Chapter: 1

INTRODUCTION

INTEGRATED FARM DEVELOPMENT

CONCEPT - effective recycling and utilization of farm wastes

Integrated Farm Development is an innovative concept to improve farm productivity in a sustainable manner through integrating various farm resources and recycling various farm / home waste. The main objective of IFD is to integrate the animal and human waste into useful and productive components such as for the manufacture of vermicompost, biogas and crop pest repellant, thereby reducing input cost for farmers. Any technology must be farmer friendly and this IFD technology is feasible and helps the farmers to easily perceive and adopt. Nearly 5-10 interventions are demonstrated in this IFD program which is location specific, technically feasible, economically viable and eco friendly.

Integrated Farm Development helps the small and marginal farmers in reducing the input cost and increasing the yield. This manual educates the farmers on the value of resources (wastes) in both their fields and homes and the technology to convert these resources (wastes) into wealth. By adopting this technology, the farm economy will definitely improve if they realize and adopt the same.

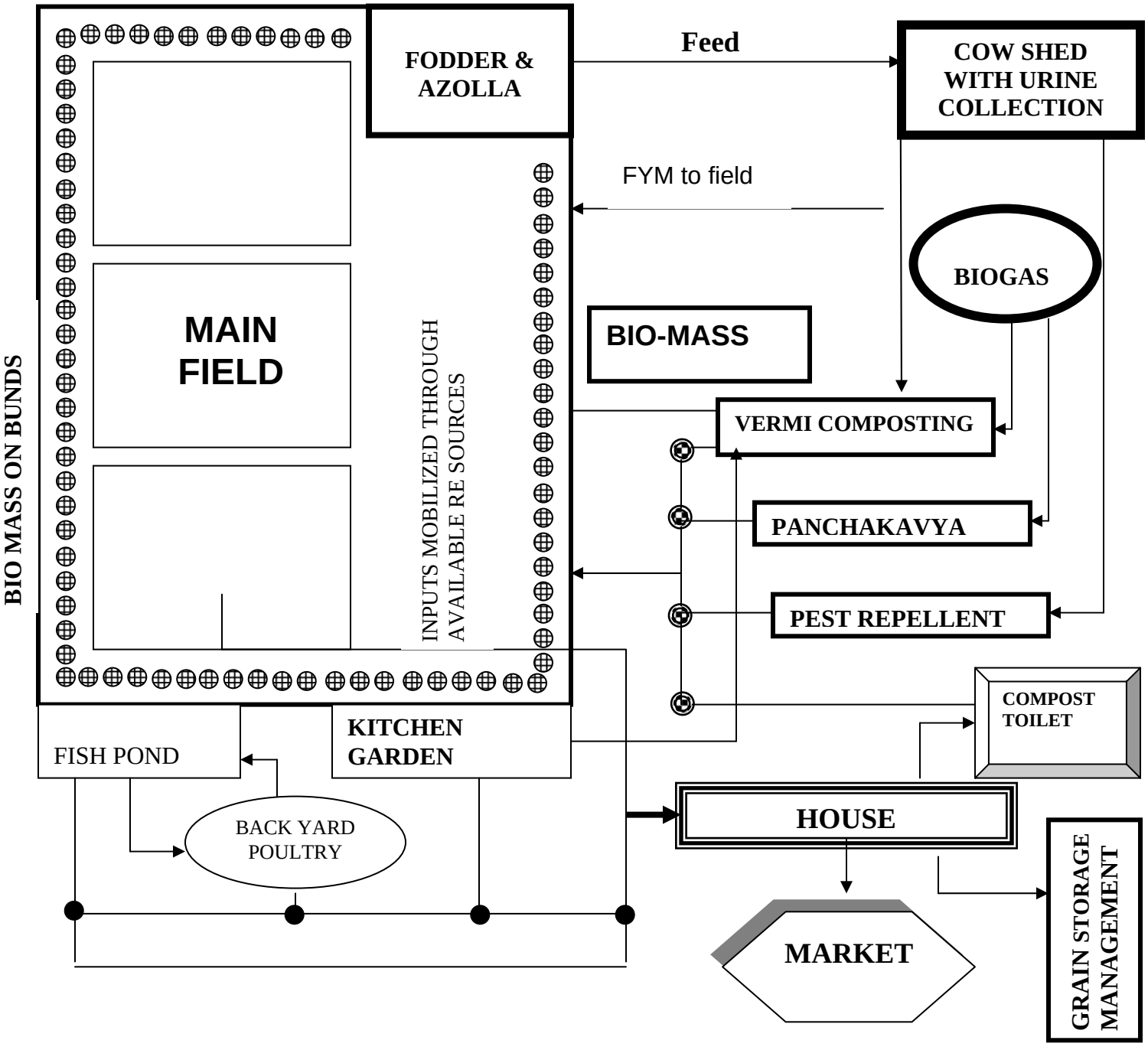
The following components have been demonstrated under IFD:

- Cattle shed with urine collection pit
- Biogas
- Vermicompost
- Panchakavya
- Pest repellant
- Green fodder
- Kitchen garden with drip irrigation
- Grain storage management
- Ecological sanitation
- Biomass

The above said components have been explained under three broad headings viz.,

- Concept visualization and advantages
- Cost and Design
- Caselets

Layout of an Integrated Farm Development Model



Chapter: 2

CONCEPT VISUALIZATION AND ADVANTAGES

CATTLE SHED WITH URINE COLLECTION PIT

A cattle shed emphasizes on safe and sound environmental condition for the animal and ensures the great care and hygiene. Cattle shed helps to safely dispose cow dung and harvest urine which facilitates effective recycling of waste to manure.

Purpose served:

1. Protects the animals from rain, wind, excessive heat, cold and dampness.
2. Resting place for animals
3. Good productivity from the animals
4. Prevents the animals from dangerous diseases
5. Resources like cowdung and cowurine are used as inputs in the preparation of biogas, vermicompost, panchakavya, crop pest repellant. These sources reduce cost of purchase of external inputs(Chemical fertilizers and pesticides)

Tips to construct a good cowshed:

- ✓ Floor should be non porous, non slippery and durable without being expensive, should admit of being readily cleaned, washed & disinfected and dried quickly.
- ✓ The floor and rear drain of the shed should not be pervious to avoid growth and multiplication of severe dangerous disease producing germs which may be transmitted to healthy animals.
- ✓ The floor should be inclined to slope so that the urine and the water that is being used for cleaning the floor may not be stagnated and gets collected in urine collection pit.

Caution:

An uneven hard floor is very uncomfortable and unhealthy for animals. A wet, slippery floor may cause the animal to feel and sustain serious injuries such as fracture, tearing and over stretching of ligaments and even abortion if the animal concerned is pregnant

Note:

- 10 kg of cow dung and 15 lit of Urine is harvested / animal / day
- 2 cum size biogas unit needed 50 kg cow dung / day

BIO GAS

Biogas is produced by anaerobic digestion or fermentation of organic matter including Cow dung, Food waste, sewage sludge, municipal solid waste, biodegradable waste or any other biodegradable feedstock, under anaerobic conditions.

Usage of Bio Gas:

1. Cooking:

Biogas can be used in a specially designed burner for cooking. A biogas plant of 2 cu.m. capacity is sufficient for providing cooking fuel to a family.

2. Power Generation:

Biogas can be used to operate a dual fuel engine and can replace up to 80% of diesel.

3. Lighting:

Gas lamps can be fueled by biogas. The requirement of gas for powering a 100 candle lamp (60 W) is 0.13 cu.m. per hour

Composition of Bio Gas:

Component	Symbol	Percentage
Methane	CH_4	40-70
Carbon dioxide	CO_2	30-60
Hydrogen	H_2	1.0
Nitrogen	N_2	0.5
Carbon monoxide	CO	0.1
Oxygen	O_2	0.1
Hydrogen sulphide	HS_2	0.1

More about Biogas – Farm, Home and Environment….

Biogas plants can yield a whole range of benefits for their users, the society and the environment. In general, the chief benefits being;

Farm:

- Transformation of organic wastes into high quality fertilizer, which can supplement chemical fertilizers
- Better manure and soil condition resulting in improved crops. The manure is odourless and free from flies and mosquitoes.
- Environmental advantages through protection of forests, soil, water and air.

Home:

- Production of energy (heat, light, electricity)
- Clean and efficient fuel, cooking is done in almost half the time compared to cow dung.
- Saving in time otherwise spent for collecting fuel or making dung cakes.
- Saves women and children from drudgery of collection and carrying of firewood, exposure to smoke in the kitchen, and time consumed for cooking and cleaning of utensils
- Improvement of hygienic conditions through reduction of pathogens, worm eggs and flies.
- Better Lighting
- Reduction of workload, mainly for women, in firewood collection and cooking.
- Improved Sanitation resulting in better health

Environment:

- Improved health as a result of eliminating energy fuels.
- Provides a source for decentralized power generation
- Provides a non-polluting and renewable source of energy
- Efficient way of energy conversion (saves fuel wood)
- Leads to improvement in the environment, and sanitation and hygiene
- Leads to employment generation in the rural areas

Types of Bio Gas Models

KVIC Floating Drum Type Biogas Plants having digester made of bricks or stones.	1 to 10 cubic metre
KVIC Type Biogas Plants with Ferro cement digester	1 to 10 cubic metre
KVIC Type Biogas Plants with Fibre Glass Reinforced Plastic (FRP) Gas holder	1 to 10 cubic metre
Deenbandhu Model (i) Brick masonry (ii) In Ferro Cement with in-situ technique	1 to 6 cubic metre
Pre-fabricated RCC fixed dome model	2 & 3 cubic metre
'Flxi' model Bag digester type plant made of rubberized nylon fabric manufactured by Swastik Rubber Products Ltd., Pune.	1 to 6 cubic metre

Floating-drum type:

The floating-drum biogas plant consists of a deep well-shaped underground digester connected by inlet and outlet pipes. A mild-steel gas storage drum, inverted over the slurry, rises and falls around a guide pipe corresponding to the accumulation and withdrawal of gas.

