

Eco Enzymes

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Abstract

Over a period of time, the foul smell reduced and the cattle and birds, which avoided the waters started coming back to the place again. Although debatable, eco enzymes used across the globe, have shown signs of healing the planet instead of hurting **ECO Enzyme** is a complex solution produced by fermentation of fresh kitchen waste (fruit and vegetable dregs), brown sugar and water. It is dark brown and has a strong sweet sour fermented scent. Garbage Eco It is a multipurpose liquid and its applications covers household, agriculture, animal husbandry, etc. Can we imagine that the waste from our kitchen can be something more than just garbage? In fact, that garbage can clean our house, our neighbourhood and the entire ecosystem. Just a little effort and coordination can transform kitchen waste into a million dollar eco enzymes industry, which can make this planet a better place to live in. Garbage that is generated each day, we can put it to some good use. It's organic solution is very useful for us and our planet. And it is surprising to know that such a solution can be formulated from our kitchen waste? An organic cleaning solution called the Eco enzymes is fast picking up pace with individual and community efforts for a greener solution. Earlier this year, when Art of Living organised the World Culture Festival (WCF) on Yamuna floodplains, the major deterrent to the show, which hosted thousands of global participants, was the stinking Barapulla drain, which flowed right beside the venue. Volunteers resorted to the natural way of cleaning the drain by making over 5,000 litres of eco enzymes and pouring it into the Barapullah drain. it.

Key Words

Garbage, Fermentation, Stinking, Brown sugar

Introduction

A complex solution produced by fermentation of sugar (brown sugar, jaggery or molasses sugar), fresh kitchen waste (fruit and vegetable) and water in the 1:3:10 ratio this gives Eco enzymes. Fermentation for three months in an air-tight container is carried out. Finally it becomes a dark brown coloured liquid having strong sweet-sour fermented scent. Eco enzyme was discovered by an outstanding farmer Dr Rosukon from Thailand she has been very actively involved in enzyme research for more than 30 years. Eco enzyme is a natural multi-purpose liquid, it is used as an alternative to the cleaning products. Eco enzymes has numerous applications and can be used in homes, agriculture, animal husbandry and many other areas. At home, besides general cleaner, air purifier, insect repellent, laundry cleaner, car care, organic fertiliser, eco enzymes can be used in several ways at a negligible cost. Its anti-bacterial and antifungal properties can be a natural antiseptic for homes. It removes odour and toxic air released from smoking, car exhaust, chemical residues of household products, etc. The enzyme residue flows underground and eventually purifies the river and the sea. Eco enzymes in different dilutions can be used in several household purposes also like washing clothes, washing utensils, cleaning floors, removing grease marks etc. In personal and pet care, the eco enzyme can be mixed in shampoo in small quantities to reduce the effect of chemicals and give a nice wash. In agricultural, eco enzymes can be used to reduce the over-use of chemicals, act as a natural pesticide and fertiliser and it can add to the general health of the soil and make it more fertile. Eco enzymes market is far behind the industry numbers. The reason being, it is still not taken up as a large-scale business model but only as an individual effort.

Examples of exoenzymes

- Necrotizing enzymes.
- Coagulase.

- Kinases.
- Hyaluronidase.
- Hemolysins.
- Amylases.
- Lipoprotein lipase.
- Pectinase.

Kitchen scope to multimillion industry

It is possible for people to make eco enzymes in the house, at an individual level – organic cleaning agents at low cost for personal use. But higher production levels can be a difficult task. On the other hand, eco enzyme can be easily made in an industry, with a little-coordinated effort at a community level and it is not so expensive. If all the houses in a neighbourhood come together and collect all the kitchen waste in a coordinated way to make eco enzymes, the cleaning enzymes become available among all the households. And with a more co-ordinated effort, a neighbourhood can start it up as a small-scale business at a local level and share the profits.



As these days garbage dumping becoming a major problem in cities, environmental groups can coordinate people for the collection of kitchen waste to manufacture eco enzymes and then they can use it for cleaning drains and other water bodies in the city. This work not only solve the problem of garbage dumping but also help to maintain the environment. Local municipal bodies can make it a law to dump garbage waste separately so that it can be used to make eco enzymes, which can be put to use by the

