In situ conservation:
nature reserves, on-farm, home & school gardens, community seed banks

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Module 1: Vegetables: From Seed to Table and Beyond
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Vegetables:

- Often are herbaceous plants
- Different parts are used as food


Root bulb of onion


Flower of Sesbania


Fruit of African eggplant


Leaves of Amaranth


Calyx of roselle


Stem of celery

- Parts (leaves, flowers, young pods) of some trees (e.g. Moringa) also can be used as vegetables

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Few vegetables are cultivated intensively and over a wide geographic range

- Worldwide, 1,500 – 2,000 plant species have been used as vegetables
- Only about 20 are cultivated intensively

- *Solanum lycopersicum* (tomato)
- *S. melongena* (eggplant)
- *Capsicum annuum* (bell/chili pepper)
- *C. frutescens* (malagueta, tabasco)
- *Brassica rapa* (Chinese cabbage)
- *B. oleracea* (cabbage, broccoli)
- *B. juncea* (mustard green)
- *Lactuca sativa* (lettuce)
- *Allium sativum* (garlic)
- *A. cepa* (onion)
- *A. cepa* var. *aggregatum* (shallot)
- *A. porrum* (leek)
- *Cucumis sativus* (cucumber)
- *Cucurbita pepo* (pumpkin, squash)
- *C. moschata* (squash)
- C. maxima (buttercup squash)
- *Spinacia oleracea* (spinach)
- *Phaseolus vulgaris* (green bean)
- *Daucus carota* (carrot)
- *Vigna unguiculata* (cowpea, yardlong bean)

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Underutilized indigenous vegetables

- Widely available in nature for human consumption
- Less well-known
- Often restricted in distribution
- Usually hardy
- Resilient to harsh climatic environments
- Thrive with few or no external inputs
- Important food source at times of scarcity

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Brief introduction of researchable IV crops

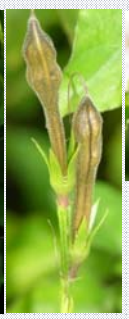
***Asystasia gangetica* : Tropical violet, tropical primrose - Acanthaceae**

- **tolerance: flooding, humidity**

100g edible portion on fresh weight

protein	Lutein	Beta-carotene	Vit. C	Vit. E	Ca	Fe	Zn	AOA (ABTSm)	Phenolics	Folate	oxalate
g	mg	mg	mg	mg	mg	mg	mg	µmol Trolox	mg	µg	mg
4.68	7.38	5.68	50	2.5	180	2.05	…	806	185	27	17



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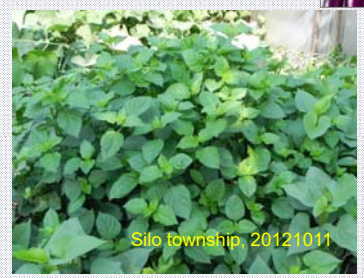
Researchable IV crops: Tropical Violet





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Brief introduction of researchable IV crops

***Basella alba*: Malabar spinach, Ceylon spinach, vine spinach - Basellaceae**

- **tolerance: heat, high rainfall, flooding, brief drought**

100g edible portion on fresh weight

protein	Lutein	Beta-carotene	Vit. C	Vit. E	Ca	Fe	Zn	AOA (ABTSm)	Phenolics	Folate	oxalate
g	mg	mg	mg	mg	mg	mg	mg	µmol Trolox	mg	µg	mg
2.25	3.12	**3.40**	57	1.4	65	1.21	0.00	457	181	**88**	160

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Researchable IV crops: Malabar or Cylon spinach

Malabar spinach production in Silo

Beidou market

Silo wholesale market

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Researchable IV crops: Malabar spinach

Total 94 accessions from GRSU

Date of sowing : 09 October

Date of transplanting : 06 November

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Malabar or Ceylon spinach (*Basella alba*)

- Leaves have a mild, pleasant flavor, much like those of spinach
- Rich in beta-carotene, vitamin C, calcium, folic acid, and protein (3.5%); medium levels of vitamin E, riboflavin, calcium, and iron
- Very productive and resistant to many pests and diseases
- Proven to have a high flood tolerance during typhoons

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Brief introduction of researchable IV crops

***Corchorus olitorius*: Jute mallow , Jew's mallow, Tiliaceae**

- **tolerance: heat, high rainfall, flooding, brief drought**

100g edible portion on fresh weight

protein	Lutein	Beta-carotene	Vit. C	Vit. E	Ca	Fe	Zn	AOA (ABTSm)	Phenolics	Folate	oxalate
g	mg	mg	mg	mg	mg	mg	mg	µmol Trolox	mg	µg	mg
5.17	7.02	5.10	124	3.9	300	5.74	0.44	478	147	92	65





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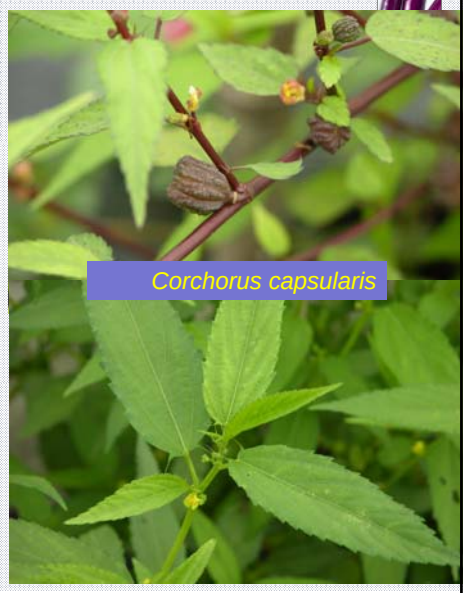
Researchable IV crops: Jute mallow & Jute


