welt hunger hilfe

For a world without hunger

NUTRITION GARDEN

GOOD PRACTICE GUIDELINES

Nutrition Smart Village

IMPRINT

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Dated
November 2020

NUTRITION GARDEN

Good Practice Guidelines

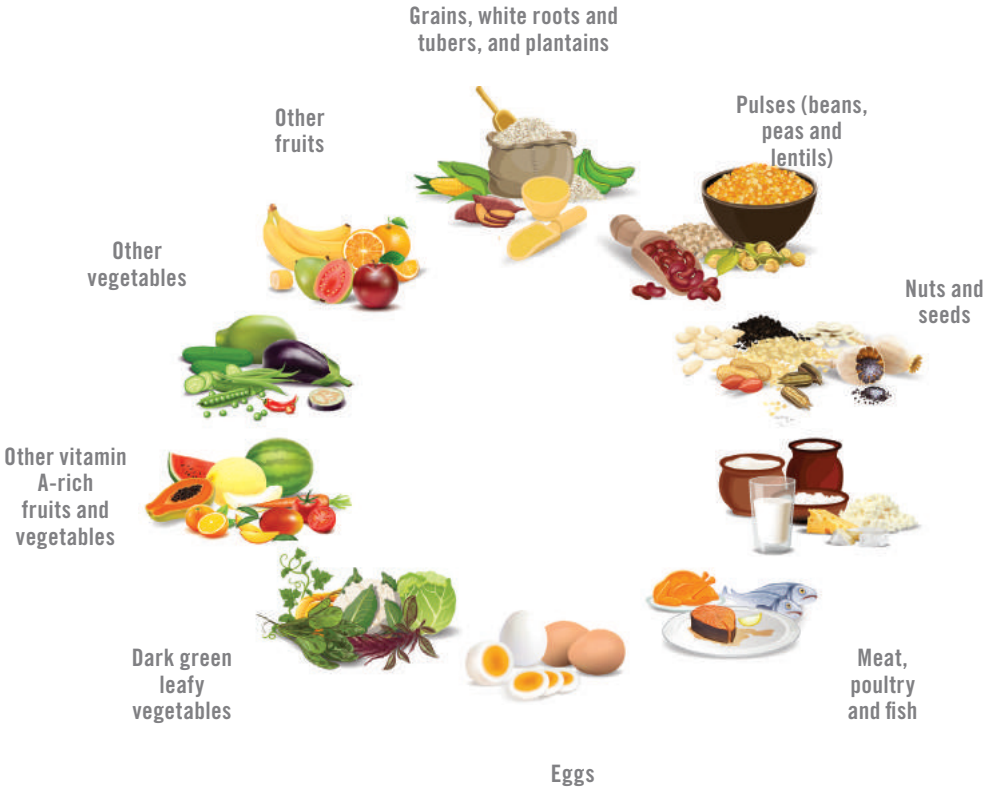
MODELS SUITABLE FOR NUTRITION GARDEN UNDER MGNREGS

Ensuring yearlong dietary diversity for the family, especially women in reproductive age and children, is one of the many challenges faced by the socioeconomically backward sections of our country. Recently, the Government of India has issued a guideline under the Ministry of Rural Development for the MGNREGS – individual benefits scheme for promoting 'nutrition gardens' with the goal to enhance dietary diversity at household level as well as to support income and employment for the family. The nutrition gardens, when well planned, can produce enough to sell excess after consumption. It has been found that there is a good demand for these vegetables and fruits within the villages as the neighbors are aware that they are 100% organic.

Welthungerhilfe has demonstrated nutrition gardens using the agroecological approach of Sustainable Integrated farming systems (SIFS) that have the potential to survive throughout the year, and are low cost and require very little space. The idea of the nutrition garden talks about producing all the dietary diversity from the garden itself, so it is important to include poultry livestock, tree, composting unit and relevant management practices.

This document brings together some of the tried and tested models that can be replicated under this scheme through labour provided the nutrition garden owner.

5/10 | 5 OUT OF THE 10 FOOD GROUPS MUST BE CONSUMED EVERY DAY TO ENSURE MINIMUM DIETARY DIVERSITY



BENEFITS OF THE NUTRITION GARDEN

- Hunger periods are reduced
- Small farms focusing on cash crops can reduce market dependence by production for own consumption
- Multiple and mixed cropping – increases dietary diversity and soil nutrition
- Organic farming- safe food, low cost, less time involvement (more resilient crops) and improved organic waste management
- Clean environment- less disease- better nutrition
- Recycling of wastewater
- More fodder
- Use of degraded lands – production of food, fodder and fuel
- Preservation of natural resources- forests and water bodies
- Increase in biodiversity- improves sources of food for both animals and humans
- Cost of production reduced- supports consumption of nutritious food on regular basis, more profits from sale, scope to buy food that is essential but cannot be grown on own farm
- Good source of uncultivated foods- allows growth of wild foods – weeds, small insects, local fishes, wild fruits

ACTIVITIES WHICH CAN BE CARRIED OUT UNDER NUTRITION GARDEN SCHEME OF MGNREGS

Sl.	Works	Activities	Proposed Human Days
1	Crop Management	1a. Multitier cropping to grow multiple crop in a small area using vertical expansion	1 Day
		1b. Sack Garden to ensure nutrition during stress period	.5 Day
		1c. Kite garden to ensure nutrition in water-logged situation	.5 Day
		1d. Plantation in fencing to intensify production	1 Day
		1e. Floating garden for waterlogged situation	3 Day
		1f. Rhizome basket to grow tubers for home consumption	1 Day
		1g. Community Vegetable nursery	2 Day
2	Pest and Disease Management	2a. Bio pesticide preparation	.5 Day
3	Livestock Management	3a. Levelling Goshala/cow shed to collect cow urine	2 Day
		3b. Poultry house over fishpond	3 Day
		3c Developing Azolla pit	2 Day
4	Soil and water management	4a. Agri-Wash model to use wastewater from hand pumps to nutrition garden	2 Day
		4b. Low cost drip irrigation	1 Day
		4c. Keyhole garden	1 Day
		4d. Liquid Manure	1 Day
		4e. Low cost vermicomposting	1 Day
		4f. Pit composting	1 Day
		4g. community vegetable nursery.	
5	Post-harvest	5a Zero energy cool chamber	2 Days

This document brings together some of the tried and tested models that can be replicated under this scheme through labour provided the nutrition garden owner.

Objective of Nutrition Garden	Principles of nutrition garden
Utilizes front yard, backyard and space around the living space to grow some nutrient rich vegetables and fruits. through recycling of household waste, grey water etc.	Fruit vegetable, leafy vegetables, legumes, tuber crops, spices and some medicinal herb along with trees like banana, lemon, moringa.
The aim is to ensure that all family members especially women and children consume at least 150-200gm of green vegetables / fresh fruits per person per day around the year.	Own seed, own input
Integrate backyard poultry and goat rearing for better nutrient availability for the soil and income enhancement.	Integrate livestock and recycle waste through composting

For a garden, the owner can decide any of the activities suitable for her garden and submit plans accordingly. A diary may be maintained for the plan based on the season and harvest. The daily produce can be recorded. The logbook can help to maintained record of consumption and income from excess production. This documentation is ideally for the demonstration villages and lead farmers not all households.

