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PREPARE AND EVALUATE BIO ENZYME SHAMPOO FROM HIBISCUS ROSA SINENSIS AND SAPINDUS TRIFOLIATUS.

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Abstract

The bio-enzymes are biological catalysts and are made up of proteins they also contain metabolites, lipids and carbohydrates. In our study the bioenzyme as prepared by using jaggery (30g), hibiscus petals (90g) and water (300 ml) by fermentation process for 1.5 months. The produced bioenzyme gave economical yield. The bioenzyme shampoo was prepared by using produced bioenzyme and sapindustrifoliantus. Hibiscus Rosa sinensis and sapindustrifoliantus both have the good hair conditioning properties and also they have antioxidants and metabolites. The formulated bioenzyme shampoo was evaluated for the quality and stability by physico chemical analysis and foam stability test along with wetting time estimation. All the ingredients used to formulate the shampoo was safer than synthetic commercial shampoos, and the physicochemical evaluation showed ideal results, but further research is required to improve its quality and specially on the conditioning performance and anti dandruff activity.

Keywords: Bio-enzymes, sapindustrifoliantus, shampoos.

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Introduction

Definition of Bio enzymes:

Bio enzymes are a complex mix of various bioactive components such as proteins, Vitamins, minerals, salts etc. produced as a by-product of fermentation of vegetable or fruit scrapes, flowers, leaves by the microbial flora found in nature [1]. This method is so simple and cost effective that it makes use of simple ingredients like Jaggery which is not only the carbon source but it is also packed with probiotics like *Lactiplantibacillus plantarum*. Which aid in natural fermentation avoiding the use of any additional fermentation starters [2].

Bio-enzymes are also called as Eco-enzyme, Garbage enzyme, Terrazyme, Fruit enzyme, Flower enzyme etc. This method was actually brought into light in the 1970s when Dr. Rosukon Poompanvong, a university student of agriculture in Thailand was working with chemically treated crops, but exposure to these chemicals compromised her health hence her search for an eco-

friendly, non-toxic alternative led to the creation of Bioenzymes [3].

Eco-enzymes were introduced more widely by Dr. Joelan Oon, a Naturopathy researcher from Penang, Malaysia. In the socialization material for the Nusantara Eco Enzyme Community (KEEN), 70% of the waste that is disposed of in Final Disposal Sites (TPA) is organic waste that causes unpleasant odors in the environment, reduces the level of plastic recycling, and poses the risk of explosions and decomposition of organic waste as well. Produce methane gas. Reprocessing organic waste from household consumption into eco-enzymes is very important when knowing the results of the Sustainable Waste Indonesia study that 60 percent of the total waste generated in Indonesia is an organic waste [4].

Some of the harmful chemicals in detergents, floor cleaners and shampoos of most popular brands are Sodium laurel sulphate actually pesticides and herbicides which kill plants insects disturbing the ecological balance and are equally harmful for humans. These chemical causes various harmful effects on to the body such as skin or eye irritation, nausea, breathlessness, dullness and even responsible for cancer. Further they harm environment by

causing algae bloom harming aquatic life, air pollution and helping harmful bacteria to become resistant to the antibiotic. Some of the other chemicals are triclosan phosphorous 1-4 dioxine etc. are harmful to our ecosystem [4].

Bio enzymes are helpful in solving these problems as they are completely natural and help in minimizing the waste because its key ingredients are fruit and vegetable peels which are considered as waste and thrown in the garbage. They are non-hazardous, non corrosive, non-toxic, eco-friendly and completely natural liquids. Bio-enzymes are simply made from anaerobic fermentation of fruit and vegetable peels in the presence of water, jaggery and yeast [5]. They are a mixture of juvenile hormones and enzymes synthesized by the micro-organisms.

The chemical properties of these bio enzymes are similar to those found in other biological systems. It can be used as a natural cleaning agent in the home, as an agricultural Fertilizer, insecticide, herbicide, and pesticide, for the purification of grey water and air, for drain de-clogging, road construction, and improving soil quality. It can also be used as a bioRemediation based agent for the removal of heavy metals from contaminated soil and for Bio-catalytic remediation of oil contaminated soil. Enzymatic processes have been implemented in a broad range of industries in recent decades because they are specific, fast in action and often save raw materials, energy, chemicals and or water compared to conventional processes. A number of comparative environmental assessment studies have been conducted in the past 15 years to investigate whether these properties of enzymatic processes lead to environmental improvements and assess whether they could play a role in moving toward cleaner industrial production. On the other hand, enzymes have become popular in cleaning products because they are biodegradable and facilitate selective reactions.

