African Union/SAFGRAD

Promoting Agricultural Research for Development in Semi-Arid Africa

Highlights of the Technical Meeting on

Research and Control of Striga and Maize Streak Virus in Africa

15-16, December, 2005

Ouagadougou
Burkina Faso

Technical Meeting on
Research and Control of Striga and Streak Virus in Africa
15 - 16 December 2005
Ouagadougou, Burkina Faso

Chairman: Abebe Haile Gabriel, Director, AU/SAFGRAD

Rapporteurs: Charles The (IRAD, Cameroon)
Victor Adetimirin (UI, Nigeria)
Mahama Ouedraogo (AU/SAFGRAD)

Thursday 15th December, 2005

08:30 – 09:00 Registration

09:00 – 9:20 Opening Session,

- Welcome remarks, Director, AU/SAFGRAD
- Introduction of participants
- Adoption of the agenda
- Logistics

9:20 - 9:40 The African Union and the Republic of Korea Initiative on Striga Research and Control in Africa, by Mahama Ouedraogo, AU/SAFGRAD

09:40-10:00 Coffee Break + Group picture

10:00-10:20 IITA's contribution in Research and Control of Striga in West and Central Africa, by Abebe Menkir, IITA

10:20-10:40 CIMMYT Activities in Research and Control of Striga

10:40-11:30 Discussion

11:30-15:30	Highlights on NARS activities on Striga Research and Control
11:30-11:45	Burkina Faso - by Sanou Jacob, INERA
11:45-12:00	Cameroon - by Charles The, IRAD
12:00-12:15	Cote d'Ivoire – by Akanvou Louise, CNRA
12:15-12:30	Ghana – by Abdulay Mashark, SARI
12:30-14:30	Lunch break
14:30-15:00	Nigeria - Lagoke, Segun T. O. (University of Abeokuta), Ibrahim Kureh (IAR/ABU)
15:00-15:15	Mali - Ntji Coulibaly (IER)
15:15-15:30	Ethiopia - Fasil Reda (EARO)
15:30-15:45	Lessons learnt from monitoring tours in AU/SAFGRAD-Korean Government striga control project and suggestions for greater impact – Victor Adetimirin (University of Ibadan, Nigeria)
15:45-16:15	Discussion
16:15-16:30	Coffee break
16:30-17:30	Overview of Maize Streak Virus Research and Control Initiatives (Cameroon, Burkina Faso, Cote d'Ivoire, Ethiopia, Ghana, Mali, Nigeria, IITA, CIMMYT)

Friday 16th December 2005

Chairman: Charles The
Rapporteur: Victor Adetimirin

8:30-10:30	Summary of proceedings of the first day & discussion
10:30-10-45	Coffee break
11:30-12:30	Discussion continued
12:30-15:00	Lunch break
15:00-15:30	Presentation of meeting report & recommendations
15:30-16:00	Closing

OPENING REMARKS

Dr Abebe Haile Gabriel
Director, AU/SAFGRAD

Dear Participants of the Workshop on Research and Control of Striga and Streak Virus in Africa, on behalf of AU/SAFGRAD I welcome you all to Ouagadougou, Burkina Faso to participate on this very important Workshop. The issues that we would be deliberating during these two days at this Workshop are very important for a number of reasons.

As you know agricultural productivity in Africa is still at a very low level. No doubt, it is the lowest at the global level. Still, there is a remarkable productivity and yield gap between research sites and what obtains at the farmers' field. Africa's agricultural productivity is low not because there is lack of enough scientific knowledge about technologies that enhance productivity. Rather it is because not enough concerted effort was put into utilizing what the scientific knowledge can and have generated. Scientists who work on the technological generation side of the spectrum are frustrated when faced with the grim reality that farmers have not been benefiting from the technological solutions they generated long time ago. African rural livelihood remains precarious unless it benefits on a continuous basis from science-based production systems. To suffer from problems of production and depressed productivity levels in the context of ignorance is one thing; to continue suffering from the same anomalies in the context of having around enough knowledge is another thing altogether. How could we explain the puzzle that African farmers and rural livelihood in general continue to suffer from problems of food insecurity associated with lower production and productivity levels, when there is abundant knowledge and scientific solutions to solve it? And, given the dominant global contours that characterize and define the processes of and prospects for national and local economic and social development, what would be the implication of this depressed level of productivity and production on competitiveness and even in the long term survival of African farmers as well as national sovereignty? I humbly invite the participants of this workshop to see the relevance of our deliberations and the value of the research programme in general in this light.

