AFRICAN UNION

SEMI-ARID FOOD GRAIN RESEARCH AND DEVELOPMENT

AU-SAFGRAD

Enhancing Food Security Through Control of Parasitic Weeds in the Crop Production

Study on :
Striga-Issues,
Challenges and Opportunities

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Foreword

Striga is a parasitic weed that significantly reduces crop (e.g. maize, sorghum) yield, hence undermining efforts to raise productivity and improve farm incomes.AU-SAFGRAD in partnership with KOICA (Korea International Cooperation Agency) implemented a programme to control striga in African Member States. The program was mainly composed of two major activities: The first activity concerns the enhancement and sustainability of a regional partnership network and the second activity, was focused on Capacity Building and Training Support to national efforts. It is structurd in a way that the first activity was supported by the African Union budget program while the second activity was supported by a contribution from the Korean Government, a partner since the inception of the program in 1999. Review and planning workshops were usually held in the first trimester of each year with attendance from participating national scientists, IITA and other experts on striga research and control. Small grants (8000 to 12000 USD) were provided to NARIs of participating countries to undertake field activities on Striga control. The actual number of participating countries was: Burkina Faso, Benin, Cameroon, Cote d'Ivoire, Ghana, Niger, Nigeria, Togo, Sudan and Botswana. At country level, activities implemented include the demonstration of technology packages designed to control Striga. This includes striga tolerant and resistant maize varieties, cultural practices (intercropping and rotation of tolerant/resistant maize varieties with

legume trap crops) etc. The Main objective of this work is to study and analyze the main strengths and weaknesses during the implementation period of the SAFGRAD's project funded by KOICA and other projects\initiatives as well and to extract lessons learned.

DR. Ahmed ELMEKASS
AU SAFGRAD Coordinator

[1] External Evaluation of Challenge Program on Water and Food.

Introduction

Summary of background and objective of the work

Research to understand Striga biology in order to develop effective control and management strategies have been undertaken at different agricultural research institutions in Africa and worldwide. To date, several initiatives are on-going aiming at reducing the Striga scourge on crops produced and consumed by the poor in Africa. Although these initiatives are working towards the same objectives and aims, the approaches are different, and very little coordination effort is put in place to ensure non duplication of effort and pertinence of the collective action.

The objective of the work is to study and analyze the implementation during the last years of the AU/SAFGRAD Striga project funded by the Government of the Republic of Korea and other initiatives as well and to extract lessons learned.

1. The study was done through the following tasks:

1. desktop review of on-going and previous Striga control initiatives by regional and sub-regional institutions in Africa, and documentation of lessons learned (success and/or failure);

2. desktop review of SAFGRAD initiative and documentation of lessons learned (success and/or failure), comparing with other initiatives ;
3. determination of shared interest, common goals and objectives that could serve as a basis for collaboration and outline the most plausible mechanisms to put in place for such collaboration to be materialized;
4. strategy for AU/SAFGRAD to effectively re-raise this initiative to a continental wide level;
5. determination of the expected output and keys indicators for measuring progress;
6. proposition of cost for the initiation of such program for making Striga a continental wide campaign;
7. proposition of some partners and stakeholders for resources mobilization;
8. presentation of the draft before a team of experts' workshop for comments and improvement;
9. facilitation of the workshop;
10. revision of the draft based on the comments received from the technical experts' workshop;
11. submission of the revised document to AU/SAFGRAD in a time as stipulated in the contract.

2. Methodology

The major steps used to conduct the study were as follows:

A desktop review was done using different documents received from the AU/SAFGRAD AU/SAFGRAD library.

A questionnaire has been addressed through internet to 26 scientists including focal points working on Striga in the different countries and regional or international institutions.

We sent one month later a reminder and finally got 9 responses from 7 countries (NARS) out of 14 (Benin, Botswana, Burkina Faso, Cameroon, Côte d'Ivoire, Ethiopia, Ghana, Kenya, Mali, Niger, Nigeria, Senegal, Soudan, Togo) and one response from ICRISAT.

After reading the different documents from the library and the responses to e-mails sent, a SWOT analyze was applied to responses given to questionnaire.

Base on the SWOT analysis, a project document on integrated Striga management in Africa involving all the countries where Striga constitutes a big issue is written and will be submitted to AU/SAFGRAD.

A restitution involving all stakeholders (focal points in each country, technical ministries, regional integration organizations, technical and financial partners, research and training institutes and centers, farmer organizations, civil society organizations, microfinancial institutions, private agri-business) will be organized.

The draft will be proposed to a team of technical experts' workshop for comments and improvement.

Observations and recommendations made in the validation workshop will be taking into account and be included into the final report of the workshop.

3.

The AU/SAFGRAD Striga project

A summary of the activities carried out in the different countries is presented in table 1.

Table 1: Main achievements of the AU/SAFGRAD in the different countries from 1999 to 2007.

Year	Countries involved	Number of farmers reached	Main achievements
1999	Ghana, Côte d'Ivoire, Benin, Cameroon, Nigeria (Kenya, Ethiopia, Malawi, Zimbabwe)	-	136 on farm adaptive trials and demonstrations implemented in West Africa
2000	-	-	-
2001	-		-
2002	Benin, Cameroon, Côte d'Ivoire, Ghana, Mali, Nigeria	Total: 1268 Benin: 87 Cameroon: 721 Côte d'Ivoire: 20 Ghana: 241 Mali: 26 Nigeria: 173	6,125 kg of seeds of 3 STR cultivars produced in Cameroon 2,758 kg of seeds of cowpea cultivar IT93K452-1 and 3,114 kg of seeds of soybean cultivar TGX 1448-2E produced
2003	Benin, Burkina Faso, Cameroon, Ghana, Mali, Nigeria	Total: 1943 Benin: 622 Burkina Faso: 23 Cameroon: 651 Ghana: 55 Mali: 25 Nigeria: 557	3,975 kg of maize seeds and 360 kg of legume seeds

.../...

Table 1: suite

Year	Countries involved	Number of farmers reached	Main achievements
2004	Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ghana, Mali, Nigeria	Total: 1980 Benin: 36 Burkina Faso: 42 Cameroon: 756 Mali: 254 Nigeria: 892	11,413 kg of maize seeds and 2,005 kg of legume seeds
2005	Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ghana, Mali, Nigeria	Total: 2069 Benin: 44 Burkina Faso: 202 Cameroon: 612 Ghana: 138 Mali: 212 Nigeria: 861	8,350 kg of STR maize and 1,822 kg of legume grain certified seeds produced
2006	Funded activities were not carried out due to late receipt of funds from the funding government		
2007	Benin, Burkina Faso, Cameroon, Ghana, Mali, Nigeria	Total: 2665 (2733) Benin: 22 Burkina Faso: 140 Cameroon: 970 Ghana: 110 Mali: 526 Nigeria: 987	7,775 kg of maize seed and 540 kg of legume seed produced

3.1. Strength of the AU/SAFGRAD Striga project

The project has been implemented in more than 10 countries in West and East Africa, allowing collaboration among these countries. So, one of the major achievement of the project is the fostering of cooperation among countries to control Striga, which can ultimately help regional integration. The Integrated Striga Control Project under SAFGRAD provides the opportunity for sharing ex-

periences among scientists and ultimately farmers in participating countries. This is expected to fast-track the control of Striga in the region.