Ji'an evening market


Corchorus capsularis

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Brief introduction of researchable IV crops

***Ipomoea aquatica*: Kangkong, water convolvulus, water spinach – Convolvulaceae**
tolerance: heat, flooding

100g edible portion on fresh weight

protein	Lutein	Beta-carotene	Vit. C	Vit. E	Ca	Fe	Zn	AOA (ABTSm)	Phenolics	Folate	oxalate
g	mg	mg	mg	mg	mg	mg	mg	µmol Trolox	mg	µg	mg
2.80	3.17	1.13	51	1.61	156	3.27	0.34	874	302	25	29



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Researchable IV crops: Kangkong




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Researchable IV crops: Kangkong

Fengshan Tropical Horticultural Experiment Branch

2011-10-18

White rust resistance

High Yield

Tenderness

Screening for salinity tolerant lines

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Brief introduction of researchable IV crops

***Portulaca oleracea* : Purslane - Portulacaceae**

- **tolerance: drought, salinity, flooding**

100g edible portion on fresh weight

protein	Lutein	Beta-carotene	Vit. C	Vit. E	Ca	Fe	Zn	AOA (ABTSm)	Phenolics	Folate	oxalate
g	mg	mg	mg	mg	mg	mg	mg	µmol Trolox	mg	µg	mg
1.33	…	2.36	9	0.47	39	1.08	…	540	102	…	…

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Researchable IV crops: Purslane

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Bird's nest fern (*Asplenium australasicum*)

- Succulent tender leaves are stir-fried, boiled or steamed
- Can yield up to 5 t/ha annually

- Extremely high in ascorbic acid; but low content of calcium and iron; protein (2.8%)

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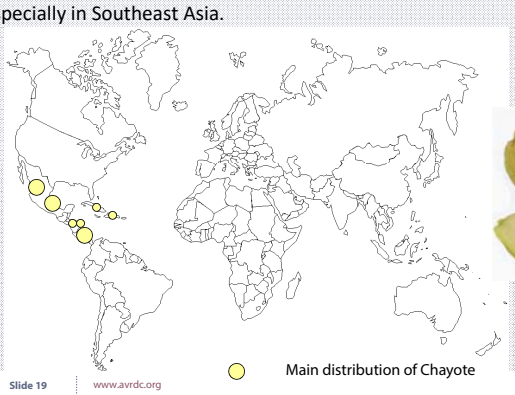
Chayote (*Sechium edule*)

Chayote is native to Mesoamerica; introduced to Asian countries. The main growing regions are Costa Rica and Veracruz, Mexico. Costa Rican chayotes are exported to Europe, whereas Veracruz is the main exporter to the United States.

The chayote fruit is used in raw and cooked forms. It is lightly cooked to retain the crisp flavor. Raw chayote may be added to salads or salsas, and it is often marinated with lemon or lime juice. Chayote is a good source of amino acids and vitamin C. The tubers of the plant are eaten as root vegetables, particularly in Southwest China. In addition, the shoots and leaves can be consumed, and they are often used in salads and stir fries, especially in Southeast Asia.



Main distribution of Chayote

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African Nightshade (*Solanum scabrum*)

- Not the deadly, poisonous nightshade species *Atropa belladonna*
- Young shoots and leaves are popular in Africa as blanched, boiled or stir fried vegetables
- Extremely high in beta-carotene and ascorbic acid content
- Other medium to high nutrient contents: vitamin E, folic acid, calcium, iron and protein (2-4%)

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Conservation of indigenous vegetable germplasm

- Worldwide, 1500-2000 plant species have been used as vegetables; in Southeast Asia, this number is close to 1000 species (PROSEA, 1994)
- Under 'in situ' protection, 500 species led to primitive cultivars
- The most suitable ones (200 species) were grown in home gardens
- 80 out of the 200 species are profitable for some form of commercial production

- Temperate vegetables (cabbage, tomato, carrot) replaced many traditional 'tropical' vegetables

- Indigenous vegetables are poorly represented in genebanks and their genetic diversity is threatened
- Example: Slippery cabbage (*Abelmoschus manihot*) in the Pacific Islands

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The case of slippery cabbage (*Abelmoschus manihot*)

- A relative of okra, it is popular in Solomon Islands, Fiji, Papua New Guinea, Samoa and Tonga
- Extremely rich in beta-carotene, high in vitamins C, E, iron, folates and antioxidants
- Many phenotypes have been observed across the islands
- Reproduced vegetatively, only 10 percent flower and set seeds
- Genetic diversity not captured and preserved
- Current crop varieties not able to adapt at same pace as climate change progresses – urgency to collect and conserve

