

- 📖 Bio-intensive Approach to Small-scale Household Food Production (IIRR, 1993, 180 p.)
 - ➔ ☐ Handling of garden produce
 - 📄 Conserving and safeguarding quality and freshness of garden produce
 - 📄 Non-refrigerated storage

Bio-intensive Approach to Small-scale Household Food Production (IIRR, 1993, 180 p.)

Handling of garden produce

Conserving and safeguarding quality and freshness of garden produce

After harvest, the quality of fruits and vegetables cannot be improved but can only be maintained for a certain period of time. Therefore, proper care should start with harvesting.

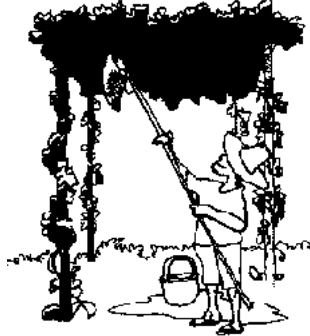
Time of Harvesting

Fruit-bearing vegetables should be harvested as soon as the dew dries in the morning. Leafy vegetables, on the other hand, should be harvested during mid-morning, when leaves are flaccid.

Harvesting Practices

1. Use of picking pole (hook) for fruits - A bag or net should be provided to catch the fruit. This will

prevent fruits from falling to the ground, protecting them from bruises.



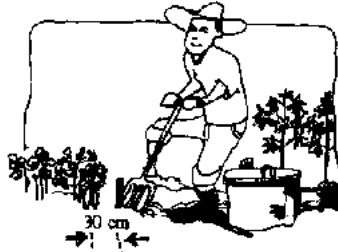
Use of picking pole (hook) for fruits

2. Uprooting the entire plant - Vegetables like pechay and mustard are commonly harvested by uprooting the entire plant. This makes the vegetables dirty because of the soil that clings to moss. A sharp round-tipped knife should be used to cut the stem instead of uprooting. Open ends should be brushed out with chlorine to prevent entry of microorganisms which induce rotting.



Uprooting the entire plant

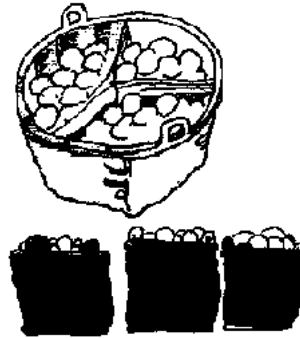
3. Digging tubers with spading fork - A marker or a label 30-cm from the center of the row should be put as guide so it will be easier for the harvester to determine where to dig. For ground creepers, vines should be lifted regularly during the growth period so that tuberous roots will be formed in rows.



Digging tubers with spading fork

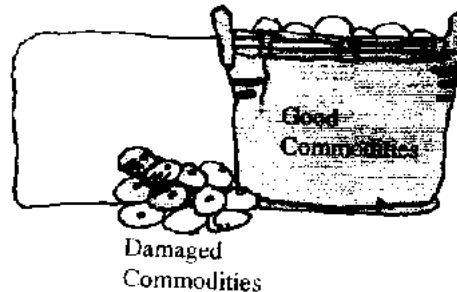
Sorting and Trimming

1. Separate vegetables and fruits of different maturities. Ripe fruits placed with unripe ones will induce the latter to ripen faster, shortening their storage life. Baskets with dividers can be used to separate fruits of different maturities.



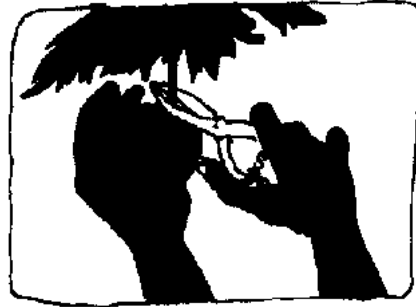
Separate vegetables and fruits of different maturities

2. Grade the harvested produce according to size/quality. Poor quality produce lowers the quality and price of the higher grade products. A separate package should be used for each grade.
3. Do not mix damaged produce with the sound ones. Damaged or injured portions of fruits and vegetables can hasten ripening of the products. Rotten commodities likewise cause the rotting of sound and clean ones. Produce damaged by insects, diseases and mechanical injuries should be put into separate containers. Those that are severely damaged should be composted.



Bio-intensive Approach to Small-scale ...
Do not mix damaged produce with the sound ones

4. Cut fruit as close as possible to the stem-end with the use of clippers. Leaving a long peduncle attached to the fruit pricks the skin of other fruits, making them less attractive and providing entrance for microorganisms.

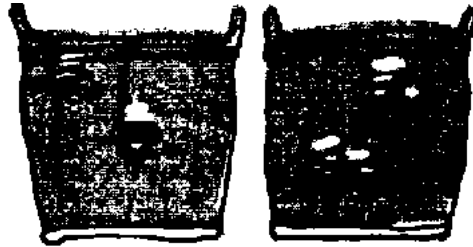


Cut fruit as close as possible to the stem-end

5. When trimming, retain 3-4 wrapper leaves to cover the head (in the case of cabbage, Chinese cabbage, head lettuce). Overtrimming (exposing head) just before packaging leaves no protection for the head to withstand further handling and transporting.

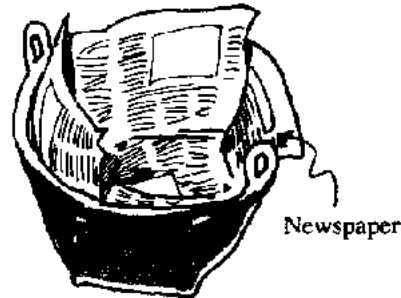
Packaging

1. Use containers that are neither too big nor too small to accommodate the harvest. Using very large containers is not advisable because handlers tend to drop heavy containers, resulting in bruised fruits and vegetables.



Use containers that are neither too big nor too small to accommodate the harvest

2. Put liners inside basket containers. Baskets used as containers for harvested fruits and vegetables should always be lined with suitable materials like banana leaves or newspapers. This will prevent the produce from getting in contact with rough surfaces.



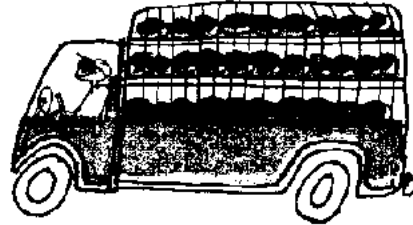
Put liners inside basket containers

Transporting

1. For bulk transport without container:

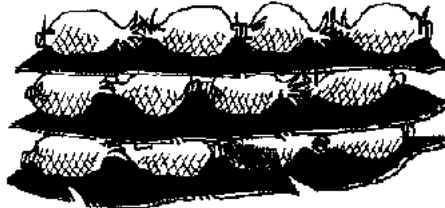
Provide horizontal platform dividers and liners for trailers, jeepneys, etc., (for watermelon, melon,

citrus and cabbage).



Provide horizontal platform

Arrange fruits crown-to-crown and base-to-base, with a cushion of banana leaves, rice stalks, etc., (for pineapple and bananas).



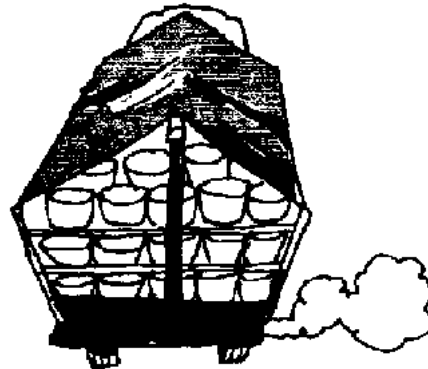
Arrange fruits crown-to-crown and base-to-base

2. Pack the produce carefully. Pliable packaging material cannot adequately protect the commodity. A 20-25 kg capacity crate lined with newsprint can be used for tomatoes and onions.



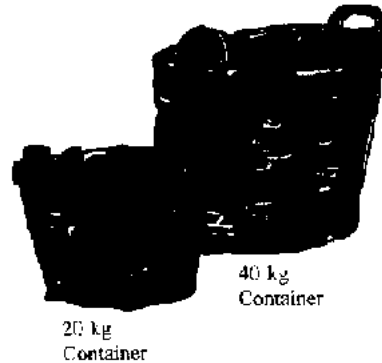
Pack the produce carefully

3. Provide space between the produce and canvas cover using a 30-cm wooden plank. Too compact stacking and use of snugly fitting canvas cover should be avoided to provide proper ventilation.



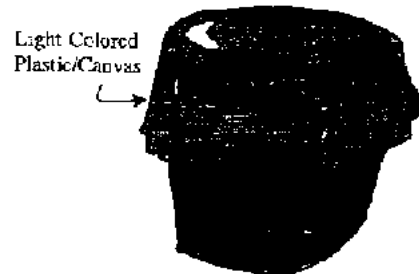
Provide space between the produce and canvas

4. Use only one type and one size of containers. Group containers according to size and type for easier stacking to minimize losses. Use small (20 kg) containers for mango, tomato, mandarin and citrus and a medium (40 kg) container for papaya and cucurbits. Each basket should have a hard



Use only one type and one size of containers

5. If the baskets need to be protected from the rain or sun, use a light-colored canvas/plastic cover that radiates heat.



Use a light-colored canvas/plastic cover

6. Avoid "throw and catch system" during loading and unloading. For loading and unloading, at least

three persons should be on hand to form a brigade.



Avoid "throw and catch system"

Source: ASEAN-PHTRC. 1981. Village Level Handling of Fruits and Vegetables; Traditional Practices and Technological Innovations. ASEAN-PHTRC Extension Bull. No. 1

Non-refrigerated storage

Vegetables and fruits have a short shelf life and have to be handled immediately after harvest. Leaving them unattended in one place will induce sprouting and rotting. Before storage, the commodity should be washed with chlorinated water, rinsed and air-dried.

Ways of Prolonging Shelf-life of Fruits and Vegetables

1. Sprinkling with water

Sprinkling water twice a day on some vegetables like winged beans (*Psophocarpus tetragonolobus*) and fruits like rambutan (*Nephelium lappaceum*) minimizes weight loss.

A disadvantage is that the free moisture hastens the growth and multiplication of microorganisms. Make sure that there is time for moisture to dry before sprinkling again.



Sprinkling with water

2. Wrapping with fresh leaves

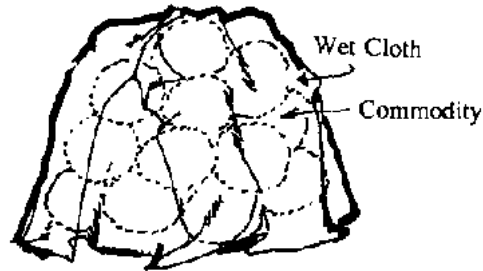
Leaves such as banana (*Musa sapientum*) and gabi (*Colocasia esculenta*) are good wrappers to keep a small amount of fruits and vegetables fresh for a few more days. Winged beans wrapped in fresh leaves can last for one-and-a-half to two weeks. Unwrapped ones only last for three days.

