Recommended Practice for Nutrition Garden



Nutrition Garden

"A concept to grow vegetables through organic gardening which will provide balance nutrients and sufficient calories to a family"



Sesta Development Services (SDS) Guwahati, India



Mizoram State Rural Livelihoods Mission Rural Development Department Government of Mizoram

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Introduction

The World Health Organization (WHO) defines health a state of complete physical, mental and social well-being and not merely an absence of diseases or infirmity. Good health can be described as the condition where both body as well as mind is functioning properly. The main causes behind poor health conditions are diseases, improper diet, injury, mental stress, lack of hygiene, unhealthy life styles etc. Over the past few years, our lifestyle has changed and we often tend to ignore the importance of healthy living in one way or the other. Health is directly related to the food consumed. To maintain good health, ingesting a diet containing the nutrients in correct amount is essential. A balanced diet is one which contains different types of food in such quantities and proportions so that the need for calories, proteins, fats, minerals and vitamins is adequately met and a small provision is made for extra nutrients to withstand short duration of leanness. Deficiency of any nutrient affects' health of an individual. For a healthy and balanced diet, consumption of five portions of fruits and vegetables a day is recommended. Research shows that eating at least 400 gm of fruits and vegetables a day can lower your risk of serious health problems such as heart disease, stroke, type 2 diabetes and obesity. The health index for country 2015 midyear showed that India had 38th rank for its health system.

This shows the health status of Indians. The health benefits of vegetables are well recognized by nutritional and medical communities. Vegetables occupy an important place in Indian diets as they increase their nutritive value and palatability. India is the second largest producer of vegetables and the third largest producer of the fruits in the world. Despite its abundance, the costs of vegetables and fruits are increasing and hence are getting out of reach of majority of Indian population. Therefore, Nutrition garden is an important strategy to increase the production as well as the consumption of fruits and vegetables. The daily per capita intake of vegetables in India is 280g. For a balanced diet, an adult should have a minimum daily intake of 100g of fruit and 300g of vegetables. Though this level is optimum for the prevention of deficiencies, a higher daily consumption i.e.500-700g is required for the prevention of the life style diseases such as diabetes, obesity, cancer and cardiovascular diseases.

A number of studies reported that nutrition garden produces a high percentage of fruits and vegetables consumed by nutrition gardening families. Although it is relatively straightforward to determine whether a nutrition gardening programme has increased production and consumption of fruits and vegetables, it is not a simple matter to determine the impact of nutrition gardening on nutritional status. It is estimated that, worldwide, 53 per cent of the approximately 10 million child deaths every year can be attributed to malnutrition (Black et al 2003). Anemia is also the most prevalent nutritional deficiency disorder in the world. It affects all age groups but the most vulnerable are pre-school age children, pregnant women and non-pregnant women of childbearing age. Globally, anemia affects 1.62 billion people, which corresponds to 24.8 per cent of the population. The highest prevalence of anemia exists in the developing countries where its causes are multi-factorial. National family health survey statistic revealed that every second Indian woman is anemic and one in every five maternal death is directly due to anemia (Kaur K 2014). Improved family nutrition and health is a key objective of the sustainable livelihoods' framework. Nutrition gardens are one strategy for addressing malnutrition, anemia and micronutrient deficiencies. Even though animal products are the best sources of micro nutrients; vegetables and fruits may be the only source of micronutrients that are reliably available to poor households (Bloem et al 1998, Talukder et al 2000, Reddy 1995).

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Nutrition garden is one of the world"s most ancient agriculture practices. Historically, people have planted vegetables and fruits in their own backyard. Gardens are defined as "a supplementary food production system which is under the management and control of household members (Soleri and David, 1987) or they are defined as "a small scale, supplementary food production system by and for household members that mimics the natural, multi-layered ecosystem" (Hoogerbrugge and Fresco 1993). Nutrition garden appears to have developed independently in Indian subcontinent. Gardening is an important component of household food security, contributes to household income and savings, and moreover, improves the health and nutritional wellbeing of the family. Nutrition gardens are a production system that the poor can easily enter at some level since it may be done with virtually little economic resources, using locally available planting materials, natural manures and indigenous methods of pest control. A poor family can afford to make beneficial use of nutrition garden plots; the plots are more likely to make a sustainable contribution to the family"s livelihood objectives. Studies conducted around the world have shown that under most circumstances, home production of vegetables results in significant improvement in the nutrient intake (availability and consumption) for women and children. Vegetables produced in the garden are largely consumed by household members. The supplementary income of the gardening households from vegetable sales is used to purchase additional nutrient-rich foods (Marsh 1998).

