Visakha Society *for* Prevention of Cruelty to Animals

We exist to help distressed animals!

VSPCA Alternative Technologies: Biogas, Vermicompost and EM

We have created a special habitat at our shelter and want to teach others how to do the same. Every living species has a special role to play on our planet. Cattle play a significant role and are multipurpose animals.

All our information is based solely on our experiences of the usefulness of the cattle from their by-products and their bodies. This provides a significant amount economically to all living beings including human beings. We feel that if our example is practiced and implemented on a large scale any shelter can be economically viable. All the other animals will also benefit and any farmer using our methods on his land can lead a respectful life forever.

Below we will showcase the realities and the importance of the cattle until his or her death by natural circumstances.

Although Visakha SPCA has just an inadequate 2½ acres of land we have achieved so much! Now we call for philanthropists and enterprising entrepreneurs to help us consolidate our gains for the benefit of others.

Ill Effects of Modernization:

Chemical Fertilizer:

Fertilizers are the chemicals used during farming to replace the chemicals in the soil, which are primarily used and required for growth of crops and plants.

The basic constituents are I. Humus or organic matter. II. Macronutrients, minerals and other elements are (1) Nitrogen (2) Phosphorus (3) Potassium (4) Calcium (5) Magnesium (6) Sulphur. III Micronutrients as (1) Zinc (2) Iron (3) Manganese (4) Copper (5) Boron (6) Molybdinum.

It is now fully known that the use of fertilizers, particularly their unrestricted use, has led to many complicated problems in relation to land environment and the food production. The regular excessive use of chemical fertilizers and absence of the use of organic manures leads to:

1. The humus content of soil is reduced.
2. The lands are losing fertility when repeatedly subjected to these fertilizers.
3. The microbial population of soil is getting reduced.

4. The earthworm which is very important along with microbes for sustained fertility of soil is getting reduced.
5. Subsoil water is getting polluted with nitrates.
6. Farmlands are developing micronutrient deficiencies.
7. Quality of food, vegetable and fruits is deteriorating.

This leads to reduction of humus in the soil along with the reduction of micronutrients and trace minerals in the soil. This is highly damaging to the soil. Farmers feel that the use of Urea and Diamonium phosphate are essential for higher productivity, and it is not possible to achieve the same productivity by using other manure. Farmers are not aware of the damages as listed above, which are leading to slow death of the soil. Suitable biomanures can provide humus and micronutrients. To start with the biomanures should be used extensively and if necessary the chemical fertilizers can be supplemented to maintain the productivity till such time as biomanures can replace chemical fertilizers.

Chemical Pesticide:

Presently everybody has fully accepted that the new pesticides have been contaminating the fruits, vegetables, milk and milk products. These are highly injurious to the health of the children in the long run. It would be desirable to reduce or stop altogether the use of synthetic pesticide.

This is a major challenge for agricultural scientists and research has already begun. The role of bio-pesticides is well known and if suitable bio pesticides are developed this problem can be handled successfully.

The use of Nicotine of tobacco, the Rotenone of Derris, and Pyrethrum of Chrysanthemum etc. were extensively used successfully. These pesticides were slow acting and in some diseases they did not act on all the insects. Hence these insecticides were nearly discontinued and synthetic chemical insecticides were introduced. These insecticides ultimately started contaminating the food and soil.

The neem and cow urine are now being developed by some institutions and individuals. These insecticides are useful and effective in many plant diseases. To start with it would be desirable to reduce the use of chemical synthetic pesticides with these.

The uropesticide can be used with other bio-pesticides. Because these pesticides can be prepared in the farmers house it self and will nearly cost nothing.

Benefits from Cattle:

Apart from providing milk, ploughing and transportation, their usages are mainly from collecting their dung and urine.

Cattle are a multipurpose animal in everyday life for villages. The following list gives the nature and utility of this animal.