The process:

The Substrate inputs like slurry, dry manure from cattle, pigs and poultry, raw materials such as corn or grass, organic waste including fats, vegetables and catering waste enter the fermenter where it is mixed, heated and agitated. The methane bacteria decompose the organic compounds and produce biogas and the processed digestate is separated for use as a natural fertilizer.

VERMICOMPOST

Vermi composting by vermi culture is the culturing of earthworms and their application for a variety of uses in farming

Why Earthworms presence is must in your land?

- Movement of earthworm in the soil creates aeration in the soil.
- Converts organic waste to effective nutrient rich manure
- Minimizes soil erosion
- Improves water holding capacity in the soil, which facilitates reduction in water utilization

Why Vermicompost is important to your soil?

- Nitrogen fixing and Phosphorous solublising bacteria are available abundantly in vermicompost.
- Micro nutrients available in the compost effectively manages micro nutrient deficiency
- Essential growth hormones like Auxin, Cytokinin and other essential vitamins are available in the Vermicompost.
- Vermicompost have the capacity to manage the nematode population effectively.

The Epigeic species have been found to be useful for compost making and the most commonly used species are '*Eisenia foetida*' '*Perionyx excavatus*' and ''*Eudrillius eugiene*'.These species are fast breeders and feed actively on organic matter high in nitrogen.

Best composting tips:

- Mixture of cattle, sheep, and vegetable wastes forms ideal feed for worms.
- Biogas slurry enhances vermi composting process

Base materials:

- **Crop residues**
- **Tree leaves**
- **Animal dung**
- **Agricultural wastes**
- **Sugarcane trash**
- **Weeds/ hedge cuttings**
- **Effluent slurry from bio-gas plant**
- **Excreta of sheep**
- **Vegetable wastes are ideal food for earth worms.**

Avoid:

- **Metals**
- **Foils**
- **Plastics**
- **Chemicals**
- **Oils**
- **Solvents**
- **Glass**
- **Citrus products**
- **Heavily spiced food & High acid food**
- **Animal flesh, Dog & Cat manure.**

Thumb rule:

- Vermiculture should be done under shelter to avoid direct sunlight or heavy downpour

Step by step preparation of bed:

First step: Select location and appropriate dimensions as mentioned above wherever compost is to be prepared.

Second step: Make a bed of 10 cm height using any of the base materials (coir waste, paddy husk, sugar cane trash etc) collected. Give a layer of soil on it. Sprinkle water on it to get a moisture level of 40-45%.The bed should appear wet.

Third step: Mix the organic waste with cattle dung in equal quantity and pour appropriate quantity of water over it so as to make a homogenous mixture. Effluent slurry from bio-gas plant is best used for this.

Keep this mixture for two weeks. During this period heating of substrate will take place. Give turning to the material 2-3 times at 4-5 days interval and transfer it on the layer of bedding prepared earlier.

Fourth step: Introduce cocoons or worms (if culturing is done for the first time, it is advisable to introduce worms) in the bed at the rate of 2000 worms for 400 kg of feed mix as prepared in third step. Then the feed mix is to be spread uniformly on the culture bed.

Fifth step: Cover the bed with Gunny cloth .Sprinkle water over the cloth periodically to keep gunny cloth wet. The worms feed actively on organic matter and assimilate only 5-10 % and rest is excreted as loose granular mounds of vermicastings on the surface away from the feed source. Thus the worms will convert the feed mix into vermicastings in 60 days. The vermi compost once formed completely will give the smell of moist soil.

Sixth step: Take out the compost and make a heap in sunlight on a plastic sheet. Keep for 1-2 hours .The worms will gather at the bottom of heap. Remove vermi compost from top and the worms when settle down at the bottom can be carefully collected for use in the next batch of vermi composting.

Take care….

- Moisture level in the bed should not exceed 40-50%.Water logging in the bed leads to anaerobic condition and change in the pH of medium. This hampers normal activities of worms leading to weight loss and decline in worm biomass and population.
- Temperature of bed should be within the range of 20-30 degree centigrade.
- Worms should not be injured during handling.
- Bed should be protected from predators like red ants, white ants, centipedes and others like toads, rats, cats, poultry birds and even dogs.
- Frequent observation of culture bed is essential as accumulation of casts retards growth of worms.
- Space is a criteria for growth and establishment of culture .Minimum space required is 2 square meter per 2000 worms with 30-45 cm thick bed.
- Earth worms find it difficult to adopt themselves in new environments .Hence addition of inoculum as a bait from earlier habitat helps in early adaptation to new site of rearing.

PANCHAKAVYA

The panchakavya, an organic formulation used for improved composting is unique combination of five products of cow (cow dung, urine, milk, curd and ghee) and other products / byproducts of plant origin.

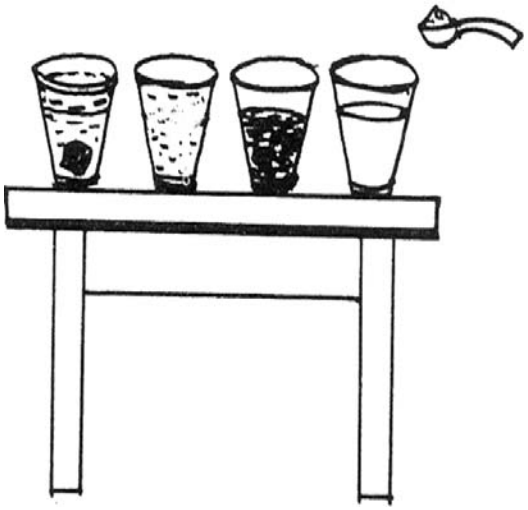
Process…….

- Mix both 5kgs of Cow dung, 5liters of cow urine with 5liters of water in a mud or plastic container and stir it daily (morning and evening) 50 times clock wise and anti clock wise up to **15 days**.

- On **16th day** with above solution , add 2 lit of fermented curd(fermented for 15 days), 2 lit of milk, 0.5 to 1 lit of ghee, 2 kg palm Jiggery or 2lit of sugarcane juice, tender coconut water 2 liters and 12 Banana and 2 liters of palmyrah or coconut toddy(if available) and keep it for another 7 days (**21 days**).

- On **22nd** day Panchakavya is ready. It can be used up to 6 months. The solution should be stirred up daily.

Materials required:



Key Ingredient

- Cow dung: 5 Kg
- Cow urine: 5 Lit
- 5 lits of water
- 15days fermented Cow curd: 2 Lit
- Cow milk: 2 Lit
- Cow Ghee: 0.5 Lit

Complementary Ingredients

- Palm Jaggery 2 Kg /sugarcane juice 2 lits .
- Tender coconut water: 2 lits.
- Fully ripened poovan or other banana: 12 Nos.
- Mud pot or Plastic drum: 1 No.
- If available toddy two litters

Merits….

- Excellent growth promoter.
- It rectifies micronutrient deficiency.
- Good pest repellent.
- Enhances insect and disease resistance in plants

Composition:

pH	5.45	IAA (ppm)	8.5
EC dSm^2	10.22	GA (ppm)	3.5
Total N (ppm)	229	Fungi	38800/ml
Total P (ppm)	209	Bactoria	1880000/ml
Total K (ppm)	232	Lactobacillua	2260000/ml
Sodium	90	Total anaerobes	10000/ml
Calcium	25	Acid formers	360/ml
		Methanogon	250/ml

How much to apply……

Panchakavya can either be sprayed (foliar application-3%) or else mixed with irrigation water (fertigation)

Nutritional status of Cattle manures:

SL No	Particulars	Content (%)			1 Kg or litre of product /content in grams		
		N	P	K	N	P	K
1	Cattle dung (fresh)	0.3 – 0.4	0.1- 0.2	0.1 - 0.3	3.0 - 4.0	1.0 – 2.0	1.0 –3.0
2.	Cattle urine	0.9 – 1.2	-	0.5 – 1.0	9 - 12	-	5 - 10

AUVUTTAM

- It is also a panchakavya preparation wherein the raw materials used for its preparation are derived from goat viz., goat dung, goat urine, goat milk, goat ghee and goat curd .The other materials used are similar to the materials used in panchakavya prepared from cow s products

CROP PEST REPELLANT

Pest repellent refers to Fermented plant extract in cow urine which serves as a repellent to crop pests.

The use of repellants to ward off insects has been a very old practice with mankind. Chemicals that prevent insect damage to plants or animals by rendering them unattractive, unpalatable or offensive are called repellants. The botanicals of plant products have been used as insect repellants in our country from ancient times. Neem leaves, Calatropis, turmeric and sandal dhoop are used in insect control from time long ago

Mode of Action….

- The pest repellant is classified as chemical repellant wherein the plant extracts present in pest repellant have strong pungent odour and certain chemicals (terpenes, quinines, phenols etc) that repel insects. Thus insect damage to plants is prevented by rendering them unattractive and unpalatable.
- The crops selected for preparation of this extract has to be changed during each preparation as the insects will develop resistance easily, if same combination of crops is used every time.

What all could be used…

Neem, Papaya, Jatropha , Parthenium, Calotropis, Anona, Datura, *Leucas aspera*, Punga, Aloevera, Ipomea, Basil, Aadathoda, Henna, Lantana, Tobacco, *Vitex negundo*, Garlic

Neem

Calotropis

Pungam

Pest management is one of the mandatory practices in any crop cultivation as pest occurrence is inevitable and natural. The enormous and indiscriminate usage of chemical pesticides in pest management has lead to soil degradation and environmental pollution. **Pest repellant** is one of the important components of **Integrated Farm Development. Pest repellant** is something natural**,** the botanical extract preparation from few plants used to repel insects from their host plants in order to prevent their damage. This extract can be easily prepared by the farmer in his farm from locally available plant materials.