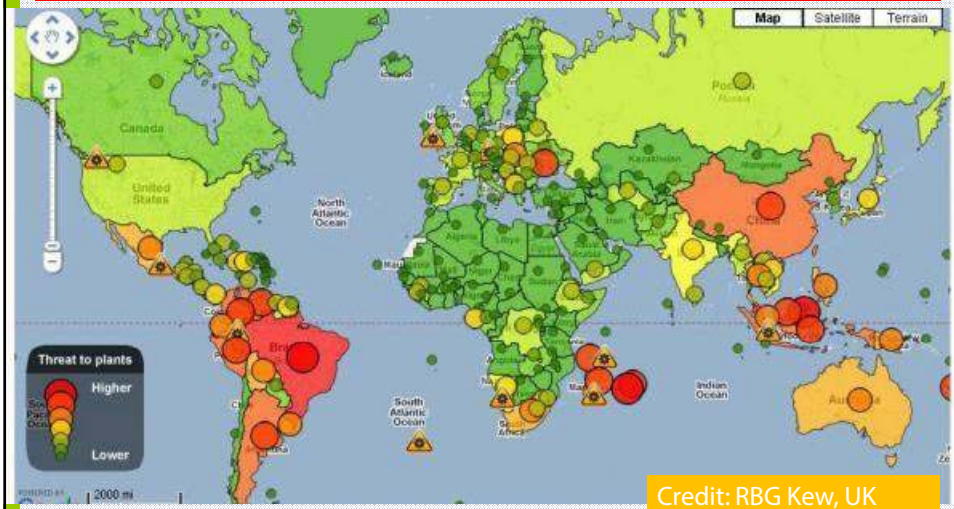
Adequate conservation of vegetable germplasm (*ex situ* & *in situ*)

Assures the availability of vegetables to contribute to the nutritional security of an expanding global population

- Provides genetic variability — a prerequisite for vegetable breeding programs
- Germplasm must be accessible and usable

More than 1-fifth of world's plants threatened by extinction

Science Daily – Sept. 29, 2010



Credit: RBG Kew, UK

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Conservation approaches and methods

- *In situ*
- nature reserves
- managed areas
- introduction to reserves
- on-farm management (farmer exchanges) (new introductions)
- on-farm conservation (community genebanks)
- field genebanks
- seed genebanks (short-term; long-term)
- in vitro genebanks (slow growth cryopreservation)
- pollen banks
- DNA libraries
- *Ex situ*

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IN SITU CONSERVATION

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Valuation of biodiversity

Direct Use Value:

Direct consumptive values: fossil fuel/biofuel; hunting (game); agricultural (food) or forest (timber, firewood) products; medicinal plants, mushrooms, berries

Non-consumptive values: ecoturism; photography; recreation

Indirect Use Value:

Ecosystem services such as pollination, natural control of pests, carbon fixing, flood control, habitat for other species, sustaining food chains, other uses are indirect-use values

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Valuation of biodiversity

Non-use Values include:

- **Option value:** conserving an element of biodiversity for later use (setting catch limits on a lake to ensure continuous opportunities for fishing)
- **Bequest value:** conserving biodiversity for the sake of future generations (sustainable forest development)
- **Existence values:** people conserve an element of biodiversity for its own sake, without an intention of using it (a species or a population, or a particular stand); include aesthetic enjoyment (natural beauty of an old forest); intrinsic rights (mere existence of something gives it a right to continue); spiritual health (people receive inspirational, religious, or cultural benefits from nature)

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Nature reserves in Costa Rica (25%)

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Restoring tropical agriculture through products from Biosphere Reserves

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THE IMPORTANCE OF FARMERS' SEED SYSTEMS

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Smallholder farming and seed supply systems

Some facts (FAO 2014; Gill et al. 2013; Nishikawa 2014):

80% of farmland in sub-Saharan Africa and Asia is cultivated by smallholders providing 80% of food supply

≥410 million out of a total of 570 million farms are ≤ 1 ha

Seed is one of the most important inputs for crop production and is mostly sourced from informal seed systems: farmer-saved seed; exchanges with other farmers; local seed and grain markets; seed networks; community seed banks

Smallholders keep locally well adapted, rustic, climate-resilient varieties alive

Modern varieties are replacing these local varieties and farmers' seed systems are threatened by the concentration of the seed industry depriving farmers of their traditional rights to save seeds.

Farmers' Seed Systems

Depending on the crop and country, 60-100% of the seed planted in developing countries is farmer produced and exchanged.

- For indigenous vegetables, root crops like yam and sweet potato, farmers' seed is usually the only source of planting material (especially local varieties of minor crops).
- Farmers' seed systems constitute a dynamic in situ conservation system in which evolutions continues to exist.
- Farmers' system is an integrated system that functions parallel to the formal system. Both systems are poorly connected.

Seed supply by formal sector and farmers

Crop/Country	Formal sector	Farmers	Year (Reference)
Rice			
Tanzania	1	99	1985 (DANAGRO, 1988)
Pakistan	6	94	1995/96 (Bishaw & Kugbei)
Egypt	38	62	1997/98 (NN 1999)
Turkey	28	72	(Kutay, 1997)
Beans			
Malawi	4	96	1985 (DANAGRO, 1988)
Zambia	12	88	1985 (DANAGRO, 1988)
Honduras	2	98	1990 (Corrales et al., 1991)
Egypt (faba bean)	14	86	1997/98 (Seed Sector Program)

Source: Almekinders & Louwaars, 2002

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Seed supply by formal sector and farmers

Crop/Country	Formal sector	Farmers	Year (Reference)
Maize			
Zambia	19	81	1997 (Aquino et al., 1999)
Zimbabwe	70	30	1997 (Aquino et al., 1999)
Pakistan	36	64	1997 (Aquino et al., 1999)
Egypt	36	64	1997/98 (Seed Sector Program)
Honduras	30	70	1990 (Corrales et al., 1991)
Malawi	4	96	1985 (DANAGRO, 1988)
All crops (average)			
Netherlands	75	25	(Ghijsen, 1996)
Germany	50	50	(Ghijsen, 1996)
Greece	10	90	(Ghijsen, 1996)

