

SORGHUM RESEARCH PROGRAMME
THE GAMBIA

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Research on upland crops in the Gambia, until recently, has been one where all aspects of Agronomy was looked into by one Agronomist. i.e. The Agronomist ran fertilizer, spacing, fungicide, Herbicide, Screening and variety yield trials. As such we have not been able to achieve full effectiveness through such a system.

Presently we have divided up the Agronomy Programme into two units, namely:- The Crop Improvement and the Farming Systems Programmes.

In 1979 I initiated the crop improvement programme and as such it is still in its infancy. The main objective of the Programme is to select and identify superior varieties of the species of crops grown in the Gambia which will ultimately be recommended to farmers. A sequence of various stages in effecting the work programme has been set up and we are closely adhering to this which is as follows:-

INTRODUCTION

SCREENING AND SELECTION

VARIETY YIELD TRIALS

Farming Systems, INPUT & CULTURAL PACKAGE PRACTICES

MULTILOCATION TESTING

SEED MULTIPLICATION

VARIETAL RELEASE COMMITTEE

DISTRIBUTION TO FARMERS

Three years has been suggested as necessary for the introduction, screening and selection process and also commencement of variety yield trials; two years for selected varieties to further undergo evaluation

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for response to various inputs and adaptation to cultural practices.

While these varieties are being tried by the farming systems group, multilocation testing will be carried out and these will involve on-farm trials. These will provide the answers to the question of quality, palatability, processing convenience and consequently acceptability.

Evidently any and all varieties that prove their merits will be brought forward to a varietal release committee, which will accept or reject these varieties.

If accepted, a year will be necessary to multiply them in order to have enough seed for distribution. The criterion for selection at all stages will be LOW FERTILITY since varieties that perform well under these conditions invariably perform better under high fertility levels.

Seeing for pest, disease and stress tolerance has been visual because facilities to critically evaluate these criteria are absent. At this juncture I would like to say that the Gambia is not involved in an actual breeding programme but I have taken it upon myself to set up the pace and get most of the requirements in place so that when we do initiate a breeding programme, we don't have to start groping in the dark.

As such a few good local varieties of Sorghum have been identified. These are high yielding and grain quality is acceptable by the farming populace who form the majority. These varieties are

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adaptable to our conditions and the main work to be done on these is probably reducing the plant height and improving on yield. High lysine Sorghums have been identified to improve on the nutritional quality of selected future Sorghum varieties by breeding whilst exotic varieties from cooperative programmes are being selected and put into the national programme and we are further strengthening our Sorghum collection which currently is comprised of seventy six entries.

In 1980, with the help of ICRISAT Scientists, Dr. Ramonatha RAO from Hyderabad and myself have been made a collection of all local Sorghums and Millets in the Gambia thus getting together for the first time ever a Gambian Sorghum and Millet germplasm. The stage is therefore now set for breeding to be carried out by either ourselves if and when convenient or other breeding programmes that ^{we} might request to come to our aid.

In the 1980 cropping season I ran cooperative trials from ICRISAT which included the followings:-

- 2 Preliminary Sorghum yield trials,
- 1 Variety yield trial,
- 1 Sorghum elite progeny observation nursery,
- 1 Observation nursery on Millet,
- 1 Pest resistance nursery,
- 1 Striga evaluation trial,
- 1 Smut nursery.

The National Programme consisted of the following:-

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- 1 High lysine profeny evaluation nursery,
- 1 Observation trial (Senegalese Gambian material),
- 1 Variety yield trial (Gambian local varieties),
- 1 Sorghum collection, screening trial,
- 1 Millet observation nursery (Senegalese, Gambian Material).

The rainfall pattern was quite a tricky one with an early drought in the beginning and also the rains ending earlier than usual. We, however, received a total of over 700 mm of rainfall during the season and both Millets and Sorghum performed well. This is clearly seen from the results in some of the trials. Over 3500 kg/ha has been recorded with two Senegalese varieties i.e. CE 151-262-AI and 2443. Millets from ICRISAT Germplasm have also yielded over 2000 kg/ha. These are lines such as:-

- (1) P - 508
- (2) P - 1476
- (3) P - 1517.

In The Gambia sorghum and millet have been the traditional food crops, though in the recent past rice and maize have become increasingly important.

