PRIMERS ON CROP MUSEUM AND BIO INTENSIVE GARDENING

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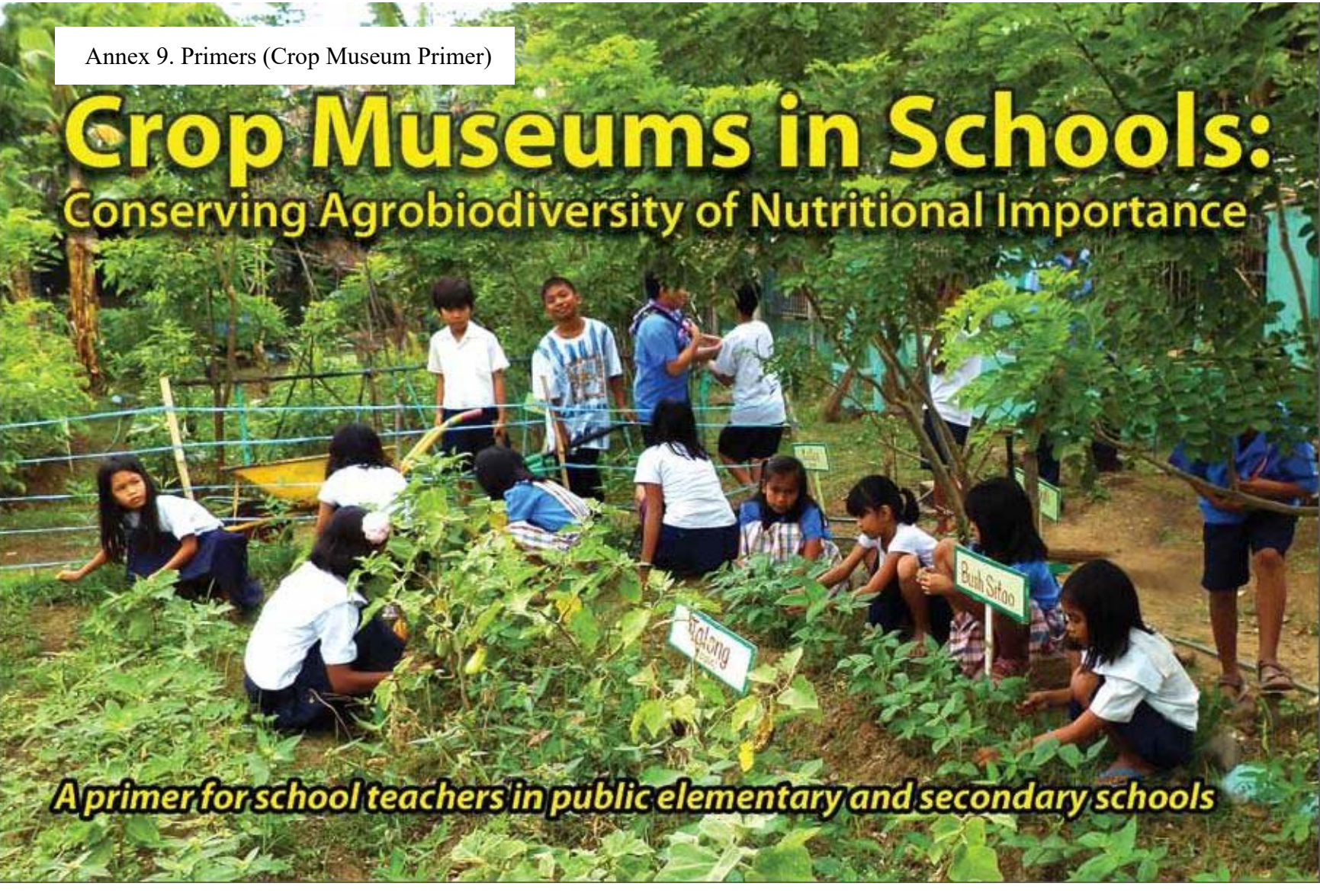
Annex 9. Primers (Crop Museum Primer)



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Strengthening the Implementation of the **Gulayan sa Paaralan Program** in Public Elementary and Secondary Schools

To address malnutrition and hunger in the Philippines, the Department of Education (DepEd) has put in place poverty alleviation schemes that will help promote food security and economic stability for affected families. It implemented the Gulayan sa Paaralan Program (GPP) to support the hunger mitigation initiatives of the government. DepEd issued Memorandum No. 293, s. 2007 to encourage both public elementary and secondary schools to establish school gardens to ensure continuous supply of vegetables for school feeding.