Source: Almekinders & Louwaars, 2002

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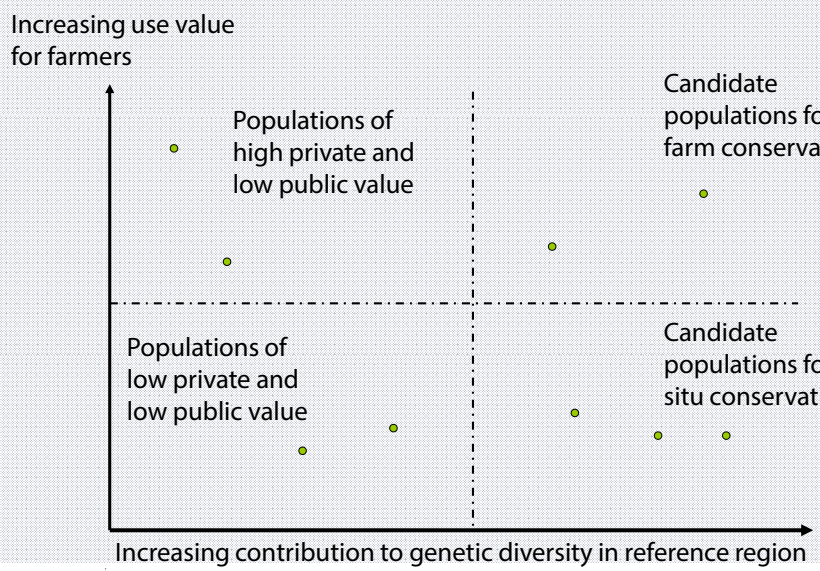
Seed supply by formal sector and farmers

Seed sources	Characteristics	Source for planting material	Source for new varieties
On farm	Known quality, cheap, readily available	+++	- - -
Neighbors, friends & relatives	No cash involved, readily available	++	+
Others in the community	No cash involved, readily available; accessibility?	+	++
Local market	Unreliable quality, last seed resource	- -	- - -
Middle men	Non-cash arrangements, loans	+, -	-, +
Neighbors, friends, outside community	Non-cash arrangements, travel required	+	+++
Seed stores	Cash for seed and traveling	+	++
Public seed agencies	Unreliable availability & quality	-	+++

Source: Almekinders & Louwaars, 2002

Classification of candidate crop populations for on-farm / school garden conservation



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Benefits accruing from on-farm conservation

	Economic + socio-cultural benefits	Ecological benefits	Genetic benefits
Farmer household	- Manage risk and uncertainty - Fit different budget constraints - Avoid or minimize labour bottlenecks - Fill nutritional needs - Forge social ties	- Minimize use of chemical inputs - Soil structure amelioration - Manage pests and diseases	Insurance against environmental and socioeconomic change
Society	- Global food security - Empowerment of local communities - Social sustainability	- Reduction of chemical pollution - Restriction of plant diseases -Regulation of hydrological flows	- Insurance against environmental change, pests and diseases - Use for the agricult. industry

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Benefits of on-farm conservation

- Ongoing processes of evolution and crop adaptation to their environments are maintained within farming systems
- Diversity conservation takes place at 3 levels: ecosystem, species and intraspecific
- Integrates farmers into national PGR conservation system
- Conserves ecosystem services
- Improves livelhoods of resource-poor farmers
- Farmers maintain or increase their control and access to genetic resources
- Public and private benefits through access to adapted germplasm for future needs; agroecosystem stability; decreased use of chemicals.

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Possible disadvantages of on-farm conservation

- Lack of characterization and documentation makes it diffuclt fo scientists and breeders to use the material
- The factors of dynamic conservation and natural selection could threaten the safety of landraces
- Genetic erosion could happen due to natural disasters or civil strife
- Social and economic change may either foster or hinder on-farm consveration
- For large areas, costs are high and substantial incentives are required.

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EXAMPLES OF ON-FARM CONSERVATION

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The diversity of bottle gourd in Kenya

Various landraces of *L.siceraria* (bottle gourd) fruits in Kenya.

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Culture and plant use can support each other: The Kyanika Kitete Museum in Kenya works to conserve gourds (*Lagenaria)* and Kamba culture.

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Taro in Cuban home gardens

Minimal management under coffee and fruit trees

Careful management in boxes

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Local Yunnan taro types distinguished by corm formation, taste and cooking quality




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Intensive intercropping of taro in paddy, an efficient and profitable agronomic practice in Asia

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In extensive low-input agriculture taro also has a place, taro cultivars are grown in swiddens in Southeast Asian hillsides along with upland rice

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<u>Preservation of food cultures</u> that use all parts of the taro plant and taro in all its statuses from wild, ruderal cultivated and intensive production is key for the conservation of taro genetic diversity

Wild type taros are used and valued for their stolons, made into pickle and also noted for medicinal properties.

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Taro flowers travelling to urban market on a bicycle to be sold and then stir fried

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Community Seed Banks

In-situ conservation and local adaptation of vegetable germplasm

- On-farm management: farmers continue to grow and maintain traditional varieties and are the guardians of diversity on farm
- Farmers select seeds from outstanding plants of preferred varieties, grown from season to season (local adaptation)
- Diversity is maintained through existing traditional networks of seed exchanges

- One option is on-farm conservation through community seed genebanks

Community Seed Bank Concept

- One community seed bank (CSB) serves one village
- 5-member executive committee selected among alumni of farmer field school
- Initial training of committee members on how to produce and save vegetable seeds
- Small initial financial support to kick-start the seed bank
- To make it self-sustaining, members of the CSB can either contribute in kind – delivery of fresh seed of one or more varieties to the CSB at the end of the season or will make a small financial contribution to sustain the activities
- Benefit: access to obtain and use the seeds of the CSB of a wide range and choice of varieties per crop

Community Seed Bank Concept (2)

Objectives of CSB

- To conserve and sustain diversified vegetable germplasm and to have ownership of this vegetable diversity (farmers' rights)!
- To serve as a seed bank for farmers to exchange and purchase seeds
- To enhance self capacity in sustaining availability of vegetable seeds and to enhance resilience of agricultural production systems through greater agricultural diversity on-farm

Community Seed Bank Concept (3)

Strategy: Conservation through utilization

- Members are encouraged to contribute vegetable diversity – old landraces and well adapted local varieties – under threat of genetic erosion – to the CSB to serve farmers' needs adequately
- Sustainability of the CSB is enhanced by utilization of the seeds being conserved. It is important to promote the use of its seeds and to encourage active exchange among farmers.