How to prepare:

- **Type I:** Selection of five to six weed plants or non preferred plants of grazing animals should be done. Two kilogram plant material of each selected plant to be chopped or ground and soaked in one part of cow dung and four parts of cattle urine. Keep it for 5-7 days for fermentation, filter it and the filtrate to be diluted in water ***(1: 10)*** and sprayed.

- **Type II:** If the leaf extract is needed for immediate spray, the plant materials collected can be put together along with water and turmeric in a vessel and boiled till the solution becomes concentrated. Then the solution is to be filtered, diluted with water and used for immediate spray.

SELECTION CRITERIA OF CROPS:

- Locally available weeds
- Non-preferred plants of grazing animals
- Less preferred crops of insects
- Plant factors- Disagreeable odour and bitterness
- Latex producing plants

FREQUENCY OF SPRAY:

The pest repellant spray should be given at 15-20 days interval during the crop period as prophylactic measure.

MERITS:

- Minimizes external input (pesticide) costs.
- Ecological approach in pest management
- Affordable, locally Accessible (around the plot) and effective.

LIMITATIONS:

- The pest repellant can be used only as prophylactic measure. Once the intensity of pest and disease increases, alternate control measures (Biological insecticide) have to be taken.
- Care has to be taken in preservation of the extract as fugal infection and worms develop if not stirred properly during fermentation process

MANAGEMENT OF WHITE GRUB – FARMER PRACTICES:

Preparation:

1. Select 5 mud pots of 5 litre capacity
2. Bury the pots under ground (in a random manner) upto the neck portion of the pots.
3. Collect 5 kgs of castor seed and pulverize, and mix it with 5 litres of water and pour the solution in a plastic drum and keep it for 10 days for fermentation.
4. Add 2 litres of fermented castor solution in each buried pots and fill with water upto neck portion.
5. Odour emanated from the pot attracts the White Grubs and rhinoceros beetle.
6. At an interval of two days, collect the beetles and destroy them.
7. Whenever solution in the pots gets reduced, keep filling it.
8. The same solution could be kept for 3 months.

GREEN FODDER

Green fodder is playing major role ensuring the increase in milk production and improves animal health and reproduction in a affordable and accessible way.

Nutritional requirements of the animals, value of various feeds and fodders and their optimum utilization can result in saving on production expenses.

The animal need feed for maintaining them selves i.e. for basic physiological process, as well as restoring wear& tear of various body tissues, for their maintenance and requirement. The other requirements for growth and production include reproduction, production of milk.

Learn about more varieties of fodder:

Characters	Varieties			
	CO3	**COFS 29**	**CO 27**	**K10**
Green fodder yield (t/ha)	400	160-170	44.40	15
Protein content (%)	10.5	8.41	7.93	9.20
Dry matter (%)	17.08	23.60	24.17	-
Plant height(cm)	300-360	220-250	262	260
Number of tillers per clump	30-40	10-15	1	-
Number of leaves	450	80-105	18.66	12
Leaf length(cm)	80-95	75-90	78.43	75
Leaf breadth(cm)	3- 4.2	3.5-4.6	6.18	8
Leaf stem ratio	0.70	0.2-0.25	0.20	-

AZOLLA

Azolla is a proteineous green fodder and supplementary feed for livestock

Introduction:

The shortage of fodder is compensated with commercial feed, which how ever, has increased the cost of production of meat and milk. An alternative plant Azolla is a substitute feed for livestock especially dairy cattle, sheep, poultry, pig and fish.

Azolla is rich in protein (25- 35%). It is also found to contain essential minerals like Iron, calcium, phosphorus, potassium, magnesium, copper, manganese, etc apart from appreciable quantities of vitamin A precursor and Vitamin B12. It is also found to contain almost all the essential amino acid for the growth of cattle and poultry. The toxic material tannin is generally found in all the leaves but it is found that tannin is very low in Azolla. Livestock can easily digest azolla due to its high protein and low lignin content.

Purpose served:

- It increases the quality and quantity of milk production
- 15-20% increase in milk production.
- 10% increase in milk fat.
- 3% increase in solids not fat (SNF)
- Commercial feed specially oil cake could also be reduced to 15- 20 percent by supplementing feed with the half the quantity of azolla.
- Improves the health and longevity of animals.

Feeding pattern for livestock and poultry (Quantity):

Cattle	-	1.5- 2 kg
Sheep & Goat	-	200- 300 gm
Pig	-	1.5-2 kg
Backyard poultry	-	20-40 gm
Turkey	-	30- 50 gm

Mixing ratio:

Fresh Azolla thus collected can be mixed with commercial feed in the ratio 1:1 or given directly to livestock.

Methods:

1. Tank method:

1. Construct the tank of one square meter with depth of one foot.
2. 15 kg of soil is uniformly spread up to the level of 0.75 feet
3. 20 kg of cow dung is mixed with water
4 Sufficient water is added to make the water level at about 0.25 feet
5. About 0.5 kg of Azolla is uniformly spread over the bed
6. After 2 weeks, 1 kg of azolla can be harvested daily

2. Silpauline lined pit method:

1. Soil surface is cleared off weeds and leveled. Bricks with a breadth of 10 cm is lined horizontally

2. Silpauline sheet of 2.5 x 1.8 metre size with 150 GSM thickness is uniformly spread over the bricks ,so as the margin of the rectangle made out by bricks .

3. Silpauline lined water proof pit of 2.10x1.5 mt with a depth of 10 cm is ready About 15 kg of soil is uniformly spread over the silpauline pit, which will provide the primary nutrient base for azolla plant

4. About 3.5- 4 kg of two day old cow dung is made in to a slurry after mixing at in 10 -12 litres of water

5. Sufficient water is added to make the water level at about 7- 10 cm .About 1-1.5 kg of pure mother culture of Azolla seed material is spread uniformly over the bed. Fresh water is sprinkled over the azolla immediately after inoculation to make the azolla plant upright.

6. Azolla will spread over the bed and will become a thick mat with in seven days. The initial one kg will become 8- 10 kg with in a span of seven days and 1- 1.5 kg depending on the growth can be harvested on the 7 th day and each and every day there after.

Note:

About 2 kg of soil in the azolla bed is almost equal to about 1 kg of commercial NPK fertilizer after six months**.**

KITCHEN GARDEN WITH DRIP IRRIGATION

Define ….

A home garden or kitchen garden refers to raising the vegetables to meet the daily requirements of the vitamins and minerals to supply the food essential for protection and body building

Kitchen garden refers to raising the vegetables to meet the daily requirements of the vitamins and minerals to supply the food essential for protection and body building. The watering in the kitchen garden is a crucial problem in the village and there is a need to reduce the drudgery among women. Drip irrigation is the solution for this problem

Principles of kitchen garden:

The main aim of kitchen garden is maximizing output and a continuous supply of vegetables through out the year. By following the principles given below in the lay out of a kitchen garden, the objective can easily be fulfilled.

1. 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 be shade effect on other crops and compete for nutrition with other vegetable crops.
2. Adjacent to the foot path all around the garden and the central foot path may be utilized for growing different short duration green vegetables, coriander, fenugreek, Ceylon spinach ,mint ,and amaranthus. Each type of this green can be grown along each side of the foot path and these crops can be rotated in different seasons.
3. The fence or trellises around the home garden may be utilized for growing light creepers like basella , coccinea ,sponge gourd and bitter gourd. These may also be rotated in different seasons
4. The compost pits are placed in two corners of the garden. They are meant for garden and kitchen waste. Pandals may be erected over the compost pits and

trained with the creeper vegetables like lablab, ribbed gourd and snake gourd. This will hide the compost pits from view.

5. Pandals may also be erected over the central foot path.
6. Both sides of the central foot path may be utilized to train tomato plants on single stemmed with the support of stakes.
7. The bunds separating the beds may be used for growing root crops or onion.
8. The conveniently divided small plots may be utilized as much as possible by following a very intensive method of cultivation

BUCKET KIT

The bucket kit is ideally suitable for kitchen gardens which are maintained by women or landless farmers, and urban gardens. It consists of a bucket a 10 metre long lateral fitted with 26 micro tubes. It can irrigate 104 plants, placed around these micro tubes

DRUM KIT

The Drum kit is most useful for kitchen gardens and small commercial vegetables gardens. It can irrigate 520 vegetable plants with just one drum of 200-litre capacity of water. The drum must be filled once in morning and evening. The drum kit consists of 130 tiny 1 mm-diameter pipes called micro tubes, fitted to 5 rows of 12mm-diameter pipes called laterals. These laterals are connected to a drum of water by a 16mm-diameter pipe called sub-man. All the pipes are pre-fitted and packed in a small box. The farmer has to just unroll all the pipes, lay them on the ground and connect to the drum. A small manual is provided to pictorially guide the farmer on correct installation and planting. Water from the drum flows out like a small stream from the micro tubes. Water spreads out in a circular pattern of about 0.5-meter radius. Four plants are planted in each of the circles.

Model kitchen garden with scientific cropping system:

Under our Indian situation, Dietician recommends consuming 300 gram of vegetables in a day by an adult and based on this, a kitchen garden should supply 1.5 kg of fresh vegetables to an average family size of 5 members. This amount of fresh vegetables can be assured from a kitchen garden with an recommended layout to an extent of 5 cents (200sq.m)

GRAIN STORAGE

Grain storage is the storage of food grains in order to minimize the losses and to maintain its original quality.

PUCCA KOTHI:

The improved storage structure is an indoor design constructed of burnt bricks in two compartments of 1 M.T. capacity each with R.B floor at the bottom and roof at the top. The inlet opening is provided in the roof at the top and the outlets are provided at the bottom. It has adequate facility for locking. The moisture barrier is provided in the construction to make it damp proof. As such these improved structures can be used to their full capacity and found to be sufficiently moisture proof and airtight. Depending upon the space available, the structure can be extended further to have more compartments. Such structures with compartments facilitate the storage of different varieties of food grains.