Banana leaves have to be slightly wilted over a fire to prevent them from cracking while in use. Leaves have to be changed before shrivelling and losing their protective property. Gabi leaves easily rot, so these should be changed before rotting occurs.



3. Drip Coolers

A wet cloth can serve as a short-term storage for fruits and vegetables. One method is to cover the commodity with wet a cloth. Another method is to place a basin of water on top of a table and let a piece of cloth drop from the basin to the floor enclosing all the sides of the table. Beneath the table is the produce placed on a piece of banana leaf, newspaper or burlap. The cloth acts as wick, draining water from basin to the produce and forming a "curtain" around the produce.



Drip Coolers

4. Storage in Moist Sawdust

Wash produce to be stored, preferably with chlorox to achieve longer storage life. Use 1 liter of water with 1 tablespoon of chlorox. Air-dry to remove excess water. Use this solution to moisten the sawdust.

Use clean and pure sawdust. If it has been used before, sterilize it by sun-drying. Remove splinters to prevent them from injuring the commodities.

Moisten a kilo of sawdust with 1 liter of water. This can store 1 kilogram of tomatoes (*Lycopersicon*

lycopersicum) or eggplants (*Solanum melongena*).

Mix sawdust and water thoroughly. Put it in a container or on clean floor in a cool, ventilated area. Bury the vegetables in the moist sawdust on a layer-by-layer arrangement. The first layer consists of sawdust, then a layer of vegetables, a cover of sawdust and so on. Each layer of vegetables should be left covered with medium-thick, moist sawdust.

Eggplant stored in this medium are good for more than a week under ordinary conditions.

Other commodities like potatoes (*Solanum tuberosum*), tomatoes, sweet potatoes (*Ipomoea batatas*) and mangoes (*Mangifera indica*) can be stored for short periods.

Storage in sawdust inhibits loss in weight as well as shrivelling. Sawdust, however, can be a source of infection if it comes in contact with any spoiled product.

Storage in sawdust is not applicable for leafy vegetables because it is difficult to remove sawdust particles from the leaves.



Storage in Moist Sawdust

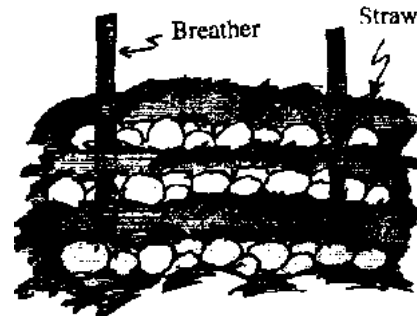
5. Clamp storage

Storing produce in piled layers of straw is used by onion growers. This is known as clamp storage.

Crops such as potatoes, sweet potato, cassava (*Manihot esculenta*) and other root crops are also stored in this manner, sometimes as a curing method. Curing is a wound-healing process to prevent entry of microorganisms.

Straw and grasses are common materials used. Layers of these materials are alternated with layers of produce until a convenient height is reached.

For onions (*Allium cepa*), a bamboo air duct (called breather) is provided to prolong storage life. This is made of longitudinally-cut bamboo slats tied together to form a tube with spaces between slats. It could also be a whole bamboo with nodes removed and hoses made along the sides at certain intervals. The breather is inserted vertically into the pile so that heat of respiration will escape. Protect the clamp against the rain, However, do not cover the clamp with plastic film, especially under full sunlight. to prevent rotting.



Clamp storage

6. Storage in Clay

Moistened clay jars are good places for storing some fruits and vegetables. The use of the clay jar is based on the fact that water evaporating from the area cools the immediate surroundings and

increases the moisture in the air.

Vegetables like cabbages (*Brassica oleracea* var. *capitata*), eggplants, tomatoes, pole sitao (*Vigna sesquipedalis*) or winged bean can be stored in clay jars for a week. Clay jars can be moistened or kept cool in many ways:

a. One method is to pour water over the covered jar enough to wet it. This provides the water for evaporation. Repeat the process when the sides of jar dry.

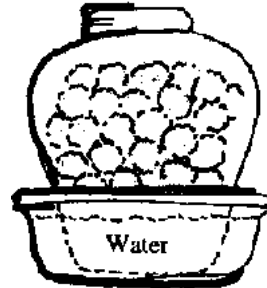
b. Another method is to seat a jar in a pan containing a small amount of water to provide a continuous supply of moisture that will seep up the sides of the jar and evaporate. Because free water accumulates at the bottom of the jar, a platform, made of banana stalks, sticks or any material that can support the commodities, should be provided to avoid the stored commodities from getting wet.

c. Jars can also be buried halfway in moist sand or soil in a cool shady place to provide the necessary coolness. This method works well with mangoes and cabbages. Ants find the cool jars a nice place to live in, so watch out for their invasion.

d. For big jars, there is a difficulty of getting water to rise from the bottom up the sides. This can be remedied by putting sacks or cloth over the covered clay jar and placing an inverted bottle of water on top, so the water drips slowly through the cloth or sack.



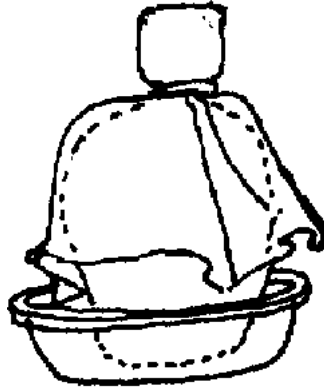
Pour water over the covered jar enough to wet it



Seat a jar in a pan containing a small amount of water



Bio-intensive Approach to Small-scale ...
Method works well with mangoes and cabbages

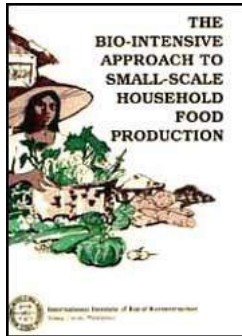


Putting sacks or cloth over the covered clay jar

Source: ASEAN-PHTRC. 1981. Village Level Handling of Fruits and Vegetables; Traditional Practices and Technological Innovations. ASEAN-PHTRC Extension Bull. No. 1

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- 📖 Bio-intensive Approach to Small-scale Household Food Production (IIRR, 1993, 180 p.)
 - ➔ ☐ Nutritional dimension of bio-intensive gardening
 - 📄 Sustaining gardens as nutrition
 - 📄 Vegetables for family nutrition



- 📄 Vitamin A content of some local foods in serving portions compared with recommended dietary allowances for various age groups
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- 📄 Vegetables with multiple edible parts
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Bio-intensive Approach to Small-scale Household Food Production (IIRR, 1993, 180 p.)

Nutritional dimension of bio-intensive gardening

Sustaining gardens as nutrition

A food-secure household with adequate dietary intake and reduced disease is likely to be adequately nourished. Gardens can make a very significant contribution with regard to iron, vitamin A, vitamin C, vegetable protein, fiber and, to a lesser extent, calories. Especially with the very poor, it is important to use a low-external input form of agriculture because these products are likely to be consumed at home. Moreover, food grown in this manner is safer to eat because it is chemical-free. Outputs of 14 pounds/day of vegetables from a 50 sq m area are easily obtained.

Given limited natural sources of fertilizers or compost, it makes sense to allocate whatever small quantities of biomass or nutrients available to a limited area - such as that found in backyards thereby maximizing outputs. Vegetable prices today are higher than at any point in agricultural history and intake among the poor is affected. This is so partly because today, vegetable production is mostly restricted to specialized commercial ventures. The deteriorating condition (from

degradation and desertification) of small and large farms is expected to further limit the availability of reasonably priced vegetables to the poor majority. The use of chemicals in vegetables is already at an all-time high. Given the ecological imbalances from pesticide overuse or unrestricted use, more rather than fewer chemicals are likely to be used by commercial growers. Family food gardens will have to be given serious attention by research and development agencies.

Here are some lessons derived from eight years of IIRR's involvement in home gardening initiatives.

1. A nutrition garden can achieve most of a family's nutrition goals in a sustainable manner if it aims at increasing the overall supply of nutrition-rich vegetables.

In a diversified garden, the family's total intake of vegetables is emphasized rather than its consumption of specific vegetables in specific quantities. The approach to planting certain amounts of specified vegetables, with the assumption that people will eat those vegetables in specified quantities is not realistic. People just aren't going to design their menus to suit recommendations based on a nutritional rationale. Let people choose what they want to but give them a wide selection of choices and urge them to grow a diversity of vegetables (8-12 at least). This way the whole family is likely to obtain the nutritional requirements at least for vitamins A and C, iron and fiber. Also, when diversity is emphasized, it is not necessary to deemphasize culturally popular vegetables such as eggplants or cucumbers that are supposedly low in nutritional value. By increasing the overall access to a diversity of vegetables, one can achieve the nutritional objectives in a more sustainable manner.

The calorie contributions of gardens are generally considered limited. But the increased consumption of vegetables from a garden does result in increased calorie intake because, in most developing countries, vegetables are eaten after they are cooked in oil. Increased vegetable consumption, therefore, results in increased oil intake and thus higher calorie consumption.

Moreover, several unconventional, neglected plant species are not typically included as a garden crop or are danger of vanishing: purple yam, potato yam, Colocasia, cassava, sweet potato,

arrowroot, etc. Grain legumes (legumes eaten in dry form) such as sword beans, jackbeans, lima beans and hyacinth beans are all rich in carbohydrates. Finally, seeds of gourds such as pumpkin and watermelon, usually eaten as a snack, are rich calorie sources.

2. Relative changes in intra-family food production and consumption are important indicators to evaluate gardening successes.

If a family which did not previously have a garden now has one that in itself is a measure of success - irrespective of the technological standard of the garden. If previously only 3-4 vegetables were grown and now 8-10 kinds of vegetables are grown in a garden, that again, is also a measure of success. Even if a family sells vegetables, the garden is successful as long as the total family intake of vegetables has also increased.

3. Incorporate the best of the indigenous knowledge available in the area.

Almost every culture, with the possible exception of pastoralists and forest dwellers, has engaged in some form of gardening or backyard mixed-tree orchards, primarily to meet household needs of food, fodder and fuel. Local people have a rich resource of knowledge, which can readily be integrated into gardening programs. The vertical use of space is maximized in traditional backyards, such as those found in the Philippines and Indonesia. A great diversity of plants, usually exceeding 3 dozen, are raised in these complex backyard ecosystems. The local selections are usually hardy and shade-tolerant and have been handed down through the generations. Special skills and knowledge in the area of varietal selection, planting time or planting calendars, seed storage and crop combinations have been passed on for generations. Unfortunately, introduced garden interventions based on dramatical new technologies dependent on external material inputs, hybrid seeds and new methods of pest control, provide little role for indigenous garden technology concepts. This knowledge, thus, becomes dysfunctional. However, if incorporated into gardening activities, this knowledge could make such programs more sustainable.

4. Input provision should be limited to the initial supply of seeds (for purposes of increasing garden

diversity) and on a case-by-case basis to the provision of community wells and community borrowing centers for tools.