African Heads of State and Government have expressed their determination to address problems of agricultural and rural development and subsequently issued a number of declarations. Just to mention the most relevant ones, they called for

- effectively **utilizing the results of scientific research** for agricultural planning to tackle problems of desertification, soil and water conservation and environment protection for sustainable agricultural and animal resources development,
- identifying and supporting the development and production of strategic agricultural commodities,
- allocating at least 10% of national budgetary resources to agriculture and rural development over the next five years, to bring about a 6% growth in agriculture per annum,

- prioritizing implementation of integrated water and agriculture programmes to enhance sustainable development in Africa,
- promoting the strengthening of **Centres of Excellence** and/or networks and their establishment where they do not exit for crops, animals, forestry, fisheries, range management, water management, desertification, drought, floods and environmental management and the strengthening of related tertiary and research institutions at continental and regional levels for the purpose of carrying out research in biotechnology, conservation of agricultural biodiversity, biosafety, food storage, water harvesting and application, etc.

They have also formulaed NEPAD as an AU's programe. The CAADP/NEPAD has four pillars, one of which is agricultural technology development and dissemination. AU/SAFGRAD undertakes activities that would contribute towards achieving that objective. The programme on research and control of striga is one of those activities in such an endeavor.

Over the last few years AU/SAFGRAD has been collaborating with NARS and IITA scientists to address the problem caused by striga on maize production in seven west and central African countries. The programme was conceptualized to promote the delivery of striga control technology packages to farmers through farmer managed on-farm demonstration trials, first in West and Central Africa, and thereafter in Eastern and Southern Africa. Of course there have also been similar initiatives such as the PASCON network that covered the whole African region with the view to promoting exchange of information on research and control of striga species on crops; and more recently the Sustainable Integrated Parasitic Weed Management in Cereal-Legume Production Systems in Africa (SIPWEMA) that aims to protecting cereal-legume production environments in Africa from striga species attacks and thus enhance food security, and improve incomes and livelihoods of resource-poor farmers. Obviously the situation calls for a more integrated and collaborative approach. It is my sincere wish and expectation that one of the outcomes of this workshop would be to contribute towards that kinds of approach for an effective intervention.

The objective of this workshop is to exchange and share information on status of the problem of striga and streak virus on the continent at large but more particularly in the represented countries as well as the types and effectiveness of intervention to combat them. We would like to hear from our collaborating NARS scientists if and how our programme on research and control of striga has been making a difference to the livelihood of farmers. We also would like to have a focused deliberation on what we need to do more to make the research programme on control of striga as well on streak virus more effective and beneficial to farmers and countries.

I would like to seize this opportunity to thank all our collaborators including the government of the Republic of Korea for their financial support of the research programme as well as for those National Agricultural Research Institutions who were keen to participate in this research network, because without their interest and collaboration we could not have been here. I also would like to thank SAFGRAD staff members who have been busy organizing this Workshop. Once again welcome and I wish you a very fruitful deliberation during the Workshop.

Highlights of Presentations

African Striga Research and Control Project

(The African Union and the Republic of Korea Initiative)

