



Intsormil

TRIP REPORT

BY

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Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln



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TRIP REPORT, KHARTOUM, SUDAN - November 19 - December 2, 1983

I arrived in Khartoum, Sudan in the P.M. of November 19th. On Sunday A.M. I experienced the travelers great fear - passport loss. But through local assistance we resolved the problem so that I could proceed with plans of Drs. Musselman and Bebawi for the days ahead. We also visited the U.S. AID Headquarters. We were unable to schedule a trip to the Western Sudan Project because of flight schedules. Jim Riley was also out of town until later.

On Monday, November 21, I was the visiting lecturer in the Biological Science Department, University of Khartoum. My presentation was on the technology for control of Striga in the United States. I had the added pleasure of an extended discussion with the students and faculty concerning the serious Striga problem in Sudan. The students and faculty were very enlightened and conversive.

On Tuesday, I accompanied an honors class on a field trip to find, identify, and discuss parasitic plants in the area.

On Wednesday, November 23, I visited the Faculty of Agriculture, University of Khartoum, Shambat. Dr. Bebawi explained various Striga projects and introduced me to staff and students. A keen awareness of the Striga problem prevails, but the research progress is governed by the availability of equipment, facilities and fiscal support. There appears to be no lack of desire or scientific expertise for the conduct of University research. The most serious problem appears to be the opportunity for extensive expanded field research.

On Thursday, November 24, we left for a four day field trip to Eastern Sudan. This area is an expansive sorghum producing area. The area employs rainfed production of sorghum on very large privately operated schemes.

This year the area was suffering the most serious drought in the memory of the local residents. Sorghum yield was estimated to be down as much as 80%. The drought is also impacting on livestock production of the area - and will no doubt get much worse before the rainy season.

The sorghum had senesced to complete dryness with most of the harvest completed. Striga had also terminated except on a few late maturing plants.

A farming operation which we visited was UM Shagara, near El Gedaref. This is the family of Mr. Ahmed M. Mohamed Eisa, a student at Kansas State University and a participant at the International Training Course on the Control of Striga held by North Carolina State University and USDA in August 1983. The family grows several thousand fedan (acres) of sorghum. Striga is becoming a very serious problem in this semi-mechanized farming system. It appears that the equipment operation may be contributing to an enhanced distribution of Striga seeds. Yield losses on infested areas has been reported to be near total devastation. One can only imagine what a pest like Striga can do to an area - which looks like the great grain plains of the United States, but planted to sorghum. With the dissemination potential of Striga seed by wind, livestock, and equipment, this area may well revert to a minimally productive arid desert rather than a major sorghum breadbasket of Sudan.

We talked to several farmers of the El Gedaref and Kassala area. There was concern, but little is being done to control or prevent the spread of Striga. Hand pulling is practiced some, but probably the timing of this practice permits seed production, insuring perpetuation of a seed supply and an enhanced opportunity for seed to be dispersed to noninfested areas.

I examined the cracking clay soils to assess the potential for the use of ethylene to induce suicidal Striga seed germination. Ethylene would need be applied after the rains start - probably coincidental with or shortly after planting. The soil at this time might be quite sticky, but the cracks would be closed. The deep cracks make for an interesting situation, because it permits Striga seeds to move deep into the soil. At this level the seeds may remain dormant and viable for an extended period.

Without suitable Striga resistant sorghum varieties the most effective defense against Striga in this area would be to prevent spread. This might be accomplished by using "Striga free" seeds, avoid Striga infested areas with equipment, do not Striga infested areas last, clean equipment thoroughly after finishing a Striga infested area, and if possible, stop Striga seed production on infested lands. The vital process of prevention of seed production may be accomplished by cultivation, hand weeding or the use of herbicides. This procedure will not protect the current crop. It will probably need be conducted for 3-5 years to effectively diminish the seed populations from the soil and reduce the probability of Striga spread.

On our return from the El Gadaref area we visited the Rahad irrigated scheme. Here we saw vigorously growing Striga on irrigated sorghum. The potential yield losses from Striga in an irrigated system may be as great as that in the rainfed area because of the intensity of cultivation. One management option here however is the use of rotation to control proliferation. The use of ethylene, synthetic stimulants and herbicides may also have potential for Striga control. Striga has demonstrated its devastating pestilence in irrigated sorghum.

Monday, November 28 was Sudan Striga Day. This was a meeting where people from the University, ARC, and Service Agencies met to discuss the Striga problems of Sudan. It was held at the Faculty of Agriculture, Shambat. (See program attached.) The meeting reviewed various topics of biology, anatomy, physiology - breeding for resistance, biological control and my discussion on control technologies employed against Striga in the U.S.A. Research needs were generally discussed. Dr. Mohomid Osmond Keder, project leader for the IDRC Striga Project appointed a committee of Drs. Bebawi, Hamdoun, Musselman, and others to identify and formulate recommendations of research needs to be a part of the proceedings of the session.

Although searching for and breeding for Striga hermonthica resistant or tolerant varieties have received major attention over the years, the availability of strong candidate varieties appear to be elusive. There just may not be presently available acceptable sorghum varieties that are resistant to the genetically variable S. hermonthica. There is a sustained hope that acceptable sorghum varieties resistant or tolerant to S. hermonthica may be found or bred. The situation in the Sudan can now at best be construed as a slight glimmer of hope for some level of tolerance somewhere in the future.