The biggest investment is for training, information, education and communication (IEC) materials, monitoring and follow-up and not for material inputs. Only in the case of community gardens should wells or borrowing-centers for tools be considered. The adoption of the gardening technology must be based on its own inherent merits and not be influenced by the distribution of material inputs (fertilizers, pesticides and garden tools). Garden programs are often driven and sustained by the constant supply and promises of material inputs. Thus, one does not know what is really motivating the individual to adopt: the material inputs or an appreciation for nutrition gardening itself.

5. Seasonal employment and wage-earning opportunities often conflict with gardening activities, and this results in temporary neglect of gardens.

The time devoted to gardens is often affected by opportunities for earning wages. When the harvest period or the sugarcane milling season starts, the opportunities for earning wages usually are high. Even school children are often kept away from school in order to maximize such opportunities to earn hard and quick cash. Naturally, a garden program is neglected. Very little can be done other than ensure that at least a minimal level of garden maintenance is undertaken. Program administrators must recognize this factor and work around these situations.

6. The sale of garden produce can result in sustained interest by the gardener in the introduced technology/intervention.

This is true if the diversity concept (10-12 kinds of vegetables) is maintained and the sale of vegetables usually does not exceed 30% of the total garden output. If the sale is local and is made to people in the same socioeconomic bracket, the sale of vegetables cannot be considered as going against the nutrition objectives. In fact, where small amounts of money are earned on a regular basis from gardens, such activities are likely to be sustained longer.

7. Introducing the concept of the community garden promoter or indigenous specialist can lead to increased sustainability.

Some of the more successful garden programs have been associated with an increased role for participating gardeners themselves, in the further promotion and monitoring of the garden program. In the initial 12-18 months, the outside technician plays a major role, especially in introducing the technological options and related training and retraining. Subsequently, the program increasingly relies on selected individuals from among practicing gardeners to assist in subsequent training as resource persons, to monitor and to provide on-site assistance. These indigenous specialists individuals can be termed as "community garden promoters".

Usually after having served voluntarily for at least a year in garden promotion, they may receive some form of remuneration for the days they spend in training or conducting follow-up visits. This remuneration is justified as a means of allowing them to hire a replacement for the farm or as compensation for lost wage-labor earning opportunities. Another approach is to provide them with an income-generating project to compensate them for the time contributed to community service. Volunteerism from poor people is realistic only if the time required from them is minimal, e.g., assistance during an immunization campaign or for once-weekly assistance in cooking a meal at the daycare center. However, in agriculture and gardening, a substantial amount of time needs to be devoted by the indigenous specialist.

8. Community gardens in urban centers and in centralized/consolidated villages offer the best opportunity for systematic exploitation of the potential for garden interventions.

Many backyards are already fairly well planted exploited with trees and usually are too shady for annual vegetables. Gardens do not yield outputs commensurate with the effort invested under such circumstances. Vacant lands, such as public lands or that donated by a philanthropist, can be used for such gardens. Community gardens are contiguous blocks of lands allocated to a group (mothers, families, urban poor, farm workers), who are then given subdivided portions of the land, say 100

200 sq m, to manage on an individual or single-family basis. The sponsoring group might then be able to assist-by providing training, fencing, water supply and maybe a community tool-loan facility - but preferably nothing more.

It must be noted that this differs from the communal gardening approach, where no land area delineation is made for each family, i. e., everyone works communally in the entire area. The sustainability of commune gardens has been poor unless it is associated with "giveaways". In such situations people just continue to stay together, giving the semblance that the concept of communal gardening is valid and working until the give-aways are withdrawn.

9. Gardens - and not the numbers of training conducted - are measures of success.

All too often, the numbers of trainings conducted or the number of training materials produced and distributed are used as the measure of accomplishment. These are only measures of accomplishment of an intermediary objective. The only real measure of initial success is the number of trainees who have started gardening or have improved their previous efforts. The measure of final success is that of gardens being sustained without any outside material input assistance. The preoccupation with targets and conduct of training and echo-training and a corresponding neglect of field-level follow-up of trained gardeners is fairly serious in garden programs. Visitors are usually taken to a few well-maintained and extraordinary efforts, especially those by the roadside and within reach of donors and agency officials. There is a need to establish very clearly that the conduct of training itself is not indicative of the job having been accomplished.

10. The key to successful wide-scale adoption is being flexible on the technology and permitting gardeners to adapt further and modify the introduced technologies.

In initial training, a range of technological options are provided and gardeners are encouraged to adopt and adapt those ideas that make sense to them. They mix and match ideas based on their own rationale and after considering their own resource base (of time, available materials, family labor, etc.). The result of such an approach is a great diversity of garden designs. It does not make sense

for project holders to be fixated on the technology itself. What is important is that the people involved in the garden program raise more vegetables than they used to in the past.

Vegetables for family nutrition

Household gardens should include vegetables that are rich in protein, carbohydrates, minerals and vitamins.

Carbohydrate/Energy Sources

Cajanus cajan (pigeon pea), pods
Colocasia esculenta (taro), tuber
Dolichos lablab (hyacinth bean), dried beans
Ipomoea batatas (sweet potato), tuber
Manihot esculenta (cassava), tuber
Pachyrrhizus erosus (yam bean), tuber
Phaseolus aureus (mungbean), pods
Phaseolus calcaratus (rice bean), pods
Phaseolus lunatus (lima bean), pods

Vitamin A Sources

Amaranthus gracilis (amaranth), leaves
Basella alba (alugbati), leaves
Capsicum annuum (green pepper), leaves
Capsicum frutescens (hot pepper), leaves
Colocasia esculenta (taro), leaves
Corchorus olitorius (jute), leaves
Cucurbita maxima (squash), tops
Daucus carota (carrot), tuber
Hibiscus sabdariffa (roselle), leaves
Ipomoea aquatica (swamp cabbage), leaves

Ipomaea batatas (sweet potato), leaves
Momordica charantia (bittergourd), leaves
Moringa oleifera (horseradish), leaves
Portulaca oleracea (purslane), leaves
Psophocarpus tetragonolobus (winged bean), leaves and flowers
Talinum triangulare (Philippine spinach), leaves

High Vitamin C Sources

Amaranthus gracilis (amaranth), leaves
Basella alba (alugbati), leaves
Brassica chinensis (petchay), leaves
Brassica juncea (mustard), leaves
Colocasia esculenta (taro), leaves
Ipomoea aquatica (swamp cabbage), leaves
Momordica charantia (bittergourd), fruits and leaves
Moringa oleifera (horseradish), leaves
Psophocarpus tetragonolobus (winged bean), leaves and flowers
Talinum triangulare (Philippine spinach), leaves

High Protein Sources

Cajanus cajan (pigeon pea), pods
Canavalia ensiformis (jack bean), pods
Dolichos lablab (hyacinth bean), pods
Moringa oleifera (horseradish), leaves, pods
Pachyrrhizus erosus (yam bean), pods
Phaseolus calcaratus (rice bean), pods
Phaseolus lunatus (lima bean), pods
Psophocarpus tetragonolobus (winged bean), pods
Vigna sesquipedalis (string beans), pods

Iron-rich Crops

Amaranthus gracilis (amaranth), leaves
Basella alba (alugbati), leaves
Brassica chinensis (petchay), leaves
Brassica juncea (mustard), leaves
Cajanus cajan (pigeon pea), pods
Capsicum anuum (pepper), leaves
Colocasia esculenta (taro), leaves
Corchorus olitorius (jute), leaves
Dolichos lablab (hyacinth bean), pods
Ipomoea aquatica (swamp cabbage), leaves
Ipomoea batatas (sweet potato), leaves
Momordica charantia (bitter melon), leaves and fruits
Moringa oleifera (horseradish), leaves
Pachyrrhizus erosus (yam bean), pods
Phaseolus aureus (mungbean), pods
Phaseolus lunatus (lima bean), pods
Psophocarpus tetragonolobus (winged bean), pods
Phaseolus calcaratus (rice bean), pods
Talinum triangulare (Philippine spinach), leaves

Calcium-rich Vegetables

Amaranthus gracilis (amaranth), leaves
Basella alba (alugbati), leaves
Colocasia esculenta (taro), leaves
Corchorus olitorius (jute), leaves
Dolichos lablab (hyacinth bean), pods
Hibiscus sabdariffa (roselle), leaves
Ipomoea batatas (sweet potato), leaves

Momordica charantia (bitter gourd), fruit
 Moringa oleifera (horseradish), leaves
 Pachyrrhizus erosus (yam bean), pods
 Phaseolus calcaratus (rice bean), pods
 Phaseolus lunatus (lima bean), pods
 Talinum triangulare (Philippine spinach), leaves
 Vigna sesquipedalis (string bean), pods

Vitamin A content of some local foods in serving portions compared with recommended dietary allowances for various age groups

Vegetable	Measure	EP Weight (gm)	Vitamin A (IU) Content				
			1000	2000	3000	4000	5000
<i>Colocasia esculentia</i> (taro), leaves, cooked	1/2 cup	82					
<i>Daucus carota</i> (carrot), tuber, cooked	1/2 cup	56					
<i>Amaranthus gracilis</i> (amaranth), leaves, cooked	1/2 cup	54					
<i>Moringa oleifera</i> (horseradish), leaves, cooked	1/2 cup	54					
<i>Basella alba</i> (alugbati), leaves, cooked	1/2 cup	68					5097
<i>Corchorus olitorius</i> (jute), leaves, cooked	1/2 cup	54					4779
<i>Capsicum annuum</i> (green pepper), leaves, cooked	1/2 cup	54				4234	
<i>Momordica charantia</i> (bitter gourd), leaves, cooked	1/2 cup	54			3742		
Isipinaka, leaves, cooked	1/2 cup	54			3734		
<i>Portulaca oleracea</i> (purslane), leaves, cooked	1/2 cup	54			3456		
<i>Capsicum frutescens</i> (hot pepper), leaves, cooked	1/2 cup	54			3437		
<i>Manihot esculenta</i> (cassava), tops, raw	1 cup	20		2631			
<i>Ipomoea batatas</i> (sweet potato), tops, cooked	1/2 cup	68		2275			
<i>Ipomoea aquatica</i> (swamp cabbage), leaves, cooked	1/2 cup	50		2122			

19/10/2011

Bio-intensive Approach to Small-scale ...

