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EARSAM MONITORING TOUR
IN WAD-MEDANI, SUDAN
Oct 26, 1989

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Semi-Arid Food Grain Research and Development
of the Organization of African Unity

ICRISAT

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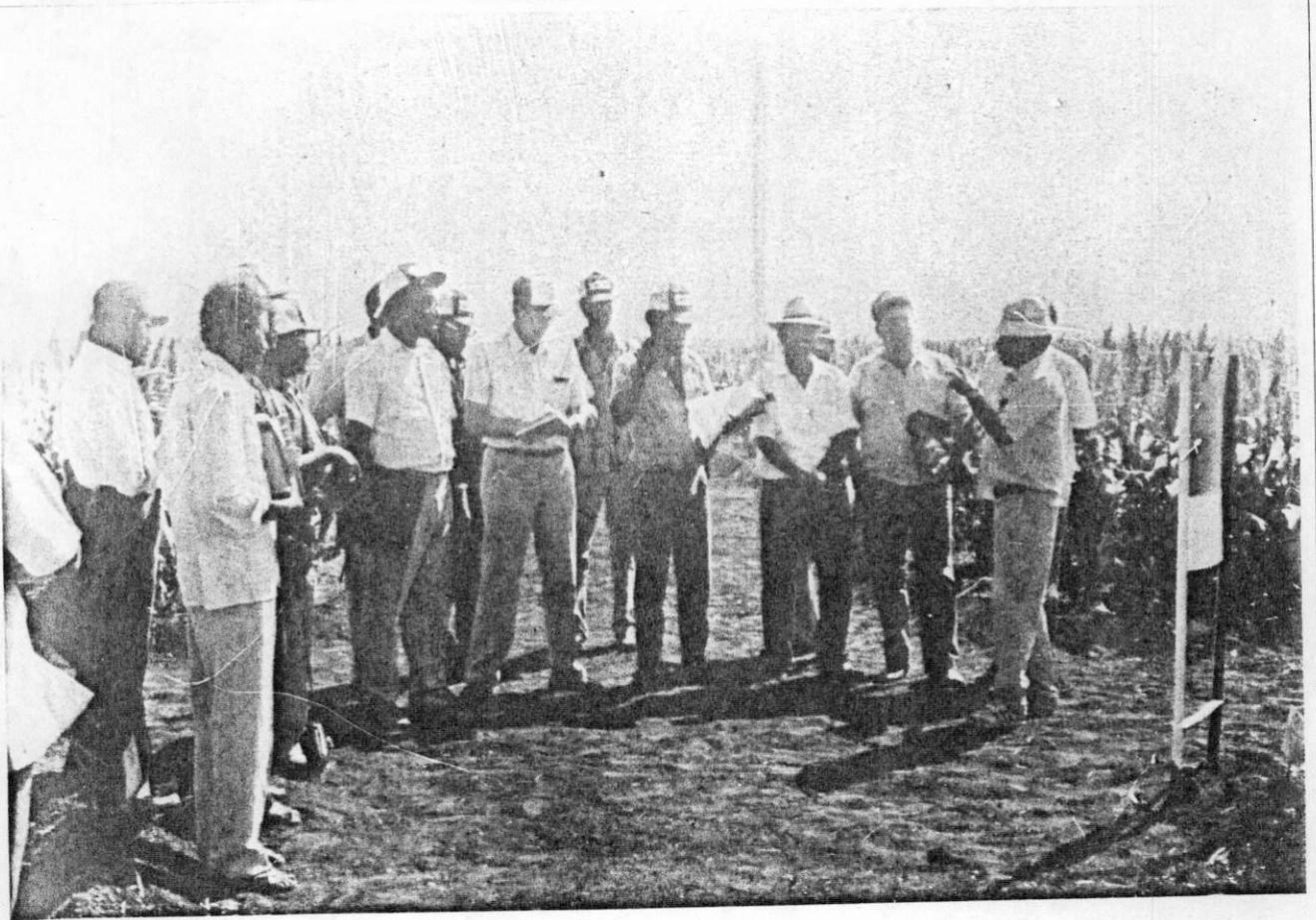
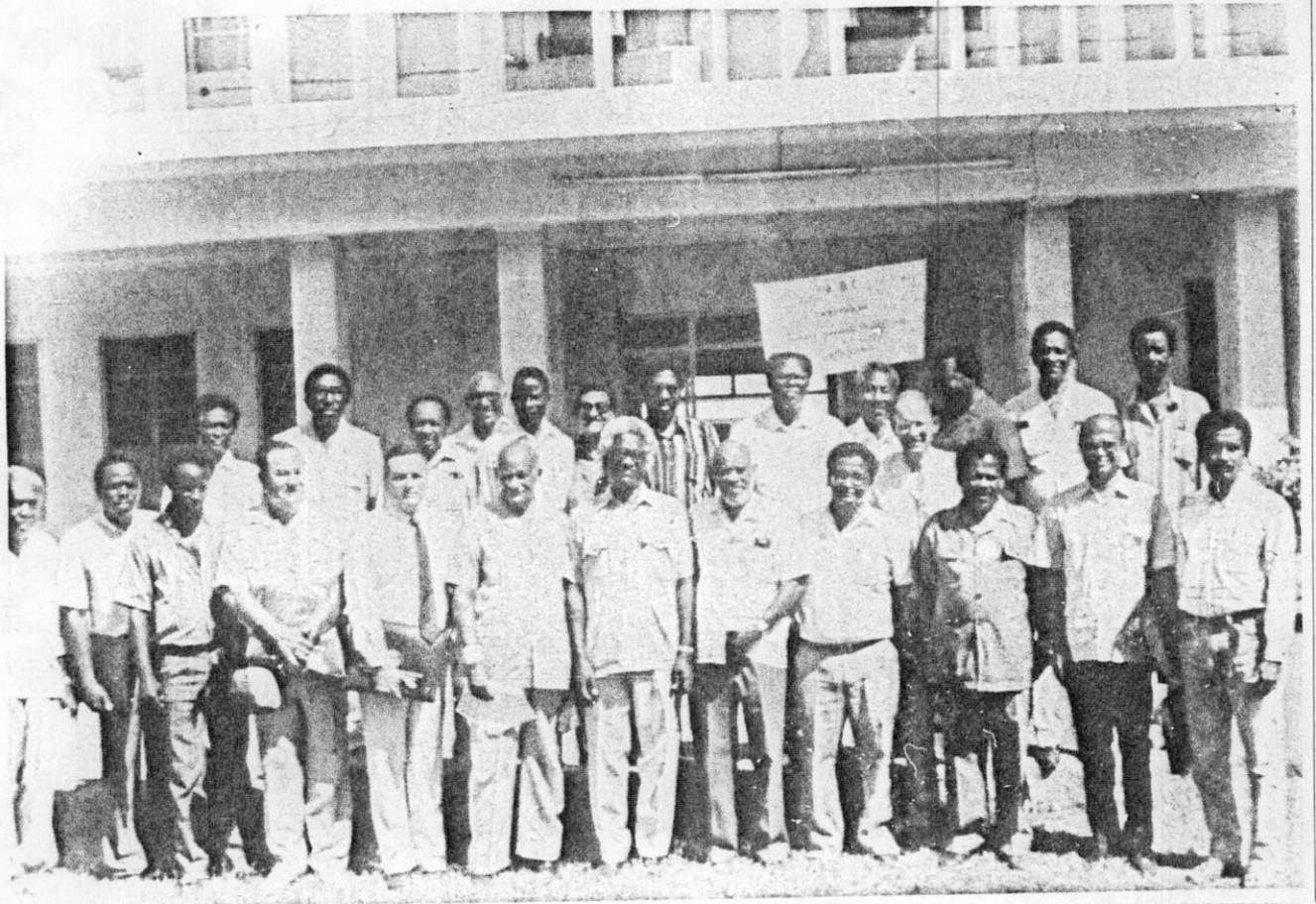
EARSAM NETWORK

