Oil crops: proceedings of the three meetings held at Pantnagar and Hyderabad, India, 4 – 17 January 1989
The International Development Research Centre is a public corporation created by the Parliament of Canada in 1970 to support research designed to adapt science and technology to the needs of developing countries. The Centre's activity is concentrated in six sectors: agriculture, food and nutrition sciences; health sciences; information sciences; social sciences; earth and engineering sciences; and communications. IDRC is financed solely by the Parliament of Canada; its policies, however, are set by an international Board of Governors. The Centre's headquarters are in Ottawa, Canada. Regional offices are located in Africa, Asia, Latin America, and the Middle East.

This series includes meeting documents, internal reports, and preliminary technical documents that may later form the basis of a formal publication. A Manuscript Report is given a small distribution to a highly specialized audience.

La présente série est réservée aux documents issus de colloques, aux rapports internes et aux documents techniques susceptibles d'être publiés plus tard dans une série de publications plus soignées. D'un tirage restreint, le rapport manuscrit est destiné à un public très spécialisé.

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:
PROCEEDINGS OF THE THREE MEETINGS HELD AT
PANTNAGAR AND HYDERABAD, INDIA, 4-17 JANUARY 1989

1. The Brassica Subnetwork-II
2. The Other Oil Crops Subnetwork-I
3. The Oil Crops Network Steering Committee-I

Edited by
Abbas Omran
Technical Adviser, Oil Crops Network

Organized by
Indian Council of Agricultural Research, New Delhi, India
G.G. Pant University of Agriculture and Technology,
Pantnagar, India
Directorate of Oilseeds Research, Hyderabad, India
International Development Research Centre, Ethiopia/Canada

Material contained in this report is produced as submitted and has not been subjected to peer review or editing by IDRC Communications Division staff. Unless otherwise stated, copyright for material in this report is held by the authors. Mention of proprietary names does not constitute endorsement of the product and is given only for information.
# CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreword</td>
<td>v</td>
</tr>
<tr>
<td>List of Participants</td>
<td>vi</td>
</tr>
<tr>
<td>Introduction</td>
<td>xi</td>
</tr>
</tbody>
</table>

## Part 1. Brassica Subnetwork-II

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opening Remarks. MAHATIM SINGH</td>
<td>2</td>
</tr>
<tr>
<td>Recent Development in Oilseed Brassicas. R.K. DOWNEY</td>
<td>4</td>
</tr>
<tr>
<td>The Interinstitutional Collaborative Research Program on White Rust (Albugo candida) Between India (ICAR) and Canada (IDRC) for Rapeseed-Mustard Improvement. P.R. VERMA</td>
<td>9</td>
</tr>
<tr>
<td>Stability Parameters for Seed Characters In Different Species of Oleiferous Brassica. H. SINGH, D. SINGH, and V.S. LATHER</td>
<td>14</td>
</tr>
<tr>
<td>Oilseed Brassica Research in India. P.R. KUMAR</td>
<td>17</td>
</tr>
<tr>
<td>Transfer of Technology and On-farm Trials of Rapeseed and Mustard. BASUDEO SINGH</td>
<td>24</td>
</tr>
<tr>
<td>Status of Breeding Research on brassica Oil Crops at Pantnagar, India. G.N. SACHAN</td>
<td>30</td>
</tr>
<tr>
<td>Agronomic Investigations on Rapeseed and Mustard at Pantnagar. ARVIND KUMAR and R.P. SINGH</td>
<td>35</td>
</tr>
<tr>
<td>Disease Problems in Brassicas and Research Activities at Pantnagar. S.J. KOLTE, R.P. AWASTHI and VISHWANATH</td>
<td>43</td>
</tr>
<tr>
<td>Effect of Some Epidemiological Factors on Occurrence and Severity of Alternaria Blight of Rapeseed and Mustard. R.P. AWASTHI and S.J. KOLTE</td>
<td>49</td>
</tr>
<tr>
<td>Problems of Insect Pests in Brassicas and Research Work at Pantnagar. G.C. SACHAN</td>
<td>56</td>
</tr>
<tr>
<td>Economic Performance, Potential and Constraints in Toria Production. L.R. SINGH</td>
<td>66</td>
</tr>
<tr>
<td>Rapeseed In Egypt. BADR A. EL-AHMAR</td>
<td>70</td>
</tr>
<tr>
<td>The Role of High-Yielding Varieties and Production Techniques on Oilseed Brassica Performance in the Central, South-Eastern and North-Western Zones of Ethiopia. HIRUY BELAYNEH, GETINET ALEMAYEHU and NIGUSSIE ALEMAYEHU</td>
<td>72</td>
</tr>
<tr>
<td>The Achievements and Future of Brassica in Kenya. M.J. MAHASI</td>
<td>79</td>
</tr>
<tr>
<td>Rapeseed Adaptation Trials in Cyprus. A. HADJICHRISTODOULOU</td>
<td>83</td>
</tr>
<tr>
<td>The Rapeseed (Brassica napus L.) Quality Breeding Progress in Shanghai Academy of Agricultural Sciences (SAAS) for Recent Years. SUN CHAOCAI</td>
<td>92</td>
</tr>
<tr>
<td>A Preliminary Study on the Combining Ability and Heritability of Main Agronomic Characters in B. juncea. WANG ZAO MU and WANG YAN FEI</td>
<td>98</td>
</tr>
<tr>
<td>Report on the Execution of Sino-Canada Research Breeding Project. LIU CHENG QUING and HONG HAI PING</td>
<td>103</td>
</tr>
</tbody>
</table>
Oil Crops in Bhutan. TAYAN RAJ GURUNG ......................................................... 119
Brassica Production and Research in Pakistan. REHMAIT ULLAH KHAN and
MASOOD A.RANA .......................................................... 127
Summary and Wrap-up for Brassica Sub-Network Meeting. HUGH DOGGETT .... 130
Report on a Tour to Oilseed Brassica Growing Areas of India.
GETINET ALEMAW .................................................. 136
Discussions and Recommendations ....................................................... 138

