OIL CROPS: SESAME AND SUNFLOWER SUBNETWORKS

PROCEEDINGS OF THE JOINT SECOND WORKSHOP HELD IN CAIRO, EGYPT,
9–12 SEPTEMBER 1989
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Esta serie incluye ponencias de reuniones, informes internos y documentos técnicos que pueden posteriormente conformar la base de una publicación formal. El informe recibe distribución limitada entre una audiencia altamente especializada.
OIL CROPS: SESAME AND SUNFLOWER SUBNETWORKS

Proceedings of the Joint Second Workshop held in Cairo, Egypt, 9–12 September 1989

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In September 1989, the Sunflower and Sesame subnetworks held their bi-annual meetings in Cairo, Egypt. The meetings were well attended and papers, presented in these proceedings, provide a very informative overview of some of the cropping systems, management practices, production constraints and research highlights for both crops in several countries.

Chronic edible oil deficit is a major problem facing many developing countries in Africa and Asia where most countries are forced to import large quantities to satisfy the requirements of their growing populations. With the present rates of population increase and the improvement of nutrition standards it is likely that the consumption of edible oil will rise over the years, increasingly drawing on scarce foreign exchange for the importation of this vital food staple. For this reason, several countries have opted to increase self-sufficiency in edible oil.

Production deficits are due to a number of factors, among which neglect in oilcrops research, in both developed and developing countries has been a major one. This is particularly true for minor crops such as sesame. In the context of the IDRC oilcrops network, initiated in 1981, the interchange of information and the sharing of results between scientists have proved to be very useful and beneficial for the generation of scientific knowledge and the stimulation of research in this important area. It is hoped that conclusions and recommendations of this meeting will stimulate further research and development in the future.

A second important reason for limited national production has been the exceptionally low levels of world prices for oils and fats in the 1980's and the comparative advantage of importation over production for developing countries. The description of a case study using a system's approach to analysis the Vegetable Oil/Protein System of Kenya has stirred much interest during the Cairo meetings and it is hoped that similar work can be carried out in other countries in the future.

The Cairo meetings will also unfortunately be remembered as the one which has witnessed the diagnosis of the fatal disease of late Dr. Hiruy Belayneh, Chairman of the Brassica Subnetwork. We will all regret his absence.

On behalf of IDRC and of all participants, I would like to thank the Government of Egypt for its hospitality, the organizers for the excellent arrangements and all those who contributed to the success of these meetings by their presentations and discussions.