1. Milk and milk products.

2. Draft powers

i. Bullock cart
ii. Plugging
iii. Electricity

3. Dung
    i. Bio Gas
    ii. Dung Biomanures
    iii. Cow Dung Cake
    iv. Dung earthworm manure
    v. Dung micro manure
4. Urine
    i. Uro Bio menus
    ii. Pesticides
    iii. Electricity
    iv. Drugs for human beings

Normally nowadays when we talk of cattle and cow only the milk production is taken into consideration. The indigenous animals are not the high milk yielders as compared to some of the exotic animals however the income from the cow and its progeny in India is because of multidimensional use of cow and its progeny. Unless we take the full use of these animals the income from these animals will be less.

Therefore one must develop a conglomerate of cow based production units which can produce (1) fuel through bio-gas (2) Manure from dung and urine (3) Pesticide from cow urine (4) Energy from the bullock, so that the village is free from pollution and maintains a healthy environment. The agriculture can be eco-friendly, sustainable and self-reliant.

At our shelter presently we use:

1. Vermicompost and Nedumcompost.
2. Bio-Gas
3. Organic Farming
4. Cow Dung Cake
5. Production of Natural Pesticide
6. Production of Natural Medicines

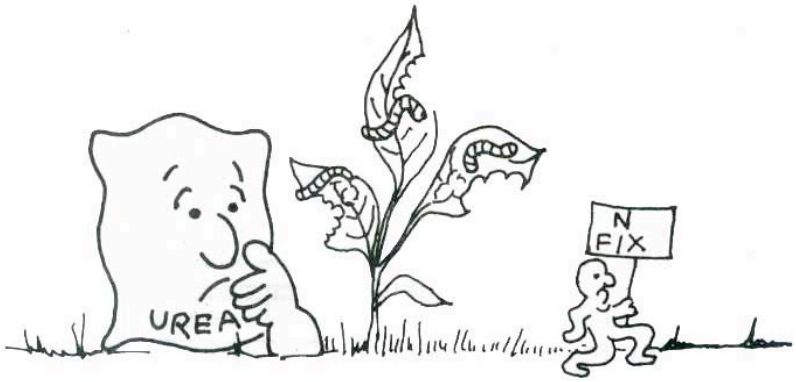
Other Naturalities: -

7. Water Shed Management
8. EM Technology

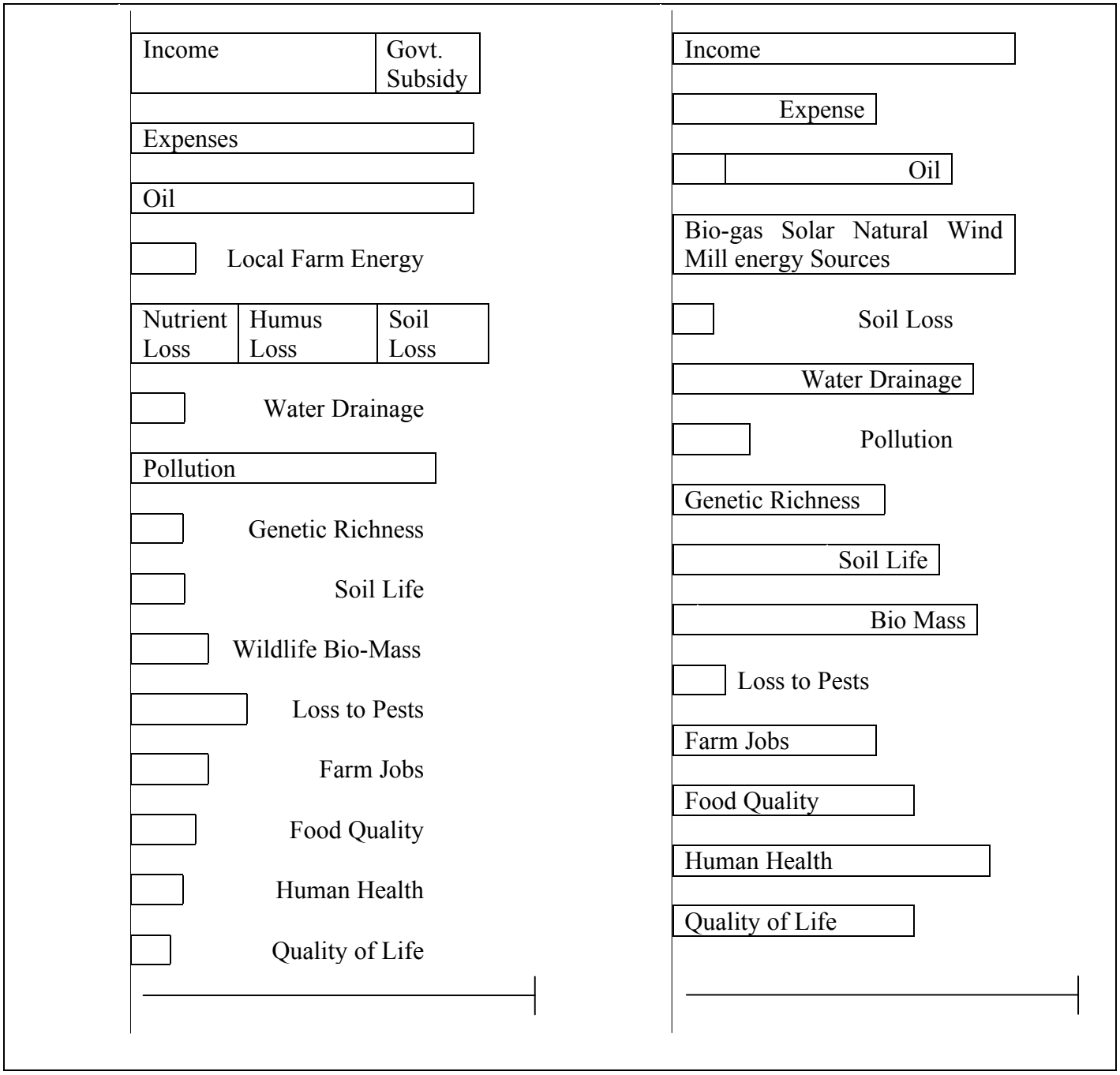
Introduction:

The "Green revolution" between 1960's and 70's helped in increasing the food production. However, the indiscriminate usage of the chemical fertilizers resulted in deterioration of soil fertility, increased soil erosion and eco – imbalance.

In contrast natural organic farming is sustainable and more resilient.



Soil is a biological medium and an organic living entity. The topsoil is made up of mineral particles, human, soil microorganisms, water and air. It is the inter-relationship between these parts that make good organic manure. The most important aspect of the soil is the presence of decaying organic matter. This acts as host to the soil bacteria, fungi and earthworms. Chemical fertilizers and soil pesticides destroy the earthworms and other useful and beneficial soil dwelling creatures. This soil without microorganisms is just an inert substance and infertile. Such infertile soil requires more expensive and energy wasting fertilizers. Though the production of bacteria, fungi, plant root secretions, and earthworms enough nutrition can be supplied to raise healthy plants and crops.



