



Intsormil

TRIP REPORT

BY

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HYBRID SORGHUM SEED WORKSHOP
SUDAN

OCTOBER 31 - NOVEMBER 9, 1983

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Sorghum/Millet

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Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln



Travel Report and Activities

SUDAN

October 31 to November 9, 1983

Travelers:

Dr. F.R. Miller, Sorghum Breeder and Professor, Texas Agricultural Experiment Station, Department of Soil & Crop Sciences, Texas A&M University, College Station, Texas 77843.

Dr. D.T. Rosenow, Sorghum Breeder and Professor, Texas Agricultural Experiment Station, Research and Extension Center, Texas A&M University, Lubbock, Texas 79401.

Travel initiation and termination:

Departed College Station, Texas, 12:05 p.m., October 31, 1983, enroute to Wad Medani, Sudan, arriving Khartoum at 6:00 a.m. November 2, 1983.

Left Khartoum, Sudan, 7:55 a.m., November 8, 1983, enroute to College Station, Texas, arriving College Station at 5:45 p.m., November 9, 1983.

Daily activities:

(See attached)

Purpose of travel:

The primary purpose of this travel was to participate in the 'Hybrid Sorghum Seed Workshop' sponsored by INTSORMIL, ICRISAT and ARC (Agricultural Research Cooperation) at Wad Medani. In addition to presentations made before the workshop we gave expert advise on the production technology associated with hybrid sorghum seed industries and assisted in the development of a preliminary national seed policy statement related to sorghum seed.

Discussion and Results of Travel

The Hybrid Sorghum Seed Workshop sponsored jointly by INTSORMIL and Agricultural Research Cooperation (ARC), National Seed Administration (NSA) and ICRISAT was held November 5 to 8, 1983, at the Gezira Research Station, Wad Medani, Sudan. There was representation from international seed organizations (list of participants attached). In addition there were several FAO Seed Specialists and local scientists present. There was significant discussion generated around most presentations but I would point to about six major presentations:

1. J. House (ICRISAT) New opportunities for grain production and quality seed availability from hybrids.

2. M.A. Mahmoud (ARC) Sorghum research and development in the Sudan before 1975.

3. Gebisa Ejeta (ICRISAT) Current status of sorghum research and development in Sudan (1975 to present).

4. A.B. Maunder (DeKalb Seed Company) Development and perspectives of hybrid sorghum seed industry in the Americas.

5. B.R. Barwale (Mayco Seed Company) Development and perspectives of hybrid sorghum seed industry in India.

6. Philip Motanya (Kenya Seed Company) Seed production and marketing in Eastern Africa.

The presentations reviewed the past situation, the current and potentials for future improvement. Dr. Earl Leng's travel report will describe further the proceedings of the actual workshop.

Related activities:

Prior to the initiation of the Workshop, Dr. Rosenow and I met with Dr. Gebisa Ejeta and Dr. Abdel Latif Nour (National sorghum breeder) and toured the research plots at Wad Medani. We observed many of the new or advanced breeding lines which have been developed by breeders in Sudan using germplasm from ICRISAT, ALAD and INTSORMIL. Of particular interest was the group of material known as 'Karper's Nursery'. These are an elite collection of yellow-endosperm Kafirs, Caudatums and Hegari's (Caudatum/Kafirs) which originally came from the Texas Agricultural Experiment Station, went to Lebanon (ALAD) and then taken to ICRISAT. These are apparently rather widely adapted and perform very well in Sudan. Many crosses and population selections were evident in the breeding nursery. The materials which looked to be among the best were zerazera types, Hegari, Caudatum and Caudatum/Kaura. These combine very nicely with the Kafir females which were being used as testers, ATx623, A296, A2977, and A2219 were most used. Their performance in hybrid combination was in the same order as listed above - ATx623

best. Atx623 seems to impart greater drought resistance and high yield potential as well as having a very good maturity. ATx3197 and A2219 get extremely early (as early as 42 days to flower) under the high temperature regime.

Materials developed in Texas by Rosenow and Miller seem especially well adapted to Sudan conditions. The nonsenescence trait of B35 and combinations with RTx7078, RTx7000 and RTx430 look very good under severe drought conditions. The females similar to ATx623 have very good yield, maturity and withstand drought well.