Part 2. Other Oilcrops Subnetwork-I

Safflower Research and Coordination in India. V.RANGA RAO .................. 144
Highlights of the Second International Safflower Conference Hyderabad,
India from January 9-13, 1989. V.RANGA RAO ........................................ 147
Coordinated Research Efforts and Linseed (Linum Usitatissimum L.)
Improvement in India. MANGALA RAI ........................................... 149
Safflower Research in Eighties in Madhya Pradesh (India). A.R.SAWANT 154
Nigerseed in India: Present Status of Cultivation, Research
Achievements and Strategies. S.M.SHARMA ......................................... 159
Constraints and Opportunities for Increasing the Production and
Productivity of Niger in India. S.M.SHARMA ......................................... 166
New Potential Areas of Niger in India. S.M.SHARMA .................................. 169
Present Production, Research and Future Strategy for Niger in
Maharashtra. A.V.JOSHI ........................................................ 171
Niger in Tribal Bihar. H.B.P.TRIVEDI .............................................. 176
Cultivation and Varietal Improvement of Linseed in India. R.N.DUBEY .... 180
Agronomic Management/Agro-Techniques for Improving Production of
Niger and Linseed. G.L.MISHRA ................................................ 186
The Present Status of Niger and Linseed Pathology Work in India.
G.S.SAHARAN ............................................................. 192
Safflower, Niger and Linseed in Nepal. B.MISHRA .................................... 203
Country Paper on Other Oilcrops in Bangladesh. M.A.KHALEQUE and
DILRUBA BEGUM ...................................................... 208
Country Report on Linseed and Safflower in Pakistan. MASOOD A.RANA,
MOHAMMAD SHARI, and ALTAF H.CHAUDHRY .................................. 213
Present Status of Safflower in Egypt. BADR A. EL-AHMAR .................... 218
Progress in Linseed On-station and On-farm Research in Ethiopia.
HIRUY BELAYNEH, NIGUSSIE ALEMAYEHU and GETINET ALEMAW .......... 220
Investigations on Some Biochemical Characteristics of Nigerseeds
(Guizotia abyssinica Cass). GETINET ALEMAW and HIRUY BELAYNEH 229
Processing of Oil Seeds in Ethiopia. DEJENE TEZERA ............................ 233
The Status of Linseed, Safflower and Niger Research and Production in
Kenya. T.C.RIUNGU ................................................ 238
Summary and Wrap-up for Other Oilcrops Sub-Network Meeting.
HUGH DOGGETT .................................................. 241
Discussions and Recommendations .................................................. 248
Part 3. Oilcrops Network Steering Committee-I