Village seed bank should be maintained for preservation and sharing of seeds.

Every household should have some arrangement for rainwater harvesting during monsoons in dry climatic zones to recharge ground water.

The labour costs for setting up each of the planned activities may be mobilized from government schemes in India (IBS- MGNREGS). Seeds and others can be obtained from agriculture schemes through the local administration. Community seed banks and community nursery are a good option.

01 I CROP MANAGEMENT MODELS

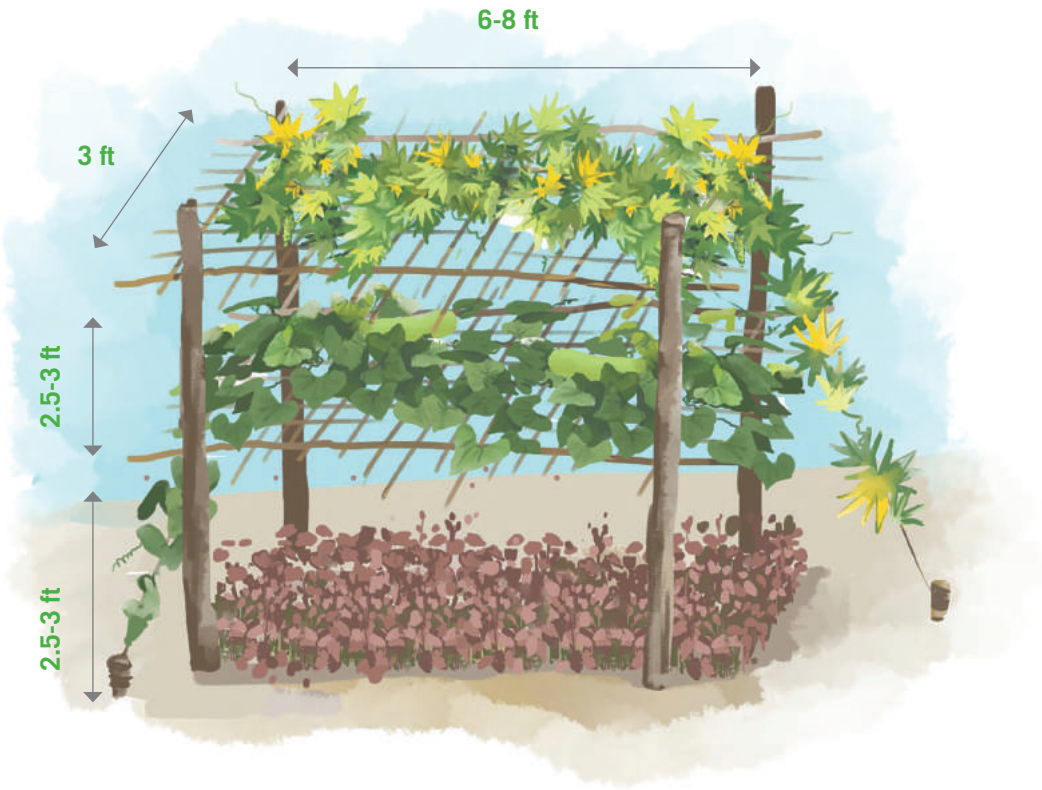
01A MULTITIER CROPPING TO GROW MULTIPLE CROP IN A SMALL AREA USING VERTICAL EXPANSION

What:
Due to lack of space and less scope for crop diversity families are not interested in growing nutrition gardens near their living areas. The multi-layer or multitier cropping provides for more than 2-3 crops from the same land.

Why:
- As water is limited, large lands of gardens cannot be kept hydrated during the harsh summers of central India and the Deccan plateau. The benefits of the household wastewater can be maximized if it is used on a small piece of land.
- One plant creates shade for the other plant.
- Plants with different root lengths absorb food from different levels so plant nutrition is available.
- Fruit trees can be integrated with nutrition garden as source of nutrition.
- Soil moisture is restored.

How:
- The direction of the structure should be north to south.
- Space required for the model is 15 -20 square feet.
- Length 6-8 feet, width 3 feet and height 5-5 feet.
- The 4 main structures can be of fruit trees/medicinal trees like- Papaya, Betel nut, Moringa, neem, or banana.
- Best benefit of this model is during the Kharif cropping season.
- At the ground level there should be leafy vegetables like Amaranthus.
- At the middle level there should be creepers like ridge gourd.
- At the topmost level there should be creepers like bitter gourd.
- Creepers with large leaves are not suitable for this model.

For demonstrated model
Rs 250.00-300.00



01B | KITE GARDEN

What:

As much as lack of water is a problem for growing nutrition garden as is too much of water. Low lying areas, delta regions and flood prone areas inundated for months or sometime high moisture content on soil are a hindrance. Reduced dietary diversity during the monsoons may cause hidden hunger. Too, much moisture is detrimental for most plants. The Sack garden and the Kite Gardens address this issue to an extent.

Why:

Kite garden model is an innovative technology in the nutrition gardens maximizing the land spaces, both vertically and horizontally, of the rural poor farmers. It is low cost methods using local available materials. This model is a vertical approach system of home gardening and this method has been used considering the maximum use of the homestead spaces.

Kite structure:
Rs 200

2 Bamboos and Jute ropes or coir ropes

How:

- The kite model is a structure (4-5 feet or 6-8 feet) which is made of bamboo or jute sticks tied with ropes.
- The structure is either buried in a sack or in the soil.
- The structure provides support to the creeper plants like bitter gourd, ridge gourd, sweet potatoes, snake gourds, broad beans, lablab, etc. to grow vertically on the kite.
- This structure does not obstruct the sunlight for the small vegetables growing below the kite.
- It can also support the vine crops in winter season such as country bean, French bean, sponge gourd, spinach etc. But most of the farmers prefer to grow country bean.
- Each kite produces 15 to 20 kg of fruits and vegetables, which is valued at Rs 300-500 in the market.
- In an integrated farm, it is possible to introduce at least 5-7 kites with an additional income of approximately Rs 3500.

01C SACK GARDEN

What:
Sack garden allows us to grow a diverse range of fruits and vegetables even in places with no or less cultivable land. The sacks are movable and can be shifted to safer places, if needed. Though there is a limitation in the plants that can be grown in a sack garden, there is still a lot of scope to provide diversity to the garden.

Why:
This is a kind of gardening technology used for flood areas, rooftops, places close to the house and places with less soil for gardening. The plants are grown in plastic sacks or grow bags. Sack farming is good for crops that do not take long to mature, are not bushy, have shallow roots and do not grow too tall. These crops include; vegetables (e.g. spinach, okra, tomatoes, leafy onions, capsicums) legumes (e.g. cow peas, beans) sweet potato vines and squash butternuts. It saves on land/space, water, money and time used in farming.