The GPP is one of the sub-programs of the National Greening Program (NGP) of the Department. It aims to promote production of foods that are rich in protein, carbohydrates, vitamin A and iron as major input in school feeding. The garden serves as a source of vegetables to sustain the School-based Feeding Program (SBFP) and other supplementary feeding in schools.

The GPP covers establishment of vegetable gardens, vegetable and tree nurseries, tree planting, propagation of medicinal plants, composting, school landscape aesthetic, vegetable development, crop museum, and related livelihood activities.

Endorsement of the concept of crop museums in schools by the Department of Education (DepEd) Philippines

Establishment, maintenance and sustainability of schools gardens:

a. Each school shall have a minimum of 200 square meter area. For schools without available space/ flooded area, they can adopt container gardening.

b. Schools are encouraged to adopt the "crop museum" technology approved by the IIRR. This will promote crop diversification and improve sufficiency on the supply of seeds and seedlings.

c. Starter seeds shall include preferred vegetable seeds that can help address malnutrition problems in schools (i.e. protein-energy and micronutrient malnutrition) as follows:

   - sources of protein – leguminous vegetables such as beans, monggo, peas, etc.
   - sources of calorie/energy – root crops such as gabi, camote, cassava, etc.
   - sources of Vitamin A and iron – leafy green vegetables such as tops of gabi, malunggay, saluyot , alugbati, kangkong, sili, kulitis, pechay, etc.

d. The school shall be responsible for establishment and maintenance of school gardens, as well as production of seeds for next cropping and partnership with stakeholders and community.

e. School gardens shall be continuously maintained and sustained thru establishment of nurseries, seed production in partnership with stakeholders.

Source: DepEd Memorandum No. 223, s. 2016

What is a crop museum?

Crop museums in schools serve as a focal point for saving crop varieties. This is a garden where teachers, students, and community members can view a diverse range of nutritionally relevant and climate-hardy vegetables. It can include trees, shrubs, root and tuber crops, vines, and short-season annual crops. Crop museums also serve as nurseries (source of planting materials) for surrounding schools and communities. Mother plants are preserved in crop museums throughout the year.

Ideally, every school district will designate at least one school as a crop museum to serve and support the needs of other schools in the district. Decentralizing seed saving of locally adapted crops will improve the sustainability of school gardens.

Why are crop museums important?

Over the centuries, backyard gardeners and farmers collected and preserved a diverse range of vegetable types and varieties. We are rapidly losing this diversity (agrobiodiversity) because once lost, we can never regain these important heritage varieties. Crop museums serve as living gene banks.

Schools can serve as custodians of biodiversity heritage in the Philippines. Schools can also serve as community seed banks.

The Philippines is used to be known for its diverse backyard gardens. However, with modernization and increasing reliance on commercial imports of vegetables, this rich diversity of crops and the culinary heritage associated with it are being lost. With this, we tend to eat less diverse diets. This is evident when food prices (especially vegetables and fruits) go up.






Locally adapted crops can tolerate adverse weather. Many of these varieties tolerate variable weather and changing climate conditions. We need to save them before they are totally lost. These crops are needed in the future when our climate has changed significantly. School gardens and backyards can be used to grow and save our crop diversity for future generations.

What are the minimum requirements for a crop museum?

The garden area should be at least 200 square meters. The plot should receive sunlight for at least 6 hours a day with good water source and a drainage system in case of heavy rains.

The school administrator should ensure that the garden face no potential future risks (e.g. use of land for buildings, flooding).

The area should be fenced on all sides with double rows of kakawate (planted 0.5 meter apart) to protect the garden from winds and typhoons and to serve as a source of green leaf manure to the garden.