KEY TO BAR DIAGRAM

A Cash Accounting **B** Energy Accounting

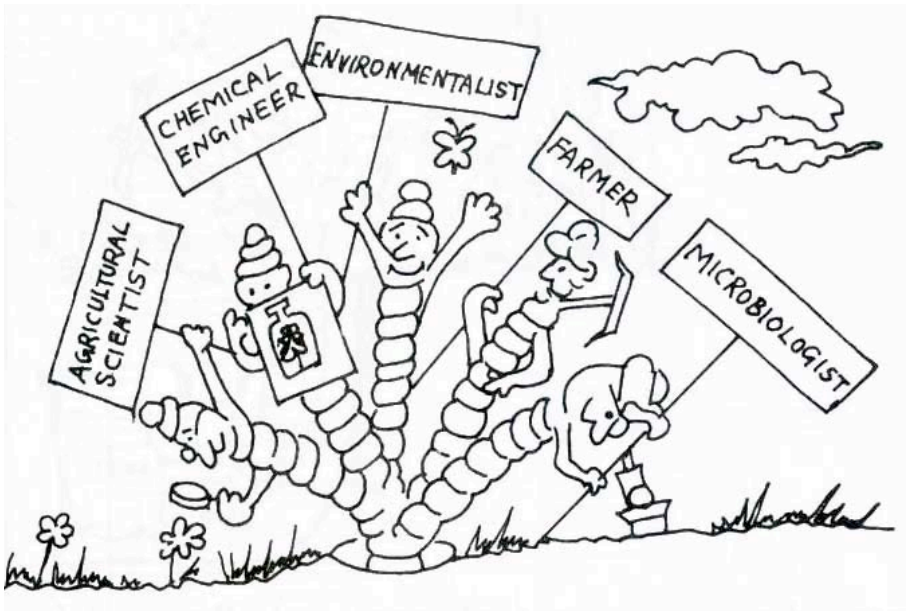
C Environment Accounting **D** Conservation Accounting

E Social Accounting

The first step towards organic farming will be complete stoppage of chemical fertilizers and pesticides and switching over to organic manuring. Vermicompost is one such manure, which can become a boon to the modern farmer and will give relief to him from the curses of chemical farming.

EARTHWORMS

The earthworms are no-doubt, one of the greatest forces of the nature in the continuous renewal and maintenance of the "all important top soil layer" upon which all life depends.



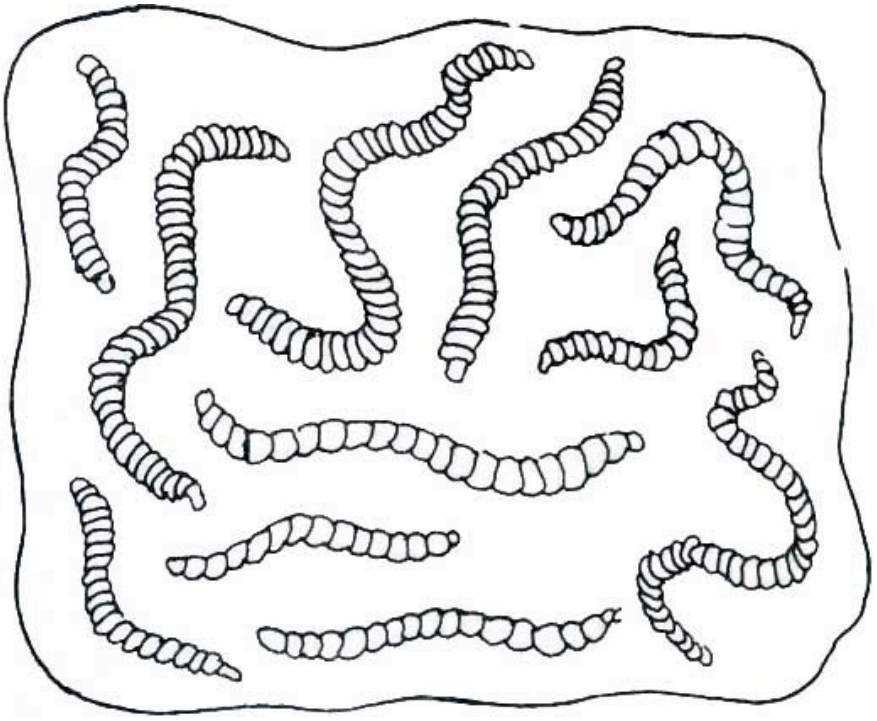
In 1881, Charles Darwin said about earthworms "It may be doubted if there are other animals, which have played so important a part in the history of the world as have these lowly creatures". He further says, "The plough is one of the most ancient and most valuable man's inventions; but long before he existed, the land was regularly ploughed, and still continues to be thus ploughed by earthworms.

VERMICULTURE

Vermin means earthworms and culture means farming. Verminculture means farming of earthworms.

