

The European Union's Rehabilitation Programme for Somalia

## Guidelines for Farmer-Level Sorghum Seed Production and Marketing in Northern Somalia



This work is funded by the European Union

**Citation:** Manyasa E and Ismail A. 2005. Guidelines for farmer-level sorghum seed production and marketing in northern Somalia. Handbook. Nairobi, Kenya: International Crops Research Institute for the Semi-Arid Tropics. 24 pp.

## Abstract

This modular training manual has been prepared within the framework of the EC funded project “Farming system improved through the strengthening of local seed systems in the Galbeed and Bay Bakool regions of Somalia,” designed and implemented by the NGO CINS.

The manual is mainly based on the four-years experience achieved by this project and its previous phase in Galbeed region, and therefore is specially suitable for use in Northern Somalia.

Soft copies of the manual are available on request from SACB, CINS, ICRISAT and the Somalia Operations office of the EC Delegation in Kenya or alternatively can be downloaded from [www.ICRISAT.org](http://www.ICRISAT.org) and [www.delken.cec.eu.int](http://www.delken.cec.eu.int).

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# Guidelines for Farmer-Level Sorghum Seed Production and Marketing in Northern Somalia



This work is funded by the European Union  
with Italian Co-financing

## Acknowledgments

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Richard Jones (ICRISAT) and Christoph Langenkamp (EC Delegation) have provided guidance in the editing process.

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## **Guidelines for Farmer-Level Sorghum Seed Production and Marketing in Northern Somalia**

The Semi-Arid Tropics (SAT) areas, where sorghum is mainly produced, face a major challenge of how to improve production and productivity.

In addition to varietal improvement and enhanced crop management, use of quality seed significantly contributes to improved productivity of sorghum.

Sorghum varieties used in Northern Somalia are all open-pollinated types.

As is typical of small farmers, sorghum farmers in Northern Somalia save part of their harvested grain to use as seed in the following season.

They have developed mechanisms of selecting and maintaining their own seed, enabling the maintenance and perpetuation of the various sorghum varieties from one generation to the next.

The success of this activity is the result of a mix of tradition, experience, and personal pride.

Though the seed produced by these farmers is of reasonable quality, there is a need to introduce appropriate interventions in order to help the farmer improve the quality of his seed.

Information gathered about farmer-level seed production in Northern Somalia shows that

- Farmers do not remove (rogue) off-types from their fields
- Farmers often do not remove diseased plants, if they are many
- During harvest whole plants are cut and stooked in the field, where they are left to stand for about 50 days
- The crop is then carried home on camelback. There, the crop is again left to stand for about 20 days before cutting off the panicles
- Panicles for seed are selected from the larger lot after cutting from the stalks
- Seed panicles are threshed in wooden mortars

- Seed is then cleaned (winnowed and large impurities removed)
- Cleaned seed is stored in tightly sealed metal or plastic containers
- No chemical or other form of seed dressing is done
- No seed germination tests are done before sowing

Dangers associated with the above farmer seed production procedures:

- a) Leaving the crop to stand in the field for up to 50 days could lead to
  - Possible damage from unexpected rains (rotting, mold development)
  - High chances of insect pest infestation
  - Shattering of over-dried panicles, leading to seed loss
- b) Transporting very dry panicles on camelback could lead to significant seed losses
- c) Selecting panicles at home after cutting off the stalks will not allow effective selection against disease, low vigor, or low biomass (high biomass is important for fodder production)
- d) Non-treatment of seed against pests before storage leads to pest damage, hence poor seed viability and germination
- e) Non-treatment of seed against diseases favors the spread of diseases

Farmer seed systems are capable of producing high quality seeds but certain attributes – especially varietal purity and germination – are not always well addressed. Training and extension programs can help farmers better understand the principles of seed production, and through this understanding farmers will be better-equipped to maintain varietal purity, improve germination and other aspects of seed quality.

The main task of the farmer seed producer is to

- Maintain varietal purity
- Preserve improved germination of the seed at satisfactory level
- Ensure that quantities of saved seeds are sufficient for his/her need and for the needs of his/her neighbors and relatives who depend on him/her. To plant 1 ha, 8-10 kg of seed is required.