Status of India Vs Mizoram

Nutritional Status

Health and nutrition are the most important contributory factors for human resource development in the country. India has been classified by the World Bank as a country with a lower middle income, with per capita GNP of US \$ 996-39451. It ranks 160th in terms of human development among 209 countries. Among the Indian population, about 28% in the rural and 26% in the urban areas are estimated to be below the poverty line2, which is defined as the expenditure needed to obtain, on an average, 2400 Kcal per capita per day in the rural areas and 2100 Kcal in urban areas. Long-term malnutrition leads to stunting and wasting, non-communicable chronic diet related disorders, increased morbidity and mortality and reduced physical work output. It is a great economic loss to the country and undermines development. Undernutrition starts as early as during conception. Because of extensive maternal undernutrition (underweight, poor weight gain during pregnancy, nutritional anemia and vitamin deficiencies), about 22% of the infants are born with low birth-weight (<2500 g)3, as compared to less than 10% in the developed countries. Both clinical and sub-clinical undernutrition are widely prevalent even during early childhood and adolescence. Though the



prevalence of florid forms of severe PEM like kwashiorkor and marasmus among preschool children is <1 %, national surveys indicate that about half of (48%) <5year children suffer from subclinical undernutrition such as underweight (43%) stunting and wasting (20%) which indicates that undernutrition is of long duration3. The studies have shown that there is a steep increase in the prevalence of underweight with increase of age, from 27% at 6 months of age to a high of 45% at 24 months of age4. This is attributable to faulty infant and young child feeding practices prevailing in the community. Persistent undernutrition throughout the growing phase of childhood leads to short stature in adults. About 33% of adult men and 36% of the women have a Body

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Mass Index (BMI) [Weight in kg/(Height in meter)2] below 18.5, which indicates Chronic Energy Deficiency. In the case of 'vitamin A' deficiency, 0.8-1% of preschool children show the signs of night blindness. Vitamin A deficiency also increases the risk of disease and death.

According to the National Family Health Survey 4 (2015-2016), more than half of the children and women are suffering from Anemia. And the state Mizoram has been ranked as the best state in terms of better health condition of these two groups. If we observed carefully than the state Mizoram has 19 and 24 percent of children and women are anemic condition respectively. Observing the data one can stated that the Mizoram has the smaller number of women who are coming under total thin category (those are having BMI of less than 18.5).

Name of the District	Percentage of children having any anemia (<11.0)g/dl)	Percentage of women having any anemia (<12.0 g/dl)	Women with BMI <18.5(total thin)	Women with BMI ≤25 (Overweight or obese)
Aizawl	10.5	18.4	7	26.8
Champhai	7.9	12.8	6.7	17.4
Kolasib	41.1	38.5	8.9	24.9
Lawngtlai	33.8	35.8	10.4	10.2
Lunglei	26.8	37.1	9.8	20.3
Mamit	19	27.9	10.3	12.7
Saiha	20.7	27.7	11.1	9.4
Serchhip	28.8	24.9	9.8	19
Mizoram	19.1	24.7	8.3	21.1
India	58.6	53.1	22.9	20.6

Food consumption Pattern

According to National Institute of Nutrition, Hyderabad 2010 every man should consume 300 gm cereals, 60 gm pulses, 100 gm green leafy vegetables, 100 gm roots and tubers and 200 gm of other vegetables like (gourd species, pumpkin, brinjal, capsicum, ladyfinger, peas and tomatoes etc.) and fruits to lead a healthy life. But surveys revealed that average consumption of these food items in villages is very low. An adult man consumes only 40 gm of pulses, 80 gm of green vegetables, less than 100gms of other vegetables and consumption of fruits is negligible. So, health of rural population can be well imagined.