INDOOR BINS (METAL BINS):

- These bins are fabricated using either 24 gauge or 22 gauge G.P sheets of different standard sizes available in the market, the capacities of which range from 2.75 to 3.0 quintals.
- These are indoor bins and may be kept in a room or verandah under a roof. In this design different capacity bins have been developed for storage of food grains required for domestic consumption and also for storage of seed grains and pulses. The locking facility has been provided in all types of domestic bins.
- The inlets are provided at the top and different types of outlets are provided at the bottom of the bins to facilitate unloading different commodities of food grains like finger millet, wheat, paddy and maize conveniently.

These bins are found to be suitable for storage of finger millets, wheat, paddy maize, pulses and seed grains

THE RAT TRAP IN GRAIN STORAGE -WONDER TRAP:

Wonder trap is an important tool in **Integrated farm Development.** Rats are a menace to farmer both at field and storage level. Among various methods used for control of rats like poison baits, fumigation of burrows and mechanical trapping, Wonder trap uses the mechanism of trapping the rats alive which cause damage to food grains at field and storage level. The trap is considered effective as it is said to trap many rats at a time.

DAMAGE BY RATS:

About 60 to 70% of the food grains produced in our country is stored at the farmer's Level. The post harvest loss of grains is estimated to be around10%. Out of this, 2.5% of the damage is caused by rats alone. There are nearly 100 species of rats in our Country inclusive of field and house rats

The food grains are treated unfit for consumption when the rats pollute it through their

- Urine
- Faecal matter
- Body hairs

MODE OF ACTION:

The bait to be kept inside wonder trap should be the preferred food of rat viz., Dal vada, dried fish meal (fried), coconut, onion and tomato. The exit point with opening and closing mechanism should be kept open for three days so that the rats may enter into the traps freely without any fear and feed the bait (food item) kept. On the fourth day, the same bait has to be kept and the exit point to be closed. While the rat enters the trap and tries to feed the bait as usual, the rat is trapped inside the wonder trap. Likewise, nearly 22 rats can be caught at a time and the trap can be drowned in water for few minutes in order to kill them. The dead rats should be disposed off by burying them in ground. Every time the wonder trap has to be washed with soap and reused.

LIMITATIONS

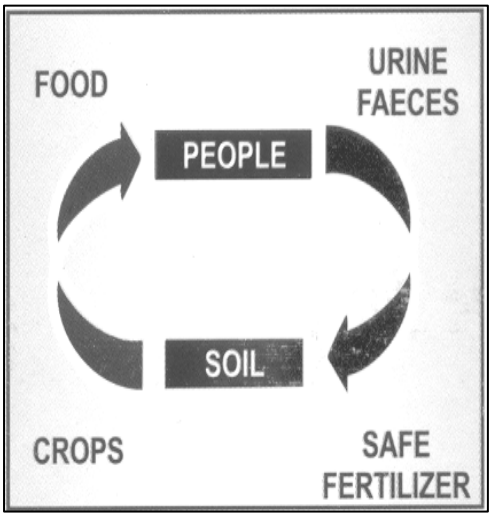
Since the entry point of the trap is small, Bandicoots are not being trapped by the trap. Only the house rats and field rats are being trapped

ECOLOGICAL SANITATION

Eco san is an alternative approach to safe and efficient management of human excreta and urine

Ecological sanitation recycles human excreta safely and productively to improve soils. It minimizes water consumption in sanitation. It protects water resources and the environment from sewage pollution thereby offering very comprehensive public health protection.

In the conventional approach to sanitation faeces and urine are excreted from the body and allowed to mix together in water. In most ecological sanitation systems urine and faeces are diverted at source and processed separately. Human excreta is safely contained within the ecological toilet, without odour, and transformed into a safe unobjectionable soil improver. In the process all the pathogens in the faeces are destroyed. All that is required is the removal of faeces only once a year or so. This removal is not an objectionable task at all as the product bears absolutely no resemblance to its origin in appearance, colour or odour.



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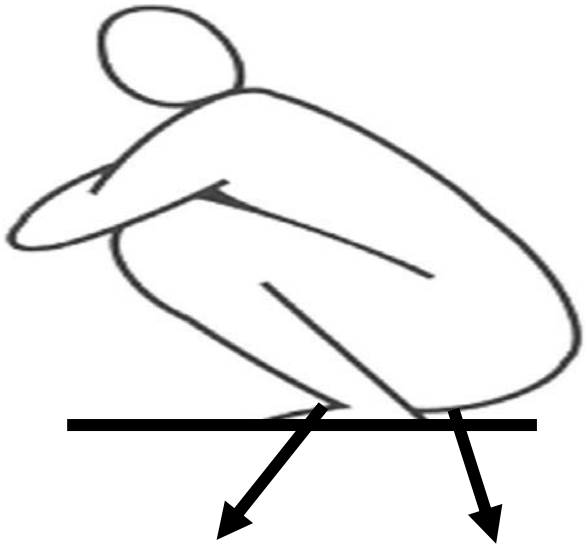


USAGE STEPS IN COMPOST TOILET

URINE	**FAECES**
Urine becomes harmless water + useful soil nutrients	Dehydrated faeces forms compost which can be used in the farm

Ecological sanitation is an approach that no longer treats human excreta as a waste product to be hidden or disposed of.

MERITS:

- Safety recycling of human waste to improve the soil productivity
- Minimizes water consumption
- Protects water resources and the environment from sewage pollution
- Offering very comprehensive public health protection
- Effective utilization of manure for field application
- Ecofriendly disposal of human waste
- It is Best way of solid waste management practice

BIOMASS

Biomass is the total mass of living matter within a given unit of environmental area. The organic materials produced by plants, such as leaves, roots, seeds, and stalks and in some cases, microbial and animal metabolic wastes are also considered as biomass

More about biomass ….

- Biomass is a complex mixture of organic materials, such as carbohydrates, fats, and proteins, along with small amounts of minerals, such as sodium, phosphorus, calcium, and iron. The main components of plant biomass are carbohydrates (approximately 75% by dry weight) and lignin (approximately 25%), which can vary with plant type.

- Fully grown tree (tree having good canopy) are cut down and the leafy material and are transported to pit, where the composting take place. After decomposition the litter can be utilized as organic manure. Branches are used for fire wood purpose.

The organic matter in the soil can be improved by the following practices:

A. Use of organic manures

B. Adding off-field organic material

A. Use of organic manures

- They are natural products used to provide food (plant nutrients) for the crop plants.
- Organic manures are applied in good quantities to increase the organic matter content in the soil.
- Organic matter in turn releases the plant food into available forms for use by crops. However, organic manures should not be seen only as carriers of plant food.
- These manures also enable the soil to hold more water and also helps to improve drainage in clay soils. They provide organic acids that help to dissolve soil nutrients and make them available for the plants.

B. Adding off-field organic material

To further supplement the availability of limited quantities of organic manures, one can also incorporate the green lopping brought from surrounding plants/trees in and around the farm. This practice is called green leaf manuring. It will be a good practice to establish plants like *Cassia seamia,* Glyricidia, Pongamia on the field bunds so that the lopping from these plants can be used for green leaf manuring.

Do you know?

Common sources of biomass are

(1) Agricultural wastes, such as corn stalks, straw, seed hulls, sugarcane trashes, bagasse, nutshells, and manure from cattle and poultry

(2) Wood materials, such as wood or bark, sawdust, timber slash, and mill scrap

(3) Municipal waste such as waste paper and yard clippings

(4) Energy crops such as willows, alfalfa , corn and soybean

Advantages

- Improves soil fertility
- Physical and biological property of soil
- Soil and water conservation
- Social factors

Green manuring (*Insitu* incorporation)

Green manuring is the practice of growing a short duration, succulent and leafy legume crop, and ploughing the plants in the same field before they form seeds.

The application of limited quantities of available organic manures can be supplemented by green manuring. Sesbania, Crotalaria, Pillipesara, Cowpea etc are good green manuring crops.

Attention

The Biomass plants grown along the bunds must be regularly pruned or the lopping must be collected frequently to avoid the shade effect on the main crop which is grown inside the field

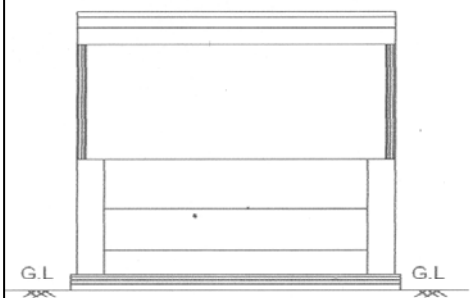
Chapter: 3

COST AND DESIGN

COW SHED WITH URINE COLLECTION PIT

PLAN SHOWING THE PROPOSED CONSTRUCTION OF

A.C. SHEET ROOF / THATCHED COW SHED (2 COWS)



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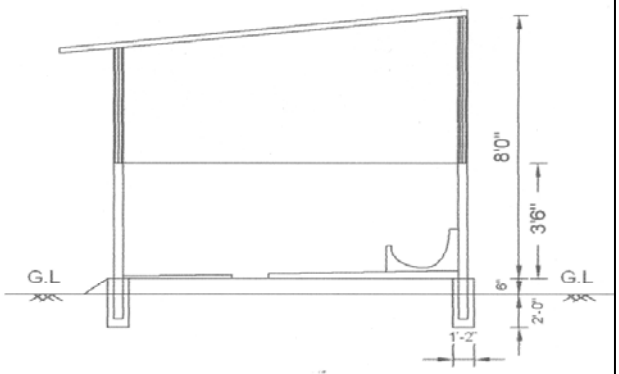