The project provides knowledge on the biology of Striga and understanding of the action of false hosts and importance of sustainable and integrated control which will allow technicians and farmers better appreciate the various possibilities for controlling Striga.

The project organized workshops, monitoring tours, field visits, which can be capitalized as achievements.

The project contributes to train scientists, technicians and farmers.

FFS were used as an approach to reach many farmers in the different countries.

A total of 1268 farmers were reached in 2002 in the six participating countries (87 in Benin, 721 in Cameroon, 241 in Ghana, 15 in Mali, 173 in Nigeria and 20 in Côte d'Ivoire).

From 2002 to 2004, more than 5180 farmers were reached by NARS of participating countries (3754 involved in technologies evaluation and demonstration and 1446 in technologies dissemination).

The project led to the promotion of demand-driven research and packaging of more productive technological options to increase agricultural production and productivity.

Regarding technologies, a total of 11 maize cultivars were used in the six countries (2 each in Benin, Ghana and Mali, 3 each in Côte d'Ivoire and Nigeria and 4 in Cameroon). Three legumes (groundnut, cowpea and soybean) were used in the participating countries. It was only in Nigeria that all 3 legumes were used. In the other countries the choice of legume was either cowpea or soybean.

Soybean was used in Ghana and Nigeria while cowpea was the legume of choice in the remaining countries.

Results showed superiority of Striga Tolerant/Resistant (STR) cultivars over the farmers' cultivar across countries and improvement in yield following the cultivation of STR cultivars was often accomplished by reduced Striga emergence. In 2004, participating NARS have been able to strengthen their capacity to produce STR maize variety and legume seed. So, more than 11413 kg of maize seed and 2005 kg of legume were reported through the on-farm community seed scheme.

Communication was a key issue in the project. Farmers' field days were organized in some countries and video tape of project activities was produced in 2003. The 16 mn video tape on Striga control were broadcasted in 2 participating countries (Mali and Burkina Faso). In 2004, some activities were carried out on farmers' perception of the technology assessment.

3.2. Weaknesses of the AU/SAFGRAD Striga project

One of the weaknesses of the project is the insufficiency of funds. So, small amount of money were given to countries for trials implementation. One can also notice the late reception of funds in 2006, so no activities were implemented that year. The late reception of money can result of lateness in planting out the trials and the best lands which ought to have been used for the trials were already used-up by farmers before the seeds arrive.

The protocols revealed the complexicity of the Striga control options. They also confirmed that the testing technologies were still research/development activities instead of diffusing them.

The project attempted to promote the same technologies in all the countries with different priorities and concerns when harmonization is not necessary. For example, the control of Striga in Niger would have to focus on sorghum and millet which are the major crops extensively cultivated. If farmer-acceptable Striga-resistant/tolerant sorghum and millet varieties are not immediately available, improvement in soil fertility through rotation and trap cropping would have to be pursued.

Another weakness of the project was that the countries were not self-sufficient in seed production.

The project did reach a great number of villages and farmers' field days were not organized in all the countries. Weak research-extension linkage was noticed for the case of Niger. So enlisting participating farmers and educating them on the project become the responsibility of researchers.

Poor soil fertility in some areas did not allow success of Striga control trials implemented. In term of communication, the lack of pictures and video in the first phases of the project was a big handicap for the success of the project.

3.3. Opportunities of the AU/SAFGRAD Striga project

Farmer field days were organized in some countries which provide greater interaction among all stakeholders and help farmers to make a decision of available technology.

In some countries, when technicians and farmers have benefited from training through a previous project, these trainees can be used for new coming projects.

The project should partner with other organization and agencies that can come up with initiatives on soil fertility maintenance to leverage the efforts made on Striga control in the country.

The food crisis which happened in 2008 can be considered as an opportunity to submit a Striga control project to donors for funding.

3.4. Threat

When war occurred in countries, it is difficult to implement developing projects like the Striga technologies. So, in 2004, political situation in Côte d'Ivoire could not permit the implementation of project activities in this country.

3.5. Perspectives for a new Striga project

In term of perspective, for a new project, the demonstrations should be simple and extensive as to cover greater number of farmer.

Foundation seeds should be procured from the relevant institutions and multiplied for farmers as certified seed. To facilitate that, farmers and farmer cooperative society may be given a short training on seed production. So, community based seed production should be enhanced in all countries. There is also the need to train more researchers and technicians in Striga research for sustainability.

Technology diffusion should be encouraged in all countries as a cheapest way of making technology available to end users.

FFS approach can facilitate effective knowledge delivery, skill acquisition, improved Striga management appraisal and appreciation as well as sustainable rapid technology adoption. This activity should be compulsory in all countries and should see the participation of all stakeholders.

Some good recommendations were made by a monitoring team who travelled through Nigeria: i) Campaign for Striga control should involve not only farmers but traditional leaders, the legislative arms of the Local Government Area and extension officers; ii)

A sensitization should be made on adverse effect of Striga on crop productivity and need to pull out Striga plants before flowering; iii) Striga should be treated as an environmental issue that should be legislated against; iv) Two days of each year may be set aside before general flowering of Striga for a district-wide Striga control.

When soil fertility is a major problem for crop production activities, in the absence of cheap fertilizers, cheap alternatives for soil fertility improvement should be vigorously pursued, although the integration of legumes in the control of Striga achieves this in part.

Concerning communication, documentation of impact of the project can be further enhanced by pictures and video recording.

So, for a new project, participating countries will be encouraged to engage in proper documentation of achievements. So, all participating NARS should document country achievements and provide indicators of impact for internal evaluation. These information would help to demonstrate projects achievements and impact on countries development. The achievement and impact of the project could be better observed with increase funding and the conduction of an impact assessment and an external evaluation.

4.

Project of OUA/STRC-SAFGRAD : duration 3 years.

In November 1997, the OUA/STRC-SAFGRAD, in collaboration with other partners wrote a project entitled "**Striga Control project for Sustainable Food Production in Sub-Saharan Africa**".

The Goal of the project was to improve the productivity of land resources through effective management of Striga in crops, thereby ensuring sustainable increase in production of major food crops contributing to the wellbeing of small scale farmers and food security in sub-saharan Africa.

Objective: to increase food production in order to attain food security in participating African countries through the implementation of collaborative activities among the national programmes and other relevant institutions for the development and transfer of technology for sustainable, integrated management of Striga in farms, thereby reducing food crop yield losses.

4.1. Geographical coverage

This project was of large coverage because taking into account 16 countries (9 from Western Africa, 1 from Central Africa, 4 from Eastern Africa and 2 from Southern Africa). The beneficiary countries were as follows : Benin, Burkina Faso, Cameroon, Côte

d'Ivoire, Ethiopia, Eritrea, Ghana, Kenya, Mali, Niger, Nigeria, Senegal, Sudan, Tanzania, Togo, Zimbabwe.