How:
- The sacks can be used to grow Indian spinach, kang kong, chili, tomato, cabbage, eggplant, bitter gourd, country bean, indian pennywort (thankuni- a medicinal plant), basil (tulsi) , mint (pudina), wild coriander etc.
- A good sack garden should allow air and water to reach all crops so that they grow well, and it should also last long. There are two designs commonly used in sack gardening; one with horizontal layers of stones and the other with stones/gravel in the middle of the sack.
- The sack garden with gravel in the middle seems better as it allows easy distribution of water and air to the crops at all levels. It is also suitable when planting crops all around the sack garden. If you do not plan to plant any crops on the side of your sack garden, the design without stones will work fine.
- A sack garden can be created with plastic or jute bags, 50 kilos of soil (no cost), 25 kilos of fertilizer (compost, manure), 15 kilos of brick chips/ stones (3 to 7 cm width), a pipe of the height of the bag/a plastic bottle opened at both ends.
- Mix manure with soil in the ratio of 1:1
- Pierce through the center of the sack bottom into the soil using a sharp and strong rod. This rod will provide support to the sack garden if you want to fix the sack in one place.
- Fold the edges of the sack to allow easy filling with the mixed soil
- Add one foot of the soil/manure mixture into the sack. Water this soil layer so that it is evenly moist
- Place a bottle without top or PVC pipe at the center of the sack such that the supporting rod is inside the bottle/ pipe. A 2-liter plastic bottle or a 5cm diameter or PVC pipe. Fill the PVC pipe with stones/gravel. Fill the area around the can with the soil/manure mixture. Lift the pipe now so that it stands on the newly laid layer. Water this level so

₹ For one sack
Rs 50

1 Sack, 1 PVC pipe 2.5 feet 5 cm diameter, Stone chips, 5 kg Soil and 2.5 kg Compost

that the soil is evenly moist. Repeat the procedure of filling the pipe with gravel and the area around it with soil/manure mixture until the whole sack is filled. Water each level.

- Add supporting rods at the side of the sack garden, if needed. The supporting rods from two or more sacks gardens can be joined with a wire to be used to train tomatoes.
- Use a sharp stick to pierce the sack for planting holes. Use your thumb to press the soil downwards to make the planting hole bigger.

01D PLANTATION IN FENCING

What:
Nutrition gardens need to be protected from domestic animals, birds etc. Most fences made today tend to be ineffective, hard to maintain or costly. Sometimes living plants are used for fencing, but the fence itself does not contribute much to production.

A well-designed fence can yield food, medicines etc.; it can also help control soil erosion and act as a windbreak. Additionally, it can be a source of leaf and stems etc. for mulching, green manuring, composting etc. Living fences can also produce fuel wood and support climbing plants.

Why:

If plants are carefully selected, the trees, shrubs, climbers etc. used to make fences can become a source of food in the dry season, especially when seasonal vegetables are difficult to grow. The fence can reduce damage to soil and plants by regulating the flow of water and strong winds. The fence plants can also provide vertical support for climbing plants. Nitrogen fixing trees are used for green manuring with leaves. Bio fence serving as a habitat for many birds and animals, has multiple purposes such as providing fodder, fertilizer and wind breakers, besides conserving biodiversity and absorbing climate-inducing gases such as carbon dioxide.

How:

- The following are recommended trees for the living fence /bio-fence:
- Lower level: agave, pineapple, etc.
- Lower middle level: zizyphus, thorny acacias, hibiscus, etc.
- Upper middle level: erythrina, wild lemon, zizyphus, etc.
- Highest level: sesbania grandiflora, Betel nuts, etc.
- Climbing plants: sponge gourd, basella, dolichos beans.

Other nonfood plants can be: Tridhara (Euphorbia antiquorum), Devil's backbone (Pedilanthus tithymaloides), Vilayti Mehendi (Clerodendrum inermis), Bougainvillea spectabilis, Karonda (Carissa carandas), Mogli Erand, Biodiesel (Jatropha curcas), Duranta erecta, Kamini, Kunti (Murraya paniculata), Firebush (Hamelia patens)

Some precautions while selection of plants:

If plants on the fence have dense foliage or spreading branches, they can block the light from reaching other garden plants. Living fences can take some time before they can provide effective protection against small animals. In the initial stages, some of the fence-plants themselves may need to be protected. If fence plants are not selected carefully, they may compete with plants inside for nutrients and water.

01E FLOATING GARDENS

What:
Floating garden is a base of aquatic weeds on which vegetables can be grown. The gardens float on flooded land or small ponds. This is used extensively in Bangladesh.

Why:
Many people around the world experience flooding. In regions with frequent flooding the growing season is affected, and crops become damaged or even washed away. Another problem for poor communities is that there is little land available for growing food. This process of growing floating vegetables is ecofriendly and financially affordable. Chemical fertilizers and pesticides are not required. Unproductive, fallow land becomes useful during the monsoon floods. The amount of vegetable grown is enough for a single family. Floating gardens can be used all year round, for summer and winter crops, and can provide families with enough vegetables to eat and to sell.

How:

1. **Place selection:** The floating beds can be prepared in places where water remains/ exists more than six months in a year, and an abundance of water hyacinth exists.

2. **Size of bed:** In general, it requires 30 feet long and 6 feet width. It is needed at least 5 times of water hyacinth for a standard bed size.

3. **Time of bed preparation:** Floating bed can be prepared at any time of the year. Due to the particular water wave actions in the Haor areas of Bangladesh, the most appropriated months are August to September.

4. **Input and materials for bed preparation:** Water hyacinth is the main material required for floating bed preparation. In addition, 2 pieces each of 30 feet long bamboo, 1 pieces of small bamboo, 1 knife and a long rope are required for the preparation.

5. **Bed preparation:**

- **Step-1:** Beds are most easily prepared where the water level remains low. Places with lower water levels require 2 additional bamboos for stabilizations.
- At first, the 2 long bamboo pieces are put on top of water hyacinth. Then water hyacinths are gathered on the top of the bamboo pieces always keeping the balance. Water hyacinths are twisted into each other; otherwise the bed will break apart in a few months. The bamboos will be moved out from underside after certain preparation of bed. This process will be repeated several times until the final height of the bed is reached. During this process, the water hyacinths need to be compacted

₹

Rs 250.00-300.00
including 3 days labour cost

by using the legs and applying pressure. The minimal height should be 3 feet from the water table.

- **Step-2:** After 7-10 days later, the bed must be shaped into the right size and leveled by cutting water hyacinths on all four sides. The cut small pieces are put on top of the bed and equally leveled by hitting with a bamboo stick.
- **Step-3:** In the following 20-25 days the bed is left fallow for decomposition of the top layer water hyacinth. It is best to have rainfall. If there is no rain, the bed should be kept wet by spraying water twice a day. Important is that the top level of the bed is never drying out to assure a maximum potential yield. The process can be speed up directly using already decomposed water hyacinth for the top layer. In this case 3-4 days are necessary before sowing of the crop.

