

ECO-FRIENDLY LIQUID ORGANIC MANURES

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Abstract: The chemical fertilizers are harming our environment and human health. This paper consists of the method that will help to replace such harmful fertilizers with Eco-friendly fertilizers which will be easy to manufacture. Liquid organic fertilizer is completely Eco-friendly and is completely made up of organic materials which are easily available at farms. We have studied the different characteristics of the plants used in the manufacturing process of this fertilizer and found that many of them contain soil enriching and pesticidal properties. Thus this paper will lead us to the Manufacturing of Eco friendly Fertilizer which are easily absorbed by plants and soil as it is in liquid form using the organic materials and plants which can replace the current chemical fertilizers and Pesticides.

Keywords: Replacing Chemical fertilizer with Eco-Friendly Liquid organic fertilizers. Can easily be absorbed by plant and soil because it is in liquid form. Can easily be manufactured

1. OBJECTIVE

To make a organic liquid manure which can reduce the dependence of our farmers on pollution causing chemical fertilizer with reduced cost.

2. METHOD

The bio-digester liquid will be used as a botanical pesticide and liquid manure. The bio-digester of 16 feet width and 6 feet height is constructed and the dung, urine, organic wastes and botanical Plants, mainly *neem, caltropis, vitex, adhatoda, custard apple, etc.* will be added to the bio-digester containing **urine and dung along with cattle shed and waste and little quantity of soil** will be added to the bio-digester water tank. The organic matter decomposes and liquid manure will be ready within 2-3 weeks. It will be regularly applied to the soil along with water at rate 200 litre per hectare. It can also be used as spray @ 10 percent as it contains nutrients, botanical plant extracts and growth promoting substances like auxins (Reference: national center of biotechnology) which help to manage pest and diseases and provide nutrients to plants.

3. EXPECTED OUTPUT

We would finally get liquid organic manure prepared from the bio digester and it can be used to replace chemical fertilizer and provide nutrients to soil. We can also get pesticides made from natural organic materials to protect our crops from pests and insects.

4. COST TO BENEFIT RATIO

The cost benefit ratio of this project is expected to be 30-50 rupees per hectare.

5. Why use liquid manure?

- to prevent pests and diseases
- to avoid using harmful, manufactured chemicals
- to provide nutrients
- to provide irrigation

6. PROPERTIES OF SOME SPECIAL PLANTS USED:-

6.1. VITEX

The genus *Vitex* includes many species from tropical and also from temperate areas. Among these species, *Vitex negundo* possess analgesic, anti-inflammatory, antimicrobial, antioxidant, hepatoprotective, antihistamine and anti-asthmatic properties.

Leaf oil of the plant has repellent action against stored product pests. *Vitex* possesses insecticidal, anti-worm and antimicrobial properties the anti-hyperglycemic effect of leaves due to iridoid glycoside was comparable with glibenclamide. It has significant productive effect on glycoprotein metabolism. Experiments have demonstrated that a different part of the plant especially leaves, fruits, roots and seeds possess anti-inflammatory and anti-arthritis activity.

VITEX negundo leaves have been reported to exhibit antifeedant activity against the larvae of an agricultural pest, the castor semilooper (*Achoea janata*), and also possess antibacterial activity against *Bacillus subtilis* and *Escherichia coli*, when tested by the paper disk method. Organic extracts of *Vitex mollis* leaves showed insecticidal and insect growth regulatory activity on fall armyworm neonate larvae (*Spodoptera frugiperda*), an important insect pest of corn.

Reference: homeguidesfgate.com

Prof. Joanne Marie
Gallagher, James 2015. Antibiotics

THE NUTRIENTS PRESENT IN VITEX THAT ARE ESSENTIAL FOR GROWTH OF CROP ARE:-

- Calcium
- Phosphorus
- Iron

Nutrients/100gm	<i>Vitex negundo</i>			<i>Moringa oleifera</i>	
	Tender	Mature	Dry	Mature	Dry
Calcium (mg)	251.42	5267.13	15214.25	440	1997
Phosphorus (mg)	185.2	680.3	1870.5	70	297
Iron (mg)	6.6	9.4	16.48	0.85	28.28
Vitamin C (mg)	141.12	180.9	21.4	220	37.1
Crude Fibre (g)	0.74	0.9	14.6	0.9	19.9

Reference:-Department of Life Sciences, Amrita Vishwa Vidyapeetham University, Ettimadai, Coimbatore - 641 112

6.2. CALOTROPIS

Calotropis gigantea is a plant grown almost everywhere and has no economic use. Leaves of *Calotropis gigantea* plants were composted with sheep dung. Composting conditions were maintained and samples were withdrawn at 30, 60 and 90 days of composting and analysed for pH, electrical conductivity, Ca²⁺, Mg²⁺, Cl¹⁻, total organic carbon, total nitrogen, available phosphorus and available potassium. Results show that contents of these parameters changes with time and at 90 days **nutrient rich compost** is obtained with decreased concentration of chloride.