4.2. Institutional networking

The project was supposed to involve at national level NARS, national extension system, NGOs and other development agencies and farmers and at international level the following international research institutions: IITA, ICRISAT, CIRAD, CIMMYT, WARDA. OAU/STRC-SAFGRAD was the management entity.

The project planned to set up a Striga Task Force of 5 to 7 members from NARS, IARCs, SAFGRAD which major functions were : i) to set up priorities for Striga research and control on identified constraints of regional dimension; ii) to review and approve annual Striga research and control work programme; iii) to monitor the implementation of project activities; iv) to review project work progress and enhance regional cooperation among Focal and Collaborating NARS.

4.3. Approach

A multidisciplinary approach was planned including agronomist, plant protection specialists, Striga biologists, breeders, socio-economists, soils scientists, extension agents from NARS, extension systems and International Agricultural Research Centres (IARCs) to implement the activities.

Technological options should be tested by Focal NARS at the operational research level, to control Striga for the different commodities (maize, millet and cowpea).

The main thrust of operational research activities will include the following:

Evaluation of Striga resistant/tolerant elite cultivars by national agricultural research and extension systems (NARES).

Development of appropriate cereal/legume intercropping systems (trap crops for rotation and improved agronomic practices).

Soil fertility improvement (nitrogen fertilizers from both inorganic and organic sources).

Minimal use of chemical control (seed treatment and post emergence applications).

Promotion of regional trials (activities from 1-4 for other NARES for testing through regional trials).

On-farm verification trials

First, technologies listed will be verified and validated on-farm by the researchers. Second, farmers will be trained to carry out on-farm demonstration trials at village level using the IPM methodology. The short term objective of the on-farm verification trials is to package technologies for an integrated Striga control on sorghum, maize, cowpea and millets.

4.4. Human resources development

At regional level, a training on Striga research and control measures was planned for trainers at regional level targeting 63, 50 and 45 technicians on maize, millets and cowpea respectively. At national level, trainers were supposed to train technicians of the

respective national extension systems who should train farmers selected by village communities. Trained farmers should subsequently serve as extension contact point to facilitate the adoption of technologies for Striga control with a targeted number of 6000 farmers to be trained through on-farm trials, visits to operational research and demonstration sites, and video shows.

4.5. Outputs

The outputs expected included the building of national research capacity to alleviate the major biological, environmental, and socio-economic constraints to integrate control of Striga; the delivery of improved technological packages or options for integrated Striga control, based on the needs and resources of poor farmers; minimizing yields losses of food grains, degradation of land resources, destruction of beneficial organisms and biodiversity; increasing awareness of the need for Striga control at national and regional levels; enhancing participation of communities in the control of Striga taking into account field campaigns.

4.6. Budget

The estimated budget was 1,972,000 USD for three years with 60 % of the budget used for operational research, on-farm verification trials and capacity building.

4.7. Strengths

The multidisciplinary approach is one of the strength of the project because no single country in sub-Saharan Africa has the technical expertise to fully undertake various activities.

Networking is also a strength by putting together NARS, extension systems, NGOs, farmers and IARCs for project implementation. The group can share experiences (success and failures).

The great percentage of the budget allocated to operational research, on farm trials constitutes a strength.

The big coverage of the project (16 countries) is also a strength.

The simplicity of the activities of the project (evaluation of varieties, cereal/legume intercropping, soil fertility improvement) constitutes a strength.

4.8. Weaknesses

For 16 countries, the IARCs, NGOs, extension systems and farmers, the budget is small and it is difficult to obtain good results and reach the maximum of farmers who are the real beneficiaries.

The duration of the first phase of this project was 3 years. This is short for a project expecting good and sustainable results.

The weak number of farmers expected to be reached is also a weakness.

5.

Results of the survey

The questionnaire was sent to 26 scientists in 16 countries.

Characteristics of the projects carried out by country are summarized in tables 2 and 3.

(cf tables)

Tableau 3. Characteristics of the projects implemented in the different countries.

Country	[illegible]	[illegible] projects	Duration (years)	Cost of project	[illegible] Striga [illegible]	[illegible] in the project
Mali	Thomas A. van Mourik	[illegible]	4	1.8 million USD	ICRISAT-[illegible], West Africa [illegible]	04
Tanzania	Jonne Rodenburg	Unravelling the molecular genetic basis of Striga resistance in [illegible] integrating QTL and genomic approaches.	3.5	[illegible]	11	0
Burkina Faso	[illegible]	1. [illegible]; 2. [illegible] Striga Control in [illegible] (ISCRAS); [illegible] 5. [illegible]; 6 [illegible]	1. 5 yrs 2. 9 yrs 3. 3 yrs 4. 6 yrs 5. 5 yrs 6. 3 yrs	-	07	07
Benin	[illegible]	AGRA [illegible] Striga project	7 yrs	-	05	04
Ghana	[illegible] S. Abdulai	African Striga Control Project, [illegible]	7 yrs	-	05	05
Togo	[illegible]	1. [illegible] 2. [illegible] Striga project	1. 2 yrs	35,000 USD	07	13
Senegal	[illegible]	1. [illegible] Striga, 2. [illegible] 3. [illegible] for [illegible] selection for Striga resistance in sorghum	1. 4 yrs 2. 2 yrs 3. 2 yrs	2. 40,000 USD	02	2. 06 3. 03
Botswana	[illegible]	AGRA [illegible] Striga project	2 yrs	-	06	06
Sudan	Abdalla H. Mohamed	1. Combating the scourge of Striga in Africa using the strength of marker assisted selection and farmer participatory breeding 2. Fighting Striga resistance genes deployed in [illegible] 3. Integrated Striga management in sorghum	1. 4 yrs 2. 5 yrs 3. 2 yrs	-	06	03
Côte d'Ivoire	[illegible] Akanvou	1. Development of maize varieties that possess resistance/tolerance to the major biotic and abiotic stresses that limit maize production in West and Central Africa ([illegible]). 2. Collaborative Striga research and control program in sub-Saharan Africa ([illegible]). 3. [illegible] Striga research and control project between [illegible] and [illegible]	1. 3 yrs 2. 4 yrs 3. 2 yrs	-	02	01

TABLEAU N° 3 / Main objectives, coverage areas, technologies available per project, list of Striga control technologies available, strength and weakness of the different projects

Country	Main Striga species	List of projects	List of partners involved	Objectives	Ecological zones or locations	List of Striga control technologies available	Project's Strongest point	Project's Weakest point
Mali ICRISAT	- Striga hermonthica, S. aspera, S. gesnerioides, Alectra vogelii, Buchnera hispida	List of projects IFAD-TAG817 (4 years), PROMISO	ICRISAT, University of Georgia, Wageningen University, Hohenheim University, NARS of Mali, Burkina Faso, Niger, Nigeria, Farmer organizations, Development projects	1. Increase productivity of sorghum and pearl millet based systems; 2. Improve farmers' knowledge on new technologies and varieties that mitigate the effects of the main production constraints (soil fertility, rainfall, insects and Striga) 3. Improve access to inputs and commercialization of sorghum and millet products.	Sahelian, Sudanian and Northern Guinean zones of West Africa	Resistant variety: pearl millet [HKP (Niger), Bwefwe], Sorghum (Seguetana, Malisor92-1, CMDT45, Soumalemba), Organic fertilizer, Hand weeding, Mineral fertilizer, Rotation or Fallow	Combination of control methods and increasing farmers knowledge on Striga biology and control	No link to input shops as yet

.../...