The Oilcrops Network for East Africa and South Asia, Achievements and Future. ABBAS OMRAN ....................................................... 256
Recent Developments in The Oil Crops Network and the ORU. HUGH DOGGETT 265
IBPGR's New Concept for the Conservation and Utilization of Germplasm; Global Crop Networks. J.M.M.ENGELS ................................. 272
Technology Mission on Oilcrops for Self-Reliance in Vegetable Oils in India. MANGALA RAI .......................................................... 274
Oilseeds Research in India: Network, Its Set Up, Organization, Past Achievements and Current Research Thrusts. V.RANGA RAO ............... 283
Groundnut and the Oilcrops Network. S.N.NIGAM .............................. 286
Oilcrops Production in Ethiopia Current Status and Future Prospects. SEME DEBELA ................................................................. 288
The Vegetable Oil/Protein System in Kenya Summary Report—Phase I. C.ZULBERTI and J.LUGOGO ...................................................... 293
Brassica Sub-Network Achievements and Activities, 1987-88. HIRUY BELAYNEH ................................................................. 320
The Present Situation and Main Achievements of Sesame Production in East Africa. MOHAMMED EL-HASSAN AHMED .......................... 324
Constitution of the Oil Crops Network (Second Draft). MASOOD A.RANA and ABBAS OMRAN ......................................................... 330
THE OILCROPS NETWORK
FOR EAST AFRICA AND SOUTH ASIA,
ACHIEVEMENTS AND FUTURE

Abbas Omran

Pre-Network (1970's)

The importance of vegetable oils and fats in the diet of the peoples of the developing world is very great, and many millions of third world citizens have a totally inadequate intake of oils and fats. The commercial importance of the oilseed crops is well known, and prices are likely to remain high for many years to come. This very factor operates to the disadvantage of the nutrition of the rural poor, who in their dire need for cash are forced to sell the oilseeds they have grown, thus depriving themselves and their families of a basic nutritional requirement.

National programs in East Africa and South Asia were, and are, conducting research on oilseeds for a long time. Many of these programs were strong but there were always difficulties in basic research, training, germplasm availability, information ... etc. Many of these scientists were working in their remote stations isolated from all world development.

This situation was recognized by the International Development Research Center (IDRC) who devoted considerable efforts to support national programs working on annual edible oilseed crops in Egypt, Sudan, Ethiopia, Tanzania, Malawi and Mozambique in Eastern/Southern Africa; India, Sri Lanka and China in South Asia, Fig. 1.

Establishment of the Network (1981)

The most appropriate strategy to meet the needs of crop improvement for oilseeds was to implement a network. This approach has already proved its value through the IDRC networks on cassava and cropping systems, and is contributing to agricultural improvement in other crops, such as cowpeas. It was proposed that the first network for the oilseed crops should be established in the Indian - Eastern African regions.

The initial step in the creation of the network was the identification of a scatter of individual projects. With several of these already established by IDRC, the network could be formed, Fig. 2.

The critical feature of a network is the linking together of the individual projects so that there is a steady flow of information, plant materials, ideas and experiences between all the projects. The best way of achieving this was through a network adviser, as has been clearly demonstrated in the South East Asian Cropping Systems Network. The function of a network adviser was therefore: to fulfil the basic functions of an International Center in so far as the provision of information, the gathering and distribution of germplasm, practical guidance, and the conduct of workshops for involved scientists concerned.

The appropriate location for the network was Ethiopia which is a primary source of diversity for most oilseed crops and has a wide range of oilseeds covering ecological zones stretching from sea level to 3,000 meters a.s.l.
fig. 2. Establishment & Evolution of Oilcrops Network

Legend

○ = IDRC-Supported project with national project leader within national program.
Network Phase I (1981-84)

The general objective of Phase I was to establish effective, practical liaison between the IDRC oilseeds projects in Eastern / Southern Africa and the Indian Region; meanwhile assisting in the establishment of the Ethiopian Oilseed Projects.

The objectives were achieved by:

- Establishing the Network in Ethiopia.
- Identifying the Network Adviser.
- Establishing two oilseed projects in Ethiopia.
- Developing an oilcrops library and computer references.
- Linking IDRC-supported oilseed projects through correspondence and visits.
- Holding the first Oilcrops Network Workshop in Egypt, September 1983 with 25 participants (mostly project leaders) from 11 countries presenting 25 papers. The proceedings were published as an IDRC Manuscript Report MR93e, 178 pp.
- Attending the First Regional Groundnut Workshop (ICRISAT/IDRC) in Malawi.

Network Phase II (1984-87)

The general objectives remained as for Phase I. The emphasis shifted from establishing the network to servicing and operating the network. Specifically, the Network adviser aimed to continue working with the Ethiopian highland and lowland oilcrops projects, to visit each project of the Network, to keep IDRC program officers in good touch with the situation, to publish an annual newsletter, to arrange for interchange of visits between scientists, to help in germplasm exchange, and to organize workshops.