Dr. Mahama Ouedraogo
Research and Programmes Officer, AU/SAFGRAD

- Maize produced annually is about 41-43 million tons from an estimated 27 million hectares.
- Striga is a constraint to maize production and a threat to food security.
- The African Union and the government of the Republic of Korea initiative was conceptualized to deliver striga control technologies, first to West and Central Africa, and thereafter to Eastern and Southern Africa, to enhance partnerships, complementarity and synergy among stakeholders and to enhance the exchange of technological information among others.
- Activities carried out in the project, which AU/SAFGRAD started executing in 1999, include verification and demonstration of on-farm striga control technologies, dissemination of proven striga control technologies, community seed production and diffusion, and expansion of activities such as training aimed at raising awareness of the problem and solutions.
- Across West and Central Africa, 5180 farmers have been directly involved to date in a total of 888 on-farm trials involving 23 striga tolerant and resistant (STR) maize, 3 cowpea varieties and one variety each of soybean and groundnut.
- The various control options increased yield and reduced the number of emerged striga plants.
- Monitoring tours are an important part of the project and these are aimed at assessing implementation and documentation of activities.
- Major constraints identified include non-timely release of funds, leading to late implementation of activities, late submission of annual reports, low level of funding for desired level of impact and non-production of scientific publications.

Fig. 1: Partial view of the participants at the technical meeting

Technologies in the Pipeline for Striga Control

Dr. Abebe Menkir, Maize Breeder, IITA

- IITA's strategy for striga control aims at increasing grain yield while at the same time reducing number of emerged striga plants and their ability to reproduce.

- New materials have been developed that support less than half of the striga on ACR97 TZL Comp 1-W, the widely tested and used STR variety, and even less than the striga plants on populations developed from *Zea diploperennis*.

- Imazapyr resistance (IR) has been incorporated into STR varieties for an integrated control approach. The IR gene makes it possible for STR varieties to be used in control systems involving acetolactase synthase (ALS) inhibiting herbicides. Even if the herbicide resistance breaks down as a result of strong selection pressure (evolution of herbicide resistance occurs in 3-5 years), the striga resistance genes in the STR varieties continue to provide considerable protection against the parasite.

- To reduce the selection pressure for the evolution of resistance to the ALS inhibiting herbicides, the herbicides can be used on IR-STR maize in alternate years.

- Some of the developed materials in the various maturity groups have been converted to quality protein.

Striga Control Technologies in Maize: New Initiatives

Dr. Fred Kanampiu, Agronomist, CIMMYT

- Striga infests more than 20 million hectares in sub-Saharan Africa.

- CIMMYT's strategy for striga control include
  - (i) reduction of striga seed bank and improvement in soil fertility,
  - (ii) development of striga resistant maize varieties,
  - (iii) use of herbicide resistant maize, and
  - (iv) biotechnology.

- Herbicide resistant maize strategy is one of medium term strategies. It combines herbicide resistant maize varieties with low dose seed coating of systemic herbicide (30g imazapyr/ha). The cost of seed treatment is approximately $4 per hectare, excluding the cost of seeds.

- Seed producers (and not farmers) are the ones to treat the seeds. This is because seeds that do not have imazapyr resistance will die when coated with the herbicide.

- Crops that are susceptible to imazapyr must be at least 12 cm from the herbicide-treated imazapyr resistance maize.

- Imazapyr resistance maize is not genetically modified organism (GMO) and the resistance amounts to adding value to already adapted genotypes.

- The IR-herbicide technology can be implemented by spraying but about 10 times greater dose than the dose used for seed treatment is required.

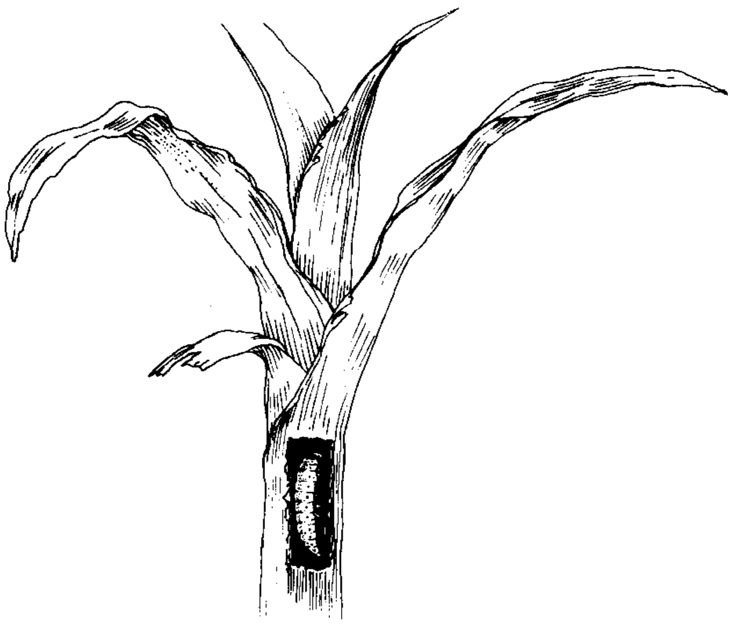

Fig.2 :