A small nursery– a simple shed with a transparent roof– should be set up for raising seedlings in trays and plastic bags. A crop museum should have access to a permanent water source.

To ensure high seed productivity, the garden should use bio-intensive methods using permanent, raised deep dug (12″) beds. Bio-intensive gardens ensure the highest possible productivity per unit area of land.

Crop museums need dedicated care. It is important that a committed school garden teacher is identified, whose administrator allows him/her to devote time for caring and tendering the garden.

What crops to grow?

Prioritize indigenous vegetable crops that are nutritionally important and relevant to school feeding programs and backyard gardens.

These are examples of nutritionally important vegetables:

1. Amaranth (kulitis)
2. Long-fruited jute (saluyot)
3. Philippine spinach (talinum)
4. Horseradish (malunggay)
5. Rice bean (tapilan)
6. Cowpea (paayap)
7. Lima bean (patani)
8. Hyacinth bean (batao)
9. Ash/white gourd (kundol)
10. Pigeon pea (kadios)
11. Winged bean (sigarilyas)
12. Okra

How to start collecting seeds/planting materials for propagation of these heritage crops?

The designated school district crop museum can organize a weeklong campaign to collect seeds ideally in the months of September, December, and April (peak periods for seed production of local varieties).

When collecting seeds ensure that the variety is a stable one: ie., has been grown for 3-5 years in the locality. This means the crops have likely locally adapted already. Only hardy, stable varieties that do not rely on chemical sprays are included in seed exchange efforts.

Schoolchildren and Parents-Teachers Association (PTA) members are asked to collect seeds from individual backyard gardens in rural communities (from individual gardeners).

Varieties that were grown in the same geographic area for a minimum of 3 years without chemical use can be considered potential/useful materials. No quantity of seed is small – even three seeds of a vanishing heritage crop will do!

Collect basic information from the grower:

- Name of seed donor
- Name of student/teacher who collected
- Name of village where the seeds were collected
- Local name of crop/variety
- Uses
- Special features (e.g. pest or drought resistant or flood tolerant, etc.)

At the school, the supervising teacher will provide an accession number, e.g. MAR 001, MAR 002, etc. for Maragondon.

How to start seed exchange between schools and between districts?

Two seed exchanges can be facilitated every year: one *within* a school district and the other *between* school districts.

Schools will distribute "diversity" kits that has 20 small packets containing 5-20 seeds.

Each school district will label the seed packets with information about the source of seeds (e.g. Liliw, Ivisan, etc.).

To maintain interest, cross visits should be organized between schools. New materials should be frequently collected.

Crop museum managers must work with school feeding coordinators to demonstrate the preparation of recipes that feature local vegetables.

Local recipes help promote the wider use of both local and modern varieties. Menus developed by the Food and Nutrition Research Institute (FNRI) are designed to maximize the use of previously underutilized crops.

Feeding programs in schools will rely on food (i.e. rice, oil, etc.) purchased in local markets and vegetables grown in schools.

School canteens can also increasingly feature crops that children have forgotten to eat and sometimes, do not even know what they look like and how they grow.

Food sources must not only be diverse (to ensure nutritional diversity) but should also be safe and totally free of chemical residues.

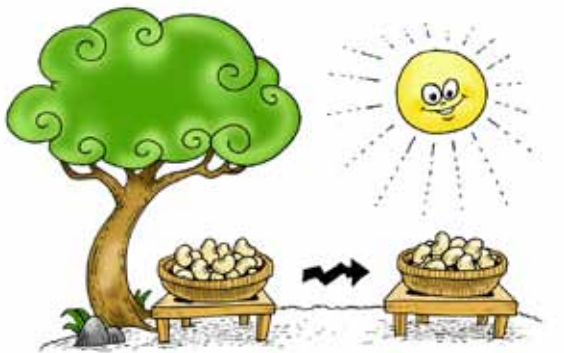
What are the other roles of school crop museums?

Crop museums are also responsible to train teachers on the importance of plant genetic resources conservation, climate change adaptation, seed production, extraction, and preservation and storage methods. Prior to training other schools, a Training of Trainers (ToT) will be conducted for district level crop museum teachers (conservators). The Department of Agriculture - Bureau of Plant Industry (DA-BPI) has special expertise in seed processing and preservation.