Community Seed Bank Concept (4)

Seed production

- CSB discusses with members to determine crops, lines and quantity of seeds to be produced and to identify the land area required for production
- CSB develops a schedule and timeline for seed production and keeps records
- CSB ensures that seeds are appropriately produced, with sufficient quality (purity, physiological maturity and good seed health)

Community Seed Bank Concept (5)

Seed collection

- It is important to conserve well adapted local lines to enhance diversity of available seeds for farmers' use. Local landraces are often robust and thrive on limited external inputs unlike commercial varieties, although yield may be lower. Local varieties may also be better adapted to local soil and climatic conditions or may have higher nutrient content – better resilience!
- CSB actively collects seeds from various types of vegetable crops
- Members are encouraged to share seeds they possess to be multiplied by CSB.
- CSB manages a simple database to record characteristics of conserved varieties as well as seed distribution

Community Seed Bank Concept (6)

Seed processing and storage

- Seed processing, drying, labelling and packing in hermetically closed containers is very critical before thinking of appropriate storage
- (1) Storage at room temperature
  (2) Storage in a refrigerator
  (3) Storage in a freezer

Community Seed Bank Concept (7)

Seed distribution / marketing

- Regulation for seed distribution among CSB members needs to be established
- What will be the basis of seed distribution:
  (1) Do members purchase seeds from the CSB? If so, how to determine quota per person and the price? If not, what kind of compensation to be given back to the bank?
  (2) Will the CSB plan to produce more seeds to be sold to non-members to generate revenue to sustain CSB operations?
  (3) Keep financial records of the CSB and manage the revenue to fund future seed production, storage operation, etc.

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Community-based seed production of traditional vegetables in Camarines Sur, the Philippines

Psophocarpus tetragonolobus
winged bean

AVRDC partnered with BIARC in Pili and local farmers with the aim of conserving crop diversity through use in a community-based approach to strengthen local seed systems, improve nutrition security and livelihoods of the rural poor.

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Materials and Methods

Project sites: BIARC; Hanawan, Ocampo; Sta. Teresita, Baao, Camarines Sur, Bicol

Crops: Jute mallow (*Corchorus olitorius*; 6 varieties); cucumber (*Cucumis sativus;* 2); bottle gourd (*Lagenaria siceraria*; 4); ridged gourd (*Luffa acutangula*; 4); eggplant (*Solanum melongena*; 6); amaranth (*Amaranthus* spp.; 4); basil (*Ocimum basilicum*; 4); winged bean (*Psophocarpus tetragonolobus*; 4); hyacinth bean (*Lablab purpureus*; 1); roselle (*Hibiscus sabdariffa*; 1).

Local indigenous vegetables (farmer-saved seed) included:
Lima bean (*Phaseolus lunatus*); butterfly pea (*Clitoria ternatea*); vegetable hummingbird (*Sesbania grandiflora*).

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On-farm IV seed production farm at Hanawan, Ocampo, Camarines Sur, Philippines established in September, 2010 (2nd cropping)

Eggplant (front), okra (center) and jute mallow (background)

Jute mallow

Yard-long bean

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On-farm IV seed production farm at Sta. Teresita, Baao, Camarines Sur, Philippines established in October 2010

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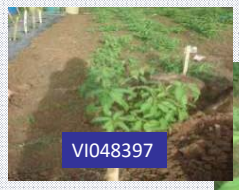
Community-based conservation & multiplication of selected IVs in Ocampo, Camarines Sur

Entries	Origin	Seed yield (g)
VI054704 *Corchorus capsularis*	Unknown	150
VI048397 (*C. capsularis*)	Vietnam	340
VI046052 (*C. capsularis*)	Vietnam	265
VI047370 (*C. capsularis*)	Vietnam	220
VI054724 (*C. olitorius*)	Unknown	790
VI047881 (*C. olitorius*)	Bangladesh	450

Jute mallow (*Corchorus olitorius*)



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Community-based conservation & multiplication of selected IVs in Ocampo, Camarines Sur

Entries	Origin	Seed yield (g)
VI034845 (*S. melongena*)	Malaysia	325
VI039460 (*S. melongena*)	Bangladesh	370
VI039443 (*S. melongena*)	Bangladesh	700
VI039538 (*S. melongena*)	Bangladesh	770
VI042481 (*S. melongena*)	Iran	200
VI044835 (*S. melongena*)	Philippines	260

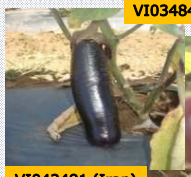
Eggplant (*Solanum melongena*)

VI034845 (Malaysia)

VI039460 (Bangladesh)

VI039443 (Bangladesh)

VI039538 (Bangladesh)



VI042481 (Iran)

VI044835 (Philippines)

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Inclusion of local selections from the Philippines

Lima Bean (*Phaseolus lunatus*), locally known as Patani**)**
origin: Mexico; Mesoamerica

