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IBPGR CONSULTATION ON PLANT GENETIC RESOURCES IN SADCC COUNTRIES

**Held in Lusaka, Zambia
22-24 September 1986**

International Board for Plant Genetic Resources

INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES

Report of an

IBPGR CONSULTATION ON PLANT GENETIC RESOURCES IN SADCC COUNTRIES

held in Lusaka, Zambia

22-24 September 1986

**IBPGR Headquarters
Rome, November 1986**

The International Board for Plant Genetic Resources (IBPGR) is an autonomous international scientific organization under the aegis of the Consultative Group on International Agricultural Research (CGIAR). The IBPGR was established by the CGIAR in 1974. The basic function of the IBPGR is to promote and coordinate an international network of genetic resources centres to further the collection, conservation, documentation, evaluation and use of plant germplasm and thereby contribute to raising the standard of living and welfare of people throughout the world. Financial support for the core programme is provided by the Governments of Australia, Austria, Belgium, Canada, China, Denmark, France, Federal Republic of Germany, India, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, United Kingdom, and the USA as well as the World Bank. FAO of the United Nations provides the Headquarters.

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PREFACE

This report of an IBPGR Consultation held at Lusaka, Zambia, 22-24 September 1986 was discussed and endorsed by the IBPGR Executive Committee at its 36th meeting, 29 October 1986. The recommendations of the report (paras. 19-38) will be used as guidelines for future action. The IBPGR further agreed, jointly with SACCAR (Southern African Centre for Cooperation in Agricultural Research), to publish the full proceedings of this Consultation.

The countries belonging to the Southern African Development Coordination Conference (SADCC) are the following:

Angola
Botswana
Lesotho
Malawi
Mozambique
Swaziland
Tanzania
Zambia
Zimbabwe

INTRODUCTION

1. Activities on plant genetic resources in the countries of SADCC (Southern African Development Coordination Conference) increased after the establishment of an IBPGR Field Office in Nairobi, Kenya in 1982 to serve eastern and southern Africa, and IBPGR support for collecting missions, conservation facilities, training, etc. was directed to the national genetic resources programmes in these countries.

2. Following visits made in 1985 by Mr. A.F.Y. Attere (IBPGR Field Officer for eastern and southern Africa) and representatives of the Nordic Gene Bank, and the wishes expressed by SADCC and SACCAR (Southern African Centre for Cooperation in Agricultural Research - an organization of SADCC), in addition to indications given of possible support by Nordic Donor Agencies, consideration was given to forming a regional plant genetic resources programme in countries belonging to SADCC (Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia and Zimbabwe). Subsequently, the IBPGR agreed to organize and sponsor a Consultation for the SADCC Region.

3. In order to provide the necessary background information for fruitful discussion, Mr. Attere visited countries of the SADCC Region (except for Angola) during 1986 and Dr. S. Blixt (of the Nordic Gene Bank) developed a draft proposal for a regional project. The following two reports were prepared and made available to the Consultation:

- (i) Plant Genetic Resources of the SADCC Countries - reports by country on present status and recommendations on future action (Mr. Attere); and
- (ii) Draft Proposal for a Regional Genetic Resources Project (Dr. Blixt).

REPORT

Organization of the Consultation

4. The Consultation was held at the Pamodzi Hotel, Lusaka, Zambia, 22-24 September 1986. The meeting was largely organized by Mr. Attere with support from IBPGR Headquarters and Dr. E. Kjellqvist of the Nordic Gene Bank. The Consultation was greatly assisted by Dr. M.L. Kyomo of SACCAR, which also provided financial support. Excellent assistance was provided in Zambia by the local organizing committee headed by Dr. B.K. Patel of the Mount Makulu Research Station and by the office of the FAO Representative in Lusaka. During the Consultation a tour was organized of the Mount Makulu Research Station. In addition a short meeting between International Agricultural Research Centres (IARCs) and Donor Agencies was organized to exchange information on activities regarding plant genetic resources in the SADCC Region.

5. The Consultation was arranged so that background information on genetic resources could be given by a number of eminent scientists in this field, followed by meetings of three Working Groups which provided a forum for wide-ranging discussions. An outline of the Consultation Programme is provided in Appendix I.