TABLEAU N° 3 (suite 1)

Country	Main Striga species	List of projects	List of partners involved	Objectives	Ecological zones or locations	List of Striga control technologies available	Project's Strongest point	Project's Weakest point
Tanzania - AfricaRice	Striga asiatica, Striga hermonthica, Rhamphicarpa fistulosa	Unraveling the molecular genetic basis of Striga resistance in cereals: integrating QTL and genomic approaches	AfricaRice, University of Sheffield, University of Birmingham, NIAB, ICRISAT, DFID-BBSRC	To screen selected African rice cultivars for resistance to different ecotypes of S. hermonthica, S. asiatica and S. aspera and to determine the phenotype of the resistance. (2) To identify QTL underlying resistance in rice to these different ecotypes and species of Striga using two different mapping populations of rice in order to select the most genetically stable QTL for use in Marker Assisted Breeding Programmes (MAB).	Field work is carried out in Kyela (Tanzania) and Mbita (Kenya); lab and rhizotron work is carried out in Sheffield and Cambridge (UK), Patencheru (India) and Nairobi (Kenya)	Many tolerant/resistant varieties of rice available, Intercropping of Crotalaria ochlroleuca in Tanzania, In Kenya, Tanzania and Uganda maize and sorghum farmers use Desmodium intercropping.	Partnership between AfricaRice, ICRISAT and UK-universities, Fundamental research leading to new insights, Identification of new sources and mechanisms of resistance, Identification of resistant crop cultivars	No involvement of farmers and extension, To much 'upstream'

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TABLEAU N° 3 (suite 2)

Country	Main Striga species	List of projects	List of partners involved	Objectives	Ecological zones or locations	List of Striga control technologies available	Project's Strongest point	Project's Weakest point
Burkina Faso	Striga hermonthica, S. gesnerioides, Ramphicarpa fistulosa, S. aspera, S. forbesii	1. FAO / PASCON ; 2. STD European Union; 3. Improved Striga Control in Maize and Sorghum (ISCIMAS) ; 4. UA/SAFGRAD Korean Republic; 5. FAO – TCP/RAF/3008 ; 6. CORAF/STRIGA	1. INERA; NARS from CILSS countries; 2. INERA, EU, Pierre and Marie Curie University of Paris VI; 3. INERA, Plant Research International B.V. Wageningen, IER-Mali, University of Bristol-UK; 4. INERA, UA/SAFGRAD, Republic of Korea, IITA; 5. INERA, FAO, Benin; Mali; Niger; Senegal; Togo; 6. INERA, CORAF, USAID, Mali, Senegal, Niger.	1. Striga Integrated control. 2. Research on parasitic plants and control methods. 3. Genetical and biological control of Striga in maize and sorghum. 4. Use of varietal resistance and false host in the control of Striga in maize. 5. Diffusion of Striga control results available. 6. Use of varietal resistance to control Striga in sorghum.	1. All country; 2. All country; 3. Western region; 4. East and West; 5. East and Centre; 6. East, West and Centre-North	Resistant sorghum varieties: ICSV1049, Framida, F2-20, Sariaso14, CEF322/35-1-2, SRN39; resistant cowpea varieties : KVX61-1. Hand pulling; Intercropping; Rotation; Chemical control.	A lot of results available	Weak diffusion of the results.

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TABLEAU N° 3 (suite 3)

Country	Main Striga species	List of projects	List of partners involved	Objectives	Ecological zones or locations	List of Striga control technologies available	Project's Strongest point	Project's Weakest point
Benin	Striga hermonthica, S. gesnerioides, Rhamphicarpa fistulosa	AU/SAFGRAD Striga project	INRAB, AU/SAFGRAD, Republic of Korea, NARS of Burkina Faso, Cameroon, Côte d'Ivoire, Ghana, Mali, Nigeria, Togo	To promote integrated control methods against Striga in maize in farmer fields	District of Atacora	Maize tolerant varieties: Acr 92 TZE comp. 5-W; Acr 94 TZE comp. 5-W; Acr 97 TZL comp. 1-W; DTS RW CO; IWDC2 SYN F2; BAG 97 TZE Comp. ; T Z E COM.3DT; Cowpea tolerant variety: TVX 1850-01F; Groundnut tolerant variety: 69 101; Rotation and intercropping maize with cowpea; transplanting pearl millet	Maize yield increase by 15%	Pearl millet and sorghum which are the traditional cereals of the area of study not included in the project.

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TABLEAU N° 3 (suite 4)

Country	Main Striga species	List of projects	List of partners involved	Objectives	Ecological zones or locations	List of Striga control technologies available	Project's Strongest point	Project's Weakest point
Ghana	Striga hermonthica ; Striga aspera	1. Development of maize varieties that possess resistance/tolerance to the major biotic and abiotic stresses that limit maize production in West and Central Africa (USAID-IITA-WECAMAN). 2. Collaborative Striga research and control program in sub-Saharan Africa (UA-SAFGRAD-Korea Repub). 3. On-farm Striga research and control project between AU/SAFGRAD-Korea Repub and CNRA	1. IITA/ Maize network –WECAMAN, USAID WOTRO- Pays Bas 2 & 3. UA/SAFGRAD Korea Republic, Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ghana, Mali, Nigeria, Togo	To develop maize varieties that possess resistance/tolerance to the major biotic and abiotic stresses that limit maize production in West and Central Africa; To promote very early, early and intermediary maize varieties tolerant to Striga; To promote integrated control methods against Striga in maize in farmer fields	Savannah zone of Northern Côte d'Ivoire	Maize tolerant varieties: Acr94 TZE Comp5-w, Acr94 TZE Comp5-y, IWD Str, TZL Comp1 –w, Rotation and intercropping maize with cowpea or soybean, integrated Striga control management	Producers accepted Striga control technologies	Sorghum and pearl millet were not taken into account and these two crops continued to propagate Striga seeds

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TABLEAU N° 3 (suite 5)