6. **Seed Sowing and seedling transplantation in bed:** When its color turns into black due to water hyacinth decomposition. The bed is ready for seed sowing or seedling transplantation. Either broadcasting method for direct seed sowing of small seed or seedling transplantation in lines is used.

7. Intercultural operation:

- **Weeding:** After the first vegetable harvest, weeds have to be removed with roots from the beds. Normally no additional weed will grow later.
- **Fencing:** Ducks are the 'main enemy' of floating bed. Ducks damage and destroy seedlings and young plants. Proper fencing of floating beds with nets is crucial to keep ducks away.
- **Staking:** Bed needs to be bamboo sticks for protection of wave action.
- **Other intercultural operation:** Fertilizer, top dressing, irrigation, etc. is not required for floating beds.
- **Trellis and stacking:** Trellis is especially applied for creeper/vine crops/vegetables (beans, gourds). Staking is needed for tomato.

8. What can be grown in floating bed: All types of vegetable can be grown in floating beds but more suitable is red amaranth, kang kong, stem amaranth, taro, radish, spinach, tomato, brinjal, country bean and seed bed of vegetables and paddy seedlings, etc. Leafy vegetables are generally more profitable. Timely preparation of seed bed and transplanting allow a fetch a higher market price and thus got more profit.

9. Harvesting: First time yields are normally lower and therefore harvested rather early after 20-25 days. A second crop can be sown or transplanted immediately afterwards. Kang kong can be harvested every week and other leafy vegetables when ready for sale.

- DO NOT use a floating garden in areas of water affected by tides or currents because the raft may get damaged.
- DO NOT use a floating garden in salty water as the crop will not grow.

01F | RHIZOME BASKET

What:
A rhizome (also known as rootstocks) is a type of plant stem situated either at the soil surface or underground that contains nodes from which roots and shoots originate. Rhizomes are unique in that they grow perpendicular, permitting new shoots to grow up out of the ground. Ginger and turmeric are popular spices which are rhizomes. These can be grown in a basket and suspended in any shaded area.

Why:
The daily use spices can be grown at home using very little space. The basket of rhizomes can be maintained even in flood prone areas. Money can be saved on ginger and turmeric which are quite expensive but required for all recipes in India, Bangladesh and Nepal. These plants also have medicinal value and can be used for treatment of common ailments like cough, cold, infections, etc.

₹ **Rs 300**

How:

Materials required:

- Bamboo basket/ plastic basket- 01 piece
- Medium thick rope- 30 feet
- Ginger seed – 200 gms
- Loamy soil - 7-10 kg
- Organic manure 3-5 kg
- Ashes- 1-1.5 kg
- Old cotton cloth or gunny bag - 1 piece
- Straw for mulching- need based

Preparing method:

- Firstly, take a bamboo basket or plastic basket (new or old) and the spread/place a piece of old cotton cloth or gunny bag inside the basket.
- Then mix the loamy soil, organic manure and ashes in a place finely and then put in the bamboo basket or plastic basket
- Now plant 4 ginger seeds around the basket and 1 in the middle. Then cover it with soil.
- Mulching with straw.
- Tie up the basket with a rope and hang it in a semi-shaded place.
- Irrigate as and when required
- Before planting ginger seed should be treated by cow urine

Planting time: April-May

01G

COMMUNITY VEGETABLE NURSERY

What:
The nursery saves quantity of expensive vegetable seed and provides proper care of seedlings to produce quality and reliable seedlings. Seedlings of vegetables such as brinjal, chili, tomato, cabbage, cauliflower, broccoli, broad leaf mustard, gourds etc. are raised in the nursery.

Why:
It improves access of community to seedlings at reasonable price. Encourages entrepreneurship development in the community. Locally availability of quality seedlings at reasonable price. This will help promote nutrition garden leading to enhanced access and utilization of

green and fresh vegetables for better nutrition. The activity sustains SIFS in the community towards food and nutrition security.

How:

Nursery site:

- Fertile soil, access to sunlight.
- Accessible for caring and selling the seedlings.

Nursery Bed:

- Fine tillage and manured with compost @10 kg per m2 10 days before seeding.
- Beds are raised 15 cm above ground to drain excess water.
- Bed size: 1 m wide and 2-10 m long.
- 50 cm passage is kept between beds for movement.

Seeds:

- 10-15 g seed to produce seedlings for planting 1 katha.
- Sprouted seeds treated with urine and cow dung.
- dried in the shade before seeding.
- Sowing: 10 cm from R-R and 1-2 cm from P-P.
- Covered with rice straw after seeding till emergence.

Intercultural operation

- Irrigation with water cane in the morning and evening daily or as per requirement.
- The beds are protected from rain and excess cold by covering with plastic sheet over the bamboo stick frame.
- Weeding is done whenever necessary.
- Soil is saturated with moisture before uprooting seedlings.

₹

Cost	Quantity	Cost (INR)
Seeds	50 g	300
Compost	100 kg	125
Bamboo	2 pieces	375
Plastic	20 m	500
Rice Straw	5 bundles	100
Land preparation and manuring	1 pax/ days	375
Seeding	1 pax/ days	375
Irrigation, weeding and other care	5 pax/ days	1880
Total Expense		4030

02 I PEST AND DISEASE MANAGEMENT MODELS

02A

BIO PESTICIDE

What:
Bio pesticide is a liquid pesticide application based on cattle-urine and some weeds. This low cost and effective method have immense potential to reduce pest infestation.

Why:
With the escalating price of fertilizers and increasing dependence of farmers on market driven fertilizers the cost of agriculture has increased and food has become unsafe for consumption. Integrated farming creates subsystems where the output of one system becomes the input for the other, as for example the use of animal wastes, organic plant wastes, etc. preparation of fertilizers and pesticides at zero cost. These solutions can instantly enhance the fertility of the soil.

How:
Locally available wild plants and organic wastes are converted into fertilizers and pesticides.