6. Participants of the Consultation included representatives of all SADCC countries, SACCAR, FAO, IBPGR, Nordic Gene Bank, IARCs and Donor Agencies. A list of participants is shown in Appendix II.

Opening addresses

7. The Consultation opened with an address by Mr. F. Kawonga, Undersecretary, on behalf of Mr. E.S.S. Nebwe, Permanent Secretary, Ministry of Agriculture and Water Development, Zambia. Mr. Kawonga stressed the need for concerted action on plant genetic resources in the SADCC countries and

that, in the Region, SADCC should attempt to establish a strong genebank.

6. Prof. L. Kåhre, IBPGR Chairman, welcomed the participants on behalf of IBPGR, and expressed his appreciation to the Zambian Government for hosting the Consultation and to the organizers who made it possible.

Conservation of genetic resources

9. Dr. R.D. Smith presented a paper on the conservation of genetic resources which provided information on the varying behaviour of orthodox and recalcitrant seeds and the principles of seed storage physiology. Particular reference was made to the environmental conditions prevalent in SADCC countries, and examples were given of low-cost seed storage facilities in which emphasis was given to proper seed drying as a basis for extending seed longevity.

Documentation of genetic resources

10. A paper on documentation of genetic resources was presented by Dr. Blixt. Definitions were provided on the type of information to be collected, as well as methods for storing and processing it, including the use of computers. A model was presented on how national and regional information systems could be linked.

Utilization of genetic resources

11. Dr. P.M.A. Tigerstedt presented a paper on the utilization of genetic resources, stressing the need for close collaboration between the genebank and the plant breeder and other germplasm users.

Nordic Gene Bank

12. Due to the delayed arrival of Dr. E. Kjellqvist, a summary of activities at the Nordic Gene Bank was presented by Prof. Kåhre. The Nordic Gene Bank was established in 1979 as a cooperative effort of the five Nordic countries (Denmark, Finland, Iceland, Norway and Sweden) and details were provided on its mode of operation. This example of regional cooperation in genetic resources work was considered as a possible model for regional collaboration among the SADCC countries.

Genetic resources of the SADCC Region

13. The paper which was presented by Mr. Attore outlined the range of diversity of genetic resources in the Region on a crop basis, and discussed the status of existing conservation facilities, activities involving evaluation, documentation and utilization and availability of trained personnel. The paper suggested expansion of national genetic resources programmes as well as regional interaction through the establishment of a SADCC genebank.

Working Groups

14. A major part of the Consultation was devoted to the three Working Groups. Chairmen and rapporteurs were appointed by the Consultation for each Working Group, and these were responsible for drafting recommendations with the assistance of two additional members.

15. Working Group I was charged with responsibility for formulating guidelines on germplasm collecting and ecogeographic surveying. The composition of the drafting committee of this Working Group was as follows:

Chairman	Prof. L. Kåhre
Rapporteurs	Dr. D.N. Mbewe Dr. C.T. Nkwanyana
Additional members	Mr. A.F.Y. Attore Ms. Jane Toll

16. Working Group II was requested to formulate recommendations on germplasm conservation, characterization, evaluation, documentation and utilization especially at the national level. The drafting committee of this Working Group was composed as follows:

Chairman	Dr. R.D. Smith
Rapporteurs	Miss G. Maphanyane Dr. D.M. Lungu
Additional members	Dr. P.M.A. Tigerstedt Dr. E. Kjellqvist

17. Working Group III was responsible for formulating recommendations on a collaborative network of plant genetic resources activities in the SADCC Region. The composition of the drafting committee of this Working Group was as follows:

Chairman	Dr. M.L. Kyomo
Rapporteurs	Mr. T. Namane Dr. T.N. Ngwira
Additional members	Dr. S. Blixt Mr. D.H. van Sloten

Recommendations

18. Recommendations, as discussed by the Working Groups and formulated by the drafting committees, were presented to the Consultation in a plenary session. The recommendations, as approved by the Consultation, are presented as a Plan of Action in paras. 19 to 38.