<i>Cucurbita maxima</i> (squash), tops, cooked	1/2 cup	68	1948		
<i>Brassica chinensis</i> (pechay), leaves, cooked	1/2 cup	50	1720		
<i>Brassica juncea</i> (mustard), leaves, cooked	1/2 cup	59	1664		
<i>Ipomoea batatas</i> (sweet potato), yellow, tuber, cooked	1 cup	150	1538		
<i>Secchim edule</i> (chayote), tops, cooked	1/2 cup	68	1513		
<i>Lycopersicon lycopersicum</i> (tomato), fruit (3 medium) raw	3 1/2 x 4 1/2 cm.	140	1039	1800	2300
<i>Cucurbita maxima</i> (squash), fruit, cooked	1/2 cup	65	640		4000

* Edible Portion

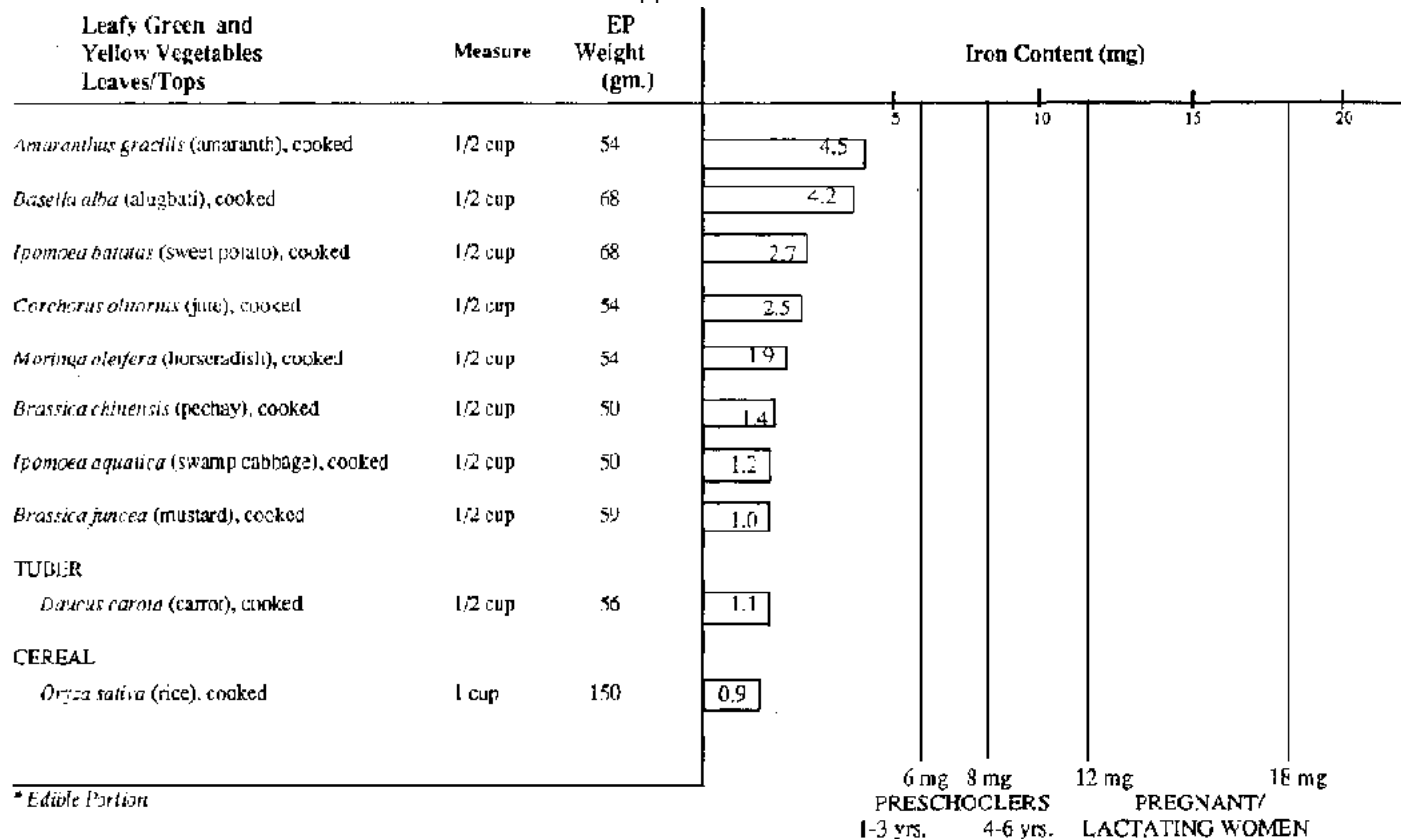
Source:

Food and Nutrition Research Institute

PRESCHOOLERS 1-3 yrs. 4-6 yrs PREGNANT WOMEN

Vitamin A content of some local foods in serving portions compared with recommended dietary allowances for various age groups

Iron content of some local foods in serving portions compared with recommended dietary allowances (RDA) for various age groups

**Source:**

Food and Nutrition Research Institute

Produced by the International

Iron content of some local foods in serving portions compared with recommended dietary allowances (RDA) for various age groups

Vegetables containing iodine

(For Goiter-affected Areas)

Scientific Name	Common Name	Parts Per Billion Iodine per 100 g edible portion
Sargassum siliquosum (dried)	aragaz	3,900,000
Gracilaria compressa (dried)	ceylon moss	500,000
Gracilaria verrucosa (deed)	gulamang dagat	3,800 - 360,160
Laurencia seticulosa (dried)	kulot	79.344
Caulerpa racemosa	lato	24,600
Codium tenue	pokpoklo	2,139
Hydroclathrus clathratus	balbalulang	1,845
Colocasia esculenta (leaves and stem)	taro	485
Daucus carota	carrot	81
Apium graveolens	celery	81
Phaseolus vulgaris	snap bean	80
Cajanus cajan	pigeon pea	80
Sesbania grandiflora	katuray	80
Phaseolus aureus	mungbean	80
Phaseolus lunatus	lima bean	80
Psonhocarnus tetragonolobus	winged bean	80

<i>Vigna unguiculata</i>	winged bean	80
<i>Vigna sesquipedalis</i>	string bean	80
<i>Pachyrrhizus erosus</i>	yam bean	80
<i>Phaseolus calcaratus</i>	rice bean	80
<i>Raphanus sativus</i>	radish	71
<i>Brassica chinensis</i>	pechay	70
<i>Momordica charantia</i>	bitter melon	65
<i>Cucurbita maxima</i>	squash	65
<i>Cucumis sativus</i>	cucumber	65
<i>Sechium edule</i>	chayote	65
<i>Lagenaria siceraria</i>	bottle gourd	65
<i>Brassica oleracea</i>	cabbage	60
<i>Nasturtium officinale</i>	watercress	50
<i>Lycopersicon lycopersicum</i>	tomato	47
<i>Solanum tuberosum</i>	Irish potato	47
<i>Capsicum anuum</i>	green pepper	47
<i>Solanum melongena</i>	eggplant	47
<i>Brassica juncea</i>	mustard	27

References:

Medical and Applied Nutrition Research Institute. 1979. Foods Highest and Lowest in Various Nutrients. FNRI Publications No.33.

Quisumbing, E. 1978. Medicinal Plants of the Philippines. Katha Publishing Co., Inc. 1262 pp.

Vegetables with multiple edible parts

Scientific Name	Common Name	Edible Parts
<i>Cucurbita maxima</i>	squash	fruit, seeds flower, shoots
<i>Psophocarpus tetragonolobus</i>	winged bean	Pods, shoots, flowers
<i>Moringa oleifera</i>	horseradish	Pods, flowers, leaves
<i>Colocasia esculenta</i>	taro	cone, leaves, petiole
<i>Hibiscus sabdariffa</i>	red serrel	fruits, leaves, petiole
<i>Sesbania grandiflora</i>	sesbania	fruits, flowers, leaves
<i>Ipomoea batatas</i>	sweet potato	tubers, leaves, petiole
<i>Vigna sesquipedalis</i>	string bean	pod, shoots
<i>Sechium edule</i>	chayote	fruits, shoots
<i>Raphanus sativus</i>	radish	roots, leaves
<i>Momordica charantia</i>	bitter gourd	fruits, shoots
<i>Capsicum anuum</i>	green pepper	fruits, leaves
<i>Allium cepa</i>	onion	bulbs, leaves
<i>Allium sativum</i>	garlic	cloves, leaves
<i>Vigna sinensis</i>	cowpea	Pods, shoots
<i>Dolichos lablab</i>	lablab bean	Pods, shoots
<i>Pachyrrhizus erosus</i>	yam bean	tubers, young pods
<i>Apium graveolens</i>	celery	leaves, stems
<i>Brassica oleracea var. acephala</i>	kale	leaves, stems
<i>Petroselinum crispum</i>	parsley	leaves, stems
<i>Ipomoea aquatica</i>	swamp cabbage	leaves, petiole

Citrullus vulgaris	water melon	fruits, seeds
Abelmoschus esculentus	ladyfinger	fruits, seeds
Brassica chinensis	pechay	leaves, flowers
Brassica juncea	mustard	leaves, flowers
Amaranthus gracilis	amaranth	leaves, seeds

Neglected annual vegetables

Amaranth

Amaranthus gracilis Dest.

Amaranth is a common plant found throughout the Philippines at low and medium altitudes. It is also found in all warm countries. The plant is an erect, smooth, branched herb, growing 30 - 60 cm in height. The leaves are ovate, longpetioled, 4 - 10 cm long.

The cross-pollinated short-lived annual is drought-tolerant (grows better than corn in dry conditions), adapted to a wide range of soils and pH levels (5.5 - 7.5 optimal) and highyielding. It cannot withstand waterlogging but tolerates some moist conditions. Generally, it is not shade-tolerant but there are indications that some varieties tolerate shade. It prefers sunny sites on well-drained, fertile soils and temperatures of 22 - 30 C. It is an ideal dry season plant.

A major food source to civilizations dating back 6,000 years, amaranth is a very nutritious and good-tasting leafy vegetable that is ready to eat in only 3 - 6 weeks after sowing. Chemical analysis of the tops shows that it is rich in calcium and iron. The plant is also a good source of vitamins B and C.

Very young plants can be pulled up and eaten whole or leaves can be removed on older plants. In

addition, cutting the tips back promotes lateral shoot growth, increasing leaf production. It has been recommended that the plants be cut back to 20 - 25 cm and allowed to regrow for 3 weeks before harvesting again, making four or more harvests possible. Once the plant flowers, the leaves become very bitter.



Amaranth

Nutritional Contents per 100 Grams of Edible Portion

Constituents	Leaves
water (ml)	89.0
calories	26.0
protein (g)	3.6
fat (g)	0.1
carbohydrates (g)	4.0
fiber (g)	1.3
vit. A (ug)	6545.0
vit. C (mg)	23.0
iron (ma)	2.9

calcium (ma) 154.0

Basella

Basella alba L.

Basella is found in settled areas, in hedges, old cultivated areas throughout the Philippines.

A popular vegetable of the Visayas, Basella is found in almost all backyards and gardens in Visayan homes. It occurs also in Malaya, other parts of tropical Asia and of Africa, often cultivated.

This is a succulent, branched, smooth, twining herbaceous vine, reaching a length of 6 m. The stems are green or purplish. The leaves are somewhat fleshy, ovate or heart-shaped, 5 - 12 cm in length, stalked, tapering to a pointed tip and cordate at the base. The fruit is fleshy, stalkless, ovoid or nearly spherical, 5 - 6 millimeters in length and purple when mature.