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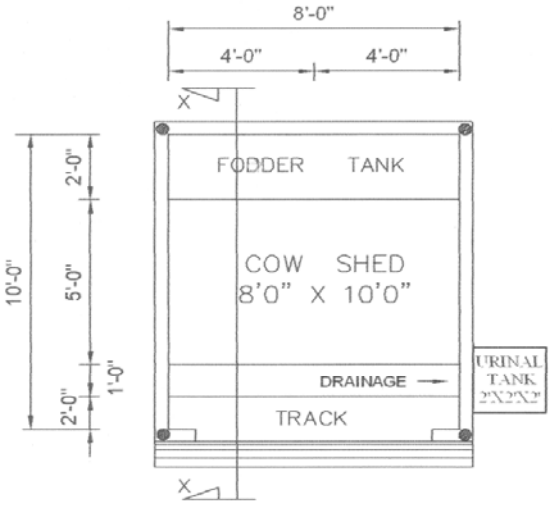


PLAN

AREA DETAILS :-

AREA COW SHED : - 80.00 SQ. FEET

D. John Prabakaran

PREPARED BY

D.JOHN PRABAKARAN

AGRICULTURAL ENGINEER

MYRADA KVK . GOBI

AC SHEET ROOF COWSHED(2 cows)

Sl.No.	Component/material	Measurement	Quantity	Rate	Amount (Rs)
1	AC Sheet	1m x 3m	3 Nos	315 / No	945.00
2	Pipe Post				
	(10 ft 2 Nos, 9ft 2 Nos)	38 RFT	57 Kg	35 / kg	1,995.00
3	Frame (chanel)	36 RFT	36 kg	35 / kg	1,260.00
4	J' Bolt, Nut			LS	100.00
5	Hollow bricks	4' x 1.25" x 0.75"	132 Nos	13 /No	1,716.00
6	Cement		5 bags	250 / bag	1,250.00
	Floor & wall:				
7	HBS Jully - 40 mm		0.25 unit	1600/unit	400.00
8	Sand		0.5 unit	2500/unit	1,250.00
9	Labour				1,500.00
10	**Urinal Tank (216 liters capacity)**				
	Plastering CM 1:4:20mm thick				
	Tank inside	2' x 2' x 2'	8 sq.ft		
	Tank bottom	2' x 1'	2 sq.ft		
			10 sq.ft	30/sq.ft	300.00
11	Unforecen item				584.00
	Total				**11,300.00**
	(Rupees Eleven thousand three hundred only)				

THATCHED ROOF COW SHED (2 COWS)

Sl.No.	Component/material	Measurement	Quantity	Rate	Amount (Rs)
1	Wooden pole	11' x 3.5"	4 Nos	100/ No	400.00
2	Wooden frame	38 RFT		LS	200.00
3	Reaper			LS	100.00
4	Thatched materials (coconut leaf)		50 Nos (2 bundle)	100 / bundle	200.00
5	Hollow bricks	4' x 1.25" x 0.75"	132 Nos	13 /No	1,716.00
6	Cement		5 bags	250 / bag	1,250.00
	Floor & wall:				
7	HBS Jally - 40 mm		0.25 unit	1600/unit	400.00
8	Sand		0.5 unit	2500/unit	1,250.00
9	Labour				1,500.00
10	**Urinal Tank (216 liters capacity)**				
	Plastering CM 1:4:20mm thick				
	Tank inside	2' x 2' x 2'	8 sq.ft		
	Tank bottom	2' x 1'	2 sq.ft		
			10 sq.ft	30/sq.ft	300.00
11	Unforecen item				584.00
	Total				**7,900.00**
(Rupees seven thousand nine hundred only)					

BIO-GAS

சாண எரி வாயு

Size of plant and requirement of cattle dung

Size of plant	Quantity of cattle dung required daily	No. of cattle heads required
1 cubic metres	25 kg	2-3
2 cubic metres	50 kg	4-6
3 cubic metres	75 kg	7-9
4 cubic metres	100 kg	10-12

Rs.10000 is the cost incurred for the construction of a 2 cu.m. metre size of Biogas plant.

VERMICOMPOST

Different types of Vermiculture:

Type	Specifications	Cost
Brick line cement structure	1m x 1m x0.3 m	Cement structure - Rs 1500,worms - Rs 350,Base material - Own source Total - Rs.1850/-
Heap system	To the convenience but height of the heap should not exceed 45 cms	Worms - Rs 350,Base material - Own source Total - Rs.350/-

Heap method

Brickline cement structure method

PANCHAKAVYA

Cost of Preparation:

The cost of Panchakavya was worked out to be Rs. 43/ litre (including cost of collection of ingredients and preparation).

The quantity of Panchakavya used per ton of compost raw material was 2.5 litres which costs around Rs.100. The cost of other commercial microbial decomposing cultures range between Rs. 100 to 120 per ton of compost raw material. Though both are on par in cost,the quality of the commercial products from external source is a main constraint. We can trust the quality of Panchakavya as it is prepared in our own farm and is of organic origin

CROP PEST REPELLANT

COST OF PREPERATION:

The expenditure incurred in preparation of this extract is negligible as all the raw materials required for its preparation are easily and locally available in the farm. As possession of cattle is mandatory in **Integrated Farm development**, availability of cow urine and cow dung becomes easy. Initial cost may incur if we are procuring plastic drum of 25 litres which cost Rs.300.

GREEN FODDER & AZOLLA

FODDER:

The cost of slips accounts to Rs.300 which can be planted in 10 cent area which yields 16 tons of green fodder in a year. Two cows can be fed with this available green fodder.

ESTIMATED COST FOR AZOLLA TANK:

A. Tank method: Size: 2.1x1.5m

S.No	Component/ Material	Quantity	Unit cost(Rs)	Total (Rs)
1	Bricks	135 Nos	2.70	364.50
2	Cement	2 bags	260.00	520.00
3	Sand	60 kg	4.50	270.00
4	0.75'' Jelly	25 kg	15.00	375.00
5	Labour	-	400.00	400.00
		Total		1929.50

B. Silpauline line method: Size: 2.1x1.5 m

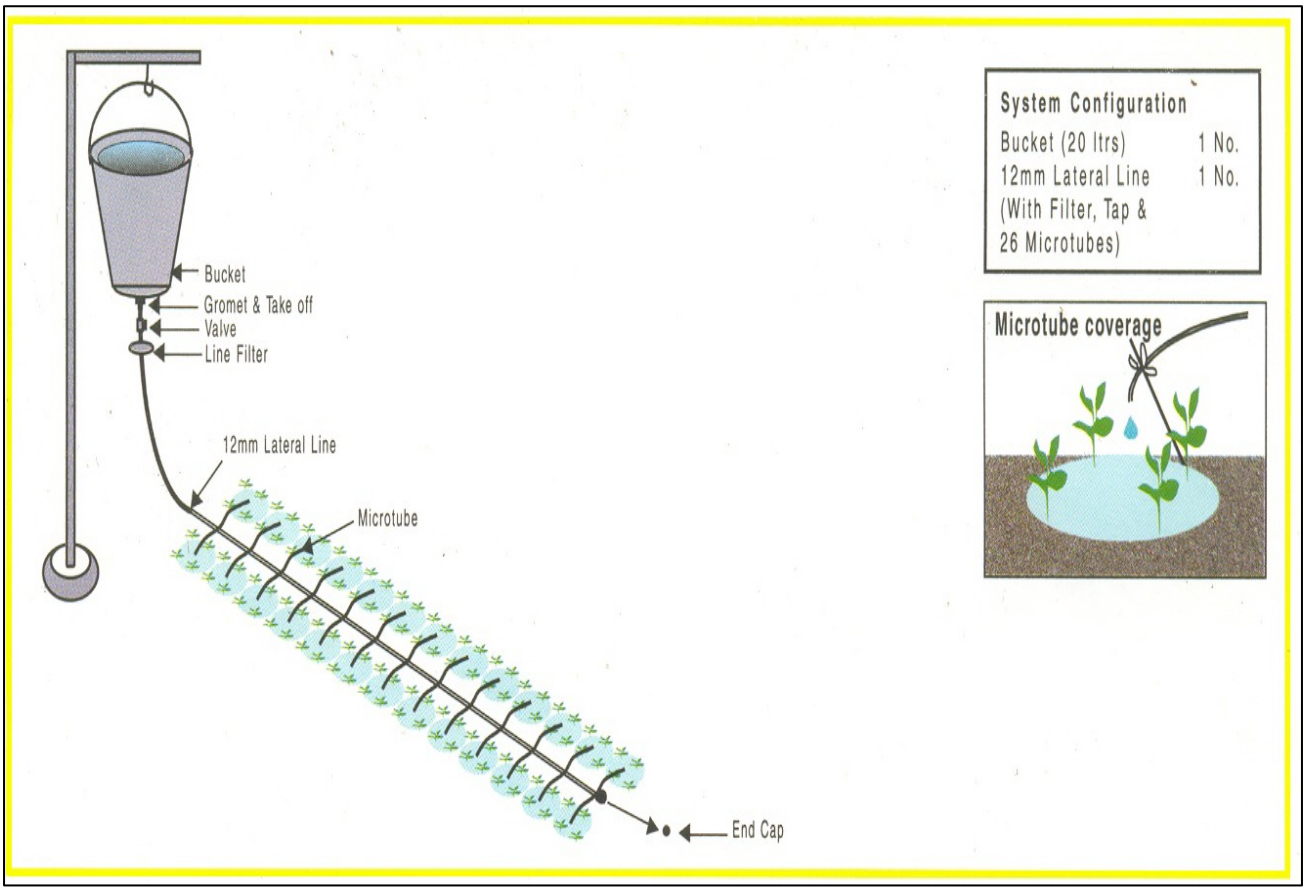
S.No	Material	Quantity	Unit cost (Rs)	Total (Rs)
1	Silpauline sheet	1 No.	250.00	250.00
2.	Bricks	27 Nos	2.70	72.90
3	Labour	-	-	50.00
Total				**372.90**