Sorghum and millet occupy about 56,000 hectares of the land area under cereals. This represents approximately 43% of the land area devoted to cereal growing.

Due to the large sums of foreign exchange spent to import supplementary cereal to feed the population, The Gambia Government is anxious to see an improvement in food situation in the country. More effort and funding is being extended to the agricultural sector.

The extension services of the Ministry of Agriculture have embarked on a campaign aimed at helping farmers to improve on the traditional production systems. Sorghum and millet yields must ^{be} raised if The Gambia is to attain self-sufficiency in cereal production.

Both crops are grown all over the country, millet tends to be dominant in the western half of the country and sorghum in the eastern.

Millet is more adopted to the low fertility sandy soils and gives a better yield with a lower total rainfall provided the rainfall is evenly distributed. However the sorghum seems to be more drought tolerant.

Both crops are grown either as sole crops or in mixed cropping, usually with groundnuts.

CULTIVARS, (a) MILLET:

The local races and cultivars have not been described and classified. They are broadly divided according to their period of maturing into early forms (95 days), "SOUNA", and late forms (up to 150 days), "SANIO".

The average yield obtained by farmers is estimated at 450 to 560 kg/ha. Potential yields for ~~early~~ ^{LATE} and ~~late~~ ^{EARLY} millets are 2800 kg/ha and 1100 kg/ha respectively. A suitable improved variety has yet to be indentified.

SORGHUM,

No improved acceptable variety exists. Local varieties have a maturation period of 90-150 days, mostly lying between 120 and 130 days. They are mostly tall (4 meters) and have open, loose pendulous panicles and a small seed size. They have a thin mesocarp, a white pericarp and the testa is not coloured in the mature grain. They are photo-period sensitive. Average yields are estimated to be 670 to 900 kg/ha, but with improved husbandry, yields up to 2000 kg/ha can be obtained.

Work is continuing on:

1. Rotation studies involving Cereal/Groundnut
2. Cultivation techniques
3. Cropping systems utilizing sorghum/millet
4. Time of planting trials.

RECENT TRIALS INVOLVING SORGHUM AND MILLET:

- Time of planting
- Compound fertilizer evaluation trials
- Fertilizer trials
- ICRISAT midge nursery (sorghum)
- ICRISAT shootfly nursery (sorghum)
- Variety observation
- ICRISAT downy mildew trial (millet)
- ICRISAT W. African variety trial.

WORK IS CONTINUING

AGRONOMY AND CROP MANAGEMENT:

A great number of the agronomic trials have been run at the Yundum Agricultural Station (13° 21' N, 16° 40' W, elevation 25.8 meters, 25km from Banjul) and they were aimed at determining the following:

1. Optimum (Economic) fertilizer recommendations
2. Effect of planting date on yield and yield components
3. Optimum plant populations and spatial arrangements
4. The place of millet and sorghum in rotation patterns
5. Improved cultivation techniques.

Recommendations resulting from these studies are subject to scrutiny and are being repeated over time and space in order to increase their validity.

With the setting up of a central research station at Sapu (13° 31' N, 14° 54' W, 280 km from Banjul), and a Rural Development Project (with great emphasis on food production) a lot of work is anticipated on sorghum and millet. There is a great need to study the cropping systems involving these two crops.

PESTS AND DISEASES:

The economic consequences of pest and disease attack have not BEEN thoroughly researched and ascertained.

Many of the diseases and pests that attack millet and sorghum have been noted in The Gambia.

Pests and Diseases of Millet:

Midge (Cecidomyia penniseti)

Stemborers Sesamia cretica and Busseola fusca)

Army worm Laphygma (Spodoptera) exempta

Downy mildew Sclerospora graminicola

Rust Puccinnia penniseti

Weaver Birds.

SORGHUM PESTS AND DISEASES

- Sorghum midge Contarinia sorghicola
- American bollworm Heliothis armigera
- Aphids Aphis sp.
- Shootfly Atherigona sp.
- Stem-borers Busseola fusca
- Weaver Bird Quela

Due to the lack of trained plant pathologists and entomologists in the past, no serious studies of these pests and diseases have been performed.

More work is envisaged in this field.

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Department of Rural Economy and Agriculture (DREA)

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RESEARCH ON SORGHUM AND MILLET IN THE GAMBIA

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