

Vegetable Seed Regeneration and Quality Preservation

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Global Theme Leader – Germplasm

AVRDC – The World Vegetable Center

International Training Course on Plant Genetic
Resources and Genebank Management

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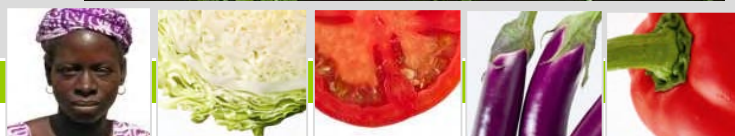
RDA, Suwon, Republic of Korea



▶ AVRDC-The World Vegetable Center

Mission:

Alleviate poverty and malnutrition in the developing world through the increased production and consumption of safe vegetables





AVRDC-HQ Taiwan - 1971



Niger

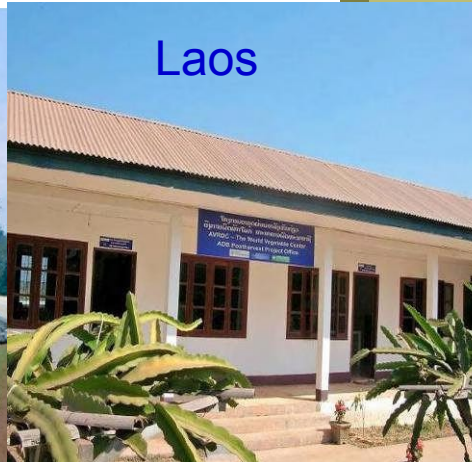


RCA Tanzania - 1992

AVRDC – Global Agricultural R&D



Cameroon



Laos



Madagascar



ARC Thailand - 1992



Solomon Islands



West & Central Africa – Mali (2005)

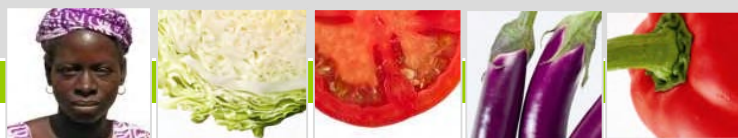


RCSA India - 2006

► Why Vegetables?

Vegetables:

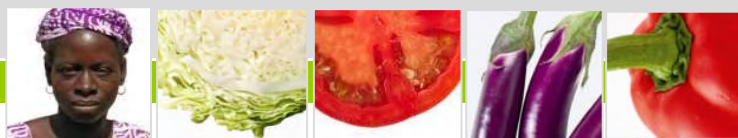
- Create jobs
- Generate higher incomes
- Alleviate malnutrition
- Improve learning capacities of children and enhance maternal health
- Improve livelihoods



► Why do we need genetic diversity?



► ... to create better vegetables



Building on crop diversity to deliver better vegetable cultivars and produce for farmers and consumers:

Higher yields through multiple resistance to pests and diseases;

More stable yields under biotic and abiotic stresses;

Improved high-value features (e.g. size, color, taste); and

Better nutritional quality (e.g. vitamin A and iron)

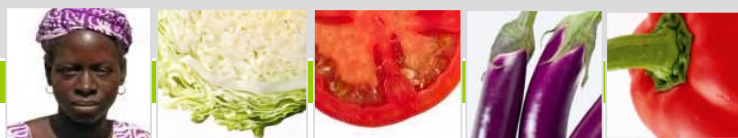
► ... to improve tolerance to environmental stress



High yielding
tomato variety



Wild tomato - source of
drought tolerance





**The world's largest collection of vegetable
germplasm in the public sector**

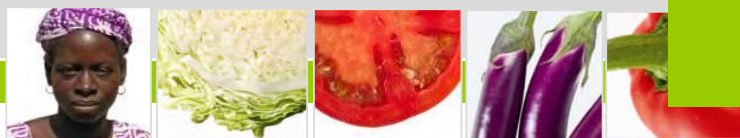
► Germplasm accessions conserved at the Center – 08/09

	Principal crops	Other crops	Total
No. of accessions	44,693	11,968	56,661
No. of genera	9	152	161
No. of species	127	277	404
No. of countries of origin			152
No. of accessions conserved at the Regional Center for Africa			1,304



► Utilization

<i>Government organizations</i>	1491
<i>Internal seed distribution</i>	1005
<i>Seed companies</i>	847
<i>Universities</i>	394
<i>Private individuals</i>	109
<i>Private companies</i>	21



Introduction to seed regeneration

This lecture outlines procedures and problems encountered during vegetable seed regeneration with special emphasis on quality preservation

Rationale:

The production and quality preservation of vegetable seeds poses several problems:

- Wide range of different species with different cultural requirements, breeding structures and seed physiology
- Appropriate isolation and pollination procedures are necessary to preserve genetic integrity while producing sufficient seed



► Problems in seed production and regeneration

Vegetable seed regeneration covers a wide range of species:

Different cultural requirements

Differences in breeding systems

Differences in seed physiology



▶ Behavior of vegetable seeds in storage

Majority of vegetable crops are produced from orthodox seeds:

Preservation is relatively easy as seeds can be dried to a low seed moisture content (4-7%) and stored in a cool and dry place for many years (decades)

Some vegetatively propagated crops (shallot, garlic, leafy sweet potato) need to be preserved in field genebanks

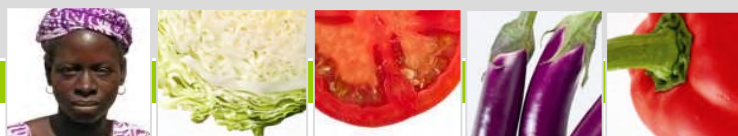


Storage of vegetable seeds



Storage of orthodox seeds in cold stores

Maintenance of garlic in field genebank



Seed quality of vegetable crops

Commercial vegetable seed

Highly viable and vigorous
Genetically pure (true to type)
Physically purity (percentage of pure seed versus seeds from other crops, weeds, and foreign matter)
Seed health: free from disease, insect pests
Uniform size of desired type
Fairly priced
Good yielding ability
Wide adaptability

Vegetable seed in genebanks

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Genetically pure (true to type)?
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“Good seed on good land yields abundant produce” (Hindu proverb)



Goal of seed preservation in genebanks

Maximize longevity of the stored seed at minimal cost

Longevity is affected by two major factors:

Quality and water content of seed before entry into storage

Conditions surrounding the seeds during storage



Categories of seed production

The seed category determines how stringent the procedure is that has to be followed in seed production.

The different seed categories are:

- Breeder's seed
- Foundation seed
- Certified seed
- Commercial seed

Genebank situation:

How are traditional varieties, landraces to be treated?



Breeder's Seed

This seed category is produced and maintained by the plant breeder or the organization which originally developed or introduced the cultivar.

Carefully maintained with a high level of selection by a qualified plant breeder

Produced in small quantities from plants which have been individually selected and seeded under very strict conditions to maintain purity



▶ Foundation Seed

This seed category is the progeny of breeder seed and is used for direct production of certified, commercial or standard seed.

Foundation seed is usually produced and maintained by the organization which developed the new cultivar or by a seed producer in close collaboration with the plant breeder who developed the cultivar. A certification agency is usually supervising and approving the production of foundation seed.



▶ Certified Seed

This is the progeny of foundation seed (up to three generations) of a cultivar within a seed certification scheme.

The seeds are produced according to an officially approved and monitored program.

Certified seed produced from certified seed is not eligible for further seed increase.

