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A SUMMARY PAPER PRESENTED AT THE OAU/STRC/SAFGRAD Workshop on
SORGHUM AND MILLETS
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By:

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WORLD WIDE GERMPLASM COLLECTIONS OF SORGHUM & MILLET

By:-

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Introduction:

The importance of germplasm in all crop improvement programs is something that cannot be over emphasized for it is the basic raw material. Unfortunately however, the world is being robbed of its unique natural resources due to many natural and unnatural factors. The major natural factors are for example, flood, drought etc., the man made factors being fire, urban and rural development, deforestation and the like. So far, crop improvement scientists have been able to gather their raw material from the farmers' fields. But this too is changing. The farmer is gradually yielding his broad based cultivars and is replacing them with the newly developed, relatively more uniform but high yielding varieties. The advantages and disadvantages of this situation is obvious. While the farmer is being supplied with seeds that would satisfy his immediate needs for higher production, he is rendered defenceless in an event of an epidemic of a new pest, disease or stress. His capability to withstand such a likely crisis is therefore limited, hence the need for the timely collection and conservation of the farmer's landraces.

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The collection and conservation of germplasm is, in my opinion, as old as agriculture itself. The very first thing that the settled farmer did is probably the identification and gathering of seed for food followed by seed for sowing further followed by selections for better seeds. The present predicament we are in, is that neither the farmer is keeping his precious seeds nor are the landraces found abundantly as they use to. The realization of this dilemma led a few far sighted individuals, institutions and foundations to alleviate the farmers difficulty and at the same time conserve the vanishing germplasm in man made world collections and gene banks. In this connection, the role and impact of the Rockefeller foundation of New York and IRAT and ORSTOM of France in the early assembly and conservations of the "world collection" of sorghum and millets in particular is of paramount importance. In the general world of genetic resources, no paper could be considered complete without the mention of institutes and gene banks like (1) The Vavilov Institute of USSR, Leningrad, (2) The German Gene Bank at Brounswieg, FRG, (3) The National Seeds Storage Laboratory, Fort Collins, Colorado, USA, (4) The Canadian Gene Bank at Ottawa, Canada.

Nowadays, the thrust in germplasm collection and conservation is further strengthened by a number of national organizations that are well known to all of you in your areas of concern. At the international level, the sorghum and millet germplasm collections and conservation effort is being undertaken by ICRISAT in close collaboration with national programs and the International Board of Plant Genetic Resources, FAO. It is also most gratifying to

note that SAFCRAD has recognized germplasm collection and conservation as one of its important objectives.

Objective:

The work of germplasm collection has to be followed by a set of important activities or objectives namely- systematic evaluation, physical and biological maintenance, documentation, distribution, medium and long-term conservation for immediate and future utilization. The failure or lagging in anyone of these objectives is bound to affect the whole process. It must also be stressed that one of the major objectives of germplasm collection and conservation is the assembly of the wild relatives of the crops.

Priority Areas of Collection:

Several individuals, institutes, organizations and foundations have made substantial contribution in identifying priority areas of sorghum and millet germplasm collection throughout the world. Priority areas are identified mainly on the extent of genetic erosion of the area rather than the abundance of diversity. Accordingly the following regions have been considered as priority regions for the collection of sorghum and millets.

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<u>Region</u>	<u>Current collection status</u>
1. South Asia	Partly covered
2. Eastern Africa	" "
3. Western Africa	" "
4. Southern Central Africa	" "
5. Far East	To be explored

More specific areas of collection and their present status is shown in table 1. (on the next page)

As stated, the list of areas of collection is tentative and will be modified as and when fresh informations come to light. All sorghum and millet scientists in Africa are invited to contribute towards the refinement and finalization of the list.

Types of Germplasm Collections:

A collection data sheet has been developed at ICRISAT in consultation with various scientists and organizations including the IBPGR. Interested collectors may feel free to contact the Genetic Resources Unit of ICRISAT for getting sample data sheets.