Eastern Africa Regional Sorghum and Millet
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EARSAM MONITORING TOUR IN WAD-MEDANI SUDAN
(Oct. 22 to Nov 1, 1989)

I INTRODUCTION

The EARSAM steering committee meeting and monitoring tour was held for the first time in Sudan which arose from a request made by the steering committee members during the 4th steering committee meeting in Nairobi, November 3 to 7, 1988.

EARSAM steering committee members:

<u>Name</u>	<u>Country</u>	<u>Function</u>
Dr. Yilma Kebede	Ethiopia	Chairman
Mr. C. Kamau	Kenya	Secretary
Dr. G. Mitawa	Tanzania	Member
Mr. M.A. Hashi	Somalia	Member
Mr. F. Hakizimana	Burundi	Member
Mr. T. Musabyimana	Rwanda	Member
Mr. J. Oryokot	Uganda	Member
Mr. O. El O. Ibrahim	Sudan	Member
Dr. V. Guiragossian	Kenya	Regional Coordinator

Observers

Dr. T. Bezuneh	Burkina Faso	SAFGRAD director of research
Dr. G. Kingma	Burkina Faso	USAID/SAFGRAD advisor
Dr. S. Mukuru	Kenya	EARCAL principal sorghum and millet breeder
Dr. L. Singh	Kenya	EARCAL principal legume agronomist
Mr. M.A. Mao	Somalia	Agronomist
Mr. C. Sehene	Rwanda	Sorghum breeder

* EARCAL Eastern Africa Regional Cereals and Legumes

The main objective of the EARSAM monitoring tour was to visit the ARC sorghum improvement programs in different disciplines and in addition the ARC/Global 2000 on farm demonstration plots.

II ACTIVITIES IN WAD MEDANI

A. Oct. 26, 1989: ARC Sorghum Improvement Program

EARSAM participants visited the sorghum improvement fields to review the National Sorghum Programs. Dr. Osman El Obeid (sorghum breeder), Dr. Abdullahi (sorghum coordinator) and Dr. I. Babiker (Director of research for Gezira station) presented a general overview of the sorghum improvement program and briefed the participants the major production constraints such as varietal and hybrid development, drought, striga, charcoal rot and smut diseases, storage losses, grain quality for utilization, and lack of marketing and price control. It was also mentioned that traditional sorghum varieties grown in rainfed areas (about 90%) are tall and late maturing and suffer from drought stress. The other 10% is for irrigated sorghums. It was also mentioned that 60% of the 90% rainfed areas is mechanized.

The sorghum breeding program is located at the ARC headquarters where irrigation facilities are available for crossing blocks and agronomic work with different water regimes.

The participants were allowed to select sorghum breeding lines from the different nurseries. Additional visit for EARSAM breeders was organized by Dr. Osman Ibrahim to make further selection from the breeding nurseries. Dr. Osman Ibrahim promised to send the materials selected by the breeders right after harvest.

The sorghum breeding nurseries and trials were divided into blocks and sub-blocks. The first block included sorghum yield trials, such as, national performance elite yield trial, EARSAM regional cooperative yield trial, ICRISAT varietal and hybrid trial and Texas A and M variety and hybrid yield trial.

It is interesting to note that the variety Kigufi from Rwanda was not adapted in Wad Medani, i.e. it was still flowering, while other varieties were approaching maturity. This gave the scientists an indication of the adaptation of germplasm from intermediate humid elevations of Eastern Africa to lowland dry areas. ICSV 112 an ICRISAT bred variety was quite well adapted in Wad Medani and also in other lowland areas of the region. The Cr: 35-5 an ARC bred variety has excellent adaptation and high grain yield compared to other introduced varieties.

The second block included breeding materials in F₂, F₃ and F₄ generations. In addition, A and B and R lines were planted and crosses were made to develop hybrids. ARC hybrids and private seed company hybrids were also grown for comparison. The private seed company hybrids in general were shorter (combine height), uniform with good grain yield.

B. Agronomic Trials

EARSAM participants also visited the agronomic trials carried out on Hageen Durra 1 hybrid. The treatments were: irrigation level, fertilizer level, density. Hageen Durra 1 showed good response to N.P. and irrigation and outyielded the local and improved varieties.

C. Striga Research

EARSAM participants also visited the striga research block. The treatments used in these blocks were: chemical herbicides, fertilizer and catch crop. The varieties used were SRN 39, IS 9830, (striga resistant), Hageen Durra 1, and Dabar. Hageen Durra 1 did not perform well at low levels of fertilizer, and herbicides and was very susceptible to striga attack. SRN 39 was more tolerant to striga attack. It was also evident that the use of Dicamba and Goal was effective in controlling weeds and reduced striga incidence. Also by applying urea and other nitrogen fertilizers one can reduce striga incidence. Mixed cropping of Dolichos and sorghum has advantage in striga fields.