1. Vermicomposting technology can be used for urban and rural waste recycling i.e., for conversion of organic waste into manure.
2. This manure can be used in agriculture, horticulture etc. or as inoculum for improving and maintaining soil fertility.
3. A few species of earthworms are used for the treatment of industrial wastes.
4. Earthworm polycultures are used for improving soil equality by turning and mixing of the soil.
5. Earthworm protein can be used as animals feed for livestock.

There are about 3000 varieties of earthworms. They have been formally classified into main 3 types, based on their lifestyles and burrowing habits.



I. VERMICOMPOSTING:

Vermicomposting is the process of converting organic waste into Vermicompost through the action of epigeic earthworm species. Before the worms can digest the waste, partial decomposition is essential. The mesophilic and thermophilie stages where heat is generated in the compost pile can destroy the worms. Once these stages are passed the pile cools down and worms can be introduced.

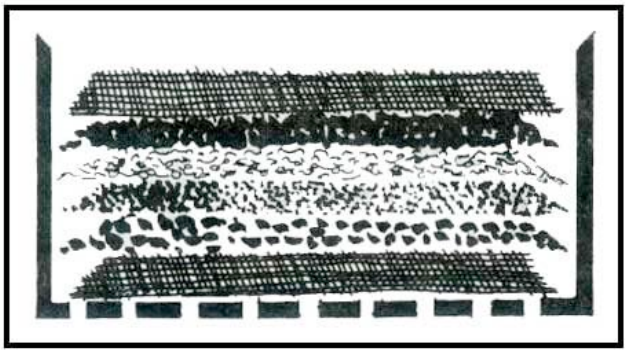
Vermicompost is the cast or excreta of epigeic earthworm species, which have been cultured with animal dung and other organic wastes.

There are 2 methods of producing vermicompost:

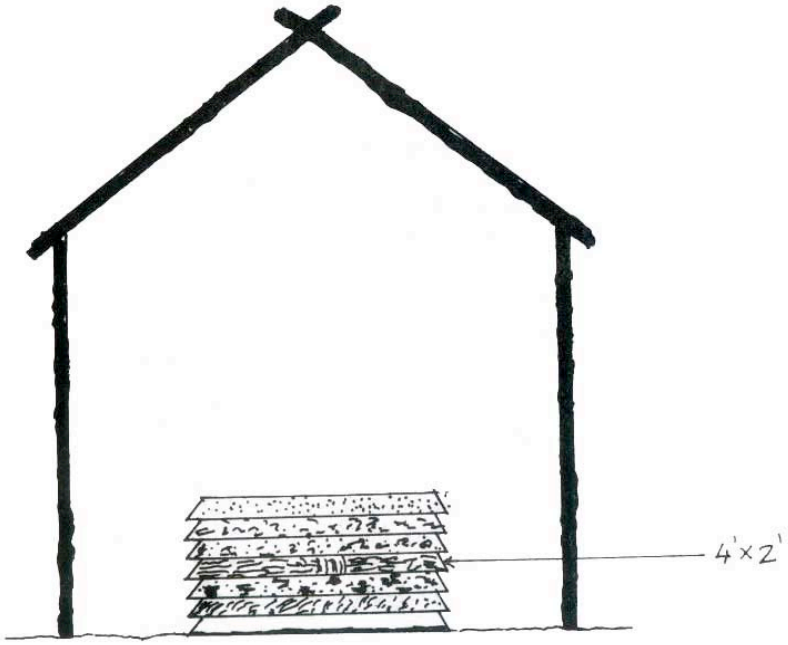
a) Pit or container method

b) Heap (Bed) method.

Pit method



Bed Method (Heap)



There is no significant difference in the quality of the manure produced by either of these methods.

Image Vermicompost pit

BENEFITS

Vermicompost Powder

1. Higher yields with enhanced qualities like taste (increased sugarcane contents), luster, size and shelf life “Enhancing Exportability”.