KITCHEN GARDEN WITH DRIP IRRIGATION

BUCKET KIT SYSTEM:

Cost of Bucket kit

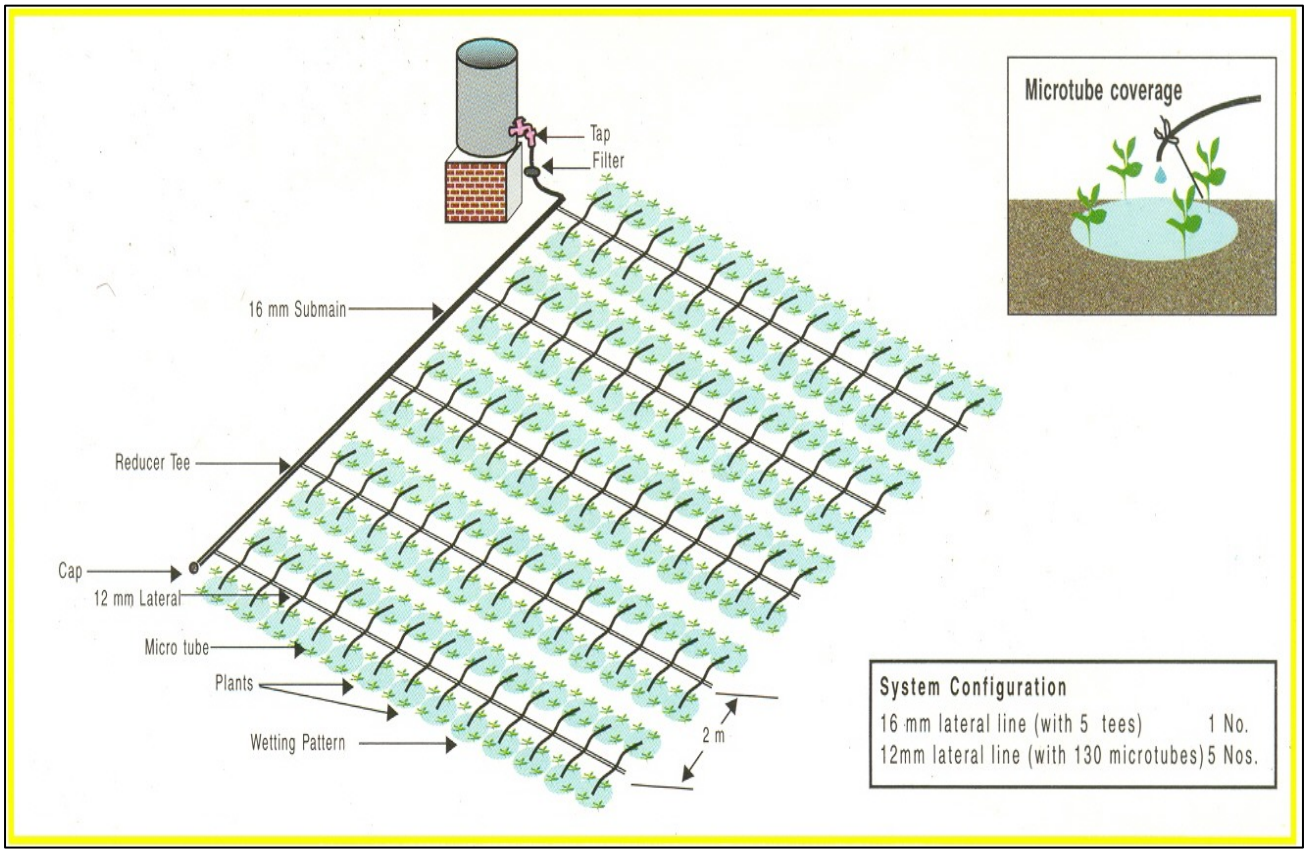
The buckets are placed at a height of about 0.5 meter and are filled 3 to 4 times a day. The kit including the bucket costs Rs.300.



DRUM KIT SYSTEM:

Cost of Drum kit

An ideal area for drum kit irrigation is 120 sqm. The kits cost Rs.1200 including the drum cost.



GRAIN STORAGE STRUCTURES

METAL BIN

The metal bin has the capacity of 150-200kg. The cost of metal bin ranges from Rs.950-1300

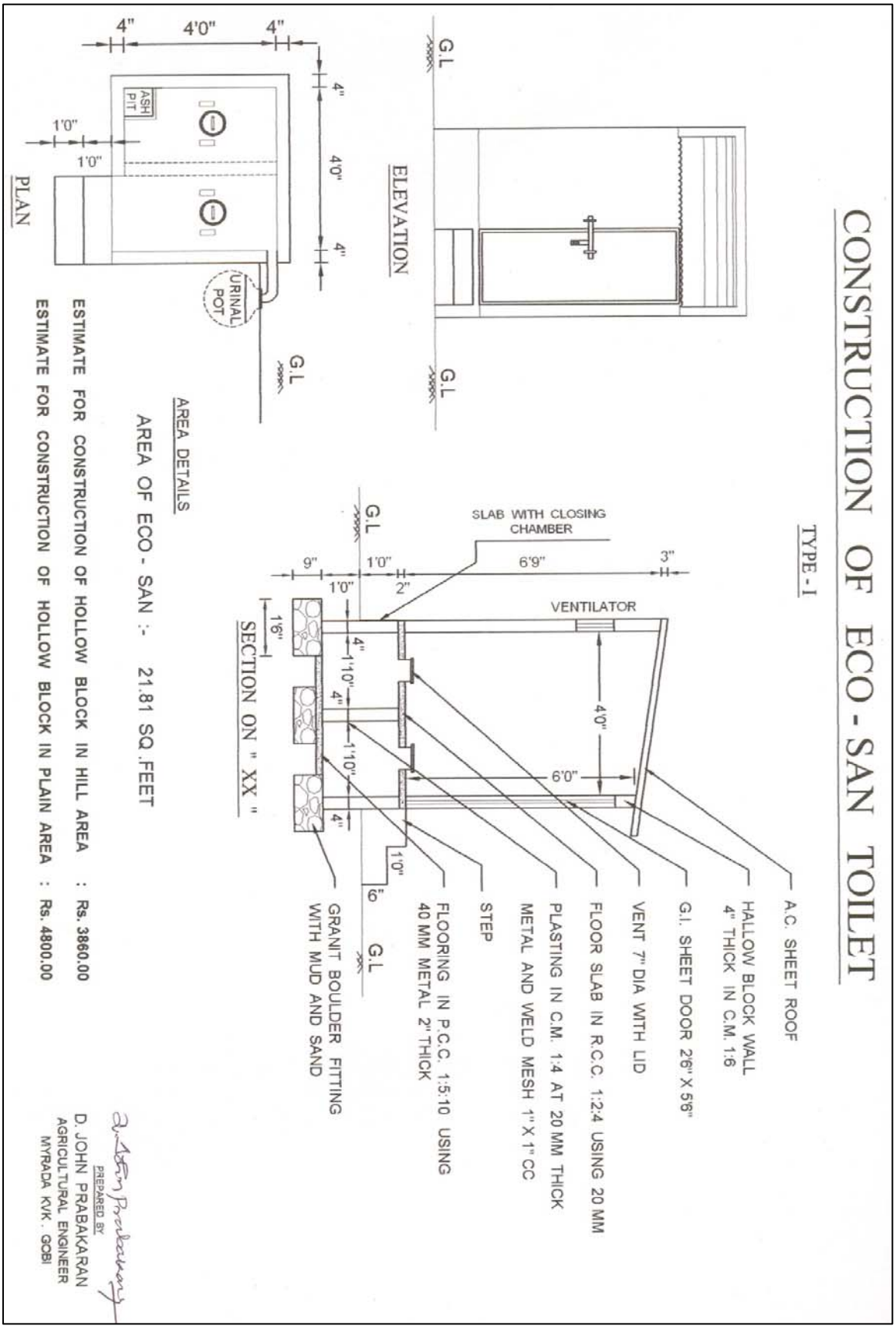
PUCCA KOTHI

The capacity of pucca kothi varies ranging from 1000kg – 2000kg according to its size and the cost of pucca kothi ranges from Rs.3000-5000.

WONDER TRAP

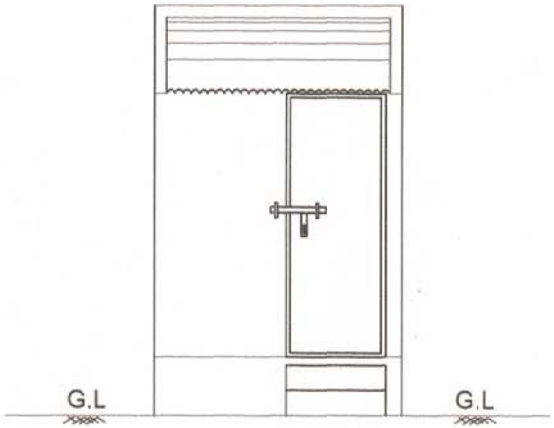
The cost of a Wonder Trap is Rs.150.