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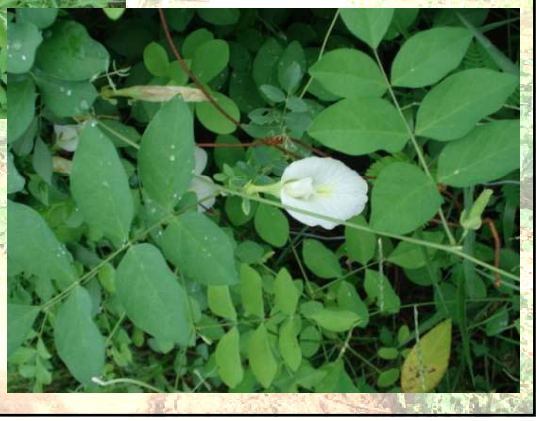
Inclusion of local selections from the Philippines



Giting Prinsesa (Bikol); Samsamping (Ilocos), local
Butterfly pea (*Clitoria ternatea*)
origin: paleotropics

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Philippine spinach, Cylon spinach, Talinum, local (*Talinum fruticosum*)

Native: Mexico, Mesoamerica, South America

Inclusion of local selections from the Philippines

Vegetable hummingbird, Katuray, local (*Sesbania grandiflora*); Malesia

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Summary of seed multiplication at 3 sites in Bicol region

	Ocampo; Nov.09 - Mar.10	Ocampo; July-Sep. 10	Baao; Oct. 10 – Feb. 11	BIARC; Sep.10 – Feb. 11	Total
Crops	Seed yield (g)	Seed yield (g)	Seed yield (g)	Seed yield (g)	Seed yield (g)
Jute mallow	2215	990	1060	100	4365
Cucumber	1020				
Eggplant	2625	2270	640	790	6325
Bottle gourd	360		560	100	1020
Ridged gourd	850	3560	1380	720	6510
Amaranth		20		45	65
Basil				125	125
Roselle				1300	1300
Lablab				100	100
Winged bean		330	360	440	1130
Butterfly pea		30	150		180

Seed distribution

Seed distribution started in 2010 to:

- Farmer community members
- Farmers in neighboring communities
- NGOs
- Local government units (LGUs)
- Farmer organizations

Seed was distributed *free of charge* to individual farmers with the *obligation to multiply the seed and share with at least one additional farmer each*, within the same community.

Objective:

- Rapid seed multiplication and dissemination
- Adoption by a wide range of farmers for the production of nutrient-dense vegetables for diet diversification and generation of additional farm income.

Potential benefits and scaling out

- Community-based seed and vegetable production increases monthly income of participating families by 20% (Holmer 2010);
- Bicol has the 2nd highest rate of child malnutrition in the Philippines; inclusion of nutrient-dense vegetables in diets is likely to improve nutritional status of children.
- At end of project support (2011), farmers in the pilot zones continued the seed production and sharing business;
- The Regional High Value Crops Development Program (HVCDP) of the DA joined forces with the project to expand the program to the entire Bicol region;
- HVCDP distributed vegetable seedlings to schools associated with the nationwide 'Gulayan sa Paaralan' program.

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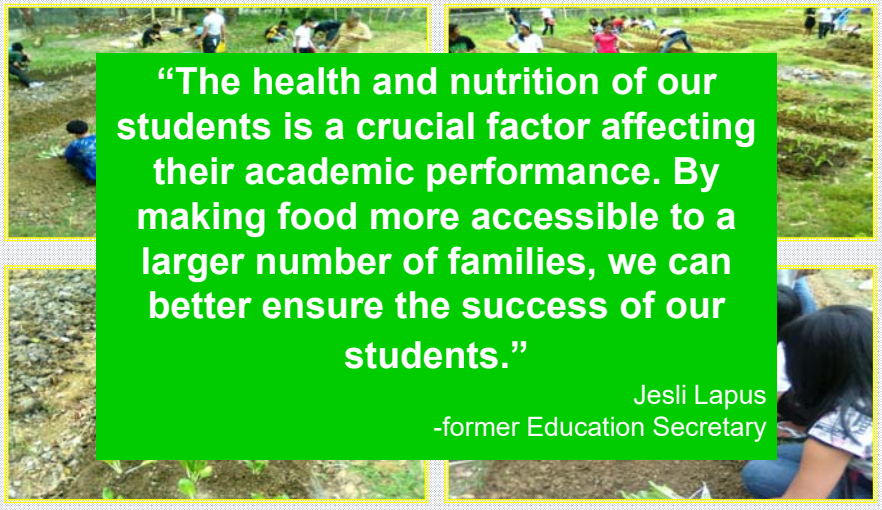
Gulayan sa Paaralan – Vegetable production in schools



"The health and nutrition of our students is a crucial factor affecting their academic performance. By making food more accessible to a larger number of families, we can better ensure the success of our students."