Crop museums serve as learning laboratories for children. It provides young students an opportunity to engage with science and to interact with their natural environment (i.e. soils, plants, biological life, etc.).

Crop museums are important mechanisms for schools and surrounding communities to reintroduce and preserve biodiversity of climate-smart crops, which also have nutritional importance.

Seed search missions, seed exchanges, seed saving/ storage, and seed sales to local communities are important functions of crop museums.



In saving seeds:

- Choose a healthy plant. Healthy seeds come from healthy plants.
- Do not dry seeds rapidly because they may not germinate.
- Prevent drying seeds from 11:00am to 2:00pm when the sunlight is most intense.
- Inspect seeds well before storing them.
- Remove infested seeds to ensure that healthy seeds are spared from pests.

There are ways of checking seed quality:

Floatation method

1. Soak seeds in water.
2. Seeds that float are either weak or dead.

Rag doll method

1. Spread a newspaper or cloth.
2. Place 10 seeds and sprinkle water until newspaper is soaked in water.
3. Roll the newspaper and wait for 3 days and check if seeds have germinated.

*Practical guidelines in storage of seeds:

- Seed quality cannot be improved by storage despite provision of favorable storage conditions. The best storage can only maintain quality.
- Good seed production, harvest, aeration, drying, and processing practices contribute to successful storage operations.
- Most seeds do not grow well when planted while too fresh. It is better to store them for 3-4 weeks before using them. Well-prepared and properly-stored seeds will stay alive for about 2 years. If possible, it is best to renew your seeds every year to get high quality crops.

** Source: Masustansiyang Pagtatanim, Department of Agriculture - Bureau of Plant Industry (DA-BPI)*

Plant genetic resources for food and agriculture are a precious inheritance from generations of traditional farmers in all regions, who developed and conserved the genetic resources that we use today. We have a moral obligation to pass these on to future generations because, once they are lost, they are lost forever.

Source: Food and Agriculture Organization of the United Nations

Final Note

Satisfaction can be derived when the school principal and teachers can share seeds with their communities and know it is making a difference to the health and lives of people. There is also satisfaction from them knowing that seed varieties are being saved before they are totally lost. So let's search for these crops, plant them in our gardens, share these seeds with schools and communities, and save them for future generations.

School gardens can serve as repository for our vanishing genetic resources heritage the same way a museum helps conserve valuable artifacts. Let's start today! Let's collect, propagate, and share our seeds with our friends in school as well as parents, teachers, and our neighbors.

Let us conserve our climate-smart agrobiodiversity heritage and our culinary traditions and, thereby also promote better family nutrition and healthy lifestyles in the Philippines. The school system is a great place to do this.











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(Bio-intensive Gardening Primer)

Bio-intensive Gardens (BIG):
A climate & nutrition smart agriculture approach

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Bio-intensive Gardens (BIG):





A climate & nutrition smart agriculture approach

Why are BIG climate and water smart?

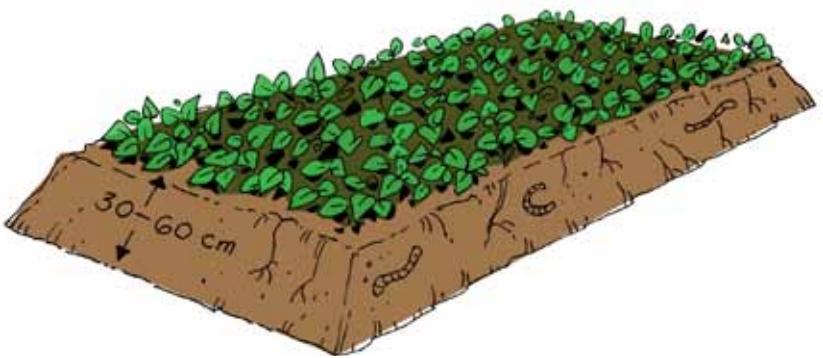
How can we make them more adaptive to climate change?

How can we conserve genetic diversity of nutritional importance?