This short-lived perennial grows best in a variety of soils with fertile, well-drained clayey loams. It is tolerant to both high temperature and high rainfall levels; some varieties are also drought-tolerant. However, water stress may induce flowering. In addition, under lightly-shaded conditions, basella produces larger leaves than when planted in full sun. Since it is a short-day plant, in days longer than 13 hours flowering will not occur. Although it grows well year-round, planting at the start of the rainy season is recommended. Basella does not grow well at elevations higher than 500 meters. Propagation is usually by 25 cm cuttings.

Basella is remarkably resistant to diseases and pests, the only serious problem being the root-knot nematode.

Young shoots and leaves are first picked 30-50 days after planting. Removing the flowers promotes continued leaf production. The vegetable is a good source of calcium and vitamin A and an excellent source of vitamins B and C. The leaves contain vitamins A3 and B3 and the fruit, iron. It has a high roughage value characteristic of leafy vegetables. Basella is a very common and popular leafy

vegetable, much used in stews and makes a good substitute for spinach. The plant is mucilaginous when cooked. The juice from the small fruits is sometimes used for fond coloring.



Basella

Nutritional Contents per 100 Grams of Edible Portion

Constituents	Leaves
water (ml)	93.0
calories	19.0
protein (g)	1.6
fat (g)	0.3
carbohydrates (g)	3.5
fiber (α)	0.6

vit. A (ug)	349.0
vit. B (mg)	86.0
iron (mg)	1.60
calcium (mg)	106.0

Bitter gourd

Momordica charantia L.

Bittergourd is grown widely throughout the Philippines and is considered to be one of the biggest income-generating crops. Of the two local varieties, the green and the white-fruited, the green is preferred for both eating and planting.

The vines of this annual herb climb to a length of 3 - 4 meters. The leaves are rounded, 2.5 to 10 centimeters in diameter, divided nearly to the base into 7. The flowers are yellow. The fruit of cultivated variety is oblong, cylindrical, 15 to 25 cm in length, pointed at both ends, ribbed and wrinkled; while the wild variety is ovoid and 2 - 4 cm long. The seeds are oblong, compressed, 10 - 13 mm long and corrugated on the margins.

The plant grows best in hot, humid areas in altitudes up to 500 m. Bittergourd is adapted to a wide variation of rainfall and soils; however, it prefers loamy, well-drained, rich, organic soil types with adequate water retaining capacity. The plant is crosspollinated and produces better when trellised.

Major pests include fruit flies, fruitworms and aphids. Diseases are bacterial wilt, anthracnose and fusarium wilt.

Fifty to seventy days after sowing, the immature fruits are ready for harvesting. They are boiled, fried, curried or pickled. Soaking the fruit in salted water removes some of the bitter taste. In comparison to other cucurbits, the bittergourd is more nutritious, with higher levels of vitamin A and calcium. The leaves and fruits are excellent sources of iron, calcium, phosphorus and vitamin B. The

tender shoots and the leaves are also eaten as a vegetable. However, they do not store well.



Bitter gourd

Nutritional Contents per 100 Grams of Edible Portion

Constituents	Leaves	Fruits
water (ml)	80.0	92.0
calories	60.0	25.0
protein (a)	5.1	1.2
fat (g)	0.4	0.2
carbohydrate (g)	12.0	5.0
fiber (a)	0.5	1.0
vit. A (ug)	5,085.0	110.0
vit. C (mg)	107.0	57.0
iron (mg)	7.1	0.2

calcium (mg)	264.0	13.0
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Black Beans *Vigna sinensis*

Several cowpea varieties are grown commercially all over the world, but the black variety is not commonly known.

Cowpea is a climbing vine with trifoliate leaves. The flowers are white or pale violet. The pods are 8 - 12 cm long and less than 1 cm wide.

Dried seeds of black cowpea have an extremely desirable taste when boiled and eaten as a vegetable dish. With sugar and evaporated milk and probably ice, the taste becomes exquisite. This most desirable taste is associated with the black seed coat. The green pods taste about the same as those of other cowpea varieties.



Black Beans

Mineral Content and Food Value of Cowpea

Constituents	Oven-dried Samples (%)	
	Pods	Seeds
ash	8.28	5.38
phosphorus as P2O5	1.91	1.77
calcium as CaO	1.17	0.11
iron as Fe2O3	0.03	0.016

Cassava

Manihot esculenta Crantz.

Cassava was introduced from Mexico in the early colonial period, but is now widely distributed throughout the Philippines in settled areas.

Cassava consists of two groups; the bitter-rooted which is grown commercially for starch and the smaller rooted sweet or edible type grown in gardens. The latter is described below.

Manihot esculenta is a short-lived shrubby perennial growing up to 5 m in height. The leaves are alternate and smooth and divided to the base into 3 - 7 narrow segments 10 - 20 cm long, except from some of the upper leaves, which are entire. The flowers are about 1 cm long. The fruit is ovoid and about 1.5 cm long, with six, narrow longitudinal wings.

Being adaptable to many soil types, it is often grown in vacant spots, along fences, on hillsides or even as a living fence. However, it grows best in well-drained, sandy loam soils with ample organic matter. (Excessive fertility stimulates high stem and leaf production at the expense of tuber growth.) It grows in a wide pH range (5.0 - 7.0), in great rainfall variation (500- 2500 mm) and in elevations up to 1700 m. Also, high humidity promotes growth even when soil moisture is low; however, cassava does not tolerate waterlogging. Daylight in excess of 10 - 12 hours reduces tuber growth. Cassava is propagated by 25 cm wood stem cuttings (mature stems are likely to be infected

with mosaic virus) and is cross-pollinated. Planting is best done at the onset of the rainy season.

While there are a number of diseases and insects affecting cassava, none cause major problems, However, damage caused by rats and red mites during the dry seasons and leaf spot can be significant.

In a 2 × 5 meter area, 2 kilos of cassava leaves can be harvested per week during the rainy season, usually 50 - 70 days after planting. However, picking the leaves causes tuber reduction. The leaves are boiled, dried or ground into a powder for soups and sauces. The tubers are harvested 150 300 days from planting depending on the variety. They contain a high amount of toxic hydrocyanic acid. However, in the sweet cultivars, this acid is confined only to the skin. To destroy the toxin, the tubers should be peeled, washed and boiled (without a lid), or roasted or fried like chips.



Cassava

Nutritional Contents per 100 Grams of Edible Portion

Constituents	Tubers	Leaves
water (ml)	62.0	71.0

calories	149.0	91.0
protein (g)	1.2	70.0
fat (g)	0.2	1.0
carbohydrates (g)	35.0	18.0
fiber (g)	1.1	4.0
vit. A (ug)	30.0	11.8
vit. C (mg)	31.0	311.0
iron (mg)	1.9	7.6
calcium (mg)	68.0	303.0

Chayote Sechium edule

Chayote is a vigorous-climbing perennial herb with hairy stem, up to 12 meters in height and with oval, palegreen fruits 6 - 10 cm long. It grows well in soils with ample organic matter (loamy or sandy preferred) and with good moisture-retaining capacity since the plant does not tolerate drought conditions, especially during early growth. Some varieties prefer lightly shaded areas. A pH range between 5.5 - 6.5 suits the crop best. Chayote flowers at day length of 12 ½ hours. The plant is cross-pollinated.

Chayote is propagated by planting a mature fruit (at an angle, large end down with smaller end slightly out of the soil) and, because of its moisture needs, is best planted at the onset of the rainy season. It is trellised along fences, trees or house posts. Chayote is easily rejuvenated by cutting back the old vines to a height of ½ meters and if conditions permit, the plant will fruit for several years.

There are rarely any serious pest or disease problems.

At approximately 100 - 120 days or 3 - 4 weeks after first fruit sets, the immature fruits, high in iron and calcium, are ready for picking. They are prepared as a vegetable, in salads or pickled. The young leaves and tendrils are cooked as vegetables. In addition, the tubers of the established plant when boiled are palatable.



Chayote

Nutritional Contents per 100 Grams of Edible Portion

Constituents	Leaves	Fruits
water (ml)	91.0	94.0
calories	25.0	19.0
protein (g)	4.0	0.7
fat (g)	0.3	0.1
carbohydrate (a)	3.0	5.0
fiber (g)	0.8	0.6
vit. A (ug)	1515.0	15.0
vit. C (mg)	24.0	14.0
Iron (mg)	1.4	0.4

Ca (mg)	1.4	0.4
calcium (mg)	62.0	17.0

Drumstick Tree/Horseradish Tree
Moringa oleifera Lam.

Horseradish tree was introduced from tropical Asia or Malaya in the prehistoric period and is now widely distributed throughout the Philippines, in settled areas at low and medium altitudes.

The plant is a small tree, 8 m or less in height, with corky bark and soft, wide wood. The leaves are alternate, usually thrice pinnate and 25 - 50 cm long. The leaflets are thin, ovate to elliptic and 1 - 2 cm long. The flowers are white and 1.5 - 2 cm long. The pod is 15 to 30 cm long three-angled and nine-ribbed. The seeds are three-angled and winged on the angles.

In some parts of the world, the horseradish tree is also referred to as "mother's best friend". Although it is grown extensively in the Philippines, few realize the vast potential of this tree. Essentially, all parts of the tree are useful.

Either propagated by cuttings or seeds at 8 months, the perennials begin flowering and continue, throughout the year. Horseradish tree grows in almost any kind of soil, the ideal being a well-drained loam or clay loam fertile ground. The best time for planting is at the onset of the rainy seasons. Before each wet season, the tree should be pruned to a height of 1 ½ meters. This promotes new branch and leaf growth and makes harvesting easier and the prunings can be used for fuel. The horseradish tree is free of serious disease; the only significant pests are the mite and the root knot nematode.

The young leaves, flowers and pods are used as vegetable in the Philippines, Malaya and India. Analyses of the leaves show that they are very rich in calcium and iron and a good source of phosphorous. They are particularly valuable on account of the calcium and iron content. Young fruits are high in protein, a fair source of calcium, iron and high in phosphorus.

Research is currently being conducted along the River Nile in Africa using the powder of the mature seed as a primary coagulant in purifying water.

In the future, the horseradish tree may be a key element in the struggle against hunger.



Drumstick Tree/Horseradish Tree

Nutritional Contents per 100 Grams of Edible Portion

Constituents	Leaves
water (ml)	-
calories	46.0
protein (g)	3.4
fat (g)	-
carbohydrates (g)	-
fibre (g)	-
vit. A (ug)	7,595.0
vit. B (mg)	142.0

iron (mg)	2.1
calcium (mg)	215.0

Hot Pepper

Capsicum frutescens L.

A native of tropical America, hot pepper is cultivated throughout the Philippines, but is also thoroughly established in open, waste places in the settled areas.

Hot pepper is erect, branched, half-woody and 0.8 to 1.5 meters in height. The leaves are oblong-ovate to ovate lanceolate, 3 to 10 cm long and pointed at the tip. The flowers are pale green or yellowish-green and 8 to 9 mm in diameter. The fruit is commonly red when ripe, oblong-lanceolate and 1.5 to 2.5 cm long.