Country	Main Striga species	List of projects	List of partners involved	Objectives	Ecological zones or locations	List of Striga control technologies available	Project's Strongest point	Project's Weakest point
Togo	Striga hermonthica, Striga gesnerioides, Striga asiatica	1. TCP/RAF/3008 2. AU/SAFGRAD Striga project	1. ITRA, FAO, NARS of Benin, Burkina Faso, Mali, Niger, Senegal. 2. ITRA, AU/SAFGRAD, Republic of Korea, NARS of Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ghana, Mali, Nigeria	To promote Striga control through rotation or intercropping cereals with false hosts; To strengthen technicians and farmers capacity in integrated control of Striga; To strengthen partnership among farmers, scientists and extension	Dry savanna	Dry savanna Maize tolerant varieties: Acr 94 TZL comp. 1-W, ACR 94 TZE Comp 5 W, TZEE W Pop STR QPM; Soyabean resistant varieties: TGX-1448-2E, TGX-1910-14F, ANIDAZO; cowpea resistant variety KVX-61-1; Use of organic fertilizer, mineral fertilizer, ridging, hand pulling, rotation/intercropping cereals with false hosts (cotton, soyabean)	-	Sudden stop of the UA/SAFGRAD project

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TABLEAU N° 3 (suite 6)

Country	Main Striga species	List of projects	List of partners involved	Objectives	Ecological zones or locations	List of Striga control technologies available	Project's Strongest point	Project's Weakest point
Senegal	Striga hermonthica, S. gesnerioides	1. Projet CEE/Striga, 2. FAO/TCP/RAF 3008 3. Marker development and marker assisted selection for Striga resistance in cowpea	1. EU, ISRA-Senegal, Burkina Faso, Mali 2. ISRA-Senegal, FAO, FAO, Benin, Burkina Faso, Mali, Niger, Togo. 3. ISRA, Generation Challenge Programme (GCP) Mexique, IITA Nigeria, UVA-Department of Biology (USA)	1. To make inventory of parasitic plants and carry out studies to control Striga 2. To carry out a sustainable integrated control of Striga through FFS 3. To develop improved cowpea cultivars with resistance to Striga ssp. and to develop markers for other important constraints and their integration in cowpea breeding programs. To carry out a diversity analysis of Striga gesnerioides in Senegal: Striga resistance phenotyping of RIL	1. All country 2. Groundnut basin of Senegal 3. Diourbel, Thiès and Louga areas	Hand weeding, Use of manure, Use of mineral fertilizer, Rotation, Sorghum resistant varieties: F2-20 and CE 145-66 (ISRA-Bambey), cowpea resistant varieties IS86-275 (Mouride) from ISRA, cultural practices	2. Good and effective participation of farmers 3. Markers and resistance have been identified	Short duration of projects

.../...

TABLEAU N° 3 (suite 7)

Country	Main Striga species	List of projects	List of partners involved	Objectives	Ecological zones or locations	List of Striga control technologies available	Project's Strongest point	Project's Weakest point
Botswana	Striga asiatica (sorghum & pearl millet), Alectra vogelii (cowpea, groundnut, Bambara groundnut)	AU/SAFGRAD Striga project	DAR-Botswana; AU/SAFGRAD, Republic of Korea, NARS of Kenya, Ethiopia, Malawi, Zimbabwe	To verify with farmers Striga resistant sorghum varieties and cultural practices (legume intercrop and NPK) to control Striga;	Central and northern regions	Hand-pulling, rotations, Striga asiatica tolerant sorghum varieties PSL 985028, PSL 985050 (from INTSORMIL but not yet released); Cowpea tolerant varieties B359 and Tswana	Involving the farming community in developing striga resistant sorghum variety and cultural practices to control striga.	Low level of funding may cause the project not achieve its objectives and also the technology need more time for development

.../...

TABLEAU N° 3 (suite 8 et fin)

Country	Main Striga species	List of projects	List of partners involved	Objectives	Ecological zones or locations	List of Striga control technologies available	Project's Strongest point	Project's Weakest point
Sudan	Striga hermonthica (sorghum & pearl millet)	1. Combating the scourge of Striga in Africa using the strength of marker assiated selection and farmer participatory breeding 2. Fighting Striga: resistance genes deployed to boost sorghum productivity 3. Integrated Striga management in sorghum	ARC-Sudan, BMZ/Germany, ASARECA, UA/SFGRAD	To increase household income through increasing sorghum productivity through tackling Striga problem sustainably and reach food security	Central and northern regions Northern and Southern regions (all sorghum growing areas)	Sorghum resistant varieties SRN39, Framida, IS9830, 555, N13, IS777 ICSVs (ICRISAT and ARC), ISM practices	The first two projects concerned with improving the genetic of resistance with funnel nicely in the third one (integrated management)	Donors sometimes they postpone or freeze project for financial or political reasons

5.1. Major donors

One can notice the weak number of donors for Striga control projects in the region. The major donors are international financial or development institutions (IFAD, FAO, EU, USAID, BMZ/Germany, Republic of Korea, DFID-BBSRC, CIDA, WOTRO –Pays Bas etc.). The contribution of countries takes into account staff salaries and infrastructures, electricity and water.

5.2. Origin of technologies

Cultivars and other Striga control technologies were created or generated by NARS and IARCs (e.g. INTSORMIL-Purdue University, ICRISAT, IITA, AfricaRice, IRRI etc.). In Botswana for instance, sorghum lines PSL 98502saF8 and PSL 985050 from Purdue University have been tested through INSTSORMIL while Cowpea B359 and Tswana cowpea variety were created by Botswana agricultural research institute.

5.3. Implication of extension services

In most of the projects, extension services were involved when the technical capacity was needed. However, extension services are often not well equipped and need additional funds for collaboration.

They were involved in the following activities:

- Selection of the farmer,
- planting of the trial,
- Implementation and follow-up of field tests and diffusion,

VFields visits,

- Running of farmer field schools,
- Training of farmers,
- Researcher-Farmer-extension discussion,
- Visiting the farmer to see progress and interact

Thus, 20 extension agents were trained in Togo, 20 in Burkina Faso and 200 in Ghana.

Some time extension services are involved in the development and delivery process. So, they are involved at all stages of the process (training of farmers, implementing the demonstrations, reporting).

5.4. Striga control methods being practiced and their effectiveness

Weeding, one of the oldest farmer's practice is still in use but it is not very effective because Striga weeds are weeded after the damage to the crop is already done and labour is expensive.

Rotations (cereals/legumes or cereals/cotton) are also used by farmers in most all the countries. At subsistence level, the rotations are not very effective because they are one season duration (due to demand for staple cereal crop) and they do not impact on Striga seed bank well to have positive effect on cereal crop planted in the following season.

Planting of Striga tolerant varieties is given good satisfaction in some regions while in other regions integration STR maize varieties in rotation or intercropping with legumes (cowpea, soybean) is being used with success.

The study revealed some benefits from the Striga control projects.

So, verification/development of Striga resistant sorghum lines on-farm makes it available to farmers. Trial implementation also empowers farmers to select the variety they think has the characteristics they prefer. Testing cultural practices to control Striga with farmers' participation will make farmers select those which are sustainable and affordable for ease of adoption. The on-farm work will through farmers' field days/farm walks/field visits publicize the Striga resistant sorghum variety and cultural practices for Striga control to many farmers.