2. Increase immunity against pest attack and vagaries of nature (50 to 60% cut in pesticides).

3. No chemical fertilizers needed.

4. Sustains yield year after year.

5. Production possible even in less quantity of water.

6. Soil

(a) Tills the soil to a depth of about 3 meters, increasing porosity, aeration and infiltration, thus helps the formation of profuse and deeper root system helping better absorption and uptake of nutrients from the soil.

(b) Encourage growth of beneficial soil microorganisms.

(c) Soil gets enrich by excreta of earthworms, which contains Nitrogen, Phosphate, Potash, Magnesium, organic Carbon and Humus.

(d) Improves soil Ph and reduces soil salinity.

(e) Converts normal soil into rich “living soil”

7. Nitrogen is found in stable form and hence not lost in atmosphere.

8. Bacterial multiplication and functioning are enhanced.

9. Composting time reduced by 50%.

Less input + More Quality Output = Increased Net Profit

II. BIOGAS:

Biogas Plant

The Visakha SPCA biogas plant is 85 cubic meters, which can provide electricity for up 30 families and also provide fuel for cooking.

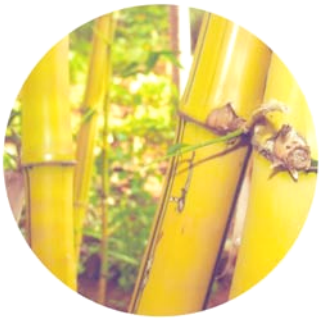
Cow dung is not only hygienic but has a very high source of energy production.

A minimum of 200 cattle is necessary for collection of the cow dung to run a biogas plant.

Fresh cow dung is collected in the evening time and mixed with water in a tank and is pushed through into the 2 chambers of the bio-gas facility.

The cow dung water and urine is collectively mixed in the chamber and left over night for sufficient production of gas. This allows us to generate electricity where necessary while also using directly for cooking for more than 250 animals at our shelter.

III. Organic Farming:



All the plants, trees, creepers and grass at our shelter are grown with by organic farming. It was a complete transformation from a wasteland to the only greenery in our area. As all other available places around us in the surrounding areas have given way to urban development and human encroachment.

The wasteland alienated to us by the government is a complete extension of the hill. We could change the land for the benefit of the animal and human beings. And the only way this could be done is using cow dung, cow urine, vermicompost, natural pesticide and

slurry from bio-gas natural medicines natural pesticide and finally the ingredient of EM technology.

2000 Shelter **2006-Cyclone affected Shelter** **2007-Present Shelter**

The above vital combination has transformed the previous wasteland into our shelter -- an eden of love and compassion.

It is amazing to see the soil of gravels, stones and rocky sand giving way to nutritious fruit, flower, creepers and trees.

Images of Organic Farming fruit, flower, creeper and trees.

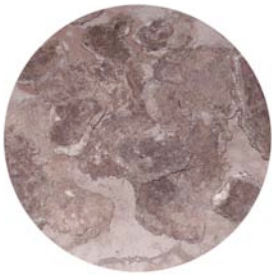
Organizing chart

Nature has evolved a very innovative bio-cycle; from farm we can get food -- fruits, vegetables etc. Plants and crops produce the biomass (which can be consumed by cow that cannot be utilized by man) and utilize it in the rumen with the help of microbes and converts it into milk, which is highly nutritious. Plants produce fuel -- fruit and fodder and help in clearing the environment of co_2 to produce O_2. Cow gives dung and urine; which can be used as manure. This manure is used in the farm and which produces the food -- fruits and vegetables useful for people. This bio-cycle is eco-friendly. People, plant and cow form an interdependent and sustainable bio-cycle.

Hence people should utilize the farmland cow and plants in an integrated manner and get the maximum benefit for themselves on sustainable basis without damaging the environment and land. This cycle is eco-friendly in nature.

IV. COW DUNG CAKE:

The importance of cow dung cake is not properly understood. If villages had not used the cow dung cake for the last 50 years we would have lost major forests for cooking purposes.