ECOLOGICAL SANITATION



CONSTRUCTION OF ECO - SAN TOILET

TYPE - II



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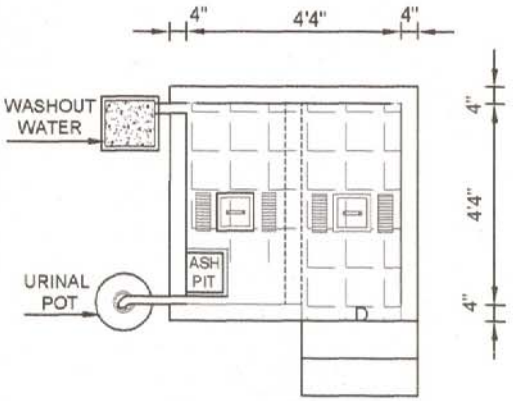
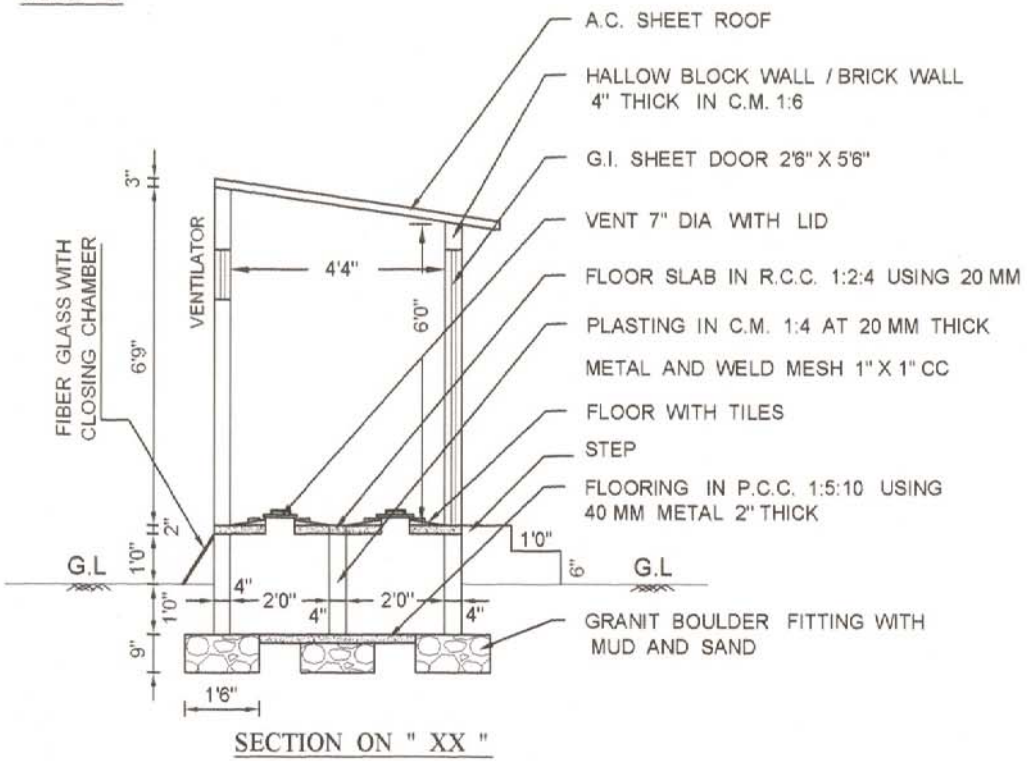


PLAN



SECTION ON " XX "

AREA DETAILS

AREA OF ECO - SAN :- 25.00 SQ .FEET

ESTIMATE FOR CONSTRUCTION OF BRICK : Rs. 7400.00

ESTIMATE FOR CONSTRUCTION OF HOLLOW BLOCK : Rs. 6116.00

PREPARED BY
D. JOHN PRABAKARAN
AGRICULTURAL ENGINEER
MYRADA KVK. GOBI

Estimate to construction of ecological sanitation Toilet

Sl. No.	Description	Construction with Hollow Block (Talavadi)			Construction with Hollow Block (Anthiyur)			Construction with Bricks (Anthiyur)		
		Unit	Unit Cost	Total	Unit	Unit Cost	Total	Unit	Unit Cost	Total
1	Cement	4 Bags	200.00	800	4 Bags	200	800	6 Bags	200	1,200
2*	Sand	35 CFT	3.50	123	35 CFT	10	378	60 CFT	10.80	648
3**	Hallow Block(16"X4"X8")	240 Nos.	6.00	1,440	240 Nos.	10	2,400	-	-	-
4***	Bricks	25 Nos.	2.20	55	25 Nos.	2	55	1350 Nos.	2.20	2,970
5	Steel weld mesh (6' X 4')	20 Kgs	12.00	240	20kgs	12	240	20kgs	12	240
6	Baby jelly(20 mm)	30kgs	2.00	60	30kgs	2	60	30kgs	2	60
7	AC Sheet 2Mts	1.5 Nos.	220.00	330	1.5 Nos.	220	330	1.5 Nos.	220	330
8	PVC pipe(3/4")	12 Ft	2.50	30	12Ft	2	30	12ft	2.50	30
9	PVC pipe(3/4") Elbow	2Nos.	6.00	12	2Nos.	6	12	2Nos.	6	12
10	AC pipe(0'-4")dia	10Mts	11.00	110	10Mts.	11	110	10Mts	11	110
11	AC pipe(0'-4")dia Elbow	1No.	20.00	20	1No.	20	20	1No.	20	20
12	AC Cowl	1No.	45.00	45	1No.	45	45	1No.	45	45
13	Clamp	2No.	10.00	20	2No.	10	20	2No.	10	20
14	Door heel	2Nos.	15.00	30	2Nos.	15	30	2Nos.	15	30
15	GI sheet door with wooden frame (2' 6" X 5' 3")& Fitting	1No.	300.00	300	1No.	300	300	1No.	300	300
16	Foot Rest	4 Nos.	25.00	100	4 Nos.	25	100	4 Nos.	25	100
17	Tiles (1' X 1')	6 Nos.	11.00	66	6 Nos.	11	66	6 Nos.	11	66
18	Lid	2Nos.	35.00	70	2Nos.	35	70	2Nos.	35	70
19	Red oxide & White wash	1No.	50.00	50	1No.	50	50	1No.	50	50
20	Mason Charge	1No.	800.00	800	1No.	800	800	1No.	800	800
21	Un skilled labourer	-			2 Nos	50	100	4 Nos.	50	200
22	Transport & other expenses	1No.	100.00	100	1No.	100	100	1No.	100	100
TOTAL				**4,801**			**6,116**			**7,401**

Chapter: 4

CASELETS

COW SHED WITH URINE COLLECTION PIT

Mr. Nagesh and family living in M. P doddi village of Talavadi block, is a member of Basweswara sangha & is having 4 cows. Before KVK intervention they tie their animals in unhygienic cattle shed and resources from cows were wasted. But now he improved his cattle shed through which the animal resources are effectively collected and utilized. Mr. Nagesh says after constructing the cattle shed that daily 20 kg of cow dung and 10-15 litres of urine are harvested effectively. This helped him to produce/replace

* 14 Kgs of LPG
* 550-600 Kgs /month worth of Rs 1800 /-
* 40 Litres of Panchakavya
* 20 Litres of pest repellent

Another farmer, Rani (wife of Mr. Nandesh) said that now their cows look healthy and free from diseases. Earlier they used to spend on an average Rs.500/month for medical treatment of the animals but now there is no such expense for medication.

VERMICOMPOST

KVK Feedback:

If we are able to manage Rats and Birds problem, heap system is found to be good for the Vermicompost production because worm multiplication rate and manure conversion rate is high when compared to that of other two types.

Farmer's Feedback:

Ms. Kalaivani, a 48 year old woman farmer of Adireddiyur village is highly interested in organic farming. She is practicing vermiculture and producing vermicompost for the past seven years. She had learnt the culturing techniques through the capacity building training programmes of MYRADA-KVK.

Ms. Kalaivani is an IFD implementer and her prime focus is on producing vermicompost. After intervention of MYRADA-KVKduring 2005, she has intensified the activity of vermicompost production. Now she owns six beds. She produces vermicompost by all these methods using Eudrillius eugiene(fast breeder) species.

Pit system – 4ftx4ftx2.5ft

Heap system – 6ftx2.5ft

Brick line cement structure – 6ftx2.5ft

The vermicompost being produced in her farm is used for groundnut, sesame,cumbu, ragi,cotton, tapioca,onion and vegetable cultivation. She says that it is not a laborious work according to her as do others say and it has become a part of the routine work in a day. Earlier she was facing the problem of bandicoot damage but now the problem has diminished to a good extent.

Before resorting to organic agriculture, she used to apply inorganic fertilizers which led to hard crust formation of the soil. But now, she applies only farm yard manure and vermicompost which improved the status of the soil. The soil looks loose, dark brown and crumby in nature. She incorporates more than a ton of vermicompost in her field for every crop season. The raw materials viz., coconut husk, sugarcane trash, biogas slurry and leaf litters are used for the vermicompost production. She had noticed a significant yield increase (56%) in groundnut after application of vermicompost comparing the field where she had not used this organic manure.

Apart from her own consumption (regular application of vermicompost) in the field, the surplus amount of vermicompost is being sold at the rate of Rs.4/kg and till now she had sold six tons of vermicompost in and around Anthiyur region.

CROP PEST REPELLANT

Ms.Padmavathi, aged 25 is a progressive young women farmer of Adireddiyur village of Andiyur block in Erode district. The crops like groundnut, maize, tapioca, cotton, sesame are being cultivated in her farm. As pest and disease occurrence are common in any biotic environment, she faced problem of leaf folder and sucking pests (whiteflies, leaf hoppers and aphids) in groundnut which was grown every year as rabi crop during north east monsoon period.

In order to manage these pests, she tried using all sorts of chemical insecticides, but in vain. Though the sucking pest and leaf folder larvae were controlled initially, in due course, it aggravated the problem of sucking pest (Resurgence). It takes nearly 3-4 chemical sprays in groundnut incurring an expenditure of Rs.1000 to combat the pest problem. Being a interested and enthusiastic farmer, she found hard to bring a solution to this problem.

It was at this time MYRADA-KVK intervened into the village (2005) and identified her as one of the IFD implementer and beneficiary. Miss.Padmavathi was eager to learn the IFD concept which emphasized LEISA practices and was ready to implement it. Now, she has resorted to bio pest repellant spray which was prepared using the locally available weed plants. There was no expenditure incurred in its preparation as the required weeds and cattle left over were easily available at her village premises.