The fruit has a very sharp taste and is extensively used as a condiment. It is mixed with or made into pickles and is a principal ingredient in all curries in India. The leaves are used as a green vegetable. They have a very pleasant, somewhat piquant flavor. The leaves are excellent sources of calcium, iron and vitamins A and B and good source of phosphorus.



Hot Pepper

Hyacinth Bean
Dolichos lablab L.

Hyacinth bean is commonly cultivated throughout the Philippines in the settled areas. This is a smooth, twining annual vine reaching a length of 6 m or more, with often purplish stems. The leaves are trifoliolate. The leaflets are ovate and 7 - 15 cm long. The flowers are pink-purple or nearly white, about 2 cm long. The pods are oblong, flattened, 7 - 12 cm long about 2 cm wide and contain 3 - 5 seeds.

Because of its deep root system, this legume is hardy and drought-resistant and grows successfully during the dry season. However, adequate moisture is required during early growth stages. The hyacinth bean grows in a wide variety of soils with a pH ranging from 4.4 to 7.8. It is best suited for sandy loam soil which is well drained. Waterlogging will kill the plant. Some varieties, namely those cultivated at higher altitudes, are known to be shade-tolerant and very fast growing. If conditions permit, e.g., with adequate water and fertilizer, the hyacinth bean can grow 2 - 3 years. It is both

self-and cross-pollinated.

Compared to most legumes, the hyacinth bean is more resistant to diseases and pests. The major diseases affecting the bean in the humid tropics are: ashy stem blight, powdery mildew and bacterial blight. Primary pests are the pod borer, aphids, mealybugs, leafhoppers, and shieldbugs.

By rotating crops and using disease-free seeds. problems can be kept to a minimum.

In South India, the hyacinth bean is a major source of protein for the rural people. However, in other subtropical and tropical countries, it is a relatively unexploited crop.

The young pods, leaves and flowers are cooked like a vegetable. Surprisingly, the hyacinth bean leaf is rich in protein and is one of the best sources of iron among the legume family. Chemical analyses of the young pods show they are fairly good sources of calcium. The protein-rich beans are harvested 70 - 120 days after sowing. Like the lima bean which contains high levels of cyanide-producing glucosides, the hyacinth bean should be boiled well before consumption. In some parts of the world, the dried bean is used as a coffee substitute. The sprouts are similar in taste to soy and mung sprouts and even the swollen roots are palatable. The field-bush varieties are excellent forage, green manure and erosion controlling crops.



Nutritional Contents per 100 Grams of Edible Portion

Constituents	Fresh Pods	Seeds
water (ml)	82.0	10.0
calories	-	340.0
protean (g)	4.5	22.8
fat (g)	0.1	1.0
carbohydrates (g)	10.0	62.0
fiber (g)	2.0	8.6
vit. A (ug)	-	-
vit. C (mg)	1.0	trace
iron (mg)	10.0	9.0
calcium (mg)	50.0	90.0

Lima Bean
Phaseolus lunatus L.

Lima bean is thoroughly naturalized in the Philippines and common in thickets at low and medium altitudes, ascending to 2,000 meters. It was introduced from tropical America and is now widely distributed.

There are two types of this legume: the twining perennial, growing 24 m tall, which is staked; and, the annual herb or bush, growing 30 - 90 cm in height. The leaves are thin, compound with three leaflets which are ovate, 6-12 cm long and somewhat rounded at the base and pointed at the tip. The flowers are greenish or pale yellow, about 13 millimeters long. The pods are oblong, somewhat

curved, 6 - 12 cm long and about 2 cm wide and contain from 1 - 4 large, variously colored or white seeds. Compared to most common beans, the lima bean grows well in poorer soils of the lowland and tropics; however, it prefers sandy loam, well-drained and well-aerated soils with pH between 6.0 and 7.0.

Of the two types, the climbing perennial is considered more drought-resistant than the bush type, but both are tolerant to heavy rainfall during the growing period. However, heavy rainfall during flowering will reduce fertilization.

Temperatures exceeding 32 - 32 C (90°F - 95°F) combined with low humidity may also cause the blossoms to shed and the pods to drop.

As with most legumes, lima helps restore soil fertility. Its vigorous growth and copious leaf shedding have caused it to be used as green manure in plantation crops in the humid tropics.

In comparison to most legumes, lima is more resistant to disease and pests. The most common ailments are pod and stem blight, halo blight and bacterial blight. The major pests include black bean aphids, stem boring beetle and mot-knot nematodes. Disease and pest problems can be minimized by routine crop rotation and by the use of disease-free seed.

The lima is a versatile vegetable with nearly all plant parts edible. The seedling stems, young leaves and pods are eaten as a cooked vegetable. Seeds can be harvested after 60 days and eaten green. The dry beans - high in protein, calcium and iron - are ready for picking at 80 - 180 days, depending on the variety. Some dry dark-seeded types may contain large amounts of cyanide-producing glucosides, which are eliminated by boiling the beans and discarding the water. The white varieties are safe. The dried seed can also be ground and used as a bean flour high in protein.



Lima Bean

Nutritional Contents per 100 Grams of Edible Portion

Constituents	Dried Seeds	Leaves	Green Seeds
water (ml)	12.0	286.0	377.0
calories	2335.0	21.4	26.6
protein (g)	21.4	-	1.6
fat (g)	1.4	60.7	66.6
carbohydrates (g)	61.0	-	3.2
fiber (g)	4.3	-	-
vit. A (ug)	trace	-	-
vit. C (mg)	1.0	-	-
iron (mg)	4.9	-	-
calcium (mv)	116.0	-	-

Long-fruited Jute
Corchorus olitorus L.

Jute occurs in and near settlements, especially on rice paddy banks. It grows widely throughout the Philippines, but is more popular in Iloilo and Ilocos regions. This is an erect branched, half-woody shrub, 1 - 1.5 m high. The leaves are ovate-lanceolate, 5 - 12 cm long, pointed at the tip, blunt at the base. The flowers are axillary, yellow and about 6 mm long. The fruits are elongated, cylindrical and 3 to 3.5 cm long, with 10 ribs. The seeds are dark bluish green, angular, about 2 mm long and very bitter.

This annual or short-lived perennial is self-pollinating and prefers short daylengths. It is tolerant to most soil types but grows best on alluvial, well-drained soils and in humid (22-3 C) conditions. However, as some varieties are sensitive to excess water at early stages of growth, it is recommended to plant at the onset of the rainy season. At altitudes above 700 m, yields diminish. Soaking seeds in hot water overnight to break dormancy improves seed germination. Leaves and young shoots are ready to harvest 40 - 60 days after sowing or when 20 - 30 cm in length. (Picking the terminal shoots encourages lateral growth.)

The most common disease is wilt; common pests include spider mites, root-knot nematodes and the larvae of the sweet potato butterfly.

Jute has an impressively high nutritional value. The leaves and young shoots are an excellent source of iron, vitamin C, phosphorus and calcium and a good source of vitamin B.

When cooked, the leaves and shoots have a high proportion of mucilage similar to ladyfinger. In the Philippines, vegetables are often prepared with bamboo shoots, fish, meat or other vegetables. The protein content of the young leaves is 1.5%; of the older, 5 - 6%. The leaves can also be dried and stored for future use. When harvesting leaves and shoots, using a sharp knife is recommended.



Long-fruited Jute

Nutritional Contents per 100 Grams of Edible Portion

Constituents	Leaves
water (ml)	84.1
calories	43.0
protein (g)	5.6
fat (g)	0.3
carbohydrates (g)	7.6
fiber (g)	1.7
vit. A (ug)	7850.0
vit. B (mg)	53.0
iron (mg)	7.70
calcium (mg)	266.0

Pungapong

Amorphophallus campanulatus (Roxb.) Blume.

In the Philippines, pungapong is commonly found in Luzon and Mindoro, in thickets and secondary forests, along roads, trails at low and medium altitudes in the settled areas. It also grows in India, Malaya and Polynesia.

Pungapong is a perennial, stemless herb, flowering before leafing every year from the previous year's corm. The leaves are usually solitary with the blades up to 1 meter in diameter.

In food value, it is comparable to squash and superior to yam bean. The petioles of young, unexpanded leaves are edible, when thoroughly cooked. When food is scarce, the corm is sometimes eaten. The leaves and corms are common feed for hogs.



Pungapong

Nutritional Contents per 100 Grams of Edible Portion

Constituents Corm

moisture	14.80
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ash	0.73
fat	0.38
protein	5.10
carbohydrates	8.37
crude fiber	0.61

Purslane

Portulaca oleracea L.

Occurring in all warm countries, purslane is commonly found in settled areas.

This plant is an annual, succulent, branched, smooth and purplish herb. The stems are 10 - 50 cm in length. Leaves are fleshy, flat, oblong - obovate, 1 - 25 cm in length. The yellow flowers open only for a few hours in the morning. The plant blooms all yearround.

Purslane can be eaten raw as a salad or cooked with meat or fish. It is an excellent source of calcium and from



Rice Bean

Phaseolus calcaratus Roxb.

Rice bean is a native of tropical Asia but is now found in most warm countries, either wild or cultivated. Formerly widely grown in the Philippines, the rice bean has declined in popularity because the increase in doublecropping of rice has replaced the ricebean rotation.

Either a short-stemmed erect plant or a threemeter twining short-lived perennial, the rice bean is grown as annual. It has trifoliolate leaves, yellow flowers and long slender pods containing variously colored edible beans. It is a short-day plant, flowering when day lengths are less than 12 hours. It thrives in the humid lowland in temperatures ranging from 18 to 30 C, but can be grown at higher altitudes, up to 1500 m. The seeds mature at nearly the same time (anywhere from 60 - 150 days), needing only one

harvest. The pods are prone to shattering so harvesting should be done in the morning when pods are damp to minimize seed loss. Because of its tolerance to drought, high temperatures and humidity, heavy soils and its resistance to most pests, the potential of rice bean for protein production in the lowland tropics is high. Its only drawback is it cannot withstand waterlogging.

The bean is resistant to insects and disease affecting legumes, including the beanfly. The main problem is the root-knot nematode, which can be minimized by planting rice bean on previously flooded soil, by rotating with other crops or by interplanting with marigold.

The rice beans contain 20 - 22% protein and high amounts of calcium and carbohydrates (60%), making them a good energy source. It is also a good source of phosphorus and excellent source of iron. The beans also contain toxic cyanogenic substances which are safely neutralized by boiling them, then discarding the liquid. The leaves and young seed pods are prepared as a vegetable and are ready to harvest 40 - 60 days after planting. The rice bean can also be used as a soybean sprout



Rice Bean

Nutritional Contents per 100 Grams of Edible Portion

Constituents	Seeds
water (ml)	13.0
calories	327.0
protein (g)	20.9
fat (g)	0.9
carbohydrate (g)	60.0
fiber (g)	4.8
vit. A (ug)	-
vit. C (mg)	-
iron (mg)	10.9
calcium (mg)	200.0

Roselle, Red-serrel
Hibiscus sabdariffa L.