Plan of Action

19. Plant genetic resources consisting of landraces, primitive cultivars and wild relatives of plants form the basic building blocks for any plant improvement programme, whether through selection or more sophisticated plant breeding. Because of the introduction of modern crop cultivars, changes in land-use and the disappearance of vast areas of natural vegetation, these resources are being threatened in the SADCC Region and need to be safeguarded for use in current and future plant improvement programmes.

20. A major background document to discussion on all aspects of regional cooperation on genetic resources, was the project proposal developed by Dr. Blixt in his capacity as IBPGR Consultant. The meeting agreed with the general principles outlined in the proposal, also taking into consideration that it is in accordance with the philosophy of SADCC with regard to regional collaboration.

21. The meeting noted that of utmost importance is the strengthening of national genetic resources units, since these will form the cornerstones of a regional project. It therefore recommended to the Governments of the SADCC countries that national genetic resources units urgently be established and/or expanded or improved. In addition to the designation of one national genetic resources centre, the meeting recommended that each Government in SADCC appoint a national genetic resources committee to coordinate activities on the national level. The national genetic resources centres should have responsibility for the following:

- To provide direct service to plant breeders and other plant researchers in obtaining genetic resources;
- To characterize, evaluate, rejuvenate, multiply and document indigenous and exotic germplasm;

- To maintain field genebanks of vegetatively propagated crops; and
- To maintain national collections under short- and/or medium-term storage conditions.

22. The meeting, recognizing that establishment of national genetic resources centres is urgently needed, and even more urgently that existing national collections need to be rescued, urged the IBPGR, IARCs and Nordic and other Donor Agencies to assist in this task.

23. The meeting recommended that strengthening of national programmes, where necessary and desired, should precede formal development of the regional genebank and build upon presently existing facilities. Nevertheless, collaboration with the developing regional centre is necessary during this period to avoid duplication of effort. If both national and regional programmes are to develop for the benefit of plant breeders within the SADCC countries, strong links between these programmes and plant breeders are necessary at all levels. The experience of the Nordic Gene Bank in developing such links within its own region could be usefully drawn upon as could the support and liaison of the IBPGR and other centres of the Consultative Group on International Agricultural Research (CGIAR). Potentially beneficial collaboration within SACCAR crop programmes should also be encouraged in order to avoid duplication of effort.

24. Facilities for seed conservation within the Region vary considerably from country to country, while none exist in Angola, Lesotho and Swaziland. In other countries only refrigerated storage at ambient moisture contents occurs. No facilities which utilize proper seed drying methods are available despite their value in terms of seed storage life. For example in Botswana, which has a relatively mild climate, the conservation of chickpea seeds at ambient moisture contents in sealed containers at 5°C gives likely lifespans between 14 and 60 years. Drying seeds prior to sealing and holding under ambient conditions gives lifespans of about 120 years. In Mozambique, with a more severe climate, seeds at ambient moisture contents placed in sealed storage at 5°C will give lifespans of about 6 years. Drying to 5% moisture content followed by storage at ambient temperatures would give lifespans of about 85 years. Therefore, the meeting recommended that establishment of highly reliable, durable and low-cost stores which meet the requirements of

the national programmes should be considered. In addition the meeting recommended that a full study on the potential of sun-drying for storage of seed over the longer term needs to be considered.

25. The meeting recommended that seed testing at the national level to monitor viability should proceed through the strengthening of existing seed testing units. As interest in wild species increases, attention will have to be paid to the problems of dormancy and seed purity.

26. Work on a limited scale on data bases and documentation is currently underway. Since the work is at an early stage, an opportunity exists to profit from past mistakes made by others in setting up documentation systems. The meeting recommended that early priority should be given to considering and agreeing upon uniform documentation procedures throughout the Region which then could be more easily synthesized into a useful regional data base. In this respect both the adoption of existing IBPGR crop descriptors as well as participation in training courses by Nordic Gene Bank and other relevant centres in decentralized data management will be of benefit.

27. Evaluation for useful traits is essential if plant breeders are to make ultimate use of this material. The limited availability of trained personnel in this field may be a serious initial constraint which will have to be overcome, particularly in national programmes. The meeting recommended that necessary steps be implemented to accelerate training of research staff at national and regional levels to carry out, in conjunction with IARCs, this important work.