Discussion

Questions/observations	Clarifications and suggestions
• Various technologies have their advantages and disadvantages. What do you think of the IR maize-herbicide technology?	• The breakdown of the IR gene is a possibility. So, sustainability and management of this method at the level of the farmer are important issues that need to be addressed.
• What is the heritability for the IR gene?	• The IR trait is monogenic and semi-dominant in nature
• IITA is addressing drought tolerance, quality, streak and striga. Are these traits being incorporated one at a time or at the same time? If incorporation is one at a time, how long will it take to incorporate all the genes for these traits into a single genotype?	• IITA works with elite materials. The quality protein trait is controlled by a single gene and therefore easy to incorporate into drought-tolerant and STR maize.
• Some materials already identified as promising for striga control succumb to striga in certain areas. Is this as a result of the high variability of striga?	• Ecotype variation, with respect to striga, requires greater attention. IITA is able to address this issue in its breeding program through multi-locational testing.
• Will the strategy of developing materials to dramatically reduce number of emerged striga plants amount to vertical resistance, which may cause problem in the long run especially given the experience with cowpea genotype B301?	• The strategy for reducing number of emerged striga plants on maize, just like damage symptoms, is horizontal resistance and not vertical resistance. Recently obtained results have shown that both STR and susceptible materials are comparable in the stimulation of striga seeds. Differences only occur in the number and rate of development of the parasite seedlings on maize.
• It appears that in one of the tables shown during the presentation of Abebe Menkir (IITA) that a non-Zea diplo population had lower emergence than the Zea diplo population. Apart from the potential of broadening the resistance to striga, it does not appear from the results shown that pursing the introgression of resistance genes from *Zea diploperennis* into *Zea mays* has been worthwhile, although one is aware that some inbreds lines have shown remarkable resistance.	• The new non-Zea diplo population shown in the table was synthesized from resistant inbred lines, which may have accounted for their remarkable resistance. Better resistance may be obtained from a population synthesized from inbred lines extracted from Zea diplo resistance genes-introgressed populations.

Questions/observations	Clarifications and suggestions
• Do IITA and CIMMYT work together or do these organizations pursue separate interests?	• Yes, IITA and CIMMYT work closely together. The two organisations attend each other's meetings, write reports together, make work plans together and exchange materials. Specific examples of joint collaboration include the African Maize Stress Project, and the Harvest Plus project that addresses biofortification.
• Can West Africa really benefit from the IR maize-herbicide technology, given that the seed industry is not very well developed and because of the engagement of communities in seed production and the cost associated with the technology? Is an additional $4 per hectare not much for African farmers?	• Seed companies and farmers in Eastern and Southern Africa were being pushed out of business because of the striga problem. So, the IR technology for controlling striga is one that gives commercial benefit to seed companies and farmers. In effect, it is the monetary benefit to both seed companies and farmers that will drive the technology, given that 40-70% of farmers in these regions obtain their seeds from seed companies. Even with community seed production as practiced in Western and Central Africa, the technology can find a place in these regions with some level of technical backstopping. It's not just farmers that need to be educated about this technology; scientists and technicians also need education.
• The $4 is for the seed treatment; what is the cost of the seed and the total cost? • Is the same herbicide effective for pests and fungi or we have to coat to protect for all these organisms?	• The $4 is additional to whatever the cost of seed is. For now, seed companies in Eastern and Central Africa are not adding the cost of the chemical to the cost of seed. It appears they would like farmers to be convinced of the efficacy of the technology and capture the market first before trying to recover the cost of the herbicide seed treatment. Of course, hybrids seeds can be sold without herbicide seed treatment in areas where striga is not a problem. The herbicide is not effective against fungi, and can, therefore, be mixed together with other seed treatment chemicals like fungicides before application.
• Will the IR-herbicide technology not promote hybrids over populations, which is more popular with farmers.	• As earlier mentioned, in East and Southern Africa 40-70% of the farmers obtain their seeds from the seed companies, so the type of seeds used for planting is farmer-driven, and the advantage of hybrids over open-pollinated varieties is no problem.