Miss.Padmavathi, for the past three years never prefers chemical insecticide and uses pest repellant with alternate sprays of panchakavya, jeevamirtham and neem extract to manage any pest menace in her field. As per her version, on an average, she saves Rs.1000/ crop/ season after resorting to this botanical insecticidal spray. She finds a healthier crop and an ecofriendly environment in the place where she lives.

KVK feedback:

* This botanical extract has Pest repellent and growth promoter characteristics for 7-10 days. After that it acts as a good growth promoter. So it is always advisable to prepare fresh extract and use it then and there.
* Adding the solution of previous preparation in fresh preparation of the extract enhances fast fermentation.

GREEN FODDER

Mr. Gurumoorthy is living in Esaparai village of Anthiyur block and having 2 cows. He says that after Kendra intervention, green fodder availability (CO3 & COFS 29) in their 30 cents of plot, they are harvesting 30 kg of green fodder daily for their two cows. In a harvested plot they can again harvest in a span of 30-40 days. So they are accessed with green fodder round the year. Mr. Gurumoorthy says 25% income was increased through milk selling and 51.9% increase in fodder availability per year has been ensured

ON BUND PLANTATION

In hill areas, nearly 1000 ha on bund fodder plantation was done by our KVK. This attempt made available enough fodder to the livestock. This also contributed prevention of soil erosion.

AZOLLA

Mr. Mahesh from Attugulipura expressed that he feeds azolla for past one year to his cow .Initially the cattle refused to take the Azolla then he used the strategy of mixing Azolla with other feeds .Then gradually after two months azolla was given as regular feed. His observation on milk yield was found encouraging. He said that while normal feeding the cow used to give 5.5 litres of milk per day but when azolla feed was given as supplementary feed since last 10 months, the yield increase identified was about 250-400 ml of milk.

KITCHEN GARDEN WITH DRIP IRRIGATION

Ms. Gurunanjamma who is living in M.P.Doddi village of Talavadi is a beneficiary of IFD and she is utilizing the farm resources very effectively to reduce the input cost. Before the intervention of IFD, She has to travel 5 kilometers to Talavadi to buy even the curry leaves and other vegetables. She expressed that after establishing the kitchen garden with bucket system she started growing vegetables and perennial trees and now she is using the vegetables and greens for her family daily. She told that by using the bucket system watering problem has been reduced and it also reduced the time and drudgery in growing vegetables. She expressed that now their family is consuming the balanced diet with the consumption of vegetables and greens.

GRAIN STORAGE

METAL BIN:

Ms.Nanjamani, wife of Mr. Jadeswamy who is living in M.P.Doddi village of Talavadi block has the metal bin of 200 kg capacity. Finger millet is the staple foods of this region. She expressed that before resorting to metal bin the harvested finger millet was damaged by rodents, insects and by fungus due to humidity in the stored grains. She told that now the food grains were saved from damage after harvest and they are able to consume the quality product.

KVK Feedback:

Myrada KVK with the association of Save Grain Campaign under Ministry of steel conducted nearly 60training programmes on post harvest technologies and distributed 2600 metal bin and 460 pucca kothi . The beneficiaries are storing the finger millet and other grains like paddy, maize etc. The metalbin has the capacity of 150-200kg and the capacity of puccakothi varies from 1000kg – 2000kg. The cost of metal bin ranges from Rs.950-1300and the pucca kothi ranges from Rs.3000-5000 according to its capacity.

PUCCA KOTHI:

Ms. Rathnamma wife of Mr. Chickkunshetty in M.P.Doddi village in Talavadi block has a Puccakothi of 1500 kg capacity. She told that after attended the training program on post harvest technology conducted by MKVK in association with save grain campaign .Her family could save the harvested food grains to its fullest value. She says “Now our family is consuming quality foodgrains and there is no loss or damage to the food grains stored”

THE RAT TRAP IN GRAIN STORAGE - WONDER TRAP:

Ms. Rajalakshmi, aged 45 is a progressive women farmer of Adireddiyur village, Andiyur block of Erode District. The crops like groundnut, maize, redgram, blackgram cotton, sesame are being cultivated in her farm. After the harvest of the produce, the pulse crops, groundnut and cereals are being stored for seed purpose and also for household usage. She frequently faced rat problem which spoiled the stored produce and caused nuisance. Though she opted to conventional rat traps and poison bait cakes in order to combat the problem, lest in vain.

MYRADA intervened at this stage and introduced Wonder trap as a solution to their problem. Ms. Rajalakshmi bought the trap immediately and as per her version nearly four to five house rats were trapped at a time. The food bait used in the trap were coconut pieces, Dal vada, and fried groundnut. The same bait was not used every time as rats are suspicious beings and develop shyness very easily.

According to Ms. Rajalakshmi, the major constraint of the trap was its structure. The structure of the trap was designed as such to trap only small rats as the exit point was too small to hold Bandicoots.

But according to Ms. Rajalakshmi, wonder trap was much better and efficient than the conventional rat trap as it could trap three to four rats at a time while the conventional trap could trap only one rat at a time.

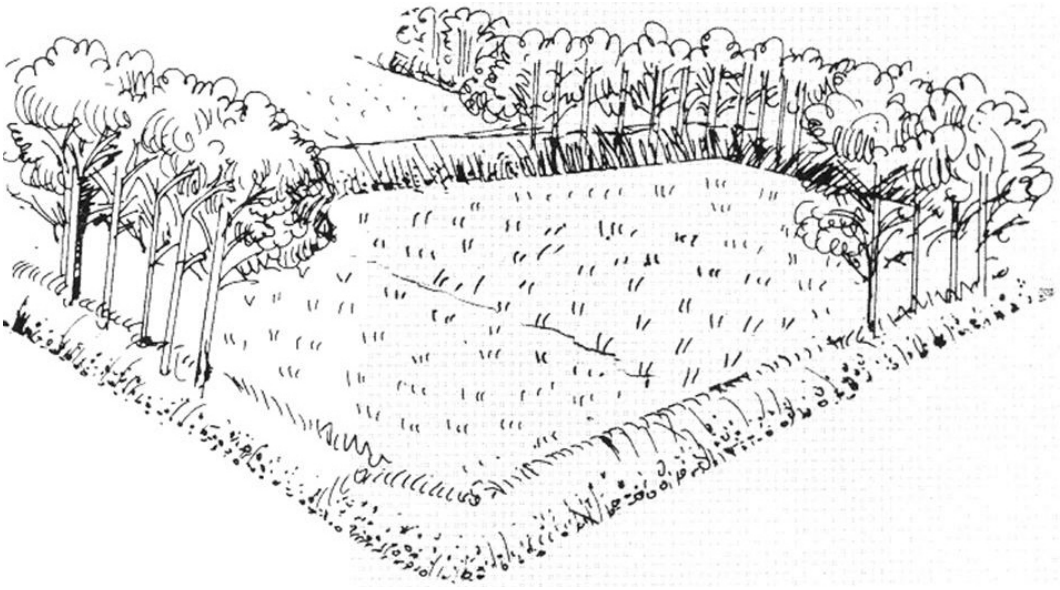
ECOLOGICAL SANITATION

Ms. Rajamma and her family adopted this Ecosan technology during 2004. Her family members consist of 3 adults and two Children .Ms. Rajammal told that before resorting to Eco San toilet, the adults were going for open defecation and during rainy season they used to go for toilet in front of their house. She expressed that now they are defecating at compost toilet which is easy to go and clean especially when her daughter came for delivery. She was using the toilet for a year before and after delivery and she felt safe to go for defecation. Even her 3 year old son could able to use this toilet. The following advantages were listed by the family about Ecosan Toilet.

1. No smell No bad odour.
2. Very little water will be sufficient.
3. The recycled urine is utilized for growing vegetables, Banana, Curry leaves and lemon trees. They are consuming and selling lemon and got revenue of Rs.500/- during last year.

Mr. Veeranna, Rajammal's husband said that after harvesting the compost, they use it for their field as manure (finger millet)

BIOMASS



KVK Intervention of Biomass plantation in watershed area:

MYRADA KVK has been working for past ten years in watershed area to promote the bund plantation using C*assia seamia* and Glyricidia trees. Approximately 20, 00000 trees have been planted in the watershed area.

Mr.Mathavappa, aged 52 is a progressive farmer of Annakarai village of kadambur hills in sathiyamangalam taluk of erode district. The crops like ragi, maize, vegetables, tapioca, are being cultivated in his farm. Ragi crop is the staple food crop in his area. The farmer was facing problems like soil erosion, nutrient run off and low water holding capacity of the soil. He found hard to bring a solution to this problem. It was at this time MYRADA-KVK identified him for technology assessment on "yield enhancement through Bio-Intensive soil enrichment practices in watershed area in Ragi ecosystem". The bund of his field was planted with *Cassia siamea* and the lopping were incorporated in the soil (planted with ragi) to enhance the soil property. After completion of the trail, the soil health improved namely soil physical and biological properties of soil (bulk density, particle density, porosity, texture, structure, colour, pore space, available nutrients, increased water holding capacity, increase flora and fauna population). The yield was also high compared to other trails.

APPENDIX

Abbreviation:

MYRADA	-	Mysore Resettlement And Development Agency
KVK	-	Krishi Vigyan Kendra
IFD	-	Integrated Farm Development
LEISA	-	Low External Input for Sustainable Agriculture
DRDA	-	District Rural Development Agency
KVIC	-	Kadhi Village Industries Commission
UNICEF	-	United Nation International Children's Emergency Fund
NGO	-	Non Governmental Organization
TNAU	-	Tamilnadu Agricultural University
ECO-SAN	-	Ecological Sanitation