Cow Dung Cake

The best way to use the cow dung would be to produce biogas and the slurry to be used for the production of manure. However because of easy availability of chemical fertilizers the use of dung has been neglected. But the lack of fuel wood has at the same time led to the excessive use of cow dung cake for cooking purposes. Nearly 60% of the cow dung is used presently for cow dung cake production.

Cow dung can be mixed with wasteful matter from animal shed or wherever available the coal waste etc, and this should be converted into cake or flakes. The cake should be as thin as possible and as dry as possible.

Total dung production in the country is about 60 to 70 Crore tons. Out of this 30 Crore tones give about 100 Crore tones of manure. This is enough for 16 Crore hector of cultivated land. The remaining 30 to 40 Crore tones of dung can be used for the cow dung cake production. We can produce nearly 15 Crore tones of cow dung cake. If all people use cow dung cake production we can produce nearly 15 Crore tones of cow dung cake.

If all propel use cow dung cake the country would require about 365 x 100=36500 Crore kg of cow dung cake. Approximately 36 Crore tone of cow dung cake. Therefore we can meet 50% of the fuel requirement of the 100 Crore people of the country. This can save our forests and other fuels.

V. NATURAL PESTICIDE:

Natural Pesticides are essential and useful for four types of diseases plants and crops – viral diseases, fungal diseases, bacterial diseases and insects.

a. Pancha Gavya
b. Pancha Kavya
c. Uro Pesticide

Pancha Gavya:

Ingredients involved are:

Fresh cow dung slurry
Fresh cow dung
Cow urine
Cow milk
Cow curd
Cow ghee
Sugar can juice
Coconut water
Ripped bananas
Toddy

Pancha Kavya:

Ingredients involved are:

Cow urine
Cow milk
Curd
Cow dung
Ghee

Uro Pesticide whose ingredients are:

Cow urine
Copper
Neem (powder or cake)
Garlic

VI. NATURAL MEDICINE:

At Visakha SPCA we are in the process of developing medicines from cow urine and dung.

We will gradually increase the varieties depending on the usage and demand and availability sources. Below are two types of natural medicines prepared that are useful for diabetics, general weakness and weak bones.

Ganavathi made from:

Cow Urine
Cow dung cake powder

Assave made from:

Distilled cow urine

Other Naturalities at our Shelter:

VII. WATER SHED MANAGEMENT

We need 30 thousand liters of water in the shelter for drinking and cleaning as we have daily take care 852 - 1050 animals and with staff of 42 animal helpers.

Our area has seen 10 years of continuous drought. While the last 3 years there is a change with many more wet months leading to imbalances.. It was necessary thus therefore to have devices and plans for implementations to tap all of resources available from nature including recycling in the best possible manner.

We must be ready for any eventuality and have developed the following:

1. Rain harvesting pits. We have four of them presently.
2. Minor check dams to the streams flowing in the front and back of our shelter.
3. Four underground wells
4. Four bore wells placed 10 feet away from each of the underground wells. This is strategically to allow the bore wells to tap the collected water from the under ground wells. This system has helped us a lot.
5. Overhead storage capacities of tanks of 30,000 litres

our wells

bore wells

water tanks

VII. EM Technology:

Introduction:

Distinguished Professor of Horticulture, Professor Dr. Teruo Higa, developed EM (Effective Microorganisms) at the University of the Ryukyus, Okinawa, Japan in the early 1980's.

EM is a liquid concentrate containing a consortium of beneficial microbes. These act as microbial inoculants in the soil, as anti-oxidants in soil as well as develops a conducive environment for the crop to grow. Over 100 countries are using this technology successfully today.

EM mainly consists of Lactic Acid Bacteria (Lactobacillus SPP.), Photosynthetic bacteria (Rhodopseudomoas spp.), Yeast (Saccharomycas spp.). EM includes both aerobic and anaerobic species of microorganisms, which co-exist in an environment of pH below 3.5. These microorganisms are not imported exotic, genetically engineered or modified.