28. As the programmes develop, consideration should be given to methods of conservation which reduce the work load of genebank curators and yet ensure adequate maintenance of the genetic diversity in the collections. This includes conservation of populations which may have widespread adaptability, especially to special marginal conditions, single gene conservation, in situ conservation, etc.

29. Considering the urgency behind preserving the genetic resources in the SADCC Region, and the need to adopt measures which are cost-effective, the meeting recommended the establishment of one central regional genebank for long-term conservation and recommended that SADCC seek the assistance of

Nordic and other Donor Agencies, as well as IBPGR and other IARCs in establishing such a facility.

30. The responsibilities of such a regional genebank would be:

- To hold the base collection of the SADCC countries;
- To maintain and manage the long-term seed store for the base collection;
- To maintain and manage medium- to long-term storage or working collections for the different countries;
- To develop, maintain and manage the regional central data base for indigenous genetic resources of the SADCC countries;
- To coordinate the collection, characterization, evaluation, rejuvenation and multiplication of indigenous genetic resources material of the SADCC countries;
- To coordinate the introduction, evaluation and documentation of exotic genetic resources material in the SADCC countries;
- To maintain and manage a long-term seed store for such introduced exotic genetic resources material which are considered of common interest for the SADCC countries;
- To develop, maintain and manage a regional central data base of such plant introductions for the SADCC countries;
- To assist in the exchange of genetic resources; and
- To publish a SADCC Genetic Resources Newsletter with particular attention to urgent problems in plant breeding and in seed and crop production.

31. The meeting, noting that the regional facility must be located in a climate of low relative humidity and where temperatures are not extremely

high, recommended that the Regional Genebank be located at Mount Makulu Research Station near Lusaka in Zambia.

32. The meeting recommended an early revision and update of the project proposal into a project document, taking the following into consideration:

(i) That training programmes be embarked upon as soon as possible; that attempts be made by the national Governments to encourage such trained personnel to remain in the field of genetic resources; that short-term training in IARCs be implemented; and that efforts be made to strengthen one University in the SADCC Region which will eventually provide post-graduate courses in genebank management and related fields;

(ii) In view of the importance of duplicating germplasm material to ensure that these are not lost should a catastrophe occur, that SADCC collections be duplicated in the Nordic Gene Bank and other designated crop-specific genebanks in the IBPGR network;

(iii) That sufficient funds be provided by the regional project for support to national genetic resources centres to collect and multiply/characterize their germplasm material.

33. The meeting underlined that the establishment of a regional project needs long-term commitments and recommended that in further discussions on the project proposal the following be taken into consideration:

(i) A donor commitment for a 20-year period; and

(ii) A phased take over by SADCC from year 10 of the project, specifying the annual running costs which are to be provided by SADCC member countries.

34. Noting the necessity for a Technical Advisory Committee to advise the regional germplasm resources centre, the meeting recommended that such a committee be established, comprising one member from the Board of SACCAR, one representative of the Board of the Nordic Gene Bank, one member of IBPGR and an additional member or members from one or more of the other IARCs on a

rotational basis. The meeting further noted the need for a Board to provide policy guidelines for the regional genebank, and recommended that such a Board be composed of the Chairmen of all national genetic resources committees in the SADCC countries (see para. 21).

35. Table 1 presents a summary of the discussions relating to what species/crops should be collected and/or surveyed where and by whom. This table presents the priorities for action as set down especially by representatives of national programmes within the SADCC Region. Whilst they may be at minor variance with priorities set by IBPGR and other IARCs, these differences were not considered significant, although the omission of a particular priority for collecting in Table 1 may not alter the collecting strategy of IBPGR and other IARCs. Areas within countries that require priority collecting appear in Table 2; this list, however, may not be exhaustive.

36. The meeting recognized the need to collect not only landraces of crops of major economic importance, but also crop related wild species, minor crops and other useful plants. The meeting further recognized that for national agricultural research and development, priority for action lay with the major crops and the collecting of their primitive cultivars which can be readily utilized in current improvement programmes. Therefore, the meeting decided that action on germplasm collecting should be considered at three levels: national, regional and international.

