect livelihoods of about 100 million people. Studies show 76% of farmland in west Kenya – about 210,000 hectares – is infested with *Striga*. What this means is that a farmer whose crop is attacked by *Striga* could lose a whole crop and any harvests would not be sufficient to feed the family and contribute to the family's livelihood.

What are the available *Striga* control methods?

Striga control methods have been researched in Africa for over 50 years with a focus on agronomic practices such as uprooting and burning *Striga* plants before flowering, field sanitation (use of *Striga*-free planting material and clean tools), crop rotation, intercropping, organic matter usage, improved fallows and push-pull system, host plant resistance (use of *Striga*-tolerant maize germplasm) and the application of herbicide.

A new *Striga* control technology known as Imazapyr resistant maize (IR maize) has been developed by scientists at the International Maize and Wheat Improvement Center (CIMMYT), Weizmann Institute of Science, Kenya Agricultural Research Institute (KARI) and BASF, the Chemical Company. The Imazapyr resistant herbicide-coated maize seed kills *Striga* before it damages the crop and is being promoted under the trade name StrigAway® maize but has different local names such as *Ua Kayongo* in Kenya and *Komesha Kiduha* in Tanzania.

Then why does *Striga* infestation persist?

Striga-infested areas have developed very high levels of long-lived *Striga* seeds in the soil with only some breaking dormancy each season when stimulated by germinating crops and conducive environmental conditions. Available control methods have not been widely adopted by farmers probably due to limited knowledge of the *Striga* lifecycle, lack of land for crop rotation, and because their benefits accrue over the long term. Herbicide applications are also expensive and ineffective since the crop is already damaged before *Striga* emerges.

What is the IR maize technology all about?

IR maize or StrigAway maize technology comprises two main elements – a herbicide-resistant maize seed and imazapyr, a systemic imidazolinone herbicide. The herbicide-resistant maize is coated with low doses of the herbicide, about 30g imazapyr per hectare, to control *Striga*. As the StrigAway maize germinates, it absorbs some of the herbicide used in coating it. The germinating maize stimulates *Striga* to germinate and as it attaches to the maize root, it is killed before it can cause any damage. Herbicide that is not absorbed by the maize plant diffuses into the soil and kills *Striga* seeds that have not germinated.

How does StrigAway maize control the spread of *Striga*?

The StrigAway seed coating acts at the time of *Striga* attachment to the maize root. *Striga* seed attempting to attach to germinating maize seed is killed and the



Better tools, better harvests, better lives



herbicide prevents the attachment of the *Striga* on the maize plant. The herbicide also kills *Striga* seeds that have not germinated in the soil surrounding the maize seedling. The StrigAway maize technology, therefore, decreases the level of *Striga* in the farm through direct attacks on the *Striga* plants and seeds. The maize field can virtually be clear of *Striga* throughout the season.

How is herbicide resistance acquired in maize?

The resistance is derived from a naturally occurring gene in maize originally identified by BASF and made available to CIMMYT.

Is the StrigAway maize technology available to farmers?

The technology is available in Kenya and Tanzania and is currently being tried in farmers' fields in Uganda and Ethiopia. In southern Africa, evaluation is being conducted in Malawi, Zambia, Zimbabwe, Lesotho and Swaziland. This is being done through the joint efforts of CIMMYT, AATF, BASF, NGOs, agricultural extension, the national agricultural research institutes and seed companies such as Kenya Seed Company and Western Seed Company in Kenya, Tanseed in Tanzania and Nalweyo Seed Company (NASECO) in Uganda.

What is the increase in maize yield when using StrigAway hybrid maize?

Extensive on-farm testing of ordinary maize and the new hybrid on farmers' fields under *Striga* infestation found that the hybrid maize yields were three (3) times those of ordinary maize. Apart from its *Striga* control qualities, StrigAway maize has other advantages that include resistance to maize streak virus and Turicum, thus reducing the problems that affect maize production.

Is StrigAway maize therefore the best technology in controlling *Striga*?

It's one of the methods of controlling *Striga* that can be used by farmers. For long-term control of *Striga*, farmers are advised to combine StrigAway maize

with other *Striga* management methods, such as uprooting, burning *Striga* plants before flowering, field sanitation, crop rotation, intercropping, organic matter use, improved fallows and push-pull system MBILI planted with groundnut, golden gram, soybean or lablab and *Striga*-tolerant maize germplasm. What has been noted, however, is the quick action on *Striga* by StrigAway maize and the immediate increase in maize yields.

Do farmers need to take precautions when handling StrigAway maize?

StrigAway maize is planted and managed in the same way that farmers currently grow their maize. As is recommended with all commercially available maize seed coated with insecticide and fungicide, farmers should wash their hands after handling the maize. They should not handle other seed before they wash off the imazapyr herbicide as this may affect germination of the other crops. StrigAway maize can be intercropped with legumes, but the two must not be planted in the same hole, as the herbicide is likely to affect the legume seed. Instructions on handling of the treated seed should be provided to farmers enclosed with packaged seeds.

Does StrigAway maize have residual effects where it is grown?

No. The amount of herbicide is minuscule and is completely broken down in the soil 2–3 months after planting.

Can StrigAway maize be grown in a field not infested with *Striga*?

Yes. It will grow and perform just like any other improved maize variety but the farmer will not have the benefit of the seed dressing without the presence of *Striga*.

Where can farmers find StrigAway maize seed?

StrigAway hybrid seed is commercially available to farmers in Kenya and Tanzania. In Kenya, the seed is available through Western Seed Company and agro-dealers in the *Striga* infested areas of western Kenya and in Tanzania through Tanseed International Ltd. New StrigAway maize varieties will be available in future from other seed companies in the region.

Is the StrigAway maize genetically modified?

No. As mentioned above, the technology relies on herbicide resistance that was derived from a naturally occurring gene in maize originally identified by BASF and made available to CIMMYT. Plant breeders at CIMMYT in collaboration with Weizmann Institute of Science, Israel and KARI with funding from Rockefeller Foundation later incorporated the IR-gene into African maize varieties and adapted it for agro-ecological regions in Africa where *Striga* is endemic.

Where can one obtain more information on StrigAway maize?

Information can be obtained from CIMMYT, BASF, AATF, KARI, Forum for Organic Resource Management and Agricultural Technologies (FORMAT), We RATE, Kenya Seed Company, Western Seed Company, Tanseed International (Tanzania), Uganda National Crop Resources Research Institute-National Agricultural Research Organisation (NACRRI-NARO) and Ethiopian Institute of Agricultural Research (EIAR).

More information can also be obtained at: www.cimmyt.cgiar.org, www.aatf-africa.org and www.africancrops.net/Striga

AATF is a not-for-profit organisation that facilitates and promotes public/private partnerships for the access and delivery of appropriate proprietary agricultural technologies for use by resource-poor small-holder farmers in Sub-Saharan Africa. AATF is a registered charity under the laws of England and Wales and has been given a tax-exempt status in the USA. It is incorporated in Kenya and in the UK and has been granted host country status by the Government of Kenya where it is headquartered.