Jesli Lapus
-former Education Secretary

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Public awareness, Promoting IVs:

Oh My Gulay! Campaign in the Philippines

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Farmers' field day in the Philippines – Moringa

- **To create awareness of the value of Moringa as cheap source of essential micronutrients**
- **To promote the cultivation of Moringa for additional farm income**

Field day held at BIARC to promote cultivation and consumption of Moringa (28 October 2009)

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Field day on indigenous vegetables

Held in June 2012 at La Huerta Farm in Sta. Teresita, Baao, Camarines Sur

Attended by 150 participants: Federation of Baao women; farmers, organized vegetable growers, municipal extensionists

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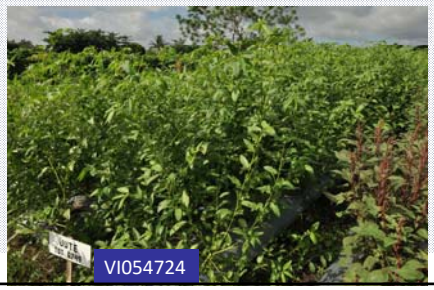
Field visit



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Field visit (2)

Hands-on training on food preparation (vegetables & spices)

Resource person: Ms. Noreta Badong, Diet Secret Organic Food Services, Naga City

Conclusions

The novel community-based seed system approach for indigenous vegetables introduced in two municipalities of Camarines Sur has been well accepted by farmers and has led to substantial production of good quality seed of a wide range of traditional vegetable crops.

This is an important step to strengthen seed security and sovereignty, food and nutrition security and to improve livelihoods of farming households.

The Regional High Value Crops Development Program has adopted this approach for expansion to the entire Bicol region, which has the 2nd highest rate of child malnutrition in the Philippines. Support was also provided to the nationwide vegetable production in schools program.

NEWS FROM THE REGIONS, SUB SAHARAN AFRICA, UGANDA

Is the role of intraspecific diversity in increasing productivity on-farm real? Some Ugandan small holder farmers' experiences!

April 22nd, 2014

Pure bean stand: 50 kg/acre
Mixture (11 v.): 175 kg/acre"

Common bean mixture grown by Jovaille

A female farmer, Jovaille Muhoozi, from Kabwohe village of Sheema district, is now very proud of growing mixtures. She got different common bean varieties from Kiziba community seed bank, grew them in pure stands but the yields were not good for three consecutive seasons where she would harvest 50kg from an acre in each season. When she resorted to growing mixtures, she harvests an average of 175kg from the same size of land. She now grows mixtures of 11 varieties and she thinks the increase in yield she has realized is a result of low pest and disease pressures in the mixtures compared to the pure stands.

Community seed banks in Ethopia

Goal:

1. Access for small-scale farmers to adapted seeds
2. Conservation of the local genetic resource for local and global communities

Setup:

- Each seed bank has space for selection and proper storage of seeds; farmers store & retrieve their own seed
- A garden serves the conservation of crops, which cannot be kept as seed
- A conservator & 2 assistants selected by each community and trained in identification, selection and storage of seeds
- A small portion of selected seed is put aside and stored as genetic reserve in the seed bank
- A 2nd sample is sent as backup to a nat. institute

Community seed banks in Ethopia (2)

Setup:

- Farmers can access their seeds at any time
- Farmers without seed can borrow seeds from the seed bank. The borrowed quantity + 25% add-on has to be paid back in kind after harvest
- At the end of project, the community seed banks stored more than 400 local varieties of 22 species
- Within 6 years, storage volume increased from 24 t to 339 t.

Challenges:

1. Increasing the involvement of women farmers in the seed associations
2. Indistinct registration of too many members being only interested in borrowing seeds
3. Need for incentives for the seed bank staff, in addition to training and extension.

Role of CSBs – Development Fund, Norway, 2011

Banking for the future: savings, security and seeds: a short study of community seed banks in Bangladesh, Costa Rica, Ethiopia, Honduras, India, Nepal, Thailand, Zambia, and Zimbabwe
Authors: A.P. Kroglund, A. Wilhelmsen, B. Batta
Publisher: Development Fund, Norway, 2011

Conclusions:

- Most CSBs have been established to combat seed insecurity
- CSBs have often been initiated by NGOs or IGOs (intergovernmental org.)
- Empowerment of farmers was an important outcome of CSBs
- CSBs promoted "bulk selling of product" and trained members in local seed production and management
- CSBs contributed to increased disposable income from the sale of surplus seed and produce for farmers' groups

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Role of CSBs – Development Fund, Norway, 2011 (2

Policy recommendations:

- Governments should establish and support CSBs as part of their obligations to implement "Farmers' Rights" and other provisions of the "Plant Treaty"

- Governments should revise seed regulations and provisions on IPR to seeds to ensure farmers' rights to save, use, exchange and sell farm-saved seeds

- Governments should redirect public subsidies from promoting modern varieties to support activities of CSBs

- NARS should extend their expertise and services for free to assist and - support communities and NGOs in setting up and maintaining CSBs

- NARS should multiply and produce farmers' varieties for increased availability of locally adapted seeds

- NGOs should adopt a mechanism to share skills and knowledge in establishing and maintaining CSBs with interested communities/organiz.

Sustainable fisheries and aquaculture
Vol. 49 Nr. 3/2015
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Conservation 28.08.2015

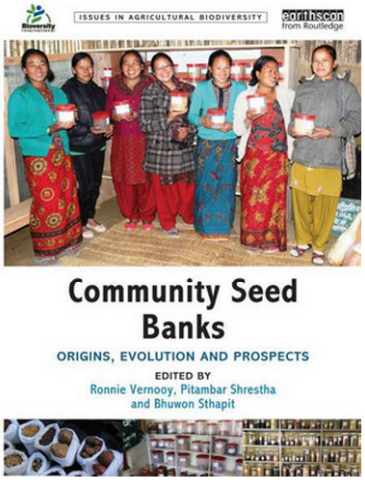
Community Seed Banks: Origins, Evolution and Prospects

Whether it is seeds saved by farmers from their own crops, bought from a market or shop, exchanged with friends and neighbours; community seed banks play an important role in the conservation and use of agricultural biodiversity, says new book.