Greenbugs were observed in the field at Wad Medani in association with the grey aphid. They were generally at a very low frequency but in an occasional spot in the field they would predominate in the aphid population. In most situations no notable damage was observed but where the incidence of greenbug increased there was an increase in damage to the non-resistant sorghum cultivars.

Dr. Ejeta has identified a line, P-898012, which has outstanding drought resistance. This line is from a Purdue study and according to Ejeta he could not further identify its source or background since it resulted from a mistake in seed packaging. However, he said it is superior to M35-1 for drought resistance (and it looked quite good at Wad Medani). The line appears to be a Caudatum/Kafir (hegari), is photoperiod insensitive, but behaves like a hegari to temperature. Seed was requested and introduced by Miller and Rosenow along with several other large seed lines and black-seed types.

Several diseases were present in the field but most were at very low frequency. Some of these were long smut, rust, blight and one unknown disease. The elongated necrotic area on a leaf (similar to a blight lesion) would exude a sticky bacterial like mass which was not unlike sugary disease which attacks floral structures. However, we did not observe sugary disease in the nursery. Photos were taken but no samples were collected.

Dwarf White Milo appears to be the most predominate cultivar grown in the Gezira irrigation scheme. It is low yielding, drought susceptible and lodges badly. The new hybrid 'Hageen Durra 1' should substantially increase yield and related production.

On November 7, we participated in a Field Trip to the Marinjan Seed Processing Plant, Wad El Nau Seed Farm, National Seed Administration at Sennar.

This field trip was both gratifying and disheartening. The seed processing facilities at Marinjan and at Sennar are good. All is handled in bags rather than in bulk. There is the potential for contamination but with good supervision and attention to sanitation these facilities are quite adequate to handle a sizeable hybrid seed industry. At Sennar there was under construction an addition to the existing facility which would more than double processing potential there.

The most striking and gratifying part of the entire trip was to see the hybrid seed production blocks at Wad El Nau Seed Farm. Here Dr. Ejeta had worked closely with local staff to produce 15 acres of excellent seed production. They had planted 2-rows of the male 1597 head-on with each 4 rows of ATx623. Nick was perfect and full, large panicles of seed were set on the ATx623 male sterile. Under irrigation and no rainfall the seed was in excellent physical condition. The fields had been apparently very well rogued and seed from these fields should plant approximately 4,000 acres of production in 1984. The local field crew and staff were visibly proud of the excellent job they had done. There was no wild sorghum in the field, no tall mutants, or off-types, etc.

Afterwards we traveled to Sennar to observe another 5-acre production field of ATx623 x 1597 and a 5-acre field of ATx623 x BTx623. The results here were far different from what was observed at Wad El Nau. These fields were under the care of the National Seed Administration and backed up by seed specialists from FAO. Either the guidance given to the staff at NSA (Sennar) was inadequate or there was a complete lack of action and attention to details of seed production. Some of the observed problems were:

1. Wild sorghum growing, flowering and seeding in production blocks.
2. Volunteer grain type sorghums in the production blocks.
3. Tall mutants and off-type plants not removed from production blocks.
4. Production blocks planted too close to other (farmer) sorghum production.
5. Cultivation and striga control not good.

It was very obvious to all that the seed from ATx623 x 1597 was not the quality here as at Wad El Nau. Even though it was recommended that samples should be taken and grown out in an off-season these seeds could probably be used. However, the seed produced from the ATx623 x BTx623 production block was not good and should be discarded because of the problems listed above. We strongly recommended that seed from Texas be purchased (3,000 lbs) to plant the expected 600 acres of production in 1984.

After returning to Wad Medani on November 7, we were divided into several workgroups to prepare working documents in the following areas:

1. Production and processing - B.R. Barwale, chairman.
2. Quality control - D.T. Rosenow, chairman.
3. Marketing, government policy and extension - E. Leng, chairman.

We do not have the recommendations of the work groups on Production (1.) or Marketing, etc. (3.). However, we are attaching the recommendations made by our group (2.)