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According to the National Family Health Survey 4 (2015-2016), the food consumption pattern of the Mizoram has been demonstrated in the following table;

Type of food	Daily	Weekly	Occasionally	Never	Total		
WOMEN							
Milk or curd	9.7	14.4	50.8	25.1	100		
Pulses or beans	15.6	40	43.6	0.8	100		
Dark green leafy vegetables	76.2	17.2	6.6	0	100		
Fruits	12.3	35.2	51.6	0.9	100		
Eggs	10.9	46.6	40.8	1.6	100		
Fish	1.5	24.8	69.4	4.2	100		
Chicken or meat	2.3	52.2	44-3	1.2	100		
Fish or chicken or meat	3.3	57-3	38.9	0.5	100		
Fried foods	86.7	8.2	4.9	0.2	100		
Aerated drinks	2.2	6.2	60.2	31.4	100		
MEN							
Milk or curd	7.6	13.2	58.5	20.7	100		
Pulses or beans	15.4	42.8	40.9	1	100		
Dark green leafy vegetables	73.4	20.9	5.6	0.1	100		
Fruits	11.2	25.5	62.3	1	100		
Eggs	8.6	57	33-4	1	100		
Fish	3.4	32.8	60.4	3.4	100		
Chicken or meat	4	77.9	17	1	100		
Fish or chicken or meat	6.1	77.9	15.5	0.5	100		
Fried foods	89.5	8.1	2.3	0.2	100		
Aerated drinks	2	10.3	59	28.6	100		

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Introduction to Human Nutrition

Human nutrition

Human nutrition is a scientific discipline, concerned with the access and utilization of food and nutrients for life, health, growth, development, and wellbeing. The scope of human nutrition is vast, ranging from biological and metabolic nutrition, through whole-body and clinical nutrition, to the massive public health nutrition issues of national nutrition programmes and the global prevention, control, and elimination of malnutrition and nutritional disorders. Nutrition is a fundamental pillar of human life, health and development across the entire life span. From the earliest stages of fetal development, at birth, through infancy, childhood, adolescence, and on into adulthood and old age, proper food and good nutrition are essential for survival, physical growth, mental development, performance and productivity, health and well-being. It is an essential foundation of human and national development.

Nutrients that we obtain through food have vital effects on physical growth and development, maintenance of normal body function, physical activity and health. Nutritious food is, thus needed to sustain life and activity. Our diet must provide all essential nutrients in the required amounts. Requirements of essential nutrients vary with age, gender, physiological status and physical activity. Dietary intakes lower or higher than the body requirements can lead to undernutrition (deficiency diseases) or overnutrition (diseases of affluence) respectively. Eating too little food during certain significant periods of life such as infancy, childhood, adolescence, pregnancy and lactation and eating too much at any age can lead to harmful consequences. An adequate diet, providing all nutrients, is needed throughout our lives. The nutrients must be obtained through a judicious choice and combination of a variety of foodstuffs from different food groups.

Balance Diet

A balanced diet is one which provides all the nutrients in required amounts and proper proportions. It can easily be achieved through a blend of the four basic food groups. The quantities of foods needed to meet the nutrient requirements vary with age, gender, physiological status and physical activity. A balanced diet should provide around 50-60% of total calories from carbohydrates, preferably from complex carbohydrates, about 10-15% from proteins and 20-30% from both visible and invisible fat. In addition, a balanced diet should provide other non-nutrients such as dietary fibre, antioxidants and phytochemicals which bestow positive health benefits. Antioxidants such as vitamins C and E, beta-carotene, riboflavin and selenium protect the human body from free radical damage. Other phytochemicals such as polyphenols, flavones, etc., also afford protection against oxidant damage. Spices like turmeric, ginger, garlic, cumin and cloves are rich in antioxidants.

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Food Groups

Foods are conventionally grouped as:

- 4 Cereals, millets and pulses
- Vegetables and fruits
- ↓ Milk and milk products, egg, meat and fish
- ↓ Oils & fats and nuts & oilseeds

Our diet must provide adequate calories, proteins and micronutrients to achieve maximum growth potential. Therefore, it is important to have appropriate diet during different stages of one's life. There may be situations where adequate amounts of nutrients may not be available through diet alone. In such risk situations where specific nutrients are lacking, foods fortified with the limiting nutrient(s) become necessary. A good example of such fortified foods is the salt.