According to a recently published book ,'Community Seed Banks: Origins, Evolution and Prospects', despite 25 years of history and the rapid growth in number, organisational diversity and geographical coverage of community seed banks, recognition of their roles and contributions has remained scanty.

The bookpublished in July 2015 by Earthscan in association with Bioversity International, is part of a series of books which aims to review the current state of knowledge on agricultural biodiversity; identify gaps, synthesize lessons learned and propose future research and development actions. The book highlights a wide range of issues, from conservation biology of genetic resources through social sciences to policy and legal aspects.

Based on an in-depth review of experiences from around the world, Bioversity International researchers have categorised the functions and services of community seedbanks into three core areas: conservation, access and availability, seed and food sovereignty.



Achieving universal primary education (MDG 2): School garden programs

Opportunities: Linking with School Health, Feeding and Sanitation Programs

- **Living laboratory for children (and parents)**
- **Sales of vegetables to teachers and parents bring revenue and help educate the community**
- **Excess produce can be for school feeding programs**

- **Philippines *Gulayan sa Paaralan* program now in 42,076 public schools**

Healthy diets begin with knowledge – school gardens

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Healthy diets begin with knowledge – school gardens

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Allotment gardens Philippines

Container and community gardening

Urban agriculture can take place in small spaces and can be productive.

Ingenuity is the key!

Community Gardens

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Healthy Diet Gardening Kits with IVs

- **Developed by AVRDC for distributing to farmers, trainees, or any private individual and to public and private agencies upon request**
- **Each kit composed of up to 17 different kinds of high yielding & nutritious vegetables**
- **Enough seeds (2-50 g) per crop to plant a home garden and sustain a healthy diet for a family of 8 for a year**

1 ERADICATE EXTREME POVERTY AND HUNGER
2 ACHIEVE UNIVERSAL PRIMARY EDUCATION
4 REDUCE CHILD MORTALITY
5 IMPROVE MATERNAL HEALTH

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Home gardens – household nutrition in the hands of women

Demonstration home garden and a selection of recipes for India


Stuffed ladies fingers


Creamy bottle gourd


Vegetable biryani


Crispy brinjal


Capsicum koftas


Chilli carrot chutney

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How Vegetables are vital to healthy human diets

Nutritional yield per 6x6 m home garden in 2 Indian States

		Protein (g)	Beta Carotene (mg)	Vit C (mg)	Iron (mg)
	RDA for a family of 4	7288	3212	58400	38143
Jharkhand	Nutritional yield / year	5349	3898	96820	9012
	% RDA met	73	121	166	24
Punjab	Nutritional yield / year	5205	5119	96	6143
	% RDA met	71	159	164	16

- Models met >100% of beta carotene and Vitamin C requirements
- Met nearly 3/4th of protein and 1/4th - 1/5th of iron requirements
- Leafy and legume vegetables campaign undertaken
- Nutritional rich recipes and food processing methods for improving iron and protein bioavailability being suggested

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Home gardens – household nutrition in the hands of women

Increasing knowledge on nutrition and cooking methods

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Improving food value and diets

Development of recipes to improve nutritional value, and extension through training programs

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Indoor window vegetable production

Half of the population now live in urban areas, hence local urban and small acreage food production is important. **Indoor vertical urban gardens** operating in **Japan**; option for **indoor window vegetable production** for every household.

Developing Global Agricultural Small Scale and Urban Food Production Systems

By K. McDonald on May 14th, 2013

Dr Jha, India, now at Colorado State University is promoting small scale and urban food production systems. His aim is increasing household nutrition and incomes and promoting economic health and well-being of rural areas.
He introduced two-wheeled tractors made in China to Afghanistan for successful small-scale farming.

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Another option - Microgreen containers

Seed trays placed inside gravel trays

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Loss of agrobiodiversity in allotment gardens

AGRICULTURE AND HUMAN VALUES
2012, DOI: 10.1007/s10460-012-9380-z Online First

Deskilling, agrodiversity, and the seed trade: a view from contemporary British allotments

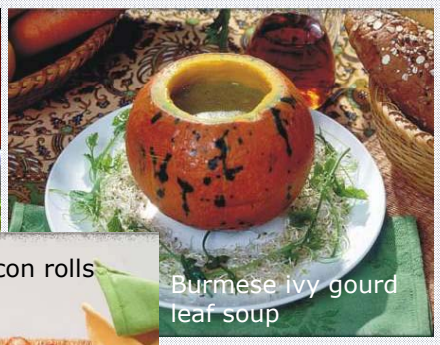
Paul Robert Gilbert

Quality control standards in Europe have restricted the circulation of non-commercially bred vegetable cultivars and led to loss of agrobiodiversity.

Dedicated seed savers who save and circulate seed of heterogenous 'heritage' varieties provide a better model for safeguarding vegetable diversity - similar to farmers who maintain their landraces.

Open Letter to the Members of the European Parliament: Need to review strict EU regulations to "*allow for the marketing of less homogenous, but genetically broader and better locally adapted varieties, and remove obstacles to the marketing and the exchange of seeds of old, rare and farmers' varieties, to enhance diversity and sustainability in European agriculture and better meet consumers' demands*" (Anonymous 2012).

Healthy meals based on indigenous vegetables



Group work: Community Seed Bank (CSB) concept

Questions to be addressed:

1. Management structure of CSB
   How to sustain activity of CSB?

2. Basic infrastructure needed for CSB

3. Crops of relevance to be targeted during phase 1

4. Select 3 priority crops and briefly describe:
- Best planting season
- Major steps in crop management
- Seed extraction, drying and storage

Suggested CSB Management Structure (example)