Bio-intensive Gardens (BIG) is an agro-ecological approach to gardening which makes the best use of available natural resources and does not rely on any chemical inputs.

Bio-intensive Garden (BIG) has a low carbon footprint because very few external resources are used.

BIG relies on locally produced seeds, locally produced fertilizers and it does not use any chemical pesticides. Thus, the carbon footprints of food produced using this approach is small. Moreover, the food products are safe and free of pesticide residues.

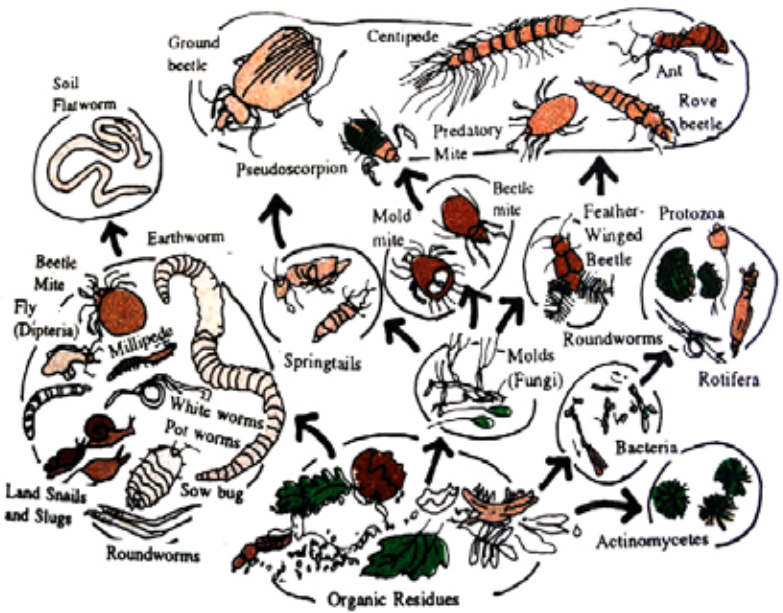


A deep-dug bed is essential when there are frequent droughts or flooding (12 inches deep or more is essential if you want to trap water in the soil).

It conserves rainwater and in times of floods, water is drawn down to the lower part of soil, within reach of the plant roots.

The beds are narrow making it possible to work from the sides to prevent compaction. This leaves the soil always loose.

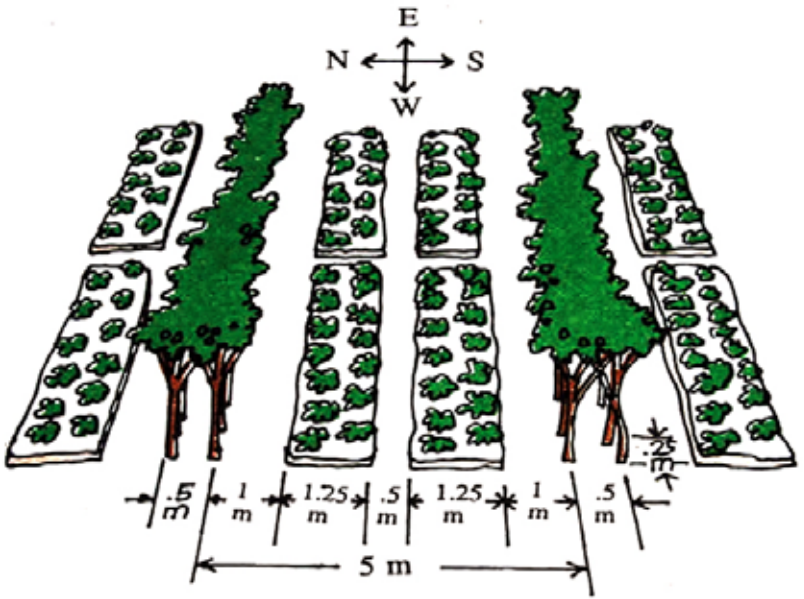
The slightest rain is absorbed and stored in the soil. BIG beds harvest rainwater better and store moisture longer.



Deep-dug beds with loose soil and lots of organic matter help store water, encourage earthworms and beneficial bacteria. This is a living soil and gets better every year (provided you don't let it dry up and compact again in summer).