Major Nutrients					
	Carbohydrates & Fats				
Energy Rich Food	Whole grain cereals, millets	Protein, fiber, minerals, calcium, iron & B-complex vitamins			
	Vegetable oils, ghee, butter	Fat soluble vitamins, essential fatty acids			
	Nuts and oilseeds	Proteins, vitamins, minerals			
	Sugars	Nil			
	Proteins				
Pady Puilding Foods	Pulses, nuts and oil seeds	B-complex vitamins, invisible fat, fibre			
Body Building Foods	Milk and milk products	Calcium, vitamin A, riboflavin, vitamin B12			
	Meat, Fish and poultry	B-complex vitamins, iron, iodine, fat			
Protective Foods	Vitamin and Minerals				
	Green leafy vegetables	Antioxidants, fibre and other carotenoids			
	Other vegetables and fruits	Fiber, sugar and antioxidants			
	Egg, milk, milk products and flesh foods	Protein and fats			

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Fruits and Vegetables Color Indicators Benefits Deficiency impacts Under developed fetus ٠ Iron, Vitamin A, Vitamin C, • Night blindness • Chlorophyll Skin diseases • GREEN Fibers • Scurvy (Vita C) • Calcium ٠ Beta- carotenes • Memory loss • Vitamin C Red Cancer ٠ Lycopene • Urinary tract infection • Vitamin A Eye sight problem ٠ YELLOW/ Vitamin C Skin diseases ٠ ORANGE Loss of immunity Beta-carotene • ٠ Vitamin C Ageing • PURPLE Fiber Memory loss • • Flavonoids Cancer ٠ Potassium High cholesterol ٠ WHITE Beta glucans low pressure • Lignans •

Sharing the identified crops cultivated in Mizoram and its nutritional values and health impacts;

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Nutrition Garden Concept

A model to meet the dietary requirements of marginal rural households and ensure nutritional self. This will be a solution to our existing scenario of needless malnutrition where nearly half of our children aged less than 3 years are being underweight, and for women suffering from anemic. Nutrition Garden will produce vegetables and fruits throughout the year. The major benefits from the nutrition garden are shown in the picture i.e. Fresh food, healthier food, nutritious vegetables and less expensive.

Fresher Healthier More nutritious Less Expensive

Basic Principles:



- **Right Location and layout designing:** Terrace model to suit in Mizoram conditions, preferably in and around of home.
- Nourishment of soil health organically: Soil amendment, natural fertilizers, soil coverage, mulching & moisture management.
- Use of local materials: Usage of locally available material like FYM, cow urine, biomass, native seeds etc.
- Crop diversification: To maintain continuity of supply and diverse sources of nutrients, mineral, vitamins, dietary fibers etc. Focus on leafy vegetables, creepers, roots & tubers, fruits, medicinal plants
- NPM: Bird perch, yellow stick, repellant crops, mix cropping, herbal extracts, vermin wash, cow urine

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Nutrition Garden Site Selection

- There will be limited choice for the selection of sites for Nutrition gardens and the final choice is usually the backyard of the house.
- Choose an open area (fairly level ground) that will allow the plants to receive full sunlight (not shaded) at least half of the day.
- This is convenient as the members of the family can give a constant care to the vegetables during leisure and the wastewater from the bathrooms and kitchen can easily be diverted to the vegetable beds.
- The size of a Nutrition garden depends upon the availability of land and number of persons for whom vegetables are to be provided.
- There is no restriction in the shape but as the houses are on hilly terrain, so suggested to go for terrace farming.



Plot site, design, layout and Bed

- Plot should be in sunny area, near household settlement with available water source,
- Preferable area: 400 square feet to ensure 1.5 kg to 2 kg vegetable per day for 120 days for a 4-5 members' family,
- The plot preferably should be square or rectangular in shape of 20 feet x 20 feet in size,
- The plot should be 20 X 20 feet, divided equally from South to North direction, leaving a path of 1 foot
- Divide the plots 12 equal size of bed 3 feet X 7-10 feet from East to West direction,
- Ensure fencing if there is issue of grazing.