Many industries are dependent on enzymes for the production of their goods. Fermentation is a method of generating enzymes for industrial purposes. Fermentation involves the use of microorganisms, like bacteria and yeast to produce the enzymes. Enzymes energize and catalyze biochemical reaction with high specificity and enhance the reaction rate. Enzymes are formed during growth of microorganisms (trophophase), as a result of oxidative metabolism and aerobic fermentative [6].

It has been seen that bio enzymes have a varied usability ranging from domestic household to agriculture. Usage of Bio enzymes is multifarious as it is completely natural and helps in reduction of waste. It is the best alternative to chemical based harsh, aggressive and non-biodegradable cleansing products which are accessible in the market. The cherry on top is it does not require fermented or particular equipments for their preparation and anybody can prepare it at their homes and kitchen gardens. The manufacture of this enzyme also has a broad impact on the environment globally and in terms of the economy. In terms of benefits for the environment, during the enzyme

fermentation process, O₃ gas is produced which is a gas known as ozone [7]. As is known, one ingredient in Eco Enzyme is Acetic Acid (H₃COOH), which can kill germs, viruses, and bacteria. While the content of the enzyme itself is lipase, trypsin, amylase, and can kill/prevent pathogenic bacteria. It also produces NO₃ (Nitrate) and CO₃ (Carbon trioxide) which are needed by the soil as nutrients. From an economic point of view, the manufacture of enzymes can reduce consumption to buy floor cleaning fluid or insect repellent [8].

Applications of Bioenzymes

Household cleaners: Kitchen vessels, laundry, toilet, flooring, home appliances, etc.

- Personal care: Shampoo, bath gel, face wash, hand wash, sanitizer.etc.
- Pet's care: Bathing, disinfectant, immunity booster, protect odour, deodorizes excretion with soil and also Aquatic safe for Fisheries, etc.
- Water treatment: Sewage water, contaminated ground water, purifying water, declogging, etc.
- Agriculture purposes: Fertilizers, insecticide, pesticide, repellent, promoting growth,
- fruit & vegetables wash, soil flexibility, etc.
- Useful for anti-bacterial and anti-viral so for refrigeration, storage etc.
- It is safer for the environment and safer for human health than traditional chemical cleaners and odour control products.
- It is economically cheaper and the cost of production is less.
- This Bio-Cleaning solution provide residual cleaning for longer period and gives stable application.
- This Enzyme Bio-cleaning solute on help to displace unknown, potentially pathogenic
- (disease causing) bacteria with known, healthy microorganisms and in this way Contribute to better human health.
- As fertilizer for plants in garden.
- Wash cars – cars will look as if they have just been polished.
- Save Money, Save Space, Save Water and Save The Earth.
- Useful for neutralization of pesticide on fruits and vegetables [7].

Types of enzymes in Bioenzymes

Bio enzyme sample comprise different types of enzymes:

- Proteases: Effective in breaking down protein based molecules like blood and food.
- Lipases: Break down fat and grease.
- Amylases: Break down all the starch molecules.
- Celluloses: Soften the fabric and restore colour to its fibres.

A Proteases

A protease is also called a peptidase, proteinase or proteolytic enzyme [8], Is an enzyme that catalyzes (increases reaction rate or "speeds up") proteolysis,

breaking down proteins into smaller polypeptides or single amino acids, and spurring the formation of new protein products [9]. They do this by cleaving the peptide bonds within proteins

Aim & Objectives

Aim

To prepare and evaluate bio enzyme shampoo from Hibiscus Rosa sinensis and sapindus trifoliatus.

Objectives of the Study

The key objectives of the study include:

Primary

1. To prepare bioenzyme from Hibiscus Rosa sinensis and preparation of shampoo with bioenzyme and sapindus trifoliatus.

Secondary

1. To evaluate physicochemical properties of bioenzyme shampoo.
2. To assess cost effectiveness.

Materials and Methods

Materials

Jaggery (used at homes)
 Water (normal drinking water)
 Plastic container with a screw cap
 Flowers of Hibiscus
 Sapindustrifoliatus
 Gelatin.

Methodology

Preparation of bioenzyme
 Filtration of bioenzyme
 Preparation of shampoo base
 Preparation of bioenzyme shampoo
 Evaluation of bioenzyme shampoo

Preparation of Bioenzyme

The Hibiscus flowers at home were collected for the analysis. The petals were separated and cuts into smaller pieces to increase the surface area of the reaction. Jaggery (30g), petals (90g) and water (300 ml) were taken in the ratio of 1:3:10 into an air tight plastic container and mixed thoroughly. Gases will be produced in this process of fermentation. So, we choose plastic containers because they can expand otherwise glass bottles would have exploded. Then the containers were kept undisturbed at a safer place for 1 month for the fermentation reaction to proceed. Gases are required to be released at different time intervals from the containers. To the gases to be released, the lid of the plastic containers was opened once in a day for a minute and the lid was closed again. After some days the gases will considerably decrease and after one month a colored liquid will be produced along with the small particles and some solid residue [52]. The liquid part is the raw bio-enzymes and it is needed to be separated out by filtration.