A four-year project run by CINS in Somaliland demonstrated that the use of selected and properly dressed seeds may result in more than 50% yield increase. These guidelines have been developed from this work so that farmers can improve their own seed quality.

## Module 1 – Seed Selection

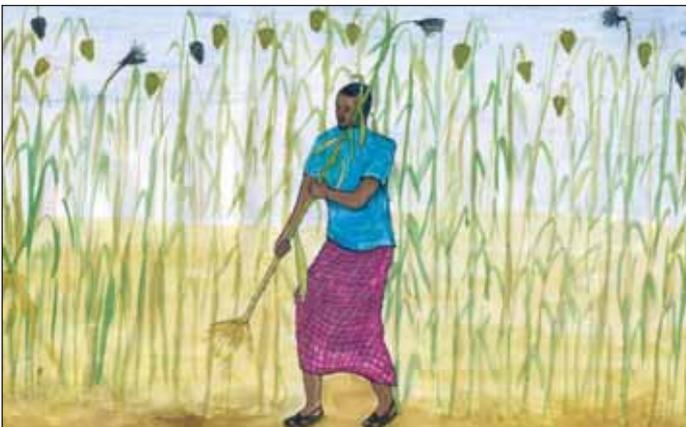
### Selection and maintenance of varietal purity before flowering:

- Rogue out wild relatives of sorghum (eg, Sudan grass), because they are likely to cross with sorghum and lead to varietal impurity. Also rogue out off-types. Farmers may not be keen to do this as it compromises grain yield in which case fields with too many off-types may not be suitable for seed selection.



*A farmer eliminating wild varieties of sorghum from his field.*

- Rogue out diseased plants, because diseased panicles, especially those affected by seedborne diseases (eg, smuts), will infect healthy panicles if they are not removed.



*A farmer eliminating smut diseased plants.*

- Diseased, rogued plants should be collected in one place and burnt.



*A farmer burning diseased panicles of sorghum.*

- Select panicles for seed in the field (standing crop).



*A farmer cutting panicles from standing plants in the middle of the field.*

- Select from the center of the field. Plants on the edges of the field are likely to be contaminated with pollen from neighboring fields.
- Select panicles from vigorous, healthy plants free from insect pests and diseases and true to variety type. Besides the dangers of transmitting seedborne diseases, insect-damaged, diseased and infected plants will have poorly filled seed with low germination. Poor seed will also give poor plant stand and seedlings with low vigor and low resistance to environmental and biotic stresses.



*A farmer cutting a good panicle instead of other nearby bad panicles.*

- Select mature, well-filled panicles.
- Harvest the selected seed panicles before the grain harvest.
- Timely harvesting is important to reduce mold damage, bird damage, insect pest infestation and loss due to bad weather. Seed should be harvested when it becomes mature.

- Maturity can be confirmed by the following signs:
  - There is a black layer on the kernel's hilum
  - You cannot indent the grain with a thumbnail
  - The grain breaks clean when bitten with the front teeth



*A farmer in the typical gesture of biting a seed to check its hardness.*

Do not leave the harvested seed panicles in the field longer than necessary, in order to minimize bird damage, pest infestation/infection, especially in windy and wet areas.

It is advisable to take them home for drying on the day of harvest.

## Module 2 – Conditioning and Processing

After harvest, thoroughly dry, thresh, and clean seeds before storing them.

Newly harvested seeds contain husks, straw, soil particles, and some unwanted seeds.

The threshing and cleaning process removes these, yielding good quality seeds of the required cultivar.

### Drying

At physiological maturity, the seeds have about 18-25% moisture content.

After cutting off from the stalks, dry the panicles thoroughly before threshing.

Dry the panicles by spreading them thinly on a clean plastic sheet or on a clean floor (cowdung smeared or concrete) and turning them once in a while.

It is important to dry seeds on a waterproof base to avoid transfer of moisture from the ground up into the seeds.



*The drying of seed on a clean sheet.*

At no time should seeds be exposed to direct sunlight for drying; temperatures under the sun often exceed 40°C and this can damage or even kill the seed.

The seeds must be dried to a safe moisture content (10-12%) to prevent infestation of pests and diseases during storage, as well as biochemical reactions within the seed that can reduce the germination.

Well-dried seed can be determined by the use of a simple moisture measurement method, to be done after seed winnowing/cleaning (see below).