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Selection of crops

Choosing what vegetables to grow involves many considerations. Below are some issues which should be considered to decide what to grow in the nutrition garden:

- Select vegetables that are preferred and likely to be eaten in local diets
- Select 10-12 different leafy and green vegetables for each season (A duration of 4 months) referring colour indicator chart
- Select some fruits for the North Western boundary (Papaya, Drumstick, Lemon)
- Choose some fence crops such as trailing bean, bitter gourd, cucumber etc.
- Select vegetables that are hardy, easy to grow and manage, and well adapted to the local climate and soil
- Select vegetables that produce good yields and are tolerant to common pests and diseases

Considering local practice, the following table explains the harvesting month of each crop:



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Red	Watermelon	Watermelon	Watermelo n	Watermelo n	Radish	Radish	Radish	Radish	Radish Tomato	Radish Tomato	Radish Tomato	Tomato
Yellow	Pumpkin	Pumpkin	Pumpkin	Pumpkin	Pumpkin	Pumpkin	Pumpkin	Pumpkin	Carrot	Carrot	Carrot	Carrot
Orang e	Lemon	Lemon	Lemon		Lemon Squash Mustard Sweet potato	Lemon Squash Mustard Sweet potato	Lemon Squash Mustard Sweet potato	Lemon Squash Mustard Sweet potato	Lemon Gquash	Lemon Gaussian Squash	Lemon Equasion Squash	Lemon Gaussian Squash
Blue/ Purple					Beet Root	Beet Root	Beet Root	Beet Root	Egg plant	Egg plant	Egg plant	Egg plant
White	Banana	Banana	Banana	Banana	Banana Onion	Banana Onion	Banana Onion	Banana Onion	Banana Onion	Banana Onion	Banana	Banana

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Planning your planting schedule

Crop rotation- a key to successful gardening

Crop rotation is the practice of growing different crops in succession on the same land. It is commonly used to control diseases and insect pests in the vegetable garden, and to build up the organic matter and soil nutrients that certain plants use during their life cycle. Different plants take different nutrients out of the soil and add back other elements or enhance the soil in other ways. Therefore, to prevent your garden from becoming less productive from season to season, crop rotation is highly recommended. Rotating your crops in this manner helps to keep your soil makeup balanced, pests and diseases at a minimum level and your garden healthy.

How to plan a rotation

- Prepare a list of vegetables to be planted in the garden. Divide the vegetables into four groups based on what part of the plant you plan to eat, i.e., plants grown for leaves or flowers (such as amaranth, lettuce, broccoli, cabbage), fruits (such as tomato, eggplant, pepper, cucumber), roots (such as carrot, radish, onion) and legumes (such as beans, peas, cover plants/green manure like alfalfa or clover).
- 2. Group the plants together in botanical families. This is to help you understand what crops are closely-related. In general, crops in the same family should not be planted in the same field continuously.
- 3. Draw a map of the growing area and divide it into equal sections.
- 4. Work out which crops will be planted in which area.
- 5. Keep records of what actually happens, not just what you planned.
- 6. Use this information when planning for next year.

How long should the rotation last?

- The longer the better
- Normal length is 4 years; if not possible, at least 2 years

Sample crop rotation plan:

	Plot 1	Plot 2	Plot 3	Plot 4
Year 1	Legumes	Leaves	Fruits	Roots
Year 2	Leaves	Fruits	Roots	Legumes
Year 3	Fruits	Roots	Legumes	Leaves
Year 4	Roots	Legumes	leaves	Fruits

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Land preparation

- Firstly, a through spade digging is made to a depth of 30-40 cm.
- Ensure tilling, separation of stones, clean weeds and breaks the clods into smaller sizes,
- Add fertile and top soils in the beds if top soil is poor/unfertile,
- Add enough well decomposed FYM @ 5 to 10 kg per bed of 3 X 7 feet dimension
- Level properly to avoid water stagnation,
- Sow seeds (soaked and organically treated) on line as per seeds size and shape, just half an inch of depth
- Cover the seeds with fertile soils/FYM
- Ensure seedling transplantation of certain plants (Chilli, cabbage, tomato etc.) between 15 to 21 days of aged
- It's advisable not to sow seeds directly of some crops like Chilli, cabbage, tomato,
- Avoid over aged seedlings.

Seed sorting and treatment of seeds and seedling

- Clean the seeds properly, separate diseased, insect infected and broken,
- Soak the seeds overnight
- Seeds or seedling needs to be treated before sowing/transplantation,
- Seeds / seedlings(roots) can be dipped in the cow urine solution (Cow urine: Water 1:10 dilution) for 5-10 minutes or
- Seeds /sapling (roots) also can be treated in sour curd water (1: 10) for a period of 5-10 minutes
- Dry the treated seeds for a while in the shade and then go for sowing
- Ensure instant transplantation of treated seedlings,
- Ensure seed sowing/seedling transplantation in the afternoon,
- Apply water as required,
- Use crop residue as soil coverage/mulch to check weed growth, reduce soil moisture and adding organic matter,