₹

Option 01	Option 02	Bio-Pesticide
Rs 600	**Rs 600**	**Rs 600**

SOME HERBS LOCALLY AVAILABLE WITH HERBAL TOXIN PROPERTIES USED IN LIQUID FERTILISERS (JHOLMAL)

MALABAR NUT	SARIPHA	JIMSON WEED	INDIAN PRIVET	CASTOR
STEVIA REBAUDIANA	TOBACCO	MARIGOLD	CHINABERRY FLOWERS	NEEM

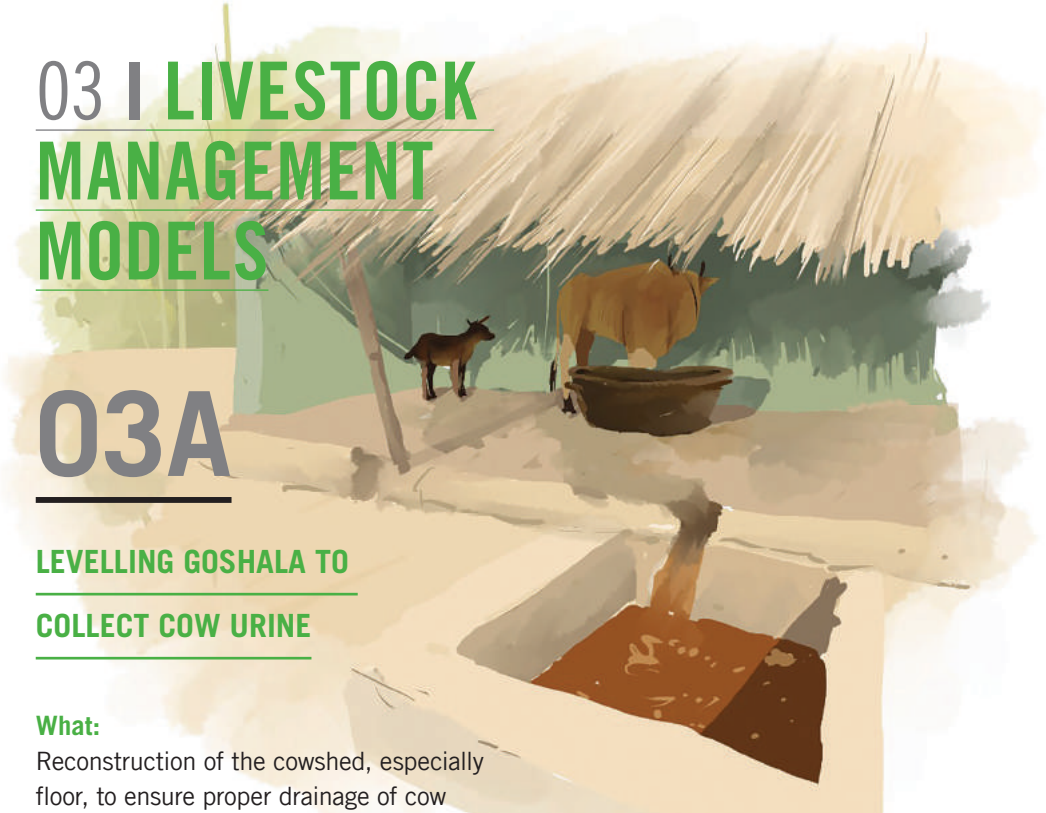
COMPOSITION OF *JHOLMAL* /LIQUID FERTILIZERS AND BIO-PESTICIDES

	Ingredients	Option 1	Option 2	Bio-pesticides
	Plastic Drum	1 (50 L)	1 (50 L)	1 (50 L)
Composition	Cattle urine	16 L	24 L	19 L
	Cattle dung	16 kg	24 kg	19 kg
	Clean water	16 L	-	-
	Herbs (Chopped leaves and twigs)	-	-	10 kg
	Jaggery	1 kg	1 kg	1 kg

METHOD AND USES OF LIQUID MANURE AND BIO-PESTICIDES

	Option 1	Option 2	Bio-pesticides
Methods	Mix, stir and keep air-tight in the drum for 2 weeks. Stirring of the mixture is done at 3-day interval.		Similar but it takes 4 weeks.
Use	Soil application at 15-d interval @200-250ml/ L water. As MANURE	Foliar spray at 7-d interval @200-250 ml/ L water. MANURE & REPELLENT	Foliar spray 7day interval @200-250ml/L water. REPELLENT

03 I LIVESTOCK MANAGEMENT MODELS



03A

LEVELLING GOSHALA TO COLLECT COW URINE

What:
Reconstruction of the cowshed, especially floor, to ensure proper drainage of cow urine and hygiene of the cowshed. The cow excreta has high value as agriculture input in the form of fertilizer and pesticides.

Why:
Usually, cattles are kept in sheds with mud or non-concrete floor. The place where cattle rest often gets messy with cow dung, cattle urine and water. During rainy seasons these floors becomes unhealthy for and causes several infectious diseases for the cattle. Also, cattle urine and cow dung are important resources that could enhance soil fertility.

How:
If the floor of the cattle shed is constructed with cement and stones, this would enable better collection of dung and cattle urine as well as protect cattle from infections. A tank constructed for urine collection could be used to make liquid manure to enhance soil fertility. A fodder trough would facilitate proper feeding of cattle and minimize waste of fodder.

The area of the cattle shed floor for 6 heads of cattle is 26.95 sq.m. (7.7mx3.5m).

₹

For constructing the cattle shed floor in cement concrete, a 1 cum fodder trough (7.7m x 0.2m x 0.65m) and a cattle urine collection tank of 250 liters

Rs 35,000 per unit

The unskilled labour: material ratio is 30:70. (MGNREGS)

03B

POULTRY HOUSE OVER FISHPOND

What:
Poultry rearing over pond: Chicken/duck raising for meat or eggs, can be integrated with fish culture to reduce costs on fertilizers and feeds in fish culture and maximize benefits. Chicken/duck can be raised over the ponds and the poultry excreta recycled to fertilize the fishponds

Why:

Raising chickens over the pond has certain advantages: it maximizes the use of space; saves labour in transporting manure to the ponds and the poultry house is more hygienic. Poultry manure that fertilizes the pond provides substrate for bacterial growth, enhances growth of aquatic flora (e.g. Phytoplankton and zooplankton) and fish feeds directly on them and the aquatic flora. In effect poultry waste is converted to animal (fish) protein. Duck helps to increase biological oxygen demand in the water through paddling or movement, which helps in physical growth of fish. Ducks consume mosquito larvae, tadpoles, dragon fly larvae and snails which also serve as vector for certain parasites. Duck droppings go directly into water providing essential nutrients to increase the biomass of natural food organisms

How:

The standard poultry shade size for the small and marginal farmer is 8 feet (length) x 8 feet (width) x 7 feet (height) [Backyard poultry]. Total 25 chickens and 15 ducks can rare in the above-mentioned poultry shade. We need to fix 2 or 3 bamboo stand horizontally inside the shed for chicken and bottom area leave for duck. There should be two or three bamboo basket with rice husk for laying / layering eggs. On an average 10-15 eggs regularly getting from this poultry shade. Bird ratio should be 10:2 [Female: Male] for better egg laying. Duck number depends on the size of the pond.

₹

Subsystem	Item Name	Unit	Unit Name	Unit Cost ₹	Amount ₹
Birds Cage over Pond	Cemented Pole	4	Number	500.00	2,000.00
	00 Bamboo	30	Number	100.00	3,000.00
	Wire Net [Murga Net]	35	Feet	120.00	4,200.00
	Nail	2	Kg	60.00	120.00
	GI wire	2	Kg	75.00	150.00
	Rope	2	Kg	60.00	120.00
	Labour	15	Number	350.00	5,250.00
	Chicken [Desi]	15	Number	200.00	3,000.00
	Duck	15	Number	150.00	2,250.00
				Total Amount	**₹ 20,090.00**

03C DEVELOPING AZOLLA PITS

What:
Azolla is an aquatic floating fern, found in temperate climate suitable for paddy cultivation. The fern appears as a green mat over water. Azolla, hitherto used mainly as a green manure in paddy has tremendous potential to meet the growing demand for fodder among the small farmers taking up animal husbandry.