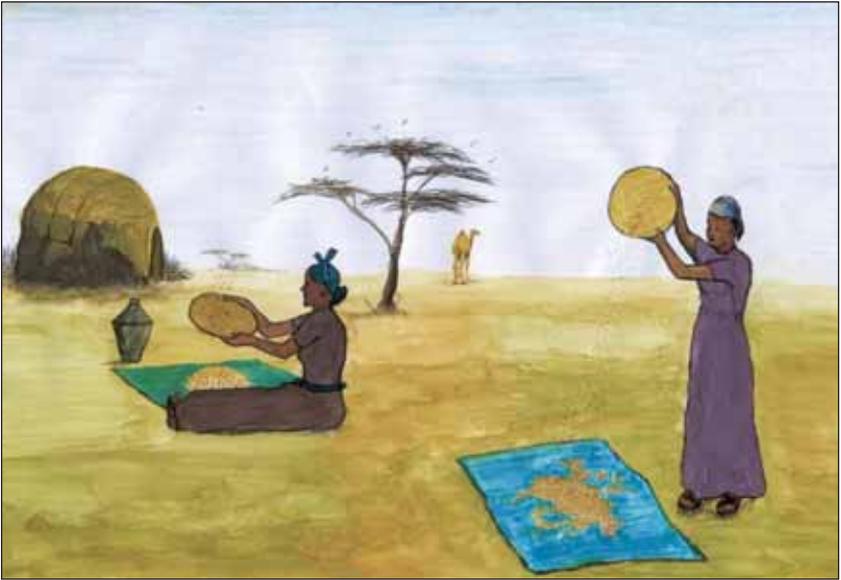
### **Threshing and winnowing**

Threshing involves separating the seeds from panicles and straw, and winnowing the chaff from the seeds. Threshing may be done by putting the panicles in clean jute/polypropylene sacks and pounding them with a stick.

If the farmer is producing more than one variety, care should be taken to avoid mixing the varieties by either using different bags or thoroughly cleaning the bag before using it for the next variety.



*Methods of threshing.*



*Two methods of winnowing.*

Threshing should also be done carefully to avoid physical damage since the damaged seed deteriorates quickly in storage.

Threshed seed is winnowed and sorted to remove chaff, small and broken seeds, and foreign material.

Winnowing is usually done by shaking the seeds in order to separate them from the chaff.

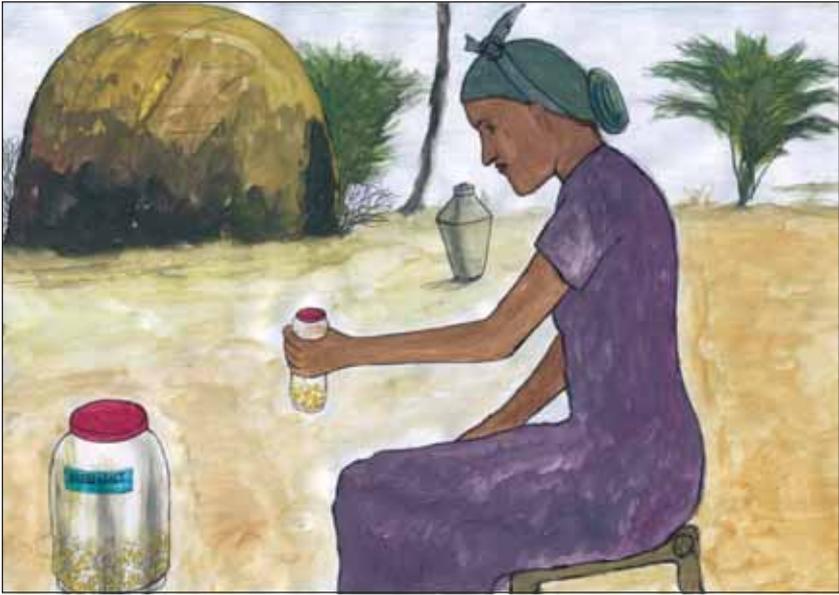
If there is wind, winnowing can be better done by dropping the seeds from shoulder height on to a clean sheet on the ground, the wind blowing from behind: any material that is lighter than the seed is removed by the wind.