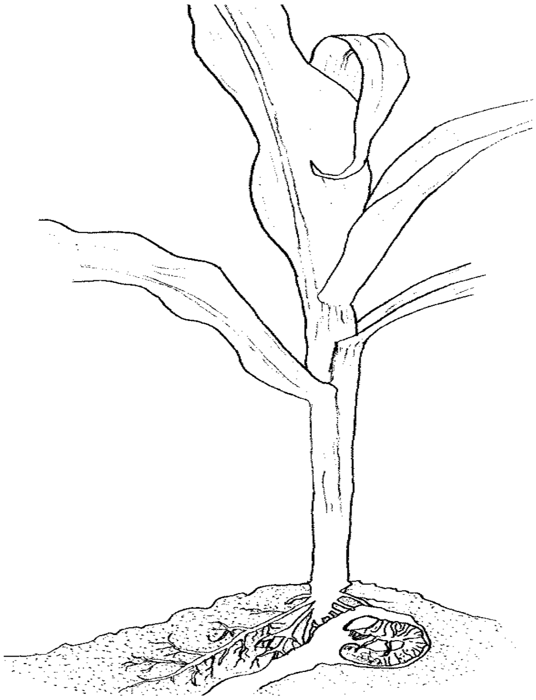

Fig.3:

Questions/observations	Responses and suggestions
• What is the source of the IR gene?	• The original owner of the IR gene was American Cyanamid who made it available to Pioneer Hybrid to incorporate into temperate maize. BASF bought over American Cyanamid, so the gene belongs to this organization at the moment. However, the gene was not patented in Africa.
• Farmers, at times eat the seeds meant for planting. Some of the herbicide-treated maize will end up in the stomach of farm families rather than in the field. How can the safety of the lives of farm families be ensured with the IR technology?	• The herbicide applied comes to about 0.56 mg per seed. The delivery level is so low that it leaves no residual effect in the soil. Mammalian toxicity of the chemical is very low. Therefore it is well tolerated by humans. It is no more toxic than the other widely used agricultural chemicals. However, farmers would still have to be educated not to eat seeds that have been treated with agrochemicals.
• Nothing came out of the SIPWEMA initiative which was extensively discussed in Morocco. Will SAFGRAD prepare a new concept note with respect to its goal of achieving greater impact or adopt the concept note prepared for SIPWEMA.	• This meeting will discuss the SIPWEMA initiative and explore what useful aspects of the concept note developed for the former can be relevant to the new initiative being pursued by SAFGRAD.

Comments
• Legumes like cowpea and soybean tolerate imazapyr quite well, so for such crops, the 12 cm distance may not be important.
• Recommendation of the rate of imazapyr should be per kg of seed and not per hectare.
• Many people are not yet aware of the scientific information provided at the meeting. This calls for a strengthening of existing networks. This is even more compelling as national programs lack resources to replicate or duplicate research already done with good results from other places.

COUNTRY HIGHLIGHTS ON STRIGA CONTROL

Burkina Faso

Dr. Jacob Sanou,
Breeder/Geneticist, INERA
and
Dr. Oumar Ouedraogo,
Weed Scientist, INERA