Results

After 1.5 months the petals got settled down which indicates that bioenzyme was ready for use and the solution was filtered using a sieve and filter paper. The produced bioenzyme gave economical yield. The extracted bioenzyme was used for preparation of shampoo with soap nuts and various evaluation tests were done by using this bioenzyme shampoo. The following results can be found out by the different experiments carried out to test the quality, characteristics and properties of bio-enzymes.

Physical properties of bioenzyme shampoo

Physical characteristics of bioenzymes shampoo like colour, smell, pH, were studied by sight, smell, pH strip respectively.

Table.2 physical properties of bioenzyme shampoo

S.No	Property	Result
1	Colour	Pale Pinkish Brown
2	Odour	Alcoholic
3	PH	5-6

Biochemical Analysis

Biochemical test were done to confirm the presence of primary metabolites like carbohydrates, proteins, lipids and secondary metabolites like alkaloids, flavonoids, quinones, saponins, tannins and the results found to be positive for these chemical constituents.

Table .3: biochemical analysis of formulated bioenzyme shampoo

Phytoconstituents	Interference
Carbohydrates	(+)
Protiens	(+)
Lipids	(+)
Alkoloids	(+)
Flavanoids	(+)
Quinones	(+)
Saponins	(+)
Tannins	(+)

(+) indicates presents,(-) indicates absent

Foam test

Foaming is very important parameter in evaluation of shampoo. The formulated shampoo produced the foam volume above 85ml and the shampoo had 83ml foam volume for about 4 minutes showing that the foam has good stability.

Table.4: Test for foam stability

S.No	Parameter	Result
1	Foam Producing Ability	Yes
2	Foam Volume	85ml
3	To Foam Type	Dense And Uniform
4	Foam Stability	Good

Wet test

The wetting ability of the shampoo was determined by using canvas disk method and the wetting time of the shampoo was found to be 5 minutes.

Cost effectiveness

The cost in making of bio-enzymes shampoo is comparatively very less than the shampoos available in market.

Table.5: Cost effectiveness of Bio-enzyme shampoo prepared

Sample	Volume	Cost
Flowers	90 gm	Free of cost
Soap Nuts	90 gm	Rupees 30
Jaggery	30 gm	Rupees 1.8
Water	300 ml	Free
Total	300 ml	Rupees 31.8

Table.6: Different Shampoos Available in Market

S.No	Sample (Brand)	Volume (500 ml)	Cost	PH
1	Clinic Plus	500 ml	446	14.23
2	Dove	500 ml	610	7.5
3	Head and shoulder	500 ml	366	5.5
4	Tresemme	500 ml	538	5.5
5	Sunsilk	500 ml	540	6.57

Discussion

The bio-enzymes are biological catalysts and are made up of proteins, they also contain metabolites, lipids and carbohydrates. In our study the bioenzyme as prepared by using jaggery (30g), hibiscus petals (90g) and water (300 ml) by fermentation process for 1.5 months. The produced bioenzyme gave economical yield. The bioenzyme shampoo was prepared by using produced bioenzyme and sapindustrifoliantus. Hibiscus rosa sinensis and sapindustrifoliantus both have the good hair conditioning properties and also they have antioxidants and metabolites. The formulated bioenzyme shampoo was evaluated for the quality and stability by physico chemical analysis and foam stability test along with wetting time estimation. The primary metabolite like carbohydrates, proteins, lipids, and secondary metabolites like alkaloids, flavonoids, quinines, tannins, saponins were found in formulated bioenzyme shampoo.

Conclusion

It is concluded that the bioenzymes are biological catalysts and are made up of proteins, Carbohydrates, lipids, and they also contain metabolites. The bioenzymes also have good Ability to remove dirt and oils by their catalytic action. In the present study bioenzyme Shampoo found to be cost effective and eco-friendly. All the ingredients used to formulate the shampoo was safer than synthetic commercial shampoos, and the physicochemical evaluation showed ideal results, but further research is required to improve its quality and Specially on the conditioning performance and anti dandruff activity.

Conflict of Interest

Authors are declared that no conflict of interest

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Author Contribution

All authors are contributed equally.

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