The meeting recommended that:

- (i) Activities on crops listed for national action should be initiated by the national institutes. Where expertise or facilities to undertake collection is lacking, assistance of the regional cooperative programme (regional centre, SACCAR) or international organizations (IBPGR, IARCs and others) should be sought;
- (ii) Activities on crops listed for regional action should be initiated by the regional cooperative programme. As in the case of (i) above, where expertise or facilities to undertake the work are lacking, the national or international organizations should be approached for assistance.

(iii) In the case of special action, such as ecogeographic surveys of wild species and the collection of specific plants which are not of immediate national or regional importance, the initiative for action lies with international institutions. These collecting missions should be undertaken in collaboration with the regional cooperative programme.

37. Considering the lack of information on several important crops, the meeting recommended that surveys should be undertaken to assess the existing diversity in the particular country(ies) concerned prior to establishing collecting priorities. This is particularly recommended in the case of coffee, cashew and coconut and for Zanzibar, fruits and spices. For some other crops in specific countries, it is recommended that assessment of existing collections is needed before a decision on further collecting can be made. This was thought to be especially important in the case of old crop collections made in Tanzania which may be dispersed in neighbouring countries.

38. The meeting recommended that national genetic resources committees (see para. 21) prepare and formulate a more detailed plan of action which incorporates these priorities (Tables 1 and 2), minor crops and other useful plants in the Region.

39. Finally, the meeting recommended that the proceedings of this Consultation be published as a joint IBPGR/SACCAR document.

Closing address

40. The closing address was presented by Mr. D.E. Gollifer, Chairman of the Board of SACCAR, on behalf of SADCC. Dr. Gollifer assured that SADCC, which is concerned with cooperation and collaboration in the Region, would be satisfied with the Plan of Action as developed by the Consultation, and stressed that emphasis be given to following up these recommendations in order to continue the interest and support of those involved in the proposed programme.

Table 1. Germplasm collecting needs in the SADCC countries

Country	National action	Regional action	International action:		Assessment required:	
			Collecting	Ecogeographic surveying and collecting	Of diversity	Of existing collections
	Maize Sorghum Pearl millet Finger millet Rice Beans Cowpea Groundnut Pigeonpea Cassava Sweet potato Indigenous vegetables Forages Tobacco Banana and plantain	Finger millet Banana groundnut Cowpea Pearl millet Sorghum Rice Sweet potato	Melons, cucumber, pumpkin Groundnut Yam	Indigenous vegetables Solanum spp. Wild rice Indigenous fruits Wild millers Kersting groundnut Yams spp. Special areas	Cashew Coconut Coffee Fruits and spices Sweet potato Groundnut	Rice Sorghum Pearl millet Maize Cotton
Angola		
Botswana		
Lesotho		
Malawi
Mozambique		
Swaziland		
Tanzania		
Zambia		
Zimbabwe		

1/ Special areas: Okevango (wild rice) and Kalahari Desert (wild food crops)

Table 2. Priority areas for germplasm collecting in the SADCC countries

Angola

1. West (Uije - Dembos, Mslanje, Central Plateau, Huila): beans (Phaseolus vulgaris)
2. Country-wide, with first priority for areas of main cultivation: rice, sorghum, pearl millet, finger millet, groundnut, cowpea, Bambara groundnut, cassava and sweet potato

Botswana

1. Eastern districts, further collecting of: sorghum, pearl millet, finger millet, cowpea, Bambara groundnut and related wild species; groundnut and sweet potato
2. Country-wide: Citrullus, Cucumis, forages and wild species of Vigna
3. Ecogeographic surveys and collecting:
Okavango Delta: particularly for wild rice
Kalahari Desert: wild food crops, Cucumis and Citrullus

Lesotho

1. Country-wide: maize, sorghum, beans, forages, Citrullus and Cucumis

Malawi

1. Country-wide for filling gaps in collections: maize, beans, groundnut, finger millet (and wild Eleusine), Bambara groundnut, sweet potato, tobacco and forages
2. South: sorghum and wild species of sorghum
3. Centre and North, lakeshore areas: cassava
4. Marginal areas: coffee