Eglal Nached,
Senior Program Officer,
IDRC, Cairo
# CONTENTS

| Forward | iii |
| List of Participants | vi |
| Introduction | ix |

## Part 1. SESAME SUBNETWORK - II

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sesame Genetic Resources: Collection, Evaluation and conservation.</td>
<td>2</td>
</tr>
<tr>
<td>AMRAM ASHRI</td>
<td></td>
</tr>
<tr>
<td>Sesame Research in the Sudan.</td>
<td>10</td>
</tr>
<tr>
<td>MOHAMED EL-HASSAN AHMED</td>
<td></td>
</tr>
<tr>
<td>Progress in Sesame Research in Ethiopia.</td>
<td>13</td>
</tr>
<tr>
<td>HIRUY BELAYNEH, BULCHA WEYESSA AND ELIAS URAGE.</td>
<td></td>
</tr>
<tr>
<td>A Brief Outline of Sesame (Sesamum Indicum L.) Research in Tanzania.</td>
<td>17</td>
</tr>
<tr>
<td>J.Y CHAMBI AND E.M. KAFIRITI</td>
<td></td>
</tr>
<tr>
<td>Scope of Sesame (Sesamum Indicum L.) in Pakistan.</td>
<td>21</td>
</tr>
<tr>
<td>MUHAMMAD ASLAM, MASOOD A. RANA AND M. SIDDIQUE MIRZA.</td>
<td></td>
</tr>
<tr>
<td>Status of Sesame as Oilseed in Bangladesh.</td>
<td>24</td>
</tr>
<tr>
<td>M.A. KHALEQUE AND HASINA BEGUM</td>
<td></td>
</tr>
<tr>
<td>Problems and Progress of Sesame Production In india.</td>
<td>27</td>
</tr>
<tr>
<td>S. THANGAVELU, G. KANDASAMY, M. SIVANADAM AND R.K. MURALI BASKARAN</td>
<td></td>
</tr>
<tr>
<td>Pests of Sesame and their Control.</td>
<td>31</td>
</tr>
<tr>
<td>S. THANGAVELU</td>
<td></td>
</tr>
<tr>
<td>Review and Prospects on Sesame Production in China.</td>
<td>41</td>
</tr>
<tr>
<td>TU LICHUAN</td>
<td></td>
</tr>
<tr>
<td>Sesame Irrigation in Egypt.</td>
<td>44</td>
</tr>
<tr>
<td>AHMED MOHAMED EL-WAKIL</td>
<td></td>
</tr>
<tr>
<td>Agronomic Studies on Growth, Yield and Yield Components of Sesame.</td>
<td>48</td>
</tr>
<tr>
<td>SAMIR TAHA AND MOHAMED EL-SROGY</td>
<td></td>
</tr>
<tr>
<td>Sesame Research and Progress in Egypt.</td>
<td>52</td>
</tr>
<tr>
<td>NESSIM R. GUIRGUIES</td>
<td></td>
</tr>
<tr>
<td>Root-Rot and Wilt Diseases of Sesame in Egypt.</td>
<td>55</td>
</tr>
<tr>
<td>A.A EL-DEEB</td>
<td></td>
</tr>
<tr>
<td>Highlights on Improving Production of Sesame in Egypt.</td>
<td>59</td>
</tr>
<tr>
<td>A.F. IBRAHIM</td>
<td></td>
</tr>
<tr>
<td>Evaluation of Some Cultivars and Promising Strains of Sesame (Sesamum indicum L.).</td>
<td>61</td>
</tr>
<tr>
<td>A.A. EL-SHIMY AND M.Z. EL-HIFNY</td>
<td></td>
</tr>
</tbody>
</table>

## Part 2. SUNFLOWER SUBNETWORK - II

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of Wild Species in Sunflower Breeding.</td>
<td>70</td>
</tr>
<tr>
<td>DRAGON SKORIC</td>
<td></td>
</tr>
<tr>
<td>Sunflower Breeding: General Objectives and Recent Advances.</td>
<td>95</td>
</tr>
<tr>
<td>JOSE FERNANDEZ MARTINEZ</td>
<td></td>
</tr>
<tr>
<td>Progress in Sunflower Research in Ethiopia.</td>
<td>102</td>
</tr>
<tr>
<td>HIRUY BELAYNEH</td>
<td></td>
</tr>
<tr>
<td>Sunflower Adaptation in Morocco.</td>
<td>106</td>
</tr>
<tr>
<td>S. QUATTAR, T.E. AMEZIANE AND A. BAIIDADA</td>
<td></td>
</tr>
</tbody>
</table>
Effect of Maturity Stages and Desiccant Application on Yield, Oil Content and Oil Quality of Sunflower.

MASOOD A. RANA, CHAUDHRY A. OZAIR, M. AYUB KHAN AND SHAFIULLAH

Trends and Strategy of Sunflower Production in Pakistan.

MASOOD A. RANA

Sunflower Production in India - Problems and Prospects.

M. RAI AND P.S. BHATRANGAR


MANGALA RAI

Status of Sunflower as Oilseed in Bangladesh.

M.A. KHALEQUE, AND S.H. MIRZA

Some Aspects Towards Overcoming Vegetable Oils insufficiency in Egypt: Production of Sunflower and its Improvement in Suez Canal Region.