The objectives were achieved by:

- Continuously helping the research activities of the Ethiopian lowland and highland oilcrops and offering courses in statistics/experimental design to research officers/technicians of the Institute of Agricultural Research and to graduate students of Alemaya University of Agriculture.
- Distributing cover pages of the most important international journals to researchers and sending back photocopies of requested papers, computer printouts of references and abstracts.
- Arranging consultation for Ethiopia, Sudan, Egypt and Nepal to advise and assess the project developments.
- Linking together scientists from different projects who share the same crops and same problems; a visit of Dr. Thangavelu (Sesame, India) with Mr. Yebio Wololdemariam (Lowland Oil Crops, Ethiopia) and Dr. H. Ishag (Oilseeds, Sudan) proved very fruitful in strengthening the links. Dr. Sawant (Safflower, India) visited Safflower work in USA, Mexico and Spain.
- Contributing to a cooperative program with Agriculture Canada (Anther Culture Project) by sending the network assistant and an Indian professor to work on the project for 2 years.
- Visiting non-IDRC supported national projects and helping to secure small research grants to ease the bottlenecks in on-going research (Tanzania), and to
- Organizing a training course in India on sesame/safflower for 15 junior research assistants/technicians from Africa and Asia. The adviser participated in teaching and coordinated the course with the Directorate of Oilseeds Research, Hyderabad.

- Conducting two workshops:
  1. Workshop II held in India, February 1985 emphasizing sesame and safflower, with 39 participants from 12 countries presenting 22 papers (IDRC MR105e, 258 pp).
  2. Workshop III held in Ethiopia, October 1986 emphasizing Brassica and niger, with 39 participants from 11 countries presenting 29 papers (IDRC MR153e, 250 pp).

- Attending the 11th International Sunflower Conference in Argentina and the Second Regional Groundnut Workshop (ICRISAT/IDRC) in Zimbabwe, to establish relations with international organizations. Editing and publishing three issues of the Oilcrops Newsletter: No. 1 (1984), No. 2 (1985) and No. 3 (1986). More than 600 copies from each issue were dispatched to oilseeds workers around the globe.

- Establishing the first Sub-Network (Brassica) and holding the first Brassica meeting in Sweden, May 1987 with 12 participants from 8 countries, presenting 9 papers (IDRC MR160e 80pp). This was followed by accompanying the participants to attend the 7th International Rapeseed Congress in Poland and establishing relations with Rapeseed Congress.

Network Phase III, (1987-89)

The overall objective of this interphase is to strengthen the oilseed research carried out in Eastern Africa and South Asia by establishing effective, practical liaison between the national oilseed programs. The specific objectives are: to continue support that will increase the effectiveness of national oil crops programs in the region; to establish the most effective mechanisms for the exchange of oil crops germplasm in the network; to continue the flow of needed information to national oilseed programs; to provide middle level technical training on oilseeds; and to evaluate the feasibility of new network forms (sub-networks and new International Unit) in increasing network effectiveness and efficiency. This phase III is termed "interphase" between the network as it was and the new development of our International Oilcrops Research Unit (IORU).

These objectives are being achieved so far by:

- Holding workshop IV in Kenya, January 1988 with 67 participants from 21 countries, presenting 50 papers (IDRC MR205e, 350 pp.) FAO, IBPGR, SIDA, CIDA, USAID, ODA, EEC and many Kenyan private Enterprises contributed to the participation in the workshop. The future of the network was discussed and laid out.

- Continuing national programs support by working with projects (Ethiopian lowland oilcrops and sunflower programs), and supporting national workshops (Kenya, 1987). More emphasis is being given to interacting with national programs which do not have IDRC support. Where necessary, National Program Support funding is allocated.
from the Network project.

- The dialogue between Indian and Ethiopian germplasm officials is being followed up to ensure that bilateral exchange continues between these two countries. Other network countries with fewer constraints to exchanging germplasm, are encouraged to exchange on a bilateral basis.

- The collaborative nursery, as recommended at the 3rd workshop is instituted using Ethiopia as a base for receiving the seed samples and distribution of the nursery. The process of the nursery receipt and dispatch will be continuous. In some cases, seed will need to be multiplied in Ethiopia before dispatch. All network members are again urged to participate. Samples received and distributed up to June 1988 are listed in Oilcrops Newsletter (No. 5:10-12, 1988). Each country received all samples of the same crop(s) they contributed. Samples received up to December 1988 are shown in Table 1.