Mozambique

1. Country-wide: cowpea, pigeonpea, Bambara groundnut, groundnut, sweet potato and forages
2. Northeast (Cabo, Nampula, Zambezi): sorghum and cassava
3. West and Central (Tete, Gaza, Manica): finger millet and pearl millet
4. North-Central (Cabo Delgado, Nampula, Zambezi, Sofala, Gaza): rice

Table 2. Priority areas for germplasm collecting in the SADCC countries (Continued)

Mozambique (Continued)

5. South (Inhambane, Gaza): maize and beans
6. Northwest (Niassa, Tete): beans and maize

Swaziland

1. Country-wide: Bambara groundnut, cowpea, forages and maize

Tanzania

1. Southern highlands, Kagera: beans
2. South, coastal plain, Zanzibar, other semi-arid areas: cassava
3. High altitude areas (Moshi, Kagera, Kigoma): banana and plantain
4. Forages (further collecting for early maturing, annual species)
5. South and North: finger millet and wild Eleusine
6. South and West: Bambara groundnut and sweet potato

Zambia

1. Country-wide for filling gaps in collections: sorghum and wild species of sorghum, sweet potato, indigenous vegetables and at lower priority, maize and cowpea
2. North (Mbala): beans
3. North and East: rice
4. East and South: groundnut
5. North and West: cassava
6. South and West: pearl millet and forages
7. North: finger millet and wild Eleusine
8. South, valley areas: Bambara groundnut

Zimbabwe

1. Northeast, Zambezi Valley and Matabeleland: sorghum, pearl millet, finger millet, pulses and wild related species
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APPENDIX I

CONSULTATION PROGRAMME

20-21 September 1986

Arrival of participants

21 September

Registration of participants

22 September

Opening session:

Chairman: Mr. N.E. Munba,
Director of Agriculture,
Zambia

Opening address by Mr. E.S.S. Nebwe, Permanent Secretary, Ministry of
Agriculture and Water Development, Zambia

Welcome address by Prof. L. Kåhre, IBPGR Chairman

Morning session:

Chairman: Prof. A. Mphuru,
Dean, Sokoine University
of Agriculture, Tanzania
Rapporteur: Mr. L.M. Mazhani,
Senior Plant Geneticist/
Breeder, Botswana

Conservation of Plant Genetic Resources	Dr. R.D. Smith
Documentation of Plant Genetic Resources	Dr. S. Blixt
Utilization of Plant Genetic Resources	Dr. P.M.A. Tigerstedt

Afternoon session:

Chairman: Dr. B.K. Patel,
Chief Agricultural Research
Office, Zambia
Rapporteur: Dr. M.S. Mwala,
Plant Breeder, Zambia

Nordic Gene Bank	Dr. E. Kjellqvist
Plant Genetic Resources of the SADCC Region	Mr. A.F.Y. Attere
Working Groups	Ir. D.H. van Sloten

APPENDIX I (Continued)

Working Group I on Germplasm Collecting and Ecogeographic Surveys

Chairman: Prof. L. Kåhre
Rapporteurs: Dr. D.N. Mbewe, Zambia
Mr. C. Nkwanyana, Swaziland

Working Group II on Germplasm Conservation, Documentation and Utilization

Chairman: Dr. R.D. Smith
Rapporteurs: Miss G. Maphanyane, Botswana
Dr. D.M. Lungu, Zambia

Working Group III on Collaborative Network

Chairman: Dr. M.L. Kyomo
Rapporteurs: Mr. T. Namane, Lesotho
Dr. T.N. Ngwira, Malawi

23 September

Morning session:

Working Groups

Afternoon session:

Working Groups
Meeting of IARCs and Donor Agencies
Drafting committees to complete recommendations

24 September

Morning session:

Visit to Mount Makulu Research Station, Chilanga

Concluding session:

Report Working Group III	Chairman: Dr. M.L. Kyomo
Report Working Group II	Chairman: Dr. R.D. Smith
Report Working Group I	Chairman: Prof. L. Kåhre
Closing Remarks	SADCC

APPENDIX II

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