Proactive Management of Striga Infestation

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Summary

Striga, also known as witchweed, is a parasitic plant that has invaded all major sorghum and millet production zones of Africa. The damage begins underground where the weed latches onto the roots of the crop and feeds on water, nutrients, and sugars causing twisted, discolored, and stunted growth. There is a strong link between soil fertility depletion and yield losses of sorghum and millet by the parasitic weed because as less nutrients are available in a farmer field; the more crops are attacked and the more the pest siphons off sugars and other substances from the host. A downward spiral arises when fields are continuously cropped with sorghum, millet and other cereals, insufficient mineral fertilizer and organic inputs are applied. Depending on the severity of pest infestation, yield losses range from 20% to complete crop failure. Seeds of the parasitic weed remain in the soil for up to 20 years and thus simple weeding and routine field sanitation procedures are not enough to eradicate it. Farmers who are badly hit by the pest end up suffering food insecurity. Proactive technologies and strategies exist that reduce Striga infestation and its yield losses and halt the spread of the pest.

Technical Description

Problems of Striga infestation and soil fertility decline must be addressed by various agronomic practices, which include fertilizer micro-dosing, organic matter recycling, crop rotation and intercropping, Striga tolerant varieties, seed dressing, pre-emergence herbicides, and hand weeding and burying of emerged shoots. Overcoming the parasitic weed with these technologies only succeeds if efforts by stakeholders are well informed because too many believe that control measures are futile. Farmers must know how to effectively implement practices and need to mobilize resources and labor for investing in control measures. Extension services play a very important role to disseminate information, implementing field demonstrations and coordinating grassroots activities. Besides this, development agencies must organize large-scale campaigns designed to overcome Striga in worst affected areas. Commercial seed companies and agro-dealers must include new technologies for Striga management in their product ranges and market them. Farmer associations must engage in bulk purchase of inputs and community-based seed production. National authorities must enact priority policies for integrated management practices to combat the weed.

Uses

Available technologies and practices for controlling Striga can be applied in all major millet and sorghum production zones. The approaches can be used to combat different Striga species that parasitize these crops; Striga hermonthica, S. asiatica, S. forbesii, and those that affect cowpea (S. gesnerioides).

Composition

Practices for Striga management are easily adapted to soil fertility conditions, Striga infestation levels, availability of agro-inputs, farming habits, and socio-economic contexts, which vary substantially in sorghum and millet growing areas.

Means of application

Widespread uptake of approaches for controlling Striga and improving soil fertility is achieved through technical training and advisory services. Participatory approaches such as Farmer Field Schools are efficient in disseminating technologies and practices for combatting Striga. There is a need for Training of Trainers in Farmer Field Schools. Capacity building focuses on site characterization, cultivation of resistant varieties, fertilizer micro-dose application, production of organic fertilizers and timing of Striga uprooting. Research centers have identified and released a range of sorghum and pearl millet varieties with defense mechanisms against Striga that keep it from attacking roots, and which are able to grow on nutrient depleted farmland. Common mineral fertilizers can be used to alleviate soil nutrient depletion and reduce Striga emergence. Animal manure, compost and fresh crop residue are suitable organic matter inputs for improving nutrient and water availability, but also stimulate abortive germination by Striga seed stocks. Crop rotation or intercropping to combat Striga involves different non-cereal crops like cowpea, groundnut, soybean, cotton, sesame, or sorrel. Desmodium, a pasture legume, was packaged into an agro-ecological approach to Striga management referred to as Push-Pull.

Agroecologies	Dryland area, Moist savanna.
Regions	Africa South of Sahara.
Developed in Countries	Burkina Faso, Chad, Ethiopia, Kenya, Mali, Niger, Nigeria, Senegal, Sudan, Tanzania, Zimbabwe.
Available in	Burkina Faso, Chad, Ethiopia, Kenya, Mali, Niger, Nigeria, Senegal, Sudan, Tanzania, Zimbabwe.
Solution Forms	Management.
Solution Applications	Weed control.

Agricultural Commodities	Sorghum/Millet.
Target Beneficiaries	Women, Youth, Small-scale farmers, Commercial farmers.

Commercialization

Commercialization Category

Commercially available

Startup Requirements

Different elements must be in place to realize appropriate and widespread uptake of these technologies: 1) Adaptation of practices according to farming practices and cultural customs, 2) Establishment of farmer field school, training of trainers and collective action programs, 3) Access to tolerant varieties, mineral fertilizers, and broadleaf herbicides from local suppliers in affordable packages, and 4) Loan facilities for producers that are adopt control technologies and practices.

Production Costs

Use of improved varieties with Striga tolerance, organic and mineral fertilizers, and post-emergent broadleaf herbicides to manage the parasitic weed and enhance sorghum and millet yields requires investment by farmers. Micro-dose fertilizer application and pulling of weeds by hand are labor intensive and involve necessary opportunity costs if this parasitic weed is to be eliminated. Training of trainers, farmer field schools and community mobilization involve substantial expenses by committed specialists that requires investment by national agricultural programs and NGOs. Tolerant varieties of sorghum and millet must be multiplied and delivered to farmers through commercial seed companies or community-based schemes.

Customer Segmentation

Use of improved varieties with Striga tolerance, organic and mineral fertilizers, and post-emergent broadleaf herbicides to manage the parasitic weed and enhance sorghum and millet yields requires investment by farmers.

Potential Profitability

Uprooting of Striga and micro-dose fertilizer application through collective input purchase by farmers in Mali led to an increase of sorghum and pearl millet yield by up to 60% within four years. The use of improved variety and fertilizer micro-dosing in sorghum production has shown to double revenues to US $241 ha-1 whereas conventional practice earned farmers US $122 ha-1. For millet, the use of premade mixes of seed and fertilizer generated an income of US $209 ha-1 and micro-dosing of

fertilizer between US $168 ha-1 and $180 ha-1. Crop rotation and intercropping with cowpea or groundnut provide a more nutritious diet and a secondary source of income. Decreases in Striga infestation and improvements of soil fertility create long-term benefits and higher returns on investment.

Licensing Requirements

Multiplication of tolerant varieties must comply with national requirements on seed systems. Marketing herbicides often requires approval by pesticide regulators.

Innovation as Public Good

The interventions and practices for Striga management in sorghum and millet systems are a Public Good disseminated by ICRISAT and other organizations.

Solution Images

Sorghum severely infested by Striga

Community action to uproot Striga

Community action to uproot Striga

Institutions

ICRISAT
INTERNATIONAL CROPS RESEARCH INSTITUTE FOR THE SEMI-ARID TROPICS

Accompanying Solutions

Fertilizer Micro-Dosing to Enhance Yield and Use Efficiency