D. ARC Sorghum Improvement Program Evaluation

EARSAM participants met with ARC scientists in the afternoon and interchanged experiences and made some recommendations. The issues of diversity and adaptation were discussed and suggestions were made. It was also recommended by EARSAM members to ARC breeders to make crosses during normal cycle (May to Oct) and grow F_1 in off-season and evaluate F_2 in the normal cycle in order not to lose a whole season. The issue of striga was again raised and the need for assessing the relative importance of striga in the Sudan was stressed. It was suggested that a thorough country-wide survey be conducted to assess the damage of striga on sorghum production.

Early maturing sorghums planted 1st week of June are needed in Gezira scheme as water for irrigation is not available after September. Therefore, breeding efforts to develop sorghum genotypes with 95 - 100 days to maturity is a high priority research. Since, 60% of the 90% rainfed sorghum is mechanized, therefore, combine height and mechanization during harvest is a must because of large scale (farms over 500 hectares) farming.

In large scale dryland cropping, sorghum is planted year after year, as a result weeds especially striga, insect attack, nutrient depletion, moisture stress are common problems. Therefore, it was recommended that the extensionists in Sudan to encourage farmers to follow a rotation scheme to avoid some of the above problems.

Safra, Korakollo and Agabsido are local sorghums grown widely by farmers in Sudan especially in rainfed areas. The improved feterita types developed by the ARC breeders are unable to outyield the three local varieties under low input and low management conditions of the farmers. Apparently, the local varieties have good root system and drought tolerance under dryland conditions. Therefore, it was recommended to put more emphasis on breeding for drought for GS₂ and GS₃ stages by identifying diverse local drought tolerant genotypes and making crosses using both pedigree and population breeding methods simultaneously.

Charcoal rot disease is closely associated with drought. Therefore, selecting genotypes with the "stay green" (non senescence) types, it is likely that these genotypes will be adapted to drought conditions and may have less charcoal rot incidence.

The long smut research in ARC is well advanced and inoculation of a large number of genotypes and plants are being practiced in field conditions. However, not many genotypes have been identified by ARC at this stage with long smut resistance. More work needs to be done. Covered smut disease unlike long smut in sorghums can be avoided by seed dressing.

Pearl millet research is carried out in western Sudan at El Obeid research station in northern Kordofan is a very good location both for millet as well as sorghum research for drought. It was suggested that the pearl millet breeder at El Obeid (Dr. El Hag Gasim) establish contact and collaboration with ICRISAT Sahelian center millet research (Dr. Anan Kumar).

III Gezira reseach, extension and management center at Barakat and ARC/Global 2000 on-farm demonstration plot visits Oct 28, 1989

A. Gezira research center:

EARSAM participants visited the Gezira research center with the help of Dr. I. Babiker and met with the director of Gezira research center (Dr. Ali Nour) in a conference room. The director welcomed the group and presented a general overview of the center, its structure, staff, the major crops (cotton, wheat, groundnut, sorghum, vegetables etc), and the extended area covering the irrigated mechanized regions.

The EARSAM participants were given a chance to ask questions and share experiences with Gezira research staff. Right after this session a movie was shown to the group about Gezira research center; its past and present activities in the Gezira scheme.

Local sorghums are grown on a 150,000 ha with an average yield of 1.2 ton/ha. Hageen Durra 1 produces average yields of 1 to 3 tons/ha. Very little millet is grown in the mechanized and irrigated regions.

Table 1: Sorghum productions in the Sudan, area, total production and average yield for 1986, 87, 88, and 89

<u>Year</u>	<u>Area in Ha</u>	<u>Production in Metric tons</u>	<u>Average grain yield Kg/ha</u>
1986-87	4,920,000	3,277,000	667
1987-88	3,362,000	1,363,000	405
1988-89	5,830,000	5,000,000	857

Source: Agricultural economics department, Ministry of Agriculture and Natural Resources Khartoum - January 1989

Average of seven year data (1981 to 1987) for sorghum production in Sudan shows that an average of 2.4 million metric tons were harvested from an average of 3.9 million hectares with a mean yield of 615 Kg/ha. The national consumption is estimated at about 1,775,000 metric tons (74.0 Kg per capita). It is worth mentioning that in the 1986-87 season, the total production rose to nearly 3.3 million tons leaving a surplus of over 1.5 million metric tons largely due to favourable rainfall conditions. However, the 1987-88 sorghum crop cycle again suffered from drought in many areas, resulting in a sharp drop in production to an estimated level of 1.4 million metric tons.