Recommendations of the Quality Control Committee

1. It has been recommended that the "Texas Seed Certification Standards" be adapted as a functional guide in establishing standards in the Sudan for the production of hybrid sorghum, i.e., A, B, R and AxR lines. This adoption will be with the understanding that its use can be reviewed from time to time as needed.
2. The isolation requirements will necessarily be arranged with neighbor tenants so that the production area is treated as a block to give necessary isolation. Fallow land around the production block must be handled as crop land for isolation purposes. To protect the production of hybrid sorghum from surrounding plantings, the statement of isolation in time as mentioned in the Texas certification will be used.
3. 'Grow out tests' would be desirable when used in the off-season to check the quality control measures taken.
4. Weedy wild sorghums (Sorghum arundinoceum S. ethiopicum) (Adar) and intergressive plants which have resulted from crosses with above should be very critically restricted. Therefore, certification should be set up in such a way as to restrict the spread of weedy sorghums. In using the Texas standards this refers to category I and category II grasses, but in the Sudan, all should be referred to as weedy wild sorghum or 'Adar'.
5. We recommend acceptance of the Tatwawadi (1979) report on seed labelling standards. The only exception would be the wild weedy sorghums (Adar) which should not be tolerated i.e., the present standard allows 0.2 percent for weeds but this should be reviewed and we suggest 0.01 percent or less.
6. We recommend the acceptance of standards for foundation and registered seed of sorghum be in association with the above requirements for certified seeds.
7. We recommend that to insure purity, trueness-to-type and high quality planting seed, certified seed should be a requirement for planting seed of hybrid sorghum until such time that competition will insure quality seed.
8. We recommend the enactment of a National Seed Law as soon as possible. This is an urgent need and should be strongly supported to insure high quality seed for the country.

9. We strongly recommend that high quality foundation seed of parental stocks especially female (AxB and A-line) parent seed be critically grown. The highest quality A-line seed is the backbone to a successful hybrid sorghum seed program. The best isolation, inspected and rogued by personnel of highest capability and the best standards should be applied to this production of foundation seed.
10. We recommend that samples of the 1983 production of each 5 acre lot of AxR, AxB, R and B-lines should be grown out in 'off season' to test purity and to demonstrate the results of contamination and as an educational activity.
11. We recommend that due to the urgency of next year's production that an outside expert in hybrid sorghum production should be hired to come to the Sudan for approximately 2 months in 1984 (August and September) to train production technicians in the science and technology of hybrid seed production, i.e., planting, roguing, nicking, harvesting, schedule of roguing, etc.
12. We recommend that all 'planting seed' of sorghum be treated/dressed with appropriate fungicides and/or insecticides as recommended by competent authority.

Summary and Conclusion

The workshop was very good in many aspects; it brought together a group of experts to form the basis for a sound hybrid seed industry; it exposed problems and made suggested solutions; and it drew attention to major seed companies that here in Africa there is potential for development of a viable market for quality hybrid sorghum seed. The following are a few critical issues which we will close on.

1. Do not control too tightly who will obtain seedstocks, who produces seed or who sells the hybrid seed. Private individuals should be given the opportunity to try. It is without doubt that some will fail, but those with the financial means, managerial ability and knowledge will succeed. There must be several who succeed (ranging from the individual farmer producing 5 acres to the large producer/seller) for the industry to be a success. We seriously and strongly recommend 'let it go', let the countrymen decide who will be their seedsmen.

2. We recommend that a consultant (an expert in sorghum seed production technology) be hired for approximately two months in 1984 (August -September) to train and work with sorghum seed producers, NSA and Plant Propagation Administration in education and procedures of field aspects of producing hybrid sorghum seed. Perhaps INTSORMIL could fund or assist in locating funds to support this critical need.

3. As previously stated we are very concerned that the National Seed Administration (NSA) and the Plant Propagation Administration (PPA) are not capable of producing sufficient quantities of high quality foundation seed of the parental stocks - especially the A-line (male-sterile). This inability to produce high quality A-line seed can severely retard or even kill the hybrid seed industry's development. We suggest:

- a) ATx623 can be purchased directly from the USA. This would be desirable to having little or none available locally or to using poor quality seed.
- b) Consideration that approval be given to private seed producers to produce foundation seed.

4. Set up procedures and guidelines that would allow for future flexibility as situations, ideas and/or concepts change.

5. If the 1983-84 winter grow-outs are successfully produced, consider having someone from the USA who has expertise in reading growouts come to Sudan. This person would train and educate the Sudanese relative to the different off-types, what they are, how they arose, etc. This could be a very short-term consultantship, i.e. one to two weeks.

6. Isolation from Adar (the local weedy wild sorghums) will be a major problem in hybrid seed production. The spread of Adar outcrosses with high yielding grain types in hybrids could potentially ruin hybrid use.