The remaining fallen seed can then be cleaned by hand, sorting the imperfect seed and non-seed material.

### **Test grain moisture content**

The safe storage moisture content of seeds is about 10-12%.

This can be checked using the simple method of salt-moisture test.



*Testing seed moisture content with salt.*

Dry common salt is mixed with a sample of grain in a glass jar and shaken. If seeds are not dry, particles of salt will stick to the sides of the glass jar as the salt absorbs the moisture from the seed.

This will not happen with adequately dried seed.

## Seed treatment

It is important that seeds are prevented from damage by pests during storage.

The seed treatment method should be affordable by the farmer.

The most inexpensive method is to mix seed with wood ash (e.g. from *Acacia nilotica*). Wood ash helps to

- Inhibit insect development and movement
- Maintain low moisture content in the seed (acts as a desiccant)

The oil extracted from neem tree grains can be used to protect seed against storage pests. However, the effect of neem oil does not last for more than 3–4 months, and use of vegetable oils – including neem – will adversely affect the viability of seeds.



*Seed insecticide dressing.*

For best results, seed should be treated with proper chemicals to prevent damage by insects, for instance ‘Actellic Super’ powder (a mixture of pirimiphos methyl and permethrin) at the rate of 30 grams for a bag of 50 kg (what will cost about 0.2 dollars per 50 kg bag).

Seed must also be protected against diseases.

Diseases are occasioned by very little organisms (they can only be seen by using a microscope), which diffuse their very small seeds (spores) in the environment, in order to spread their population. The black powder produced by sorghum panicles affected by smut, for instance, is composed by an enormous number of smut spores, which can be easily transported by the wind.

Even good sorghum grains therefore can carry some spores on their surface. When the grain germinates in the soil, those spores germinate as well, thus reproducing the disease in the new plant.

An inexpensive method of disinfecting seeds from some germs of diseases that may exist on their surface consists in soaking the seeds in water for 4 hours, then spreading them in the shade for making the spores germinate, and finally spreading them in full sunlight for killing the germinated spores and drying the seeds.

Better results can be obtained in a simpler way by using chemical fungicides, namely copper hydroxide (sold as “Blue Copper”, “Kocide” or other commercial names), or the Bordeaux mixture, which is a solution of powder of copper sulphate and burnt limestone (calcium oxide, “Nuurad” in Somali language). To prepare 30 liters of Bordeaux mixture, 300 grams of copper sulphate and 300 grams of calcium oxide are needed. With 30 liters of Bordeaux mixture, it is possible to treat about 200 kg of seed, for a cost of less than half a dollar per 50 kg bag.



*Seed fungicide dressing.*

Many other reliable chemical products exist for seed treatment, but they are more expensive.

**GLOVES AND MASKS SHOULD BE WORN WHEN HANDLING CHEMICALS.**

However, a product like “Murtano” has the advantage of being very practical and simple to use, because it is effective both against insects and diseases, at the rate of 50 grams for 50 kg of seed, and costs about 2.5 dollars for a 50 kg bag of seed.

**ANY SEED TREATED WITH CHEMICALS MUST NOT BE EATEN.**

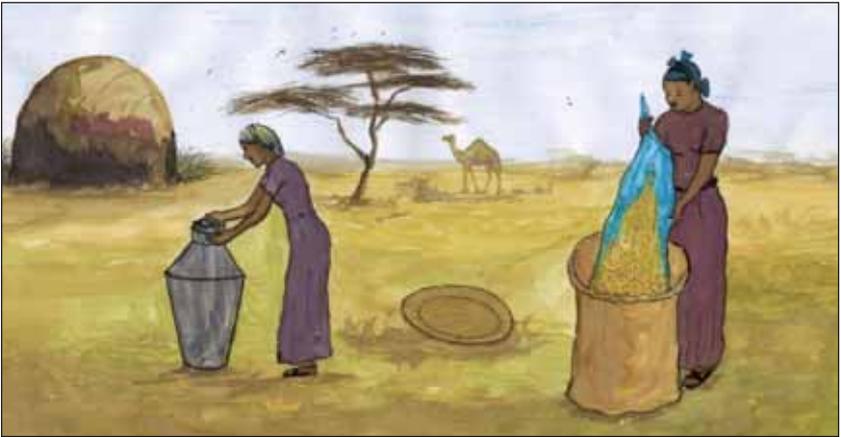
## Module 3 – Storage and Marketing

### Storage

The most important requirements for seed storage are

- Keep seeds in a cool and dry place (18-20°C, less than 60–70% relative humidity)
- Protect them from insects and rats
- Keep them out of reach of children

Seed must be packed in suitable packing material (jute bags, cloth bags, carton boxes, tins and drums) and properly sealed.