sanitation department in various parts of the city. In villages people can be educated about eco enzymes which can be used in agriculture as natural fertilizers and pesticides reducing the adverse effects of chemicals on plants and soil. At a business level, small scale industries can in fact “buy” the properly segregated kitchen waste from various households, hotels, vegetable markets and supermarkets . They manufacture the eco enzymes and sell it to make profits. With the trend to have a more organic lifestyle, & to acquire eco friendly environment various multinational cleaning agents firms can do business of eco enzymes on a larger scale and sell the eco enzyme products on a much wider platform for customers. Instead of dumping the environment with garbage and filth, a little coordinated effort and enthusiasm in small neighbourhoods can create a billion dollar market just with your kitchen dustbin. Scientists, environmentalists and researchers have warned people against direct dumping of waste plastic in open ground or into the available water bodies due to it’s harmful effects on the entire ecosystem. The plastic wastes could be used in road construction and the field tests withstood the stress and proved that plastic wastes used after proper processing as an additive would enhance the life of the roads and also solve environmental problems. Plastic use in road construction is not new. It is already in use as PVC or HDPE pipe built by PVC or HDPE to form plastic mats. Waste plastic is ground and made into powder; 3 to 4 % plastic is mixed with the bitumen. The durability of the roads laid out with shredded plastic waste is much more compared with roads with asphalt with the ordinary mix. The use of the innovative technology not only strengthened the road construction but also increased the road life as well as will help to improve the environment and also creating a source of income. The plastic is not even easily biodegradable and takes more than thousands of years for it’s complete natural decomposition. Studies have shown that open burning of waste plastics or using the same for area reclamation or land filling is even more dangerous to the environment, since this leads to further increase in soil pollution, water pollution and air pollution through high degree. The combination of these wastes with aggregates and bitumen revealed great results.

Methodology



Making ECO Enzyme

Ratio of Making Eco Enzyme	
brown sugar, molasses sugar or jaggery	10 Kg
fruits and vegetable dregs	30 kg
Water	100 Liter

Before we throw away fruit or vegetable odds and ends next time around, we should remember to convert them into multipurpose enzyme solution – Eco Enzyme, an excellent household helper which is an

effective household and laundry cleaner, air purifier, car wash cleanser and even organic fertilizer. It is easy to DIY fresh kitchen waste at negligible cost, producing effective multi-purpose solution that is useful and beneficial to the environment. Choose to use cleaning products made with chemicals, we are polluting the underground water, rivers and the surrounding eco-system. Conventional cleaning products contain phosphate, nitrates, ammonia, chlorine and many other harmful chemicals. The accumulated effects of these chemicals that are released from every household contaminates the environment. Let Eco-Enzyme be our best household helper. Discover the miracle of Eco-Enzyme. We can protect and care for Mother Earth from the kitchen by making and using Eco Enzyme.

CONTAINER:

Air-tight plastic container.

INGREDIENTS:

Water, fruits and vegetable dregs and sugar (brown sugar, molasses sugar or Jaggery)

INSTRUCTION:

1. Prepare an air-tight plastic container. Do not use glass or metal containers that do not allow expansion caused by gas released during the fermentation process of enzyme.
2. Dilute sugar in water, follow by adding your kitchen waste. Use only fruit and vegetable dregs. Avoid oily cooked food, fish or meat residues (make those your garden compost materials). To make fresh smelling enzyme, add orange/lemon peel or pandan leave etc.
3. Leave some air space for fermentation.
4. Make sure the container is air-tight.
5. During the first month, gases will be released during fermentation process. Release the pressure built up in the container to avoid rupturing.
6. Push the floating dregs downward every once in a while.
7. Place at cool, dry and well ventilated area. Avoid direct sunlight. Let it ferment for at least 3 months before use. Filter and it is ready to use.
8. After 3 months, extract out the water and leave only the sediment. The sediment can be dried to become fertilizer or may leave it for next fermentation.
9. The ideal color of eco enzyme is dark brown. If the color turn to black add same amount of brown sugar to re-ferment it.
10. It may have white, black or brown layer on top of the eco enzyme, ignore it. If you encounter worms in the container, leave it for a while can close the cover tightly.
11. If you have not gather enough kitchen waste, you may fill up the container gradually. The 3 months fermentation period start from the last day you add in the kitchen.

There are some precautions during the preparation of eco enzymes :

1. Do not use glass or metal containers that cannot expand.
2. Garbage for making enzyme does not include paper, plastic, metal or glass materials.
3. The ideal colour of eco enzyme is dark brown. If it turned black, add in same amount of sugar to start fermentation process again.
4. It may have a white, black or brown layer on top of the enzyme, ignore it. If you encounter flies and worm in the container, leave it and the chemical reaction of enzyme will dissolve them naturally.