The possibilities for immediately available biological control appears even less hopeful than breeding for resistance. Although there is Smicronyx, a pod destroying beetle and Jononica a herbivorous butterfly, the utilization of these and other biological control agents appear to be a long way from a functional control technique.

The development of functional mechanical, chemical, or agronomic control techniques appear far from a practical reality. Hand weeding is practiced some, but this practice does not provide the alleviation of damage to the current crop. It is doubtful that the timing and extent of this practice is sufficient to have a significant impact on Striga seed production - thus the perpetuation of seed production continues.

There might be some long term benefit from hand weeding if it were carried out at a level such as to prevent seed production for 3-5 years. The philosophy of this long term benefit may be a formable task in extension salesmanship.

The development of a program to effectively use herbicides to control Striga is in its infancy. The cost of the chemicals and the availability of equipment and technology to utilize herbicides make this control procedure a formable challenge. However, there probably is a legitimate basis for developing chemical control techniques for these areas where this alternative is plausible.

The use of seed germination stimulants might provide a usable system of Striga control under some situation. The use of ethylene might be used on mechanized private farms or provided as a service in the irrigated schemes. The development of the synthetic stimulants such as GR-24 may be suited to other situations. The problems of equipment and available technology associated with the use of herbicides are also applicable to the use of stimulants.

The present Striga situation in Sudan consists of areas suffering severe yield losses. Other areas have pockets of extensive damage but otherwise a scattered infestation. There still remains large areas with little or no Striga. It is to these areas that attention should now be given. An exhaustive effort should be made to "protect" these noninfested areas by equipment sanitation, the uses of noninfested seed and the removal of incipient infestations before they produce seed to infest another area. This procedure is simply the philosophy that prevention is cheaper than control. It is much easier to put out a fire at the time of ignition than when it becomes a raging inferno. The same can be said for a Striga infestation, with similar sequences and consequences.

The Sudan Striga day ended on a note of desire to generate progress towards some functional program. However, the magnitude of the problem is immense, especially considering the prospects of developing workable options.

Knowledge and desires towards Striga - and Orobanche - are apparently present in Sudan in both the University and in ARC. What appears to be missing is an integrated approach toward developing an operational field program of research. Perhaps the ARC function should be structured to deal with applied field research with the university providing the basic research input. There is certainly research needs for both Agencies to work on. I did not have an opportunity to visit ARC field projects. My opinion, based on discussions and observations, of what the Striga program in Sudan needs is a coordinated effort of basic research projects, field research on control procedures, a systematic effort to find resistant/tolerant varieties, and an infra-structure to implement the knowledge into the agricultural community.

The Sudan Striga problem, like the Striga problem elsewhere, poses an ever increasing threat to agricultural productivity. Unless it is addressed with efforts commensurate with the task, devastating losses are as sure as the trend towards mechanized commercial agriculture. A basic and minimum start toward this pest problem could be the establishment of a Striga Research

Center that would both coordinate and conduct research on various facets of the problem. In addition, the Center should coordinate and conduct training of scientists, technicians, extension personnel, farmers, and farming scheme personnel. Whether such a Striga Center is located in Sudan and/or elsewhere, it will require considerable funding to achieve a "threshold level of operation" in order to make a significant impact on the Striga problem. Little miniscule - shirttail projects scattered here and there just will not produce the needed magnitude of results.

After the Striga meetings I was able to talk some with Jim Riley and others about the various projects in Sudan including the Striga problems of Western Sudan. It was unfortunate that I was unable to schedule a trip to the west on this trip. The western area should certainly be considered in terms of the Sudan Striga problem.

The remainder of the week was spent with Dr. Bebawi, Dr. Mohamed Osman Khidir, and other staff members at Shambat.

On Friday, December 2, I departed Sudan for home.



Robert E. Eplee
Center Director

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SUDAN STRIGA DAY

28 NOVEMBER 1983

UNIVERSITY OF KHARTOUM
FACULTY OF AGRICULTURE
SHAMBAT

- 8:00 Welcome, Abdel Rahman el Tayeb, Dean
- SESSION I-Research Reports, Faiz Faris Bebawi presiding
- 8:15-8:30 A personal view of Sudan Striga Research, Faiz Faris Bebawi
- 8:30-8:45 Striga in sugarcane in Sudan, Salman Hassan el Awad
- 8:45-9:00 Striga species occurring in Sudan and their distribution,
Lytton John Musselman
- 9:00-9:45 BREAKFAST Striga lab
- 9:30-9:45 Agronomic practices as related to Striga Control in Sorghum
Dafalla A. Dawaad
- 9:45-10:00 Studies on the ecology of Striga hermonthica, Adil Eisa Awad
- 10:00-10:15 Biological control of Striga spp., Adil Omar Ahmed
- 10:15-10:30 Active use of plant pathogens in weed control, Awad Mahamed
Abdel Rahim
- 10:30-10:45 Studies on seed dormancy of Striga, Ali Elawad Mazloum
- 10:45-11:00 Orobanche in vegetable crops. Abdullahi Ibrahim Mohamed
- 11:00-11:15 Screening for Striga resistance in millet, Mahamed Abdalla Omer
- 11:15-11:30 Agronomic performance of different sorghum genotypes resistant
to Striga hermonthica, A. E. Abdalla and N.A. Nafie
- 11:30-11:45 Technical developments in the control of Striga, Robert E. Eplee
- 11:45-12:30 OPEN and discussion
- SESSION II Research Needs and Development, Abdalla Mohamed Hamdoun, presiding
- 12:30-1:15 Discussion of research needs and their priority