Grown mostly in West and Central Africa and India, roselle shows promise for successful cultivation in the Philippines.

Roselle, erect and branched, is a woody annual reaching a height of up to three meters. The stems are purplish. The leaves are 8 - 12 cm long, variable in shape and either entire or deeply 3 or 5-lobed. The flower is pink with dark center and is about 5 cm long. The fruit is ovoid, hairy and about 2.5 cm long.

Its vigorous main root (tap root) makes it extremely tolerant to extended hot dry spells throughout the growing and fruiting periods. It is best suited to moderate amounts of rainfall. It is also adapted to a wide range of soils, producing a usable crop in low fertility soils, although for high yields, a fertile soil is necessary. Roselle is a short-day plant, flowering when day lengths are less than 12 1/2 hours. The flowers are self-pollinating.

One drawback of roselle is its attractiveness to insects, the most common being the cotton stainer, bollworm, flea beetle and root-knot nematode. Common diseases are leaf spot and fruit rot.

The leaves and young shoots, which are extremely high in vitamin A, are eaten raw, cooked or dried. The vegetable is similar to jute in that the cooked leaves are mucilaginous or slimy. The leaves and shoots can be cut off the plant throughout its growth. The swollen calyces of the flowers harvested 100-160 days after planting are used in the preparation of beverages and jellies. The calyces also contain 17% oil with 26% albuminoids, providing high amounts of food energy. Fiber is also prepared from the base of the stem.



Roselle, Red-serrel

Nutritional Contents Per 100 Grams of Edible Portion

Constituents	Leaves	Calyces
water (ml)	85.0	90.0
calories	43.0	39.0
protein (g)	3.3	0.7
fat (g)	0.3	1.1
carbohydrates (g)	9.0	8.0
fiber (g)	1.6	1.4
vit. A (ug)	4135.0	.10
vit. C (mg)	54.0	10.0
iron (mg)	4.8	-
calcium (mg)	213.0	174.0

Sauropus

Sauropus androgynus

Sauropus, or katuk as it is called in Indonesia, is a highly popular, nutritious and appetizing green, leafy vegetable in the Philippines, India and Malaysia. It is also very prolific, out yielding all other vegetables in a trial in Indonesia. Its vigor, year-round productivity and pest resistance make it a good addition to any garden or living fence.

Sauropus is a perennial, a small tree or woody shrub whose long upright main stems often grow so tall (if left uncut) that they fall over from their own weight. It grows well in the hot, humid tropics, even tolerating very heavy soils and heavy rainfall. It is easily propagated from seeds or woody cuttings and is usually planted as hedge cuttings (10 cm apart) or along fences.

No pest or disease problems have been recorded for Sauropus.

Plants from cuttings yield young shoots and leaves for harvest in about three months. They can be eaten raw or cooked. The older leaves, the flowers and fruits are also edible. (Cooking is recommended because the flavor of the raw leaves can be somewhat strong.) The leaves contain 6 - 10% protein. The roots and leaves are used for medicinal purposes and the leaves have also been used to color preserves.



Sauropus

Spiny Bamboo

Bambusa blumeana Bl. ex. Schult. f.

Spiny bamboo is found from southern China to the Malay Peninsula and throughout the Philippines at low and medium altitudes in settled areas.

The stems are 10 to 25 m high and 8 to 15 cm in diameter, with the basal parts surrounded by stiff, branched, interlaced, spiny branches. The leaves are 10 to 20 cm long, 1 to 2 cm wide. It is rarely found in flower.

This bamboo is the most commonly used species in the Philippines. It is most useful for building purposes and for the manufacture of furniture and household utensils. The young shoots are fairly tender and are used for food. Bamboo shoots (labong) are fair sources of calcium and iron. They contain 1.76% protein and 4.24% carbohydrates.



Spiny Bamboo

Sweet Potato

Ipomoea batatas (L) Lamk.

Sweet potato was introduced by the Spaniards from Mexico in the early colonial period and is now cultivated throughout the Philippines and in all the other warm countries.

Ranking second to rice as a staple food, it is an important crop of the Philippines.

The plant is a perennial herb cultivated as an annual with trailing or twining stems 1 - 5 meters long. The leaves are ovate to oblong-ovate, 6 - 14 cm long, somewhat entire, angular or lobed, pointed at the tip and heart-shaped at the base. The flower is funnel-shaped, 4 - 5 cm long, pinkpurple to whitish. It grows in a wide range of soils (sandy loam being the best), provided they are well-drained since it cannot withstand waterlogging. Average temperatures at 24 - 25 C and good exposure to the sun make for a healthy crop. In addition, a pH range between 5.6 - 6.6 is best, although sweet potato will grow in soils with a pH as low-as 5.2. The plant matures best in low humidity conditions with moist soils during tuber initiation (50 - 60 days after planting). It is a short-day plant requiring only 11 hours of daylight or less to induce flowering. It is cross-pollinated and usually propagated by cuttings. It is affected by a number of pests and diseases, the most serious being the sweet potato weevil, tortoise shell beetle and fusarium wilt.

The tubers, harvested 90 - 150 days after planting, are an excellent carbohydrate source, with more calories than both rice and com. Compared to the white, the yellow-fleshed tubers have higher levels of vitamin A and are boiled, baked, fried or mixed with other root crops.

The tops are cooked and eaten as a salad and a leafy vegetable. The leaves are an excellent source of iron and a good source of calcium, phosphorus and vitamins.



Sweet Potato

Nutritional Contents per 100 Grams of Edible Portion

Constituents	Yellow fleshed tubers	Tubers	Leaves
water (ml)	70.0	70.0	87.0
calories	121.0	114.0	42.0
protein (g)	1.6	1.5	3.2
fat (a)	0.2	0.3	0.7
carbohvdrate (a)	28.0	26.0	8.0

fiber (g)	1.0	1.0	1.6
vit. A (ug)	1255.0	60.0	2700.0
vit. C (mg)	37.0	30.0	21.0
iron (mg)	2.7	1.0	4.5
calcium (mg)	33.0	25.0	25.0

Taro

Colocasia esculenta (L.) Schott Endl.

Taro is an extremely popular crop throughout the tropics. Although it is non-seasonal and can grow anytime of the year, in the Philippines the supply cannot meet the demand.

This plant is variable in size and grows from 30 to 150 cm in height. The rootstock is tuberous and up to 10 cm in diameter, short or elongated. The leaves, in groups of two or three or more, are long-petioled, ovate, 20 - 50 cm long.

Taro is one of the few plants tolerant to waterlogging and shade. Depending on the variety, it is either cultivated in rainfed or irrigated lowland paddies or in upland areas. The lowland variety is suited to most types of soils, but fertile soils promote faster growth. It is also grown on the banks of rivers, streams, ditches and canals. The upland variety prefers deep, well-drained friable loams with adequate moisture reserves. To retain moisture, the crop is best mulched. Upland taro grows best in elevations up to 1500 meters. Both types prefer a pH range of 5.5 - 6.5, high temperatures (21 - 27 C) and high humidity. Most upland varieties (dasheen and eddoe) mature quicker than the paddy-grown taro, in 180 - 120 days versus 240 - 300 days. In addition, the tubers store longer, 3 - 6 months, compared to the paddy-grown which rot after a few weeks in storage.

The taro hornworm is a common pest of the plant, but they can be handpicked from the leaves. Other pests are the pineapple mealybug and soil mealybugs. The major disease problem is leaf

blight: affected leaves should be destroyed and the crop rotated. Tuber-rot occurs during storage, it can be minimized by proper ventilation.

Baked, boiled or fried like chips, the tubers are good carbohydrate foods. The flour produced from the tubers is similar to potato flour. It is used in soups, biscuits, breads and puddings. Taro starch is of superior quality and can be used in baby foods. The young and old leaves of the upland taro are edible. Of the lowland, usually only the younger leaves are palatable. High in calcium, iron, phosphorus and vitamins A, B and C, the leaves and stalks are prepared as a vegetable. In some taro varieties, calcium oxalate crystals, a substance which lowers the food value of the vegetable, are present. Boiling usually removes the crystals, however, except in some older leaves. Some upland varieties, namely Dasheen, are relatively free of the crystals.



Taro

Nutritional Contents per 100 Grams of Edible Portion

Constituents	Leaves	Leaf Stalks	Tubers
water (ml)	85.7	93.0	75.0
calories	48.0	24.0	94.0
protein (g)	3.3	0.5	2.2
fat (g)	0.6	0.2	0.4
carbohydrate (g)	9.9	6.0	21.0
fiber (g)	0.9	0.9	0.8
vit. A (ug)	4,695.0	180.0	trace
vit. C (mg)	27.0	13.0	8.0
iron (mg)	0.8	0.9	1.2
calcium (mg)	110.0	49.0	34.0

Velvet Bean

Mucuna pruriens (L) D.C.

This plant is found in thickets and secondary forests at low and medium altitudes from Northern Luzon to Mindanao. It is also found in India and Indo-China.

The velvet bean is a vigorous, climbing vine, reaching 18m when grown on a support or 5.5 m on the ground. The leaflets are thin, ovate to oblong-ovate and 5 - 12 centimeters long. The pods are stout, compressed, slightly curved near the apex, 6 - 11 cm long, 2 cm wide and densely covered with stiff, somewhat appressed, brown, very irritating, stinging hairs. The seeds are ovoid, about 12 mm long, compressed, brownish and mottled with black.

This annual or short-lived perennial is capable of growing in drought conditions and in a wide range of soils. It can even grow in well-drained leached heavy clays of the tropic lowlands. It tolerates fairly acidic soils and shade as well, but for optimum growth sandy loam with pH of 5 - 6.5, full sun

and 1200 1500 mm of rainfall are required. It has been reported to be a short-day plant but showed no significant response to day length in South Africa.

A hardy, drought-resistant, shade-tolerant legume already planted in the Philippines as a coffee substitute and a green vegetable, the velvet bean holds great promise of being grown on a much wider scale.

Very few pests and diseases affect the velvet bean. A bacterial leaf-spot, a leaf-spot caused by a fungus and a rust can be controlled by destroying diseased plant debris. A wilt disease in the wet season and root-knot nematodes may also cause some damage to the plant.

There are a large number of cultivars of the velvet bean and its uses are widely varied. The dry beans, maturing in 180 - 270 days, are roasted, ground and brewed like coffee, yielding a beverage with a chocolatecoffee flavor. The immature pods can be harvested and eaten 1 - 2 months earlier while the leaves can be harvested also 1 - 2 months after planting. Both are used as vegetables. The dry beans can also be cooked and eaten but they must be boiled and soaked in several changes of water to remove the toxic principles in the beans.



Velvet Bean

Water Leaf, Philippine Spinach
Talinum triangulare

An erect or semiprostrate small (30-60 cm), short-lived perennial herb, talinum is a common weed of the tropics now grown in home gardens as a leafy vegetable. It is a remarkably adaptable plant with the ability to grow in drought or moist hot humid coastal conditions, with some organic matter. In slightly shaded areas, talinum has greater leaf production. It is either cultivated by seed or cuttings 15 20 cm long and is sensitive to day lengths, preferring shorter days. Talinum does not produce well at elevations over 1000 m.