- The latex of *Calotropis gigantea* contains **cardiac glycosides, fatty acids.**
- **Green cropping with Calotropis procera**
- *Calotropis procera* grows as a weed in many areas of India, but it is also purposefully planted. The plant's root system has been shown to break up and cultivate cropland. It is a useful green manure and will be planted and ploughed in before the "real" crop is sown.
- *Calotropis procera* improves soils nutrients and improves moisture binding, an important property in some of the more arid croplands of India. The plant is tolerant of dry and salty conditions and can easily be established in over cultivated areas to help improve the soil conditions and reinvigorate the land.

6.3. NEEM (*Azadirachta indica*)

As a fungicide, neem oil is made from neem have been used in India for over two millennia for their medicinal properties. They are said to be antifungal, antidiabetic, antibacterial, antiviral, contraceptive and sedative. Neem products are also used in selectively controlling pests in plants. Neem is useful for damaging over 500 types of insects, mites, ticks, and nematodes, by changing the way they grow and act. Neem does not normally kill pests right away; rather it slows their growth and drives them away. As neem products are cheap and not poisonous to animals and are eco-friendly, they are good for **pest control**.

Pesticidal activity includes

- The formation of chitin (exoskeleton) is also inhibited.
- Mating as well as sexual communication is disrupted.
- Larvae and adults of insects are repelled.
- Adults are sterilized.
- Larvae and adults are poisoned.

Neem as a bio-fungicide :

It is used as a preventative when disease is just starting to show. It coats the leaf surface which in turn prevents the germination of the fungal spores. Neem oil is effective against rots, mildews, rusts, scab, leaf spot and blights.

Neem as soil conditioner and organic manure

Neem has adequate quantity of NPK in organic form for plant growth. Neem typically contains about 6% neem oil and min. 4% nitrogen, 0.5 % phosphorus and 0.5% potassium. Being totally botanical product it contains 100% natural NPK content and other essential micro nutrients. It is rich in both sulphur compounds and bitter limonoids. According to research calculations, neem cake seems to make soil more fertile due to an ingredient that blocks soil bacteria from converting nitrogenous compounds into nitrogen gas.

Neem and environment

The natural insecticides, fungicides and bio-pesticides made out of neem have many advantages. Research studies indicate that they are not harmful to humans or animals. The pests will not develop resistance over generations while the beneficial insects like

butterflies, ladybugs, etc are spared. The soil is enriched, and neem extracts leave no residue in the environment. Neem seed cake also stimulates the phosphorus uptake slightly but had no effect on potassium uptake.

REFERENCE:- D.P. Agrawal (n.d.). "Medicinal properties of Neem: new findings".

<http://www.pesticides.gov.uk>

http://www.natureneem.com/index_fichiers/Neem_in_Agriculture.htm

6.4. CUSTARD APPLE(*Annona reticulate*)

Insect Repellent:

Mix some powdered custard apple seeds in water and leave it for a couple of days. Sprinkle the mixture everywhere around the house, especially in the infested areas. Results will be instantaneous

Pesticide and Weedicide:

The same mixture can also be used as pesticide for agriculture. Sprinkle some of the infested plant on a regular basis for 10 to 15 days for the complete removal of leaf eating insects.

Commercial Farming Pesticides:

The seeds of custard apple are also mixed with neem seeds to make another potent toxic pesticide used in commercial farming. The pesticide thus made from these seeds is natural and harmless to ecology.

REFERENCE:- <http://www.stylecraze.com/articles/amazing-uses-of-custard-apple-seeds/>

6.5. LANTANA CAMARA

USE AS MANURE:

Bio mass from lantana plant can be used for manuring trees from its ash which contains a good amount of manganese and potassium. It has to be useful as an organic source for improving soil productivity and can reduce the use of nitrogenous fertilizers by 50%. It also improves soil fertility and accelerates nitrogen and phosphorous cycle .

REFERENCE:- <http://nopr.niscair.res.in/bitstream/123456789/13019/1/SR%2048%2811%29%2054-57.pdf>

6.6. ADHATODA

Leaves of *Adhatoda vasica* can be incorporated into the soil while preparing the nursery. This increases soil fertility; acts as an insecticide and renders the uprooting of the seedlings easier.

REFERENCE:- <http://www.celkai.in/Crops/Medicinal%20Plants/Adathoda.aspx>

7. MAIN ADVANTAGES OF THIS LIQUID MANURE

1. IT IS FULLY ORGANIC AND CHEAP
2. NO BIOLOGICAL MAGNIFICATION OCCURS IN THE FOOD CHAIN
3. IT DOES NOT HARM ENVIRONMENT AND CAUSE POLLUTION
5. EASY TO PREAPRE AND HANDLE
6. IT PROTECTS BENEFICIAL INSECTS
7. IMPROVES THE SOIL FERTILITY.

CONCLUSION

Liquid organic manure will help our farmers in growing pant with more yield and without using any chemical fertilizers which are harmful to the human body. It will also help to replace the currently existing chemical fertilizers in industry. Its benefits and advantages are at par when compared to other fertilizers. Also its manufacturing process is very simple and can be taught to every Indian farmer to increase his income.

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