- Maize is now extensively grown in areas where sorghum and millet held sway.
- Major constraints to maize in Burkina Faso are drought and striga.
- More than 60% of farmlands are infested with striga.
- One out of 8 maize fields is on striga infested field in Burkina Faso.
- Different control technologies are appropriate for different categories of farmers who operate under different socioeconomic conditions.
- Farmers who operate under traditional farming systems constitute about 55-60% of the farmers in Burkina Faso, while farmers practicing semi-intensive agriculture account for 25-30%. The remaining 5-15% are made up of farmers that practice intensive agriculture.
- A farmer-participatory approach was used in the evaluation of varieties for striga-endemic area.
- Evaluation is usually done under natural infestation.
- ACR94 TZE Comp 5-W was selected by 90% of the farmers involved in the demonstrations. The variety had the highest grain yield among five varieties and the lowest number of emerged striga plants.
- STR maize intercropped with cowpea was found to be superior to the farmers' practice.
- Seed production of STR maize was carried out to increase the availability of seeds to be used for trials in 2006.
- Breeders, agronomists and weed scientists need to work together for greater success.

Cameroon

Dr. Charles The,
Plant Breeder, IRAD

- Cameroon started striga research on a 2 hectare sick plot in 1984.
- Inbred line development started in 1986.
- To date, at least 50 inbred lines, 10 synthetics and a number of hybrids have been developed.
- More than 300 on-farm demonstration trials have been conducted to date under the African Striga Research and Control Project (AU/SAFGRAD-Rep. of Korea intiative).
- Effective trap crops have been identified in Cameroon and successfully used to reduce striga seed inoculum in the soil.
- Inbred lines from mid-altitude ecology have showed potential as parents of hybrids for lowland *Striga hermonthica* ecology.

Cote d'Ivoire

Dr. Louise Akanvou,
Plant Breeder, CNRA

- Maize is second to rice in terms of area under cultivation in Cote d'Ivoire.
- Area under maize cultivation is between 600,000 to 700,000 hectares.
- Local varieties yield between 0.5 to 0.9 tons per hectare while improved varieties yield over 1 ton per hectare.
- About 40,000 tons of maize is imported per annum in Cote d'Ivoire. Consequently, the crop has the potential to contribute immensely to the attainment of food security in the country.
- On farm demonstration trials has been made impossible due to the political situation in the country.
- Activities to be pursued include strengthening of the seed production system for more effective dissemination of seeds of striga tolerant varieties.
- Posters are being considered for the education of stakeholders. The posters are to be written in local languages.

Ethiopia

Dr. Fasil Reda,
Weed Scientist, EARO

- An estimated 67-85% of farmers are still using the practice of hand-pulling in Ethiopia.

- Late hand-pulling and early hand-pulling give similar yields for sorghum, but reduced labour is required for late hand-pulling.

- Sorghum cultivars differed in their responses to striga.

- Location differences have been observed with respect to effectiveness of various control options.

- Caution needs to be exercised in building farmers' expectations beyond what is possible.

Ghana

Dr. Mashark Abdulai,
Plant Breeder/Geneticist, SARI

- IR maize-herbicide technology works but handling and management is a problem.

- Intercropping is the most popular of the technologies for controlling striga but striga control has not been as effective as with rotation. Consequently, farmers are more willing to practice rotation than intercropping.

- Maize yield increased in plots previously planted to soybean, while striga count reduced in comparison to plots planted repeatedly to the farmer's maize variety.


Fig.4 :

Mali

Dr. Ntji Coulibaly,
Agronomist, IER

- There are 15 species of striga in Mali; the major ones are *S. hermonthica* and *S. gesnerioides*, both of which are found on 82% of infested farmlands.

- Activities carried out include yield loss assessment, on-farm demonstration of STR varieties, resistance breeding, intercropping with leguminous trap crop such as cowpea.

- On farm demonstration trials have facilitated the identification of adapted varieties capable of giving good yield under striga infestation.

Nigeria

Prof. Lagoke, S.T.O.,
Weed Scientist, Abeokuta University
and
Dr. Ibrahim Kureh,
Crop Physiologist/Agronomist, IAR/ABU

- A total of 47 farmers were involved in on-farm demonstration trials in 2005; 12 in Imeko, 15 in Mokwa and 20 at Bida.

- Rodents attack groundnuts more when intercropped that when planted sole.

- Considerable competition has also been observed between maize and intercropped cowpea.

- Farmers currently prefer rotation.

- Integrated management yields were higher than yields of maize under farmers' practice; Striga emergence counts were also lower under the integrated management options being recommended for striga control.