Nursery Soil preparation to raise seedling



• Top fertile soil: well decomposed FYM (1:1) - Preferably

- Heavy clay soil: well decomposed FYM: Sand (1:1:1)
- Soil mixture can be treated with locally multiplied Trichoderma @ 1kg to 10 of soil mixture
- Fill the seedling trays/poly tubes, sprinkle water in the trays/tube,
- Keep the trays/tube inside a net house,
- Sow treated seeds in the trays/tubes, just in a depth of 0.5 cm, cover with soil,
- Ensure soil moisture by applying water time to time.
- Transplant seedlings within 15 to 21 days (vegetables), papaya by 25 to 30 days.
- Ensure hardening of seedlings for 3 to 7 days before transplantation.
- The crop rotation will be strictly followed

Sowing and planting

The main objective of a nutrition garden is the maximum output and a continuous supply of vegetables for the household throughout the year. By following certain procedures, this objective can easily be achieved. Direct



sown crops like okra, cluster beans and cowpea can be sown on one side of the ridges at a spacing of 30 cm. Clerodizedrum (meant for whole plant pull out and clipping) can be sown after mixing 1 part of seeds with 20 parts of fine sand by broadcasting in the plots. Small

onion, mint and coriander can be planted/sown along the bunds of plots.



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- Seeds of transplanted crops like tomato, brinjal and chilli can be sown in nursery beds or pots one month in advance by drawing lines. After sowing and covering with top soil and then dusting with 250 grams neem cake so as to save the seeds from ants. About 30 days after sowing for tomato and 40-45 days for brinjal and chili and big onion the seedlings are removed from nursery and transplanted along one side of the ridges at spacing of 30-45 cm for tomato, brinjal and chili and 10 cm on both the sides of the ridges for big onion. The seedlings can be watered once in two days in the earlier stages and then once in 4 days later.
- The perennial plants should be located on one side of the garden, usually on the rear end of the garden so that they may not shade other crops, compete for nutrition with the other vegetable crops.
- Adjacent to the foot path all around the garden and the central foot path may be utilized for growing different short duration green vegetables like Coriander, spinach, colo-cassia etc.



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The following table is suggesting the vegetable that need to be shown in the nutritional garden;

Season wise cropping list (Crop calendar)					
Colour Indicator Chart	Summer (February-May)	Kharif/Rainy season (June-September)	Rabi/Winter season (October-January)		
	Colo cassia	Cabbage	Broccoli		
	Lettuce	Cucumber	Cabbage		
Green	French Bean	Maize	French Bean		
	Okra	Dhania	Coriander		
	Maize	Mint	Chili, mint		
Ded	Watermelon	Radish	Tomato		
Ked	Red chilli		Radish		
	Pumpkin	Pumpkin	Carrot		
	Рарауа	Рарауа	Рарауа		
Orango/Vollow	Lemon	Lemon	Lemon		
Orange/ renow	Mustard	Mustard	Squash		
		Sweet potato	Mushroom		
		Squash			
Purple/Blue	Egg plant	Beet root	Egg-plant		
White	Radish	Garlic	garlic		
willte	Ash gourd(ripen)	Radish	Radish		

Perennial plot

- 1. Banana, Papaya and Mango
- 2. It may be observed from the above crop arrangements that throughout the year some crop is grown in each plot without break (Succession cropping) and where ever possible two crops (one long duration and the other a short duration one) are grown together in the same plot (companion cropping).

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Composting

Compost is a form of organic matter and can be made from a range of organic materials usually considered to be waste.

- Ingredients: straw, cut grass, organic waste from the kitchen, weeds, plants, leaves, animal manure (except from dogs and cats), wood ash, animal and fish bones, feathers, cotton cloth, bits of leather or paper, soil.
- Do not use cooked food, large pieces of wood, plastic, metal, glass, crockery, wire, nylon, synthetic fabrics, coal ash, seeding grass or very tough weeds.
- Composting is a natural process that involves the decomposition of organic matter. Millions of microorganisms drive the compost process by breaking organic matter down to its original nutrient form.
- Highly beneficial to soil and plant growth.