ABDEL-FATTAH MOHAMED ABDEL-WAHAB


SALWA I. EL-MOHANDES

Sunflower Research and Production in Egypt.

BADR A. EL-AHMAR

Performance of a New Synthetic Sunflower Stock Developed From Local and Introduced Germplasm and Further Improvement Via Population Improvement Method.

R. SHABANA

Response of Sunflower and Associated Weeds to Some single and Tank Mixed Herbicides.

A.F. IBRAHIM, Z.R. YAHIA, H.R. EL-WEKIL AND E.D. ABUSTEIT

Report on Sunflower Production In Dakahlia Governorate, Egypt.

S.E. EL-KALLA

Studies of Diallel Cross in Sunflower (Helianthus annuus L).

KHALED HAMMAD

Effect of Some Intercropping Patterns of Sunflower/Soybean on Yield, Yield Components and Land Usage in Egypt.

M.A. MADKOUR

Sunflower Diseases in Egypt.

ARAFA A. HILAL

Part 3. GENERAL

The Vegetable Oil/Protein System Program: The Kenyan Experience.

CARLOS ZULBERTI

Microbial Control of Lepidopterous Pests of Oilseed Crops.

H.S. SALAMA

Sunflower and Sesame Research in the Philippines.

NENITA M. TEPORA

Part 4. DISCUSSIONS AND RECOMMENDATIONS

Discussions and Recommendations

I. Sesame

II. Sunflower

III. General
The primary objective of the oil crops network is the improvement of oil crops which could be achieved by improving the yield per unit area and expanding the area under production. The yield per unit area can be increased by both developing high yielding varieties and improved cultural practices leading to better weed control, seed-bed preparation and good stand establishment.

During his visit to the Sudan in October 1988, Dr. A. Omran, the Network Coordinator advised to collect more information on the reported gap between the recorded research station's yields and the farmers' yields. Accordingly, a survey of the central rainfed lands of the Sudan including the most important sesame producing areas such as Blue Nile and Kassala, was conducted during the period April-July 1989 to obtain information needed to describe the farming systems, methods used and production constraints as well as local germplasm.

From the survey, it was found that in all rainfed areas of the central rainlands of the Sudan, the farming systems are similar. In these areas sorghum and sesame are the two major crops cultivated by the farmers. The survey and meetings with the farmers revealed many constraints to production. However, the following are considered as the major ones which formed the basis for the plan of work:

1. **Low soil fertility**: Soils of the central rainlands of the Sudan are inherently low in nitrogen which severely limits the productivity of cultivated crops. Since the two major crops; sorghum and sesame are non-leguminous, their production tends to further deplete the soil fertility. The trend is sorghum-monocropping. Sesame and other crops are grown less extensively. Consequently sorghum, a shallow rooted crop planted in monocropping pattern will result in continuous depletion of nutrients from the top soil, thus reducing yield correspondingly. In addition to severe depletion of nutrients, the fields become heavily infested with noxious weeds.

2. **Poor cultural practices**: Crop husbandry practices in these areas are generally poor, which adversely affect crop yields. Most farmers depend on hired tractors for land preparation and usually miss the optimum sowing dates. Broadcasting, practiced by the majority, results in uneven plant distribution, inefficient weed control and consequently poor stand establishment.

3. **Poor seed supplies**: Although the research centers have released several improved varieties of sorghum and sesame, which possess many desirable characters in addition to their higher yielding ability, the majority of the farmers still use the old, familiar, and traditional types. The seeds used by most of the farmers are usually selected from the previous crop or purchased from the local markets. These seeds are not pure, lack uniformity in size and colour, and may be damaged and have low viability.