- Integrated management option consists of using an STR maize variety with the recommended fertilizer rate and legumes planted in rotation or intercropped.

- Under high striga infestation and on light soils, the striga tolerant variety ACR 97 TZL Comp 1-W is not as outstanding.

- ACR 97 Comp 1-W has been observed to be highly susceptible to weevils under the storage system used in Imeko.

- Based on previous experience, some other rotations are being proposed for the derived savanna and southern Guinea savanna.

- Groundnuts, soybean, early maturing cowpea and cotton are effectively used as trap crops in the northern Guinea savanna

Observations and Lessons Learnt from Monitoring Tours in the 'African Striga Research and Control Project

(AU/SAFGRAD-Government or Republic of Korea Initiative)

Dr. Victor Adetimirin,
Plant Breeder, University of Ibadan

- Options currently available for striga control and being extended to farmers may not give complete control but have given farmers new hope.

- The project has been effective in taking the product of research from the shelf to where they are needed – farms across West and Central Africa.

- 'One size does not fit all'. Strategies for striga control must take into consideration the severity of field infestation. Even if intercropping is to be practiced, heavily infested fields should be considered for trap crop cultivation first.

- Are we making impact? Yes.

- Is the present level of impact the best we can make? No.

- What can we do to increase the level of impact?
  In many places, demonstration trials are carried out in the same location year-in, year-out. Although some evolution has occurred with respect to technologies being demonstrated on-farm, greater impact requires that new locations are used for on-farm demonstrations.

  Extensive diffusion of STR varieties must be pursued in locations that have had three years of on-farm demonstration trials.

  Individual countries should consider producing maps of areas already covered as a guide for areas where new activities are to be carried out.

  Transportation is often a major problem with respect to accessing remote areas.

General Comments

- It is time to do a stock-taking of how farmers perceive the project.

- In Cameroon, a study is now being carried out to assess the impact of the project. It may be useful to have such studies in all participating countries.

- ACR 97 TZL Comp 1-W is to a large extent dent. There are new synthetics which may be tried in Imeko, Nigeria, where farmers have encountered problems with weevils. The synthetics are expected to be able to withstand weevils better than dent varieties.

Fig.5: *Swapping Striga for patents*

HIGHLIGHTS ON MAIZE STREAK VIRUS

Cameroon

Dr. Charles The,
Plant Breeder, IRAD

- *Cicadulina mbila* is the major vector of the maize streak virus in Cameroon.
- Sources of resistance genes to the virus is available and the sources have been generally effective although sometimes some high incidences of streak are observed especially in some composites.
- Conversion of materials for streak resistance is now routine.

Burkina Faso

Dr. Seidu Traore
Entomologist, INERA

- Differences in strains of the maize streak virus exist although the various sources of resistance appear to be effective against the various strains. There may be need to do some monitoring in this regard.
- The maize streak virus is also found on maize in drier regions.

Nigeria

Dr. Ibrahim Kureh and Prof. S.T.O. Lagoke

- Materials cultivated in Nigeria are resistant to maize streak virus.
- The virus has been effectively controlled in Nigeria.

International Institute of Tropical Agriculture, IITA

Dr. Abebe Menkir

- Maize streak virus (MSV) is endemic to Africa.
- MSV follows the population dynamics of the leafhopper which is in turn affected by the prevailing moisture and environment.
- IITA's focus with respect to MSV and other biotic constraints has always been breeding for durable resistance, which addresses the problem of sustainability.
- At IITA, the strategy of deliberately selecting plants that show minor symptoms to maintain a balance between host resistance and parasite, reducing the drive for the evolution of new virulent strains of the virus.
- Inheritance of MSV resistance is simple and the trait can be easily transferred.
- Resistance to MSV can be improved from near zero to 100% in a few generations.