Why:
Azolla can easily be produced in large quantity required as green manure in both the seasons – Kharif and Rabi. It can fix atmospheric CO2 and nitrogen to form carbohydrates and ammonia respectively and after decomposition it adds available nitrogen for crop uptake and organic carbon content to the soil. Azolla suppresses

₹ The cost of one Azolla pit is **Rs 2000**

The unskilled labour: material ratio is 30:70. (MGNREGS)

tender weeds such as Chara and Nitella in a paddy field. Azolla releases plant growth regulators and vitamins which enhance the growth of the rice plant. Azolla can be a substitute for chemical nitrogenous fertilizers to a certain extent (20 kg/ha) and it increases the crop yield and quality. It reduces evaporation rate from the irrigated rice field. It easily grows in wild and can grow under controlled condition also. In addition to their farming activity, small and marginal farmers are generally capable of rearing 2 to 3 units of cow/ buffaloes. Azolla fodder plot, if set up by these small farmers can cater to the fodder requirements of remaining part of the year. Azolla can be supplemented with regular feed of the animal @ 2-2.5 kg of azolla per animal.

How:

Azolla can be grown in artificial water bodies made preferably under shade. A pit of the size of 2m x 2m x 0.2 m is dug as a first step. The bottom of the pit is covered with plastic gunnies. About 10–15 kg of sieved fertile soil is uniformly spread over this plastic sheet. Slurry (made of 2 kg cow dung and 30 gm of super phosphate in 10 litres of water) is poured on to this sheet. More water is poured to make the water level reach about 10 cm. About 500 gm-1 kg of fresh and pure culture of Azolla is introduced in the pit. Azolla will rapidly grow and fill the pit within 10 – 15 days. About 500 – 600 gm of Azolla can be harvested daily thereafter.

04 I SOIL AND WATER MANAGEMENT MODELS

04A AGRI-WASH MODEL TO USE WASTEWATER FROM TUBE WELL TO NUTRITION GARDEN

What:

In Jharkhand, the water scarcity is too high, farmers are unable to grow vegetables in their homestead garden throughout the year and depend on market to meet their daily nutritional requirement.

In this current situation of Covid-19, hand wash has become more important and compulsory for all. In the rural area, 15-20 families generally depend on single hand pump and used it for collection of drinking water, washing clothes, hand washing etc. Therefore, the wastewater generated is quite high and normally it has no use. The Agri WASH model is introduced to minimize the wasting of water and use it in the

nutrition garden to grow vegetables.

Why:

- Water available for whole year to grow vegetables in the homestead.
- Check water logging conditions nearby community water resources and prevent resources from contamination to maintain drinking water quality.
- To maintain community hygiene and stop water borne diseases in the community.
- Stop multiplication of mosquitoes by eradicating wastewater logging points.

How:

1. Make a cemented parapet around the tube well with 3 feet radius and drainage line
2. Make a water collection pond – 10 feet X 10 feet X 4.5 feet sized for storing the wastewater. The wastewater can then be filtered through a soak pit and use it in the nutrition garden and may be for duck rearing.
3. Connect the drainage line with the water collection pond
4. Make 2 or 3 settling chambers at equal intervals on the connecting drainage line to filter the hard particle from the used water, depending on the total length of water exit line. The water flows through exit line into the settling chambers, then from the settling chambers to the pond. Settling chambers size may be – 1.5-2' x 1.5-2' x 1' Feet.
5. Each settling chambers must be filled with charcoal, sand and marble pebbles to absorb the hard particle from water.
6. Settling chambers should be covered up with cemented plate to protect it from external solid materials.
7. Two sieve plate need to be placed at water inlet and outlet points of every chambers.

₹ for demonstrated model **Rs 6000 approx**

04B LOW COST DRIP IRRIGATION

What:

Keeping the soil moisture optimum during the dry seasons is a big challenge and a hinderance for the maintenance of the nutrition gardens and homestead farms. This model reuses the mineral water bottles for watering of plants, and thereby supports in conserving the environment. The pitcher is an earthen pot where all wastewater from the household are accumulated and keeps the soil hydrated along with the use of mulching.

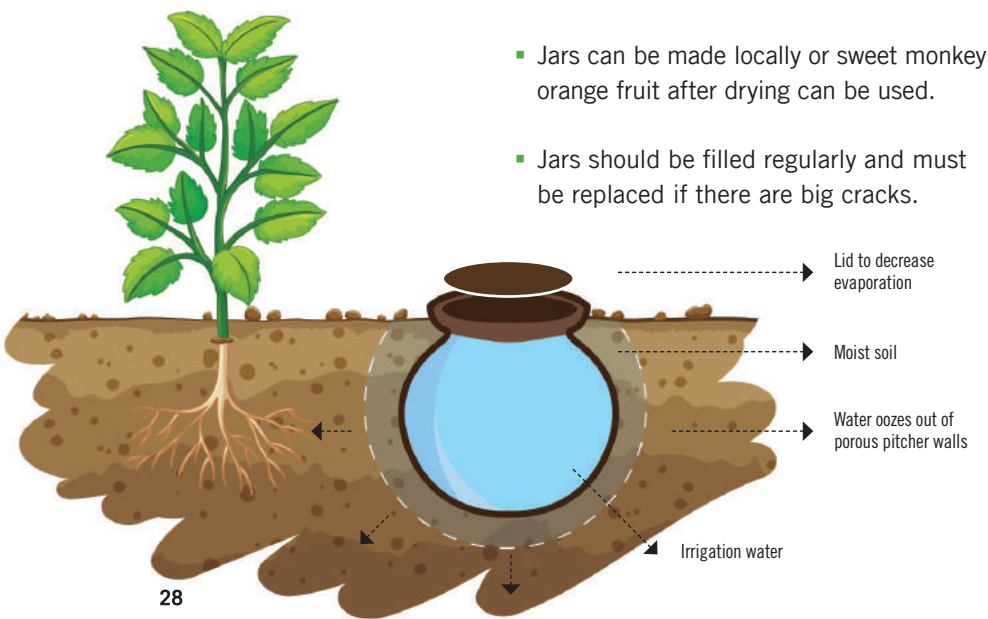
Why:

- Manual drip irrigation systems are easy to handle
- It requires no technical equipment
- It is generally low cost.
- These low-cost methods and models have high self-help compatibility and a relatively high performance.
- It can be used in almost every area, but farmers can especially adapt it for arid areas where evaporation rates are high.
- Therefore, such systems are also called HELPFUL irrigation methods: High-frequency, Efficient, Low-volume, Partial-area, Farm-Unit, and Low-cost. Two different models have been tried and found to be effective the pitcher irrigation and the bottle irrigation.