One of the greatest benefits of the projects is the generation of elite crop varieties and formulation of control packages using these generated varieties that continuously delivered to farmers.

5.5. Advantages/disadvantages of Striga control methods available

5.5.1. Advantages

The advantages from the Striga control methods available are as follows:

- Hand weeding of Striga can lead to decrease of Striga population and better grain filling,
- Concentration of nutrients in composite fertilizer and urea and small volume,
- Effect of compost/manure on soil health and crop growth, price (own material, no cash needed),
- Cereal-legume intercrop: efficiency of surface area, risk avoi-

dance and extra income generation; while ensuring cereal production, beneficial effects on soil and crop growth,

- Low Striga infestation of plots under rotation with legumes resulting of reduction of Striga seeds bank of the soil,
- Resistant varieties: no change in workload, potential higher yield under Striga and lower number of emerging Striga, decrease of the sol seed bank,
- Best understanding of the Striga problem; good experience on control methods; good experience in laboratory (scientists well trained),
- Control technologies recommended are simple, of low cost and affordable by farmers,
- Trap crops need to be cash crop to allow farmers to get money by using them,
- STR maize varieties yielded more than farmers' local varieties on infested plots.

5.5.2. Disadvantages

The disadvantages from the Striga controls methods available are as follows:

- Workload and potential inefficiency of hand weeding after resprouting Striga,
- Compost/manure: quantity and workload for production and transport,

- Composite fertilizer and urea: access and high price,
- In cereal-legume intercropping, crop competition, practicality of combining intercropping with animal drawn implements and additional workload,
- If trap crops are not cash crops, farmers are reluctant to adopt them,
- Bad adaptation of resistant varieties to site specific conditions and grain/stover quality,
- Non-adoption of STR maize varieties in Striga infested areas.

5.6. Current degree of Striga infestation, Constraints and opportunities for effective Striga control

Striga current degree of infestation varies from mild to severe depending on countries. For example in Sudan the infestation rate is different per region and per crop, but generally severe depending on the crops (Pearl millet: severe, Sorghum: mild to severe, Maize: mild, upland rice: none-mild-severe).

The adoption rate of Striga control technologies developed in the different countries also varies from country to country and in the same country depending on the regions.

But in general, adoption rate of Striga control technologies is still low for most of the countries. In some countries, instead of abandoning fields like in the past, by using the Striga control technologies available farmers are cultivating their fields.

The constraints for effective Striga control are as follows:

- Lack of financial means and short duration of projects resulting of absence of vehicles for travels,
- Inconsistency of fund provision for research was also a constraint,
- Lack of credit for implementation of Striga control technologies,
- Non involvement of all stakeholders at the definition, the implementation and the evaluation of the strategy for an effective control of Striga,
- Weakness of extension services,
- Lack of a national or regional strategy of fighting against Striga,
- Lack of understanding of biology, ecology and environmental /input effects on the parasitic weeds,
- Lack of appropriate varieties and other inputs (mineral and organic fertilizer, herbicides),
- Seeds of maize and false hosts not available at community level,
- For a farmer perspective, since Striga destroys crop before it emerges, lack of adequate knowledge on Striga and access to inputs is a big issue,
- Weak financial resources of farmers to buy inputs (fertilizers, chemicals against pest),
- The farmer always provided very poor fields for experiments and it was always difficult to obtain uniform infestation on the farmers' fields,
- For a researcher perspective, lack of funds and harsh environmental conditions to develop effective technologies are constraints and also insufficiency of human resources to conduct activities,

- For an extensionist perspective, lack of knowledge on effective striga control methods is a big constraint for effective Striga control,
- Most of the extension staff had limited knowledge on striga biology and control
- For an agro-input dealer perspective, not been sure whether farmers will purchase the inputs is a constraint,
- Lack of effective technologies to control Striga in some countries,
- Most of the technologies available are not affordable to farmers,
- For researcher, extensionist, lack of a reliable source of funds for technologies generation and dissemination.
- Lack of information and communication between the abovementioned actors.

There are also some organizational constraints: insufficiency training for extension agents, weak organization of agro-dealers.

The opportunities for effective Striga control are as follows:

Availability and quantity of appropriate varieties of legume crop seeds in some countries,

Availability and price of mineral fertilizers in some countries,

Availability and quantity of organic fertilizers produced (composting) in some countries,

Beginning of collaboration with universities,

Great motivation of farmers to use Striga control technologies like STR maize varieties,

Collaboration between Striga researchers and extension, farmers and agro-dealers in multiple countries and at different levels and disciplines,

With funds available, scientists are well trained in many countries and have the capacity to develop effective technologies to control Striga,

Effective Striga control technologies in many countries of the continent,

There is a need to create effective network and ensure a reliable source of funds.

5.7. Technologies which deserve dissemination

Use of manure, mineral fertilization, hand weeding and rotation are key technologies which must be disseminated. In Tanzania and Kenya, green manure (*Crotolaria ochlroleuca* G. (sunhemp), *Mimosa invisa* L.(Colla), and *Cassia obtusifolia* L.(Sicklepod)) is also used.

In some regions, resistant/tolerant varieties are being adopted and fertilizers are being increasingly used, composting is increasingly adopted, intercropping is starting to be adopted.

The integration of existing technologies should be privileged rather than individual technologies. For pearl millet: Integration of (1) improved pearl millet-legume intercropping, use and combination of (small amounts of) (2) organic fertilizer, (3) composite mineral fertilizer, (4) N-fertiliser (Urea), (5) hand weeding of escaping Striga plants and (6) use of improved pearl millet varieties. There is potential for the improvement of organic fertilizer through composting and fortification with phosphorus. Currently, ICRISAT is screening and selecting for resistance to *Striga hermonthica* in pearl millet.

For sorghum: Integration of (1) improved sorghum-legume intercropping, use and combination of (2) organic fertilizer, (3) composite mineral fertilizer, (4) N-fertiliser (Urea), (5) hand weeding of escaping Striga plants and (6) use of Striga resistant and tolerant sorghum varieties. There is potential for the improvement of organic fertilizer through composting and fortification with phosphorus.

Chemical control using herbicides constitutes a good option in some countries when herbicides in good quality are available.

Some biological control methods can be simplified to start disseminating them.

When resistant sorghum and maize varieties do exist, they should be disseminated in combination with other Striga control technologies.

Since no single method is effective, there is a necessity to combine many control methods. So, integrated Striga management technologies should be privileged actually, since one single technology cannot overcome the Striga problem.

5.8. New research topics or technologies or research topics which deserve a deep investigation

Breeding for resistance (maize, sorghum, pearl millet and rice), agronomy research, integrated Striga and soil fertility management (ISSFM) research, Striga population genetics and ecological preference studies, on farm testing and demonstration of ISSFM and resistant varieties, research into farmers local knowledge and cultural control methods are key research topics.