5. Make full use of eco enzyme residue:
 - a) Reuse for next production by adding fresh garbage.
 - b) Use as fertiliser by drying the residue, blend it and bury in the ground.
6. If you have not gathered enough kitchen waste, you may fill up the container gradually. The 3 month fermentation period start from the day you place your last batch of kitchen waste.
7. The longer it takes, the better it gets. Harvested Eco enzyme will never expire. Do not store in the refrigerator.
8. If every household utilised their garbage to produce eco enzyme, it can stop kitchen waste from polluting our land and meanwhile ease global warming. You can help change the climate!

Conclusion

As a disinfectant, eco enzyme can replace most cleaning liquids for multiple household products, even to purify air from airborne bacteria, due to its ability to kill bacteria and fungus. Other than to reduce the usage of chemical based cleaning liquids, eco enzyme also has its own economic value because it reduces the expense from buying commercial cleaning products. Furthermore, the nutrients that are contained inside the fruit and vegetable residue from processing an eco enzyme can be utilised as fertilizers. Enzyme activities inside an eco enzyme can also be utilized. During a fermentation process, the enzymes of microorganisms are active to process the energy source. Arun and Sivashanmugam (2015) found that eco enzyme contains amylase, protease and lipase activity that can be utilised to treat dairy waste, in which it contains carbohydrate, protein and fat to be broken down by those enzymes.

The following are some of the benefits of eco enzyme:

1. Kitchen cleaner
2. Dishwashing liquid
3. Air purifier
4. Clothes detergent
5. Waste treatment
6. Body wash and hair care
7. Insect repellent
8. Pesticide
9. Fertilizer
10. Floor cleaner

Dehradun nagar nigam has made an experimental project which uses an enzyme solution, which is produced by the process of fermentation of fresh kitchen waste, to convert garbage into manure. The product was developed by volunteers from Art of living was demonstrated at Sahasradhara trenching ground on Thursday in the presence of mayor Vinod Chamoli and CM Trivendra Singh Rawat. Chamoli told, "The volunteers had asked us to try this new product and so we tested it in the trenching

ground. After seeing all the results, we will decide whether to use it on other sites.” Vedvyas Gulati, member, Art of Living, told , “The microbes in the enzyme act on the garbage waste converting it into compost but the only thing which it doesn’t decompose. It takes three months to make the eco-enzyme solution and it can be prepared at home also.

Acknowledgement

I wish to thank and acknowledge Dr. Anubha Madam, Christian Eminent College, Indore [M.P.] for the support and guidance .

References

[1] Anon.

Annual Fisheries Statistics Volume 1

. Department of Fisheries Malaysia, Ministry of Agriculture and Agro-Based Industry, 217, 2003.

[2] FAO. National Aquaculture Sector Overview Malaysia. FAO Fisheries and Aquaculture Department. Retrieved December 1, 2017, from http://www.fao.org/fishery/countrysector/naso_malaysia/en.

[3] SEAFDEC.

Southeast Asian State of Fisheries and Aquaculture 2017

. Southeast Asian Fisheries Development Center. Bangkok, Thailand. Retrieved December 1, 2017, from http://www.seafdec.org/documents/49cm_wp06-3.pdf.

[4] Turcios, A. E. & Papenbrock, J. Sustainable treatment of aquaculture effluents

— what can we learn from the past for the future ? Sustainability, **6** (2), 2014 836-856.

[5] Axler, R. P., Tikkanen, C., Henneck, J., Schuldt, J & McDonald, M. E. Characteristics of effluent and sludge from two commercial rainbow trout farms in Minnesota. The Progressive Fish-Culturist,

59 (2), 1997, 161-172.

[6] Summerfelt, S. T., Adler, P. R., Glenn, D. M. & Kretschmann, R. N. Aquaculture sludge removal and stabilization within created wetlands. Aquacultural Engineering, **19** (2), 1999 81-92.

[7] FAO.

The State of World Fisheries and Aquaculture 2012

. Food and Agriculture Organization of the United Nations. Rome, Italy, 2012.

[8] Mirzoyan, N., McDonald, R.C. & Gross, A. Anaerobic treatment of brackish water aquaculture sludge: an alternative to waste stabilization ponds. Journal of World Aquaculture Society, **43** (2), 2012, 238-24

- [9] Rafiee, G. & Saad, C. R. 2005. Nutrient cycle and sludge production during different stages of red tilapia (*Oreochromis sp.*) growth in a recirculating aquaculture system. *Aquaculture*, **244**, 2005 109-118.
- [10] Chen, S., Coffin, D. E. & Malone, R. F. 1997. Sludge production and management for recirculating aquacultural systems. *Journal World Aquaculture Society*, **28** (4), 1997, 303-315.
- [11] Timmons, M. B. & Ebeling, J. M. *Recirculating Aquaculture Systems*. Cayuga AquaVentures, LLC. Ithaca, New York, 2007.