NECESSARY PRODUCTS TO BE MADE TO USE EM TECHNOLOGY:

EM is used as a base culture for preparing various types of input materials.

These are: (2.1) Activated EM or EM Rice water (2.2) EM Compost (2.3) EM Bokashi (2.4) EM 5 (2.5) EM FPE (Fermented Plant Extract).

Bokashi for Animal:

For animal feed mixture, use rice bran or any feed concentrate to which the animals are habituated.

Rice bran or feed concentrate	100%
Water	15-20% of total volume of rice bran or feed concentrate
Molasses / jaggery	3% of water
Activated EM	10% of water

APPLICATION OF EM TECHNOLOGY:

AGRICULTURE
ORCHARD CROPS
MUSHROOM FARMING
POLUTRY APPLICATION
LIVESTOCK

EFFECTS OF EM:

The following are some of the beneficial influences of EM

(a) Promotes germination, flowering, fruiting and ripening in plants
(b) Improves physical, chemical and biological environments of the soil and suppresses soil borne pathogens and pests.
(c) Enhances the photosynthetic capacity of crops.
(d) Ensures better germination and plant establishment.
(e) Increases the efficacy of organic matter as fertilizers

Due to the above stated beneficial effects of EM, yields and quality of crops are enhanced.

*EM is not a pesticide and thus does not contain chemicals that could be construed as such. EM is a microbial inoculant that functions as a biological control measure in suppressing and/or controlling pests through the introduction of beneficial microorganisms to the plant environment. Therefore, pests and pathogens are suppressed or controlled through natural processes by increasing the competitive and antagonistic activities of the microorganisms in EM inoculants.

EM IN ANIMAL PRODUCTION

One of the way important effects of EM –the following benefits acres to the animals.

Effects of EM on livestock.

1. Suppresses the foul smell on livestock barns and septic tanks.
2. Decreases number of flies and ticks.
3. Improves animal health.
4. Decreases the stress of animals.
5. Improves fecundity.
6. Improves animal dung quality, (produces good manure)

APPLICATION OF EM

1. Add: Bokashi into feed of animals
2. Mix: EM 1 into drinking water.
3. Spray EM Bokashi on the bedding for animals
4. Put EM into septic tanks.

(Bokashi is a fermented organic fertiliser prepared with organic material. Bokashi will be aerobic or anaerobic depending on the process used . Bokashi adds to the sustained nutrients supply from organic material with Effective Microorganism. Also the growth regulated like substances produced by effective microorganism from decomposition of organic matter. Bokashi acts as a storage house for EM.

IMPORTANT ASPECTS OF USING EM

(1) EM is a living thing
EM is a living entity. Therefore, EM is completely different from chemical fertilizers or agrochemicals. EM does not work when applied in the same method as chemical fertilizers or agrochemicals. It is important to note that EM increases population of beneficial microbes in the soil.

(2) Use good quality water
It is important to use good quality water when watering crops, diluting EM 1, preparing bokashi and EM 5. Using polluted water (high BOD, Low DO) causes infection of pests and diseases, reduction of yield and crop quality. If you cannot get good quality water, please filter it by charcoal or EM ceramics.

(3) Storage of diluted solution

It is desirable to utilize diluted EM solutions within 3 days.

(4) Storage information
Store of EM – up to 6 months in a closed container, in a cool and dark place. (Please do not store in refrigerator).

Check smell if in doubt. EM always has a sweet and sour smell. If smell is foul, do not use it. After the cap of bottle is opened and air comes in, a white membrane may be observed on the surface of EM. This is yeast and does not cause a problem.

We are also effectively using EM during Natural Disaster conditions!

For further information please contact us at: info@VisakhaSPCA.org

Acknowledgments: CAPART, New Delhi , June 1996 magazine http://capart.nic.in/

Godhan Utpadan Kendra, New Delhi

EM technology: Maple Orgtech (India) Ltd., Reg office, Uttaranchal