*Proper packaging of seeds.*



*Proper packaging of seeds (sealing).*



*Safe storage of seeds.*

The packed seed can then be stored in cribs and houses.

If packed in bags, the bags must be stacked on wooden pallets and not on the floor or against walls.

Seed kept in houses should be stored in the driest part of the house.

### **Seed germination (viability) test**

It is very important to ascertain the viability of seeds, especially after an extended period of storage.

This should be done before sowing.

A simple method is to put at least 10 seeds between two moist cotton cloths and place in a warm but shady place for about five days.

It is also possible to check germination by sowing in small pots.

A germination level of at least 70% (7 out of 10) can be considered satisfactory.

## Marketing

Seed marketing aims to satisfy the farmers' demand for timely and reliable supply of a range of seed varieties of assured quality at an acceptable price.

All the functions of seed marketing including processing, grading, packaging and labelling, storage, transportation, distribution and promotion, have to be structured and organized to meet the requirements and needs of the seed consumer – the smallholder farmer.

In general, Somali farmers only buy sorghum seeds from grain/seed traders based in villages after a drought period. After a good season the majority use their own saved seed or get the seed from relatives.

The grain/seed traders usually buy seeds from farmers in surrounding villages during harvesting time and they store the seeds of various types separately in metal or plastic containers, drums, and sacks. These traders are either retailers or wholesalers who sell



*Seed trader buying seeds from seed producer.*

mainly grain and seeds in addition to other supplies including foodstuffs.

## Packaging and labelling

In making a decision to buy a particular variety from a given supplier (eg, seed/grain trader), farmers expect certain benefits.

Seed packaging and labelling is a powerful tool to identify and market seeds.

Seeds can be packaged in different materials and containers. The following considerations need to be made when deciding on the most convenient packaging material:

- The quantity of seed in each package
- The cost of the package
- The conditions under which the container is kept

Normally, the most suitable packaging material is a paper bag.

The labels on the package should show the name, area suitable and major positive qualities of the variety being marketed.

The information should be in a very simple and easy-to-understand language, including characteristics of the variety in addition to other use recommendations for a specific seed variety:

- Name of sorghum variety, e.g. *Elmi Jama*, *Feerur geeley*, *Kuuso*
- Produces high grain yield and good quality of conserved fodder
- Growing areas, e.g. Northwest and Awdal regions in Somaliland
- Net weight: 5 kg – enough for 2½ tractor hours (half-hectare)
- Yield: 5 kg of seed produce up to 1000 kg of grain
- Colour: white
- Germination level: 95%
- Purity: 90%
- Free from pests and diseases
- Year of production: 2004
- Expiry: Use within 2 years from the year of production
- Warning: Do not eat, treated with insecticides and fungicides

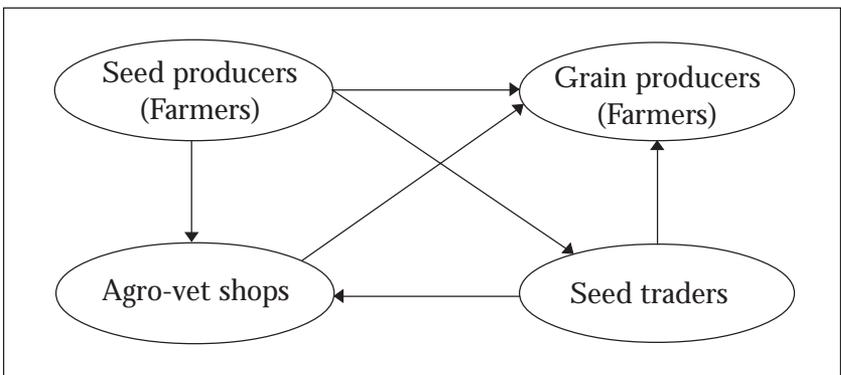


*Seed traders showing the packaged seeds to farmers and discussing the seed with them.*