- All projects, even the discontinued ones, receive computer printouts of references pertaining to their crops. It is made sure that national programs receive oilseeds abstracts, computer profiles and searches when needed. A bibliography on sesame diseases is in print for publication.

- As recommended by the participants of the previous workshops, training in all disciplines is being considered. P.R. China, Pakistan and Ethiopia have offered to conduct training on breeding, agronomy and quality aspects. This will be discussed and finalized during these January 1989 meetings.

- FAO agreed to coordinate publications of sesame and safflower between the "Oilcrops Newsletter" and their "Sesame and Safflower Newsletter". A group of scientists including the Network Adviser met in Vienna for FAO and formulated an international sesame project. The main objective is to support sesame producing countries in their efforts to improve the agricultural production and the socio-economic status of their populations through sesame improvement. The project aims also to strengthen national institutes, build strong genetic basis for sesame, build an efficient network for information and material exchange. The project was endorsed by participants of the Fourth Oilcrops Network Workshop held in Kenya in 1988.

- Four sub-networks under the umbrella of the mother Oilcrops Network were formed, Figure 3:
  1. Brassica sub-network, formed May 1987
  2. Sesame Sub-network, formed January 1988
  4. Other Oilcrops (linseed, niger, safflower, ...) is formed during January 1989.

- The four sub-committees can decide their activities and meetings. It is suggested that each can meet once every 18 months and that the chairman and co-chairman participate in the common workshops with selected members from each sub-committee as relevant to workshop themselves.

- Members of the sunflower sub-network were supported to attend the 12th International Sunflower Conference (Yugoslavia, July 25-29, 1988) and established relations with the Sunflower...
Fig. 3. Developing The Oil Crops Network (1987-89).
Associations and the FAO/Yugoslavia Sunflower germplasm and breeding branch.

The steering committee of the Network includes 10 members (2 from each sub-network plus the Network adviser as secretary and the IDRC Program Officer responsible for the Network). Meetings are scheduled so as the Network steering committee can meet annually with any of the sub-network meetings.

Table 1. Oilcrops Network Nursery: samples received and dispatched up to December 1988.

<table>
<thead>
<tr>
<th>Country</th>
<th>Brassica</th>
<th>Linseed</th>
<th>Nigerseed</th>
<th>Safflower</th>
<th>Sesame</th>
<th>Sunflower</th>
<th>Groundnut</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nepal</td>
<td>11</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Sweden</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>5</td>
<td>2</td>
<td>8</td>
<td>-</td>
<td>9</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td>China</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>India</td>
<td>31</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Egypt</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Somalia</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>13</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Philippines</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>16</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Israel</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>21</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Kenya</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>FAO</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>49</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tanzania</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>9</td>
<td>-</td>
<td>45</td>
</tr>
<tr>
<td>Canada</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cyprus</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>6</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nicaragua (FAO)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>9</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>63</td>
<td>3</td>
<td>9</td>
<td>16</td>
<td>142</td>
<td>53</td>
<td>4</td>
</tr>
</tbody>
</table>

The proposed oilseeds unit

Some oilcrops are receiving considerable attention from International Organizations like groundnut (ICRISAT) and soybean (INTSOY and IITA), and some are receiving moderate attention like rapeseed/mustard (GCIRC) and sunflower (International Sunflower Association). Yet some crops are receiving little or no attention like sesame, linseed, nigerseed, safflower and castor.

IDRC contacted several donors who showed interest, then IDRC thought to start a nucleus of an International Oilcrops Research Unit. Support for oilcrops will expand as additional resources become available over time. The objective is to develop a small, flexible, multi-donor-supported research unit to provide scientific and technical back-stopping and coordination to researchers primarily in Eastern and Southern Africa and South Asia working on annual oilcrops.

The Ethiopian Government has agreed, in principle, to have the Unit established in Ethiopia.

The Network will be attached to the proposed Oilseed Unit as a satisfactory base to help the Unit in their regional activities. The adviser can participate in research as a member of the Unit. In addition to the Coordinator, the Unit will comprise, initially, 2-3 scientists. Other positions, supported by additional donors, will be added later. The Unit
would also employ short- and medium-term consultants.

Some of the initial efforts are:

a) To screen germplasm and to generate more variability for national projects,
b) To incorporate important resistances into good national material,
c) To distribute nurseries for testing, including to NGO's where appropriate,
d) To develop male-steriles and breeding populations; and assess the practicability of hybrids in due course,
e) To develop and use tissue-culture technology as needed to facilitate the above,
f) To study the possibility of resistance breeding against Orobanche and Cuscuta, and
g) Training will be one of the main activities once the Unit is well established.