In summer, when your gardens are generally not actively maintained, the entire garden should go into a cover crop of legumes (i.e. cowpea, rice bean, etc.). This keeps the microbes alive and reduces weed growth and most important of all, it keeps soil temperature low.

The planting of trees around the periphery of the garden (Kakawate or *Gliricidia sepium* or *Cassia siamea*) is an absolutely essential element. Leaves of these nitrogen fixing trees serve as source of green fertilizer. If trees are not planted on all four sides of the plot, then we don't get the advantage of cooling effects of trees. If you don't have trees, the wind tends to dry the soil. Moreover, trees can serve as barriers against strong wind.



Hedgerows Lopped and Incorporated into Beds

Green leaf manure trees are also grown between every two sets of plots to provide sufficient green leaf fertilizer.

The advantage of using green leaves as fertilizer is that it is a way of storing carbon in the soil, unlike when one uses chemicals where we contribute to the greenhouse gases (trees absorb carbon).

Another feature of BIG is that it uses mostly indigenous plant species. These are usually hardy and climate-resilient. Climate-resilient varieties are being lost because they are not popular amongst market-farmers.

These indigenous heritage varieties are still around and passed down from one generation to another. They must be saved because they are hardy and tolerate long dry weather (e.g. patani or lima bean, bataw or hyacinth bean, kadios or pigeon pea).

Every garden should have 70% of its area devoted to indigenous crop varieties. The rest could be acquired from commercial seed sources.

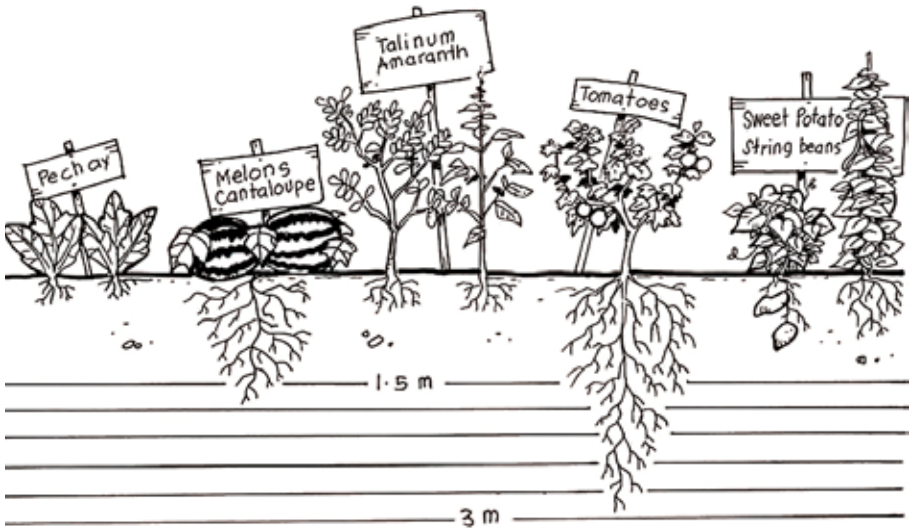
With rising temperatures we can expect more pests and diseases. That is a reality. This is the reason for increasing the intraspecies diversity to reduce risks from crop failure (e.g. different kinds of sweet potato).

… the interspecies diversity is also important. Diverse gardens ensure dietary diversity.

In BIG, we practice minimum tillage. After the first digging and especially in the drier months, we avoid subsequent unnecessary digging. The next crop is planted in the residue of the previous crop. This is a way of conserving soil moisture.

Green or blue net tunnels help reduce temperature and protect the crop from rain and insects.

Another way of conserving moisture and lowering soil temperature is to place mulch on top of the bed and in between plants within the bed.



In BIG, the plants do the digging themselves. When you practice crop rotation you take advantage of the fact that different crops have different rooting depths. So crops are always rotated and never planted in the same area in the same year.

BIG is an excellent example of climate smart agriculture.

Try it out and see for yourself. Enjoy nature and live a healthy lifestyle with chemical free, fiber dense and micronutrient rich foods.

Enjoy dietary diversity by maintaining garden diversity.

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