Intercropping (different densities and crops), cereal resistant to Striga and interaction between different control methods,

Breeding cowpea for resistance to Alectra vogelii,

Research on biological control (use of fungi and Bacteria) and in combination with cultural methods,

Phyto-sanitation: using clean and good quality seed, hand-rogueing before seed setting, limiting inputs from outside,

Cultural control through rotation, intercropping, short-fallows, transplanting, mechanical,

Chemical fertilizers and herbicides,

Integrated packages formulation,

Research on false hosts effective in the control of Striga,

Screening local legumes varieties to check their capacity as trap crop for *Striga hermonthica* (local cowpea and bambara groundnut varieties),

Farmer participative technology development,

Climate change effects on parasitic weed distribution and effects,

Environment x host x parasite interactions,

Study of the virulence of different Striga populations on maize,

Molecular characterization of Striga populations,

Organize seeds sector of resistant varieties and trap crops to make seeds available and at low cost,

Strengthen the participation of extension services to research activities and diffusion of Striga control technologies,

Evaluate the cereal balance and nutritional status of children in farms in infested areas,

Gender and socio-culturally acceptable technology development

Initiate an adoption and impact study of the technologies disseminated,

Training of extension agents and farmers constitutes a very important topic.

5.9. Potential risks for the development of a new Striga control project

There is no risk, if budgeting and funding is available for infrastructural investments (such as cars etc) and human resources for the project envisaged.

Lack of funding to implemented the Striga control technologies in all the areas infested by the parasite.

There is a risk of non involvement of farmer organizations.

Lack of knowledge about the actual adoption rate and the main factors determining the adoption of technologies promoted by the previous and on-going projects is a potential risk.

Lack of knowledge about the impact of the project on the availability of resistant cultivars of crops in the area of diffusion can be considered as risky.

In the case of Benin for instance, there is a risk of not attaining the outcomes of the project if pearl millet and sorghum which are the traditional cereals are not included in the project because they are mostly used in customary ceremonies.

The sudden end of projects is also a big issue.

In semi-arid countries with erratic and unreliable rainfall, the development of new Striga control technologies may be delayed.

The instability in few areas of some countries (e.g. Sudan) can perturb the implementation of projects.

5.10. Institutional framework

The study revealed that there is an institutional framework capable to develop an integrated Striga control program in most of the countries comprising:

National agricultural research institutes,

National extension systems,

International Agricultural Research Centres,

Many farmers unions,

Local communities,

Many development projects in the countries,

NGOs,

Universities,

Some foundations,

Agricultural Training Schools.

Nonetheless, some countries will need the backstopping of the regional bodies and advanced national research institutes not only to develop and implement the integrated Striga control program, but also to develop training courses for technicians and farmers.

5. 11. Lessons learned from all projects

Striga control is possible, if farmers have the right knowledge and access to information and necessary inputs.

NARS and IARCs should continue research activities.

There is need to define a national Striga control strategy.

Abandonment of cotton because of the financial crisis led to negative effects notably high infestation of Striga species.

The use of resistant cultivars will on itself not be sufficient to solve the Striga problem in a lasting way. A stakeholder participative, integrated and conscious and disciplined approach should be used to control the problem sustainably. So, it is necessary to involve all stakeholders (scientists, extension agents farmer organizations) to the fight against Striga.

In the absence of resistant genotypes, the use of cash crops as associate crops was acceptable to the farmer even if the associate crop does not completely control the striga infestation. Also consistency of research over time helped to extend the technologies to the farmers.

Integration of pearl millet and sorghum in the Striga control technologies is very important because leaving these crops at the edge will contribute to propagate Striga infestation.

Government and Technical and Financial Partners should join their effort to make available financial means for the stakeholders and the seeds at community level.

Farmers and extension personnel are enthusiastic and are willing to participate to see Striga eradicated.

There are high chances of crop failure due to drought which delay/ frustrate researchers who are developing technologies to control Striga.

Other important lesson one can learn is that you may not depend on one source to carry on research.

5.12. Mechanisms of exchange of technical information / Strategy to fight against Striga

The mechanisms actually used are effective, but the frequency of encounters and size of the exposed public may be too small. We shall implement larger scale operations.

Implementation of demonstrations where farmers and extension agents will be trained, Implementing best technologies in farmer fields with participation of farmers and their organizations,

Mobilize farmer groups in villages and encourage them to start farmer field schools, fund to educate/ train them on Striga and methods of its control as well as for the purchase of some basic requirements for their groups like knap-sack sprayers, chemicals, fertilizers for their practical,

Training of farmers through FFS and multiplication of farmer field schools in Striga infested area,

Transfer of technology through the Participatory Development of Technology approach,

A liaison committee made up of research and extension should be tasked with the responsibility of getting the technology to the farmers.

Organize field visit for farmers and their organizations,

Strong involvement of women,

Organize field days around trials and demonstration plots,

Organize agricultural shows,

Organize farmers and give them access to credit,

Organize the seeds sector of targeted crops,

Workshops, conferences, Annual meetings, annual reports,

Organization of workshops for countries' national coordinators alternately in the different countries,

Organize monitoring tours in countries and across countries,

Exchange visits between farmers within the same country and farmers of different countries,

To ensure an active participation of farmer organizations in Striga control programs, appropriate training of field agents and funding for activities are necessary.

Communication/Information and sensitization

More use of media (radio, video, mobile phone services, television and village cinemas, movies) and internet based forum and publication of results (scientific papers, extension papers, posters, leaflets, policy briefs, etc.),

In Botswana for example, use of media (TV, Agrinews monthly magazine; Newsletter, Factsheets, Daily Newspaper column),

Use of internet to exchange information and technologies,

Make available logistic (vehicle and funds) at the right moment.

Regarding Strategy to control or eradicate Striga, one can mention that it is not possible to eradicate Striga, but it can be possible to suppress its continuously spread while ensuring productive and

profitable cropping systems for the farmers. This involves a strategy of integrated Striga and soil fertility management that is flexible and adaptable to the local situation.

Adopt a strategy of integrated Striga management i.e. develop Striga resistant crop varieties and employ various cultural practices known to control Striga such as rotations, intercropping, trap crops, nitrogen application, weeding and burning, etc.

To ensure funds flow, AU/SAFGRAD should be involved heavily in Striga catastrophe, through organizing efforts starting with inventory for tactics farmers use to control the parasite, then exchange and sharing of these technologies through the continent.

Identification the strengths and weaknesses of each research program and make regional programs then continental one strong program to tackle the parasite.

Striga effective control is possible, but eradication is not in the foreseen future. We can achieve control if all the stakeholders have all the required information and if all stakeholders have a common understanding of the strategies/approaches to follow. On the one hand this requires that we conduct research on remaining knowledge gaps (such as the earlier mentioned environment × host × parasite interactions), while on the other hand it means that we need to disseminate the existing information and also to communicate a comprehensive and consistent message to provide stakeholders with simple and effective guidelines for control. We should embrace all possible technologies and strategies available and exclude none. In my opinion this would also mean that we need to maintain an open mind towards the use of controversial technologies such as GMO's. Striga control strategies which deplete the soil seeds bank should be privileged. Also, an integrated approach

that reside on resistant crop cultivars combined with environmental safe tactics is important. So, we need to strengthen the resistance in the host crops and cloning the genes for inter and intra-specific gene transfer. Plus formulation of management packages to be disseminated to farmers.