Total area planted under sorghum varies widely from year to year, partly due to climatic conditions, but mainly as a response to market forces, since marketing has little government intervention for this grain, except in periods of scarcity. Average grain yield is very low, both in irrigated and rainfed agriculture (Table 1).

It was very clear from the presentations and the movie shown that in the Gezira scheme cotton is the most important commodity. However, other crops such as wheat, sorghum groundnuts, oil crop and vegetables are also grown and pressure to increase food crop production is becoming more evident because of rapid population increase.

B. ARC/Global 2000 on farm demonstration plots

EARSAM participants visited on-farm sorghum demonstration plots carried out jointly by ARC and Global 2000. Global 2000 work very closely with extension workers to reach the farmers through many demonstration plots on sorghum as well as wheat in the Sudan.

Good fields of Hageen Durra 1 hybrid and other seed company hybrids and ARC released and pre-released varieties were visited on the farmers fields. Good yields (3 to 4 tons/ha) were obtained

because of fertilizer application and additional irrigation at critical stages of plant development.

Through our interaction with the local farmers, it was evident that the farmers are quite satisfied with the superior yield obtained from Hageen Durra 1, but they face problems with threshing (i.e. ease of separating the glumes from the kernels) and good Kisra making (i.e. Kisra becomes brittle when compared to local feterita varieties). However, Hageen Durra 1 apparently has good grain qualities and can be used in the form of flour with wheat flour for bread making and also other uses.

Farmers apparently know very well the advantages of fertilizer use (2N:1P), irrigation and good crop management, through their long term experiences in cotton growing. Also, the Sudanese farmers have developed a tendency to rely on the national government to provide credit, fertilizer, irrigation and infrastructure. But with the existing political situation in the Sudan, the estate enterprises has slowed down in making the necessary, timely inputs to the farmers. As a result, the production of crops has been static. The pioneer private seed company and Global 2000 apparently are very disappointed with this static situation.

In conclusion, the researchers in ARC (Agricultural Research Corporation) have established a good working relationship with the Gezira scheme for testing and producing the technologies and improved varieties and hybrids in farmers fields. The ARC extension workers and Global 2000 are working very closely with the researchers to extend and improve sorghum production and productivity both in irrigated and rainfed farming situations. As a result, the farmers realize and accept the technologies provided but because of the lack of available inputs and credits, the sorghum production remains static.

After visiting the demonstration plots, EARSAM participants were invited for a lunch with the farmers by Global 2000. In the evening the Global 2000 again invited all EARSAM participants, ARC scientists and INTORMIL scientists to a dinner in Hotel Imperial.

IV ARC/INTSORMIL WORKSHOP - Oct 29 to 30.

ARC/INTSOMIL organized the workshop at Wad-Medani as part of the CRSP participation in sorghum producing countries. The EARSAM participants were also invited to join the workshop on Sudanese sorghum and millet research and production related scientific papers presentation, (attached you will find the program). The EARSAM scientists interacted and shared their experiences with the ARC and INTSORMIL scientists. The EARSAM regional coordinator presented a paper on "Sorghum and Millets research coordination and networking in eastern Africa".

V Food Research center in Shambat, Khartoum (Oct. 31, 1989)

EARSAM participants departed to Khartoum and visited the food science research center at Shambat. A general overview of the center was presented to the group and the chemical analysis, rehiology, post harvest, baking and milling labs were visited. EARSAM paprticipants were very much impressed with the excellent facilities and the research work conducted. Discussions were held with the director of the center (Dr. Badi) on issues related to training possibilities in the near future for EARSAM scientists and technicians. Dr. Badi welcomed the idea of training EARSAM scientists provided that arrangements are made ahead of time and should be convenient and timely with the ongoing research work conducted at the center.

VI Departure of EARSAM participants (Nov. 1 1989)

EARSAM participants departed on Nov. 1, 1989 to Nairobi and then proceeded to their respective countries. During their stay in Nairobi, steering committee members received the regional striga cooperative trials to be planted in 1990 crop season.

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