Discussion

- The consensus was that Maize Streak Virus (MSV) is no longer a major problem in Western and Central Africa and should not be a problem in other parts of Africa. IITA developed many maize varieties that are resistant to streak and the resistance genes are still effective against streak.
- WECAMAN recommendation that all materials for release should be resistant to streak virus is being adhered to.
- Perhaps there may be need to carry out some monitoring activities of the incidence of the virus in the sub-region now that it is about two decades since resistant materials have been made available.
- IITA has promised to be of assistance to NARS that needs to convert any material to streak resistance.
- IITA is willing to assist NARS to srengthen their capability for such conversion in their respective countries if the need arises and requests for such is made.
- Obatanpa had low level of resistance to MSV but in two years the resistance was taken to a high level.

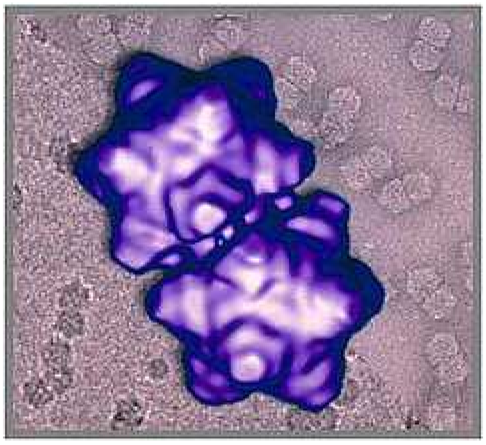

Fig. 6 : Maize streak virus

Issues Discussed and Major Conclusions Reached for Greater Impact in Striga Control Activities in Africa

- The mandate of SAFGRAD is pan-African. Consequently, SAFGRAD is trying to extend its on-farm demonstration trials to countries in Eastern and Southern Africa.

- The need to cover all parts of sub-Saharan African necessitates a request for higher level of funding from the government of the Republic of Korea and exploration of other sources of funding. But, donor support is important but it cannot substitute for African ownership of solutions to Africa's agricultural problems

- Timing of monitoring activities must be such that trials are at stages when their effectiveness can be objectively ascertained.

- Monitoring tours must be strengthened because it has the capability of improving the quality of striga control activities and also provides opportunities for interaction with farmers.

- Greater impact also means that in countries already involved in the project, demonstration trials must move to new areas while diffusion must be made to cover areas where demonstration trials have been successful for two to three years.

- There is a need to carry out impact studies in all countries. An internal as well as external evaluation of the impact being made is necessary. And, there is need to be clear about what the indices of impact are; possible indices of impact are:
    - Farmers' adoption of introduced STR varieties
    - Farmers' adoption of introduced striga control technologies
    - Farmers' ability to crop areas previously abandoned due to striga infestation
    - Number of farmers used for on-farm demonstration trials

    - Number of farmers reached in the STR seed diffusion activities
    - Number of villages reached
    - Percentage of infested areas reached in each country

- Rather than ‘reinventing the wheel’ by repetition of researches and trials carried out in other areas, geographical coordinates and latitude information may need to be collected from the on-farm sites and the already collected data subjected to the current tools of GIS to enable the identification of locations that may likely give the same results.

- Where on-farm trials are being carried out, an exit strategy needs to be put in place to ensure continuity of the activities that will ensure a sustainable control of the parasite. Non-governmental organizations may be able to offer assistance in this regard.

- There is a real constraint of transportation to regular visits to on-farm demonstration sites. More aggressive striga control activities for greater impact may require that provision be made for vehicles.

- Non-timely disbursement of funds can mess up well-planned activities and limit the possibility of impact. AU/SAFGRAD must ensure that funds are released before the commencement of field activities.

- East African NARS are willing to come on board the on-farm demonstration trials being executed in Western and Central Africa because of the success and experience already gathered in these regions.

- Radio, television and posters in local languages are effective tools for taking striga control technologies across countries and should be explored.

- Even with an agenda to pursue greater impact, the consensus was that SAFGRAD’s activities should be limited to striga rather than spreading resources thin over all parasitic weeds, especially given the greater importance of striga.

- It should be possible to modify the Morocco SIPWEMA document and bring on board those people who prepared the document into the present initiative. SAFGRAD may need to constitute a working group for this task.

Workshop on Research and Control of Striga and Streak Virus in Africa
15 - 16 December 2005
Ouagadougou, Burkina Faso

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