### Seed production and distribution process (Diagram 1)

1. Seed is produced by local trained seed farmers (seed producers)
2. Seed producers (farmers) supply treated seeds to other farmers for grain production
3. Seed producers sell seed to seed traders based in the villages, who process, treat, and package treated seed for sale to farmers
4. Agro-vet shops based in district towns buy treated seed from farmers or seed traders and in turn sell treated seed to farmers

The seed distribution process is illustrated in the following diagram



*Diagram 1: Farmer back to farmer seed system.*

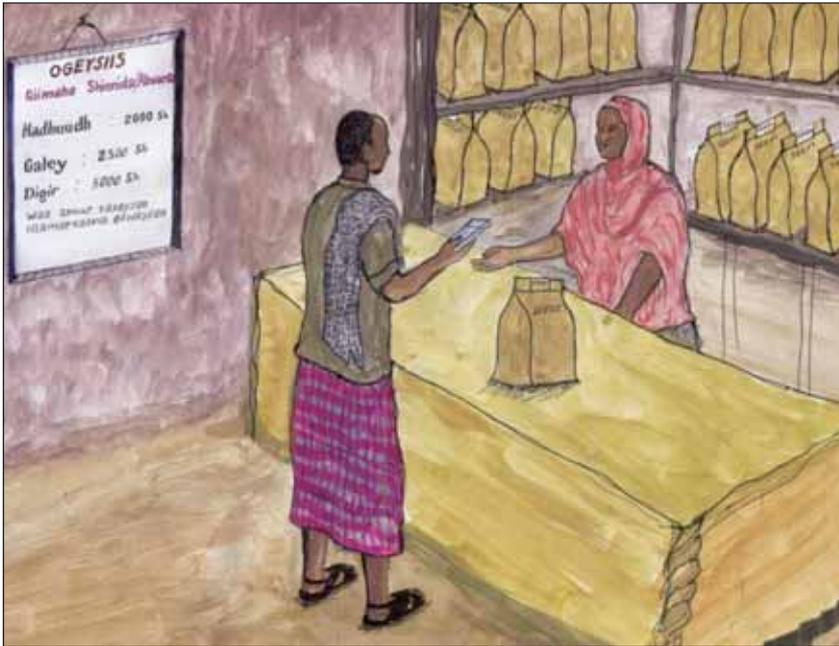
## Seed promotion

Promotion helps to increase the demand for seed from farmers.

For effective promotion to occur, the seed traders need not only to know the qualities of seed types they retail, but also to be able to communicate this information efficiently to their customers – farmers.

Furthermore, good customer relations by seed traders and other promotional activities including village-based seed fairs, variety demonstrations, radio, posters, and price incentives would help to further promote the demand for seed.

Strong partnerships should be established between seed traders, agro-vets, village-based farmers' groups, extension workers from the Ministry of Agriculture, the village and district administration, and NGOs to promote the use of quality seeds at village and district level.



*Farmer buying seed from seed trader in the village.*





CINS  
Cooperazione Italiana Nord Sud

CINS is an Italian NGO established in 1988. It is a private, independent and non-profit oriented organisation, whose main purpose is to promote solidarity and to improve the quality of life for the most disadvantaged populations in the developing countries.

Presently, CINS is active in several countries of Africa, Latin America and Eastern Europe; taking part in co-operation actions funded by EC, Cooperazione Italiana, UNICEF, ACNUR, UNDP, IFAD and USAID.

The main sectors of intervention of CINS are agriculture, capacity building of rural associations, vocational training, income generating activities, public health, emergency and rehabilitation activities.

In Somalia, CINS is mainly concerned with seed production, crop diversification, rural engineering and capacity building including gender issues.

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## About ICRISAT



The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is a non-profit, non-political, international organization for science-based agricultural development. ICRISAT conducts research on sorghum, pearl millet, chickpea, pigeonpea and groundnut – crops that support the livelihoods of the poorest of the poor in the semi-arid tropics encompassing 48 countries. ICRISAT also shares information and knowledge through capacity building, publications and information and communication technologies (ICTs). Established in 1972, it is one of 15 Centers supported by the Consultative Group on International Agricultural Research (CGIAR).

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