How:

Pitcher irrigation

- Porous clay jars (or pots) are placed in shallow pits and soil is packed around.
- Water slowly seeps out through the porous walls and reach the roots of the plants.
- Jars can be made locally or sweet monkey orange fruit after drying can be used.
- Jars should be filled regularly and must be replaced if there are big cracks.



₹ **for demonstrated model- no cost of materials. The bottles can be collected from Restaurants. Only labour cost of farmer from MGNREGS**

Drip irrigation:

It's a very efficient technique and extremely simple method for growing plants by hanging the plastic bottles near plant . Here plastic bottles are used to create slow release of water for nutrition gardens especially during inadequate availability of water and summer days.

- Cut off the bottom of the bottle.
- Make a hole in the bottle cap.
- Dig a hole next to the plants or group of plants that is deep enough to position the bottle.
- Connect the bottle cap hole and plant(s) to be irrigated through a simple jute rope or an easily available waste saline pipe.
- Hang bottle near plant or group of plants with the help of bamboo stick.
- Once the bottle is in position, pour water into the container.

04C KEYHOLE GARDEN

What:

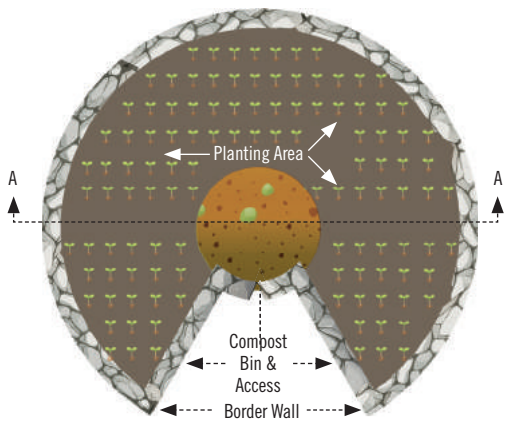
A keyhole garden is the ultimate raised-bed planter. It is often built in the shape of a circle measuring about 6 feet in diameter that stands waist-high and is notched like a pie with a slice cut away. A hole in the centre holds a composting basket that moistens and nourishes the soil. The keyhole garden can be built with recycled materials and requires less water than a conventional garden.

Why:

To have green vegetables (preferably short-term crops) and diversifying food plants during lean periods and in crisis especially in semi-arid/ arid regions. In dry regions water percolates faster and soil gets dry very quickly due to high rate of evaporation. Keyhole gardens are basically convex dome like circular elevated beds with a central hole and a mulch layer in the bottom. It works like an organic recycle tank where cow dung, compost water etc. are fed through central hole. The mulch layer traps the water and it comes upward to the crop bed through capillary action.

How:

1. Make two concentric circles of 6.5' and 1.5' on bed
2. At central circle place a ring made up of dry sticks, bamboo mat or waste bamboo basket of 1.5' dia.
3. Clear the soil up to 8" depth and place a 6" to 8" mulch layer in the bottom.
4. Then heap soil mixed with compost in the outer circle with gradual slope towards outer ring.
5. The best quality of soil should always be put on top.
6. Guard the soil slope with used bricks, stones or fencing using other waste materials.
7. Now fill up the inner feed circle with manure, bio waste and watered heavily for first time.
8. Subsequently small amount of water should be given on regular basis with other bio and kitchen waste.
9. The circular bed can be divided into 7 different sections by ridges to grow short term vegetables like radish, carrot, spinach, turnip, amaranth, cholai, fenugreek, poi, mustard green etc.
10. The outer circle can be used to plant creepers vegetables like gourd, cucumber, lauki etc.
11. Further plants like chili, brinjal, tomato etc. can be taken on the outer circular ridge also.



₹ for a 6'.5 feet garden
Rs 1170

04D LIQUID MANURE (MGNREGS)

What:
Sanjeevak or Amrit pani is a liquid manure application based on cattle-urine.

Why:
This low cost and effective method has immense potential to improve plant nutrition. In a brick masonry pit of 1m*1m*1m, 50 kg of cow dung, 20 litres of cattle urine, 1 kg jaggery and 1 kg of chickpea flour is mixed with 1000 litres of water.

How:
This solution is fermented for 5 to 7 days. This solution should be shaken regularly three times a day. After 7 days, the liquid manure of 1000 litres is diluted and applied on the field. This liquid manure can be mixed with irrigation water (fertigation) at the time when crops are irrigated. This ensures an even spread of the manure in the field. It can also be used in vegetable plots and kitchen gardens. The pit can be filled again and within the next 15 days another round of Sanjeevak can be applied to the crop.

₹ The unskilled labour: material ratio is 30:70. This activity is only for those households eligible under MGNREGS for work on private land. A maximum of 3 Sanjeevak pits will be constructed per selected household under MGNREGS. The unit cost of one Sanjeevak pit is around
Rs 2000

04E LOW COST VERMICOMPOSTING

What:
Vermi-composting uses earthworms to turn organic wastes into very high-quality compost. In ideal conditions, worms can produce at least their own weight of organic matter in a day.

Why:
The micro-organisms in the worm can promote healthy plant growth. There is very minimum input cost. It can also be marketed within the village.

How:
Usually, a twin pit model is used for vermi-composting, with the pit size of 3.6m*1m*0.75m and with a dividing wall in the middle. Vermi-composts are best suited for intensive application in kitchen gardens and small vegetable plots. One vermi-compost pit produces 0.15 ton of compost, which is sufficient for enhancing productivity of 0.25 hectare (2500 sq.m.).

₹ **for a 6'.5 feet garden**
Rs1170

04F PIT COMPOSTING

What:
Revitalizing soil health holds the key to improving productivity of Indian agriculture. Composting is a process of utilizing and processing solid waste through which its organic component is biologically decomposed to a humus-like state that can be used as fertilizer.

Why:
Solid wastes usually contain the entire range of micro-organisms in large numbers. Under appropriate conditions, the microbial population grows and in doing so, degrades the organic portion of the waste. NADEP composting involves the construction of a 3.6m*1.5m*0.9m compost trough, which can produce 1 tonne of composted manure in each cycle. This manure is enough to cover 0.25 hectare of agricultural land.

How:
- The NADEP pit is usually constructed with a lattice brick wall to ensure proper aeration.