Evaluate first the endogenous solutions.

Involve all stakeholders at the different steps of the process and make a financial evaluation of the activities in order to establish the real base of diffusion.

Take into account the difference between farms in the strategy of diffusion of technologies.

All those activities should be done through a participatory approach. Farmer participatory approach, though farmers involvement from the start even during the development and formulation. Also strengthen the relationships between research and extension officers as a link with farmers.

Concerning the Strategy for implementation of ongoing projects or future projects through networking some mechanisms can be proposed.

On the continent (Africa) level we should identify strong and knowledgeable individuals with experience in Striga research and technology dissemination. We could organize an online discussion forum or a workshop with these individuals to discuss the way forward.

Strengthen linkages with organizations involved in Striga research so that scientists can exchange Striga information and resistant crop materials, conduct short courses, hold workshops, improve monitoring of projects and extension activities.

Regular meeting to share information, if not possible the use of online news letters and an biennial workshop will be helpful.

Required mechanisms to ensure an active participation of farmer organizations in Striga control programs are as follows :

Involve farmers at all stages of project development (diagnostic, design, testing, dissemination)

Train farmers on Striga

On the country level we should organize broad stakeholder meetings at Striga infested areas. In these meetings we can analyze the problem, discuss what has been proposed and tested already and why it didn't solve the problem and identify the way forward.

c) Start various farmer field schools (FFSs)

6. Shared interest

As the survey and the case study showed, *Striga hermonthica* is still a problem for cereal crops in Western, Eastern and Southern Africa countries. With the support of some projects technologies available in the different regions have been implemented.

A wide-range of Striga control practices have been developed by farmer experience and formal research projects. Striga-tolerant varieties, rotations, cereal/legume intercropping, fertilization (nitrogen, compost, manure), water conservation techniques that can enhance soil fertility and humidity and biological control agents that can be applied to the seed are a few of the practices that have been found to be highly effective under experimental conditions. Farmer adoption of Striga control practices, however, has been minimal. In fact, recent data would suggest that Striga-related

crop losses are increasing dramatically in Africa. Many technologies can be tested in a regional basis using the same protocols.

We hypothesize that the reason that Striga control practices have not been widely adopted is because they have not been widely disseminated or have not been promoted through appropriate approach.

7. Basis for a collaboration project

7.1. Overall goal

To ensure food security by increasing crops production particularly in Striga infested areas.

7.2. Specific objectives

To disseminate Striga resistant/tolerant varieties

To adopt Striga management practices

To diversify crops production (cereals and legumes)

To reduce Striga infestation by 50%.

7.3. Activities

Breeding for resistance to Striga (maize, sorghum, pearl millet legumes) should continue using Marker-Assisted Selection (MAS) approach,

Research on biological control,

Seed multiplication of Striga resistant/tolerant varieties,

Participatory varietal selection (farmer managed variety selection),

Training the extension agents and farmers,

Integrated Striga management taking into account some of these components:

Striga tolerant varieties (cereals and legumes)

Water conservation techniques

Use of trap crop (legumes in rotation or intercropping)

Use of organic fertilizer (manure or compost), composite mineral fertilizer, N-fertilizer (Urea)

Hand weeding

Use of biological control (*Fusarium oxysporum*)

Use of herbicide

Monitoring and evaluation

Communication/Information and sensitization

8. Most plausible mechanism for collaboration

A participatory approach that involves farmers, researchers and extension agents, donors, policy makers is needed to ensure that the current Striga control practices are understood and adopted by farmers in Africa.

This requires use of different mechanisms:

Workshops, conferences at continental level : Striga Task Force, country coordinators, IARCs, Donors, FARA, SROs

Workshops at national level for restitution, annual meetings with all stakeholders,

Organize farmer field schools in each country,

Communication/Information and sensitization by using media (TV, radio, news paper)

Organize monitoring tours in countries and across countries,

Exchange visits between farmers within the same country and farmers of different countries,

Use of internet to exchange information, technologies, knowledge,

Create a database on Striga control technologies available at continental level,

Create a Striga control network.

9. Strategy for AU/SAFGRAD to re-raise the initiative at continental level

This proposal is an AU/SAFGRAD initiative to promote adoption of Striga control practices in areas infested by Striga in Africa.

AU/SAFGRAD should utilize the framework available at continental and sub-regional levels. So, AU/SAFGRAD should work in collaboration with FARA and the SROs (CORAF, ASARECA, SADC) to write a new project and submit to donors with the help of FARA and the SROs.

Planning meetings and workshops can be organized at continental level involving a Striga Task Force, country coordinators, IARCs, Donors, FARA, SROs.

Workshops can also organized by sub-regions on common issues.

At national level, restitution can be done and activities planning meetings can be held with all stakeholders. Farmer field schools can be organized at country level around demonstration plots for dissemination of Striga control technologies.

10. Expected outputs

The outputs expected from this initiative are as follows:
Increased farmer production and productivity of cereal grain,
Diversified production (cereals and legumes),
Increased farmer income,
Alleviate the food crisis,

Reduced Striga infestation (50%).

11. Keys indicators for measuring progress

A strong partnership is created among countries and stakeholders for a promotion and diffusion of Striga control technologies,

Increase to at least 20% of number of farmers using Striga control technologies to minimize yield losses,

At least 20% of seed producers associations benefit from training on Striga control and seed production to strengthen their capacity,

Number of regions covered by the project per country,

At least 3 Striga resistant/tolerant varieties of each cereal and legume (maize, sorghum, cowpea, soyabean, groundnut) promoted by country,

Number of demonstration plots implemented on Striga control by country,

Number of farmer field schools organized by country,

Number of field visits organized,

Number and composition of participants to field days to share the Striga control results obtained during the cropping season on demonstrations,

Number of exchange visits organized at national or regional level,

Communication (released papers, video, films, CD, etc.),

Number of Periodical reports produced,

Surveys done at the beginning, middle and end of projects,

Regional reports at AU/SAFGRAD level,

Websites of AU/SAFGRAD and partners institutions,

Reports of the different training sessions and the mission on ground,

Number of signed contracts between AU/SAFGRAD and donors and, between AU/SAFGRAD and countries.

12. Cost of Program

Budget: $1,000,000 per year (**Total of $5,000,000**).

Duration: 5 years

Countries: All Striga infested African countries (West, Centre, South).

13. Partners and stakeholders for resource mobilization

FAO
IFAD
IDRC
EU
USAID
DFID-BBSRC
CIDA
AU/SAFGRAD
FARA
CORAF
ASARECA
SADC
INTSORMIL
IITA
ICRISAT
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Enhancing Food Security Through Control of Parasitic Weeds in the Crop Productior

AU-SAFGRAD

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