4. **Other constraints**: Erratic rainfall is another major factor detrimental to yield. Also severe damage caused by diseases and pests are often extremely high. At the present time no effective control measures are used against these diseases and pests by the farmers. From the information gathered by the
survey and group discussion with the scientists at Abu Naama Research Station and other centers, it was evident that the present farming systems practiced in the central rainlands of the Sudan are similar which resulted in:

- depletion of soil fertility,
- severe infestation of fields by noxious weeds, and
- inefficient utilization of land due to cultural practices that result in low plant population, poor plant stand establishment and consequently low yield per unit area.

These factors acting together have resulted in low yields of the cultivated crops. Therefore, in order to improve the yielding ability of any crop, pressures from the above constraints must be reduced. Programs to develop and extend to the farmers ways and means of overcoming some of the basic constraints should be formulated to cater for: lack of improved seeds, ineffective weeds, diseases and pests control, low maintenance of soil fertility levels, poor plant stand establishment, uneven distribution, and low plant population. The plan of work will be based on agronomy, breeding and technical production package to be developed through experimentation and trials. Findings of the previous research will be tested and applied.

In order to intensify the research efforts for more precision, the breeding and agronomic programs started earlier at Kenana Research Station will be extended to the testing sites to test the breeding materials under the prevailing conditions for adaptability across environments through multi-location trials as well as on-farm trials to identify the best suited lines for release to farmers.

The agronomic program aiming at the improvement of the traditional husbandry practices is also extended. The promising lines are tested under different sowing dates, inter-row spacing and foliar fertilization.

The recommended cultural practices such as optimum sowing date, use of healthy (treated) seeds, planting in rows to allow for inter-row cultivation and efficient weeding and consequently improving stand establishment will be applied. The experimental nursery can be used as demonstration plot for the farmers around the research station.

Sesame Research

In recent years, the pattern of rainfall distribution has changed dramatically. The annual rainfall varies from season to season and from region to region in the same season and the rainy season becomes shorter. Consequently, area and production of sesame fluctuated due to erratic rainfalls.

The present study was initiated in 1986/87 on the feasibility of developing early maturing or drought resistant high yielding varieties for short and marginal rainfall conditions.

The long-term objective of the study was to screen/breed varieties for the drought stricken areas and those with sufficient rainfall.

The techniques used include:

1) Collection and evaluation of local and introduced sesame germplasm.
2) Developing desirable genetic recombinants through single, multiple and backcrosses among the promising lines.
3) Induction and selection of mutations for earliness and responsiveness in the improved local types, and
4) Testing elite cultures for adaptability across environments
through multi-location trials for initial release as varieties.

The genetical variability developed by hybridization and irradiation using improved varieties showed good recombinations and single plant selection is practiced in $F_2$ and $M_2$ generations.

The collections (local and introduced) grown in observation nurseries during 1986/87 showed wide variability of duration to maturity, plant height, branching and yielding ability. The promising lines were selected and advanced to the preliminary variety trials conducted at three testing sites over two seasons, 1987/88 and 1988/89. The data on yield and its main components were analyzed to assess the magnitude of variability.

The results showed that there was a wide variation for yielding ability, duration to maturity, plant height and branching.

Considering duration to maturity, there is a wide range of variation and accordingly the varieties could be classified into extra-early, early and medium maturing. The early and extra-early maturing lines mature during the wet rainy days of September. The medium maturing varieties showed high yielding potential coupled with disease resistance and escaping the attack of sesame seed bug that appears at the last week of October attacking the late maturing local types.

When the lines were tested for adaptation or yield stability, the early maturing (from high latitudes) showed low and consistent yields indicating that they are poorly adapted to the prevailing environments.

The medium maturing lines (from Africa or similar regions or latitudes) showed high yields of considerable stability, indicating that they could adapt to the prevailing and/or improved environments. This suggests that direct selection for yield should be practiced within introduced materials of similar environments, temperature and day length. Eight varieties which combined relatively high yield (responsive varieties) and considerable stability of performance are selected and advanced for further yield testing (multi-location and on-farm trials) for initial release as commercial varieties.