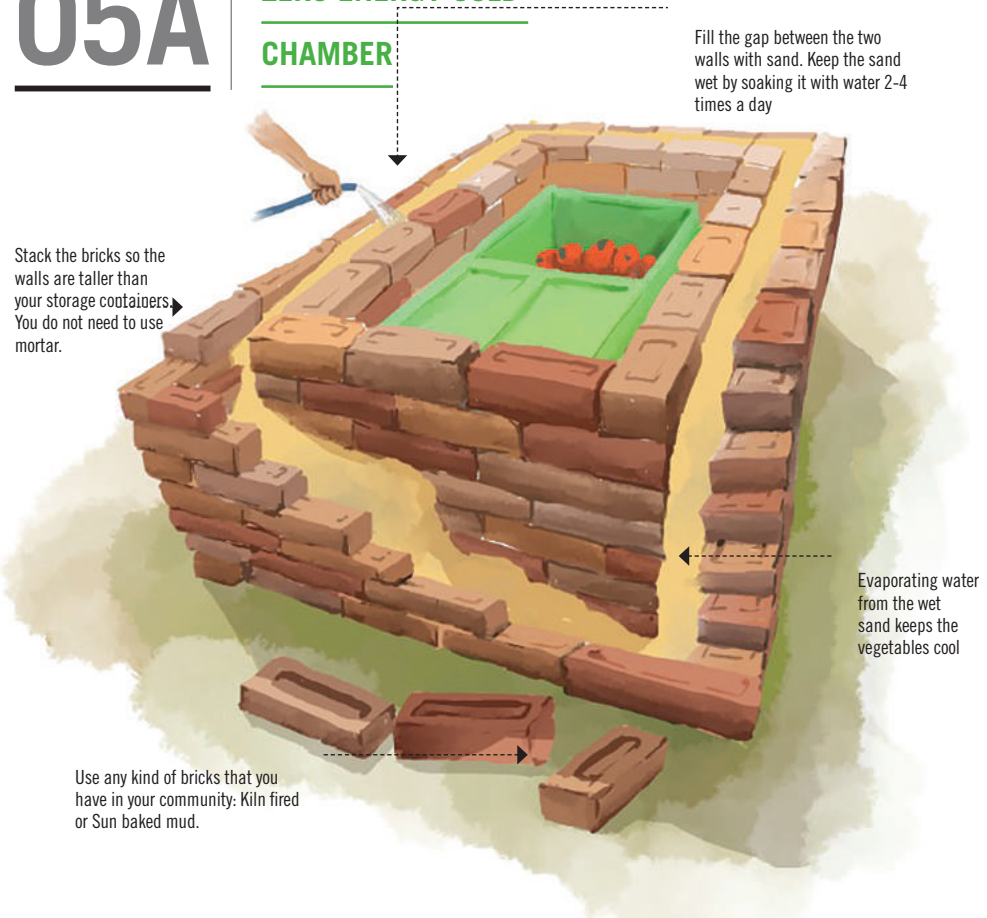
- Inside this trough a series of layers of agricultural waste, dung and soil are successively heaped upon each other.
- About 100-110 kg of agricultural waste is first placed on the ground in a layer which is about 6 inches high.
- 4 kg of dung mixed in 125-150 litres of water is applied on top of this layer (the quantity of water used varies with the seasonal temperature, more water being necessary in the summer months). On top of the second layer, cleaned and sifted soil (roughly half the weight of the agricultural waste used, i.e. 50-55 kg) free of stones, glass etc. is spread on which a little water is also sprinkled.
- In this manner successive layers are heaped to a height of about 1.5 ft. above the top of the trough.
- After this, the top of the pile is sealed with a 3-inch plastering of soil mixed with dung (400-500 kg).
- Within 2-3 months dark brown, friable, soft and moist compost, free of all foul odours is ready. It has been generally estimated that by the NADEP method, one head of cattle produces 80 tonnes of manure in a year. The nutrient status of this manure is Nitrogen 0.5-1.5%, Phosphorous 0.5-0.9% and Potassium 1.2-1.4%.

₹

The unskilled labour: material ratio of this work is 25:75. The unit cost of a NADEP pit of 3.6m*1.5m*0.9m is estimated at around Rs 8000

05 I POST HARVEST

05A ZERO ENERGY COLD CHAMBER

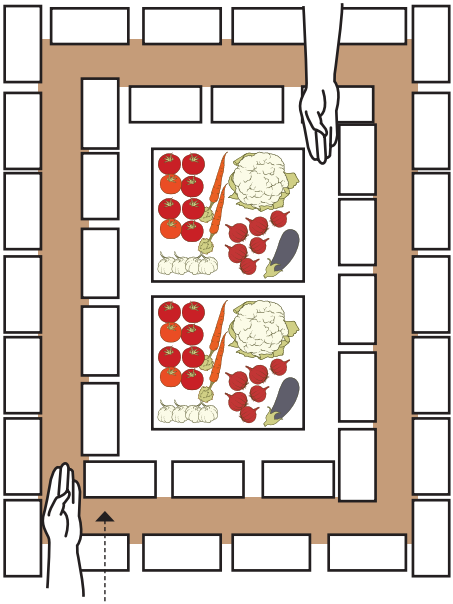


What:

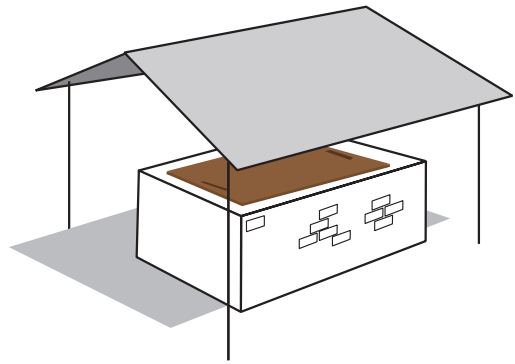
Small and marginal farmers who come to sale their surplus products at the local hatia (market), often fail to sell their entire produce at a good price as they do not have any access to cool storing facilities to preserve their vegetables for the next market; this forces them to give away all their products at the end of the day, at a lower price. The Zero Energy Cool Chamber, an already prototyped technology was identified to address this situation. It is a simple design of double lined brick tank with moist sand filled in the gap that helps to store about 60 to 80 Kg vegetables, fruit etc without weight loss for 2 to 3 days.

Why:

This chamber helps to store about 60 to 80 kg of vegetables, fruit etc. without any weight loss for 2 to 3 days. farmers can store their unsold vegetables. This has



Measure four fingers of space (7-8 cm) around your storage containers to get the size of the chamber



The chamber needs shade and a good lid to keep the cool air in and animals out

increased their enthusiasm as they earlier were often worried about not getting enough return on their agricultural produces. On an average, this model is helping farmers to save about Rs. 800.00 for a 5 to 8 months vegetable production period, increasing the shelf life and retaining weight and freshness of the produce. The benefits would further enhance as the farmers have a regular surplus of production period.

How:

The Zero Energy Cool Chamber was conceived to solve this problem and, with the simple design of a double lined brick tank with moist sand filled in the gap. This chamber is an on-farm storage chamber working on the principle of evaporation reducing the temperature inside it. Cool chambers can be constructed easily anywhere with locally available materials like bricks, sand, bamboo, khaskhas/straw and, gunny bags with a source of water. It is a double walled chamber, filled with sand in between the walls. The sand is always kept moist to reduce the temperature inside the chamber. This chamber can keep the temperature 10-15°C cooler than the outside temperature and maintain about 90% relative humidity. Farmers can easily construct these chambers nearer to their houses to store their produce for a few days after the harvest.

₹ The unit cost of this is around **Rs 8000**

ACKNOWLEDGEMENT

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04

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