Integrated Pest Management

Pests are organisms that cause damage to things that are valued by human beings, such as agricultural crops. Pests can come in many forms, including insects, diseases, weeds, and mammals. Here we define agricultural pests as organisms that cause economic loss to crops. Limiting the damage that pests cause can be very important to farmers, particularly if the pest substantially reduces the harvestable yield. Integrated Pest Management (IPM) is an approach which combines all useful methods for controlling a certain pest (or group of pests); optimally these methods will work synergistically. Integrating different IPM methods effectively requires skill and knowledge. The more we know about a pest's biology and ecology, the better we can manage the pest and minimize damage from it. We have to obey following points while selecting methods for pest management;

- Only organic means will be adopted to manage pests and diseases.
- The materials used to manage pests and diseases will be less expensive, locally available and will be user friendly.

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Cultural practices

Clean cultivation is essential since weeds could act as the alternate hosts for the insect pests and the virus diseases transmitted by insects. Healthy seedling production practices should be followed to ward-off the early season sucking pests and the viruses that they transmit. Plants from the same family should not be planted next to each other, since they may share the common pests and diseases.

Traps

Use of pheromone traps is recommended for tomato fruit borer, army worms, fruit flies, legume pod borers, eggplant and okra fruit and shoot borers, diamondback moth, and other pests for monitoring and/or mass-trapping. Yellow sticky traps could be used to monitor and trap whiteflies, leafhoppers, winged aphids, adult leaf miners, and other species. Blue sticky traps are recommended for managing thrips

Seed Preservation and Storage

5 tips for preserving and storing organic seeds from nutrition garden;

Step 1 – Clean seeds promptly after removing them from plants - It is essential that as soon as you take seeds from plants that's the first thing you do is thoroughly clean them. That means removing all soil, dirt, and dust residue. This can be done with a recyclable facial tissue or soft hand towel. Depending upon the species, you may also need to remove additional matter such as natural coatings, shells, husks, and cobs.

Step 2 – Dry seeds before storing- One clean, your seeds will need to be dried. Separate seeds by type accordingly, and spread them out evenly on a dry paper towel or clean dye-free parchment. Resist the urge to use newspaper – the ink can seep through onto the moist seeds. If the sun is shining feel free to let them dry quickly in their naturally lit environment.

Step 3 – Freezing seed for long term storage – Inspect your seeds to ensure that they have completely dried. When that is confirmed you are ready to place them into a container for safe storage. If storing seeds for the long term (approximately up to 2 years) you will need to freeze them. When freezing, place the same-kind seeds into a ziplock bag and seal them tightly. Because you need to reduce the rate of aerobic respiration you must exclude all oxygen

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from the container. If you're forward thinking about seed preservation on a larger scale you may consider investing in a vacuum sealer to completely extract all oxygen from the atmosphere surrounding your seeds. Label each bag by type of seed and the date that is was packed away. Once sealed and labeled place them at the back of the freezer away from opening doors so that the temperature remains constant

Step 4 – Open area storing for shorter term- Organic gardens in regions with more static climates may require the storing of seeds for the short term alone. Whatever the reason, if you are looking at shorter term seed preservation you may be considering open area storage. You will still need to sustain the seeds in an airtight container to keep the oxygen at bay. Temperatures should remain cool and constant as well. At the same time, you will need to prevent moisture from entering the container. This can be accomplished with an old household trick involving powdered milk. Place two heaping tablespoons of powdered milk onto layers of tissue (three or four will be fine, depending upon the ply count), wrap the tissue firmly around the powder (you don't want any of the powder to touch the seeds), and place it within each jar/container where your seeds are being preserved. Once again, label each container by type and date

Step 5 – Carefully transmission from storage to planning – When the time comes for you to remove your seeds from storage be sure to keep them sealed until the container/ziplock has returned to room temperature. Remember, seeds should not leave storage until you are truly ready to return them to the soil, so plan your planting schedule accordingly.

The above seed preservation tips will serve your personal or community nutrition gardening needs. However, when it comes to seed preservation on a larger scale much more care is involved, delving into agricultural sciences and tailoring preservation methods by plant species.

Material and Equipment

- Provision for water supply (water harvesting structure)
- Fully decomposed farm yard manure (FYM)/compost
- Quality local/improved seeds and plant materials
- Spade and crow bar
- Coir rope and measuring tape
- Lime or ash for marking
- Fencing materials.
- Small tools and implements (Dao, spade, hand raker, hoe, few bamboo sections etc.)
- Wire (GI/plastic/any others)

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