There are no significant pests or diseases affecting talinum. Sometimes under irrigated conditions, rodents inflict stem damage.

The shoots are harvested when 15 - 20 cm in length or at 25 - 45 days when leaves are fully developed. Removal of the terminal shoots promotes lateral growth, which stimulates the plant to produce for up to 1 year. Shoots are prepared as a vegetable, the succulent leaves and flowers are cooked in soups and stews. The mucilaginous vegetable contains relatively high amounts of oxalates which are destroyed when boiled.



Water Leaf, Philippine Spinach

Nutritional Contents per 100 Grams of Edible Portion

Constituents	Leaves
water (ml)	91.0
calories	25.0
proteins (g)	2.4
fat (g)	0.4
carbohydrates (g)	4.0
fiber (g)	1.0
vit. A (ug)	-
Vit. C (mg)	31.0
iron (mg)	5.0
calcium (mg)	121.0

Wax Gourd

Benincasa hispida (Thunb.) Cogn.

Wax gourd is cultivated in the Philippines for its large edible fruits. It is also found in India, Japan, Malaya and Polynesia in general cultivation.

A member of the cucurbit family, it has the distinction of being the easiest to grow. It is an annual herb climbing vigorously to a length of several meters. Wax gourd has leaves which are rounded or kidney-shaped, 10 - 25 cm in diameter, heart-shaped at the base and 5 - 7 lobed. The flowers are large and yellow. The fruits, round or elongated, may grow as large as 2 m long and 1 m in diameter, weighing as much as 35 kilos. When young, they are covered with hair which eventually develops into a hard, waxy coating as the fruit matures. Both the hair and the waxy coat make the wax gourd very resistant to disease, pests and spoilage - fruits can be stored up to one year without refrigeration.

Wax gourd is suited to a wide range of soils, growing best on those with ample organic matter. It

prefers stable high temperatures, with moderate, evenly distributed rainfall. It does not do quite as well with heavy rainfall, but reports indicate it can still be grown in the rainy season provided that the plant is trellised. Wax gourd is fairly drought-resistant; however, a high soil moisture level is conducive to early rapid growth. During short day-length periods when female flower production is stimulated, higher fruit production can be expected. Hand-pollination is sometimes necessary for better production. The plant requires staking or trellising. It can also be grown over roots and trees for added support of the heavy fruit.

Wax gourd is extremely pest-and disease-resistant. Minor pests are aphids, fruit flies and cutworms. There are no serious diseases.

Fruits are harvested 80 - 160 days after planting. The unripe fruits are boiled and eaten as vegetables, while the ripe fruit is peeled and candied to make an excellent delicacy. The young leaves and flower buds are prepared as a vegetable. The seeds of the mature fruit are removed and roasted, tasting much like pumpkin seeds. A quality vegetable oil is also produced from the seeds. The seeds remain viable for 10 years.



Wax Gourd

Nutritional Contents per 100 Grams of Edible Portion

Constituents	Fruit	Leaves
water (ml)	92.0	-
Calories	28.0	284.0
protein (g)	0.7	22.0
fat (g)	trace	3.7
carbohydrate (a)	6.0	55.9
fiber (g)	0.3	61.4
vit. A (ug)	trace	-
vit. C (mg)	15.0	-
iron (mg)	0.6	-
calcium (mg)	20.0	-

Winged Bean

Psophocarpus tetragonolobus (L) D. C.

Originating from and widely spread across Asia, the winged bean is spreading throughout the tropics and subtropics due to its almost incredible qualities and number of uses.

A robust, twining, bushy plant reaching four meters in height, the winged bean prefers a hot humid climate with high rainfall (2500 mm). It grows well in a wide range of soils as long as these are well drained. It grows at altitudes up to 2000 m. It is a short-day plant flowering when day length is about 12 - 12 ½ hours. Despite its extensive root system, it is not tolerant of long dry spells. The winged bean has thus far shown no serious disease and few pest problems: false smut and root-knot nematodes. Every plant part is eaten, but the stem of this "supermarket on a stalk" are extremely high in protein, fat, carbohydrates and vitamins.

The winged bean begins producing the immature pods (the most widely eaten plant part) in 2 - 3 months and continues producing them for 5 months. Long before that, the protein and vitamins A and C-rich leaves, shoots and flowers can be harvested. The mature seeds are harvested 180 - 270 days after sowing and can be mea, roasted, steamed and made into tofu or milk. When combined with corn, they have a nutritive value as high as skim milk. Protein content ranges from 29 to 37% and edible oil from 15 to 20%. The seed's hard coat requires a very long cooking time but a new method of cooking using baking powder can reduce cooking time tremendously. The method involves initially boiling the beans in water, adding ½ teaspoon baking powder per one cup of liquid, letting the beans soak overnight in the solution, rinsing them and then boiling them again. The beans are tender in 20 - 25 minutes. The tubers, eaten like potatoes, are harvested at 120 - 240 days after planting.



Winged Bean

Nutritional Contents per 100 Grams of Edible Portion

Constituents	Tubers	Fresh Pods	Seeds
water (ml)	75.0	92.0	10.0
calories	91.0	25.0	405.0
protein (B)	2.8	2.1	32.8
fat (g)	0.6	0,3	17.0
carbohydrate (g)	20.0	4.0	36.0
fiber (g)	1.5	1.7	-
vit. A (ug)	-	-	-
vit. C (mg)	-	-	trace
iron (mg)	-	-	2.0
calcium (mg)	-	-	80.0

Yam Bean

Pachyrrhizus erosus (L.) Urb.

Yam bean is a native of tropical America but is now found in thickets and hedges throughout the Philippines in the settled areas, at low and medium altitudes.

A root crop highly demanded throughout the tropics, the yam bean is one of the most vigorous legumes, reaching 5 meters in height when grown on supports. The leaflets are broader than long, reaching a length of 15 cm and a width of 20 cm. The flowers are pale blue or blue and white and 2 to 2.5 cm long, 1.5 cm wide. The pods see about 10 cm long, 10 - 12 mm wide, flat and hairy and contain 8 to 10 seeds. The roots are large, fleshy and turnip-shaped.

It is almost ideally suited to the tropics, needing only ample moisture, a long hot growing season and medium fertile soils. It can tolerate heavy rainfall but needs good drainage and can withstand short drought periods, especially in its later growth stages. Best yields are obtained in areas with

moderate rainfall on sandy loam soils high in organic matter.

The yam bean plant has some insecticidal properties which probably makes it pest-resistant. Only the tuber is affected by insects boring into it. In Asia, the only disease so far seen is mosaic virus, which can severely affect the plant. Prompt removal of any affected plant is the only control method.

Tubers can be harvested 5 - 9 months after planting from seed, or 3 - 4 months if from small tubers. All other parts of the plant are usually poisonous, except for the pods. Immature pods are considered among the most delicious green beans in Philippine markets. Experience is necessary to know the right picking time. The mineral content of the young pods shows that they are fairly good sources of both calcium and iron. The tuber on a dry weight basis has 3 - 5 times the protein of other root crops, but the tubers also have only about half the dry matter compared to tubers of other crops. They are eaten either raw or prepared in a variety of ways. They have a high carbohydrate content and are fairly good sources of calcium and iron.



Yam Bean

Nutritional Contents per 100 Grams of Edible Portion

Constituents	Fresh Pods	Tubers
water (ml)	86.0	87.0
calories	45.0	46.0
protein (g)	2.6	1.6
fat (g)	0.3	0.2
carbohydrates (g)	10.0	10.0
fiber (g)	2.9	1.3
vit. A (ug)	345.0	-
vit. C (mg)	-	15.0
iron (mg)	1.3	0.8
calcium (mg)	121.0	18.0

Maintaining the nutritional value of vegetables: Food preparation tips

The nutritional value in any food starts to deteriorate at the very moment of harvesting and continues with each stage of storage and preparation, resulting in additional vitamin losses Here are some preparation tips to help retain the nutritive value of vegetables

Trimming

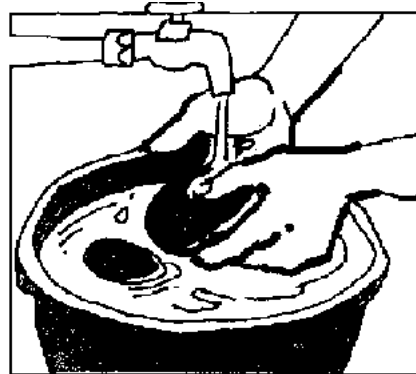
Vegetables must be trimmed sparingly to prevent the significant waste of vitamins and minerals, as these nutrients are generally present in higher concentrations in the outer layers of vegetables, seeds, roots and fruit For instance, with the peeling of potatoes, 12-35% of the vitamin C may be discarded Peeling of carrots may cause a marked waste of vitamins B1, B2 and nicotinic acid



Trimming

Washing

If the food has not been chopped or sliced too finely, the washing of vegetables for short periods does not adversely affect nutrient losses, so wash vegetables before they are chopped



Washing

Cooking

Boil vegetables in as little water as possible to minimize losses in vitamins and minerals Serve the cooking liquids with the vegetables or make them into sauces, gravies or soups Cook vegetables until just tender and serve immediately.



Boiling Guide for Fresh Vegetables

Vegetable	Boiling time (minutes)	Vegetables	Boiling time (minutes)
Asparagus:		Celery, cut up	15 to 18
Whole	10 to 20	Chard	10 to 20
Tips	5 to 15	Collards	10 to 20
Beans:		Corn, on cob	5 to 15
Lima	25 to 30	Kale	10 to 15
Span, Linch pieces	12 to 16	Ladyfinger	10 to 15

Strip, 1-inch pieces	12 to 18	Laufringer	10 to 15
Beets:		Onions	15 to 30
Young, whole	30 to 45	Parsnips:	
Older, whole	45 to 90	Whole	20 to 40
Sliced or diced	15 to 25	Quartered	8 to 15
Beet greens, young	5 to 15	Peas	12 to 16
Broccoli, heavy stalks,		Potatoes:	
split	10 to 15	Whole, medium-sized	25 to 40
Brussels sprouts	15 to 20	Quartered	20 to 25
Cabbage:		Diced	10 to 15
Shredded	3 to 10	Rutabagas, pared, cut up	20 to 30
Quartered	10 to 15	Spinach	8 to 10
Carrots:		Squash	8 to 15
Young, whole	15 to 20	Sweet potatoes, whole	35 to 55
Older, whole	20 to 30	Tomatoes, cut-up	7 to 15
Sliced or diced	10 to 20	Turnips:	
Cauliflower		Cut-up	10 to 20
Separated	8 to 15	Whole	20 to 30
Whole	15 to 25	Turnip greens	10 to 30

Reference:

Consumer and Food Economics Research Division Agricultural Research Service. 1971. Family Fare: A Guide to Good Nutrition. USDA, Washington, D.C.

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