The various types of collections are briefly described below:-

1. Accessions collection - The available world collection;
2. Spontaneous collection - The ~~wild~~ and ~~woody~~ races maintained separately;
3. Named cultivar collection - Assembly of named cultivars released by private and public institutions;

Table 1: Tentative list of identified areas for Sorghum and Millet collection in Africa:-

Area	Status of Collection	Remark
Algeria	partly collected	mostly for parliament
Angola	not collected	unknown type
Benin	partly collected	need more work
Botswana	collected in 1980	good k ¹ per types
Durundi	partly collected	not much known
Cape Verde	not explored	explore in 1981/82
Cameroun	fairly well collected	needs recheck
Central Afr. Republic	not collected	explore 1981/82
Chad	not well collected	very important and
Congo	" " "	explore - 1982
Egypt	partly collected	to be checked
Ethiopia	well collected except packets	efforts continuing
Gambia	collected in 1980	less variable
Ghana	partly collected	to be collected in 1981
Guinea	" "	explore 1981
Guinea Bissau	" "	explore 1981
Ivory Coast	to be explored again	some collections
Kenya	fairly well collected	check lake areas
Mali	collected	Recheck
Mauritania	partly explored	further work
Mozambique	not collected	in 1981
Niger	partly collected	needs coverage
Nigeria (N)	good types observed	needs coverage
Rwanda	fairly well collected	to be explored
Sierra Leone	to be explored	few collections
Somalia	collected in 1980	desert types
S. West Africa	not collected	to be explored
Sudan (SE)	collected in 1980	excellent source
Tanzania (SE)	collected in 1978/79	excellent source
Togo	to be explored	good p. millets
Uganda	partly collected	needs more work
Upper Volta	some collection exists	needs recollection
Zaire	some collection exists	needs recollection
Zambia	Collected in 1980	less variable
Zimbabwe	isolated collections	for 1982.

4. Genetic stock collection - germplasm with known genetic traits of resistance, special marker genes, genic and cytoplasmic male sterile lines, etc.
5. Conversion collection - converted lines from tall to short, photo-period sensitive to non-sensitive and etc.
6. Other collections such as pools, basic, bulks and population.

Assignment of IS or IP numbers:

As per the 1978 recommendation of the IBPGR Advisory Committee on sorghum and millets, ICRISAT has been charged with the responsibility of assigning IS (International Sorghum) and IP (Inter-pearl millet numbers to the entire "World Collection" of the two crops as well as its other mandate crops. This important task is being well implemented in broad consultation and without losing sight of the need to record the original pedigree references.

Systematic Evaluation:

The evaluation and characterization of the germplasm is continuing. In the future, however, it is planned to evaluate the germplasm at or close to its original habitat to start with in a regional fashion. The collaboration of all sorghum scientists in Africa is vital to this program. The list of descriptors required for the evaluation exercise has been developed jointly

by ICRISAT and the IBPGR. The one for sorghum has already been published and released. Interested scientists may contact either the Genetic Resources Unit of ICRISAT or the IBPGR, Rome. The pearl millet descriptors list is being finalized for publication.

Present Size of the World Collection:

The World collection of sorghum and pearl millet being maintained at ICRISAT is growing daily. The country wise collection is shown in the special bulletin of ICRISAT's Genetic Resources Unit which is presented as annex to this paper. Active program of seed exchange and collection of germplasm is going on at an accelerated pace. However, the task is still huge.

The following table 2 shows the numbers collected and conserved at the ICRISAT gene bank.

Table 2. Sorghum and Pearl Millet Germplasm Resources at ICRISAT:-

	<u>Sorghum</u>	<u>Pearl Millet</u>
<u>No. of Accession:-</u>		
Actual	16,587	12,431
Transit	5,386	2,193
No. of Countries Represented:	61	25
No. of Wild Relative SP/Access.	12/141	17/33
No. Distributed 1977-79	36,879	17,184

Range of variability in sorghum and pearl millet:

A wide range of variability is already in our gene bank. Some of the major characters and their range of variability is presently being prepared for publication and wide distribution. Wide range has been observed in maturity, plant height, head length and width, grain size, shape and color, leaf size, mid-rib colour and other important characteristics.

General Concluding Remark:

Germplasm collection is man's most important resource. The effort should be made at both the international and national level. That is why for example that whenever ICRISAT collects any germplasm in any country it prefers a joint mission and also delivers a complete duplicate of the collected material to the national program. The international centers can probably be in a unique situation to hold and conserve the medium and long-term world collection. National programs can and must collect and conserve their own germplasm resources.

In this regard, it would be desirable to promote a simplified germplasm exchange system. The material collected and conserved at ICRISAT belongs to all scientists who wish and could utilize it. As many have already known, all the genetic material conserved at ICRISAT is distributed free of charge anywhere in the world.

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