

## **Community Service Based Development Of Ecoenzyme In Batusangkar**

### **Pengembangan Ekoenzim Berbasis Pelayanan Masyarakat di Batusangkar**

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#### **Key Words**

Community service,  
ecoenzymes, chemical  
fertilizers

#### **Abstrak**

Batusangkar merupakan salah satu kabupaten yang menjadi sentra pertanian di provinsi Sumatera Barat. Namun luasnya lahan pertanian di Nagari Cubadak, Batusangkar belum mampu meningkatkan kesejahteraan hidup petani. Harga pupuk kimia sintetik yang selalu meningkat setiap tahun menjadi salah satu penyebab menurunnya perekonomian petani. Tujuan kegiatan pengabdian kepada masyarakat ini adalah mengembangkan ekoenzim berbasis kearifan lokal sebagai pengganti pupuk kimia sintetik untuk meningkatkan produksi pertanian di Nagari Cubadak. Pengabdian Kepada Masyarakat ini merupakan PKM berbasis eksperimen dengan mengembangkan ekoenzim menggunakan sayuran, buah-buahan dan bahan tambah lainnya yang berasal dari Nagari Cubadak kemudian dilakukan pengujian jumlah dan jenis mikroorganisme yang pengerjaannya dilakukan di Laboratorium MIPA IAIN Batusangkar. Hasil penelitian menunjukkan terdapat 14 hingga 20.106 jumlah mikroorganisme dengan morfologi berbentuk coccus. Pengujian terhadap pertumbuhan tanaman tomat menunjukkan adanya perbedaan tinggi tanaman dan jumlah buah antara tanaman tomat yang diberi ekoenzim dengan yang tidak diberi ekoenzim. Dengan demikian dapat disimpulkan bahwa ekoenzim yang dikembangkan telah berhasil meningkatkan produksi pertanian di Nagari Cubadak Batusangkar.

## INTRODUCTION

The use of synthetic chemical fertilizers has become one of the basic needs in agriculture. Often in its use that seems over it gives confidence to farmers that the more it is used, the greater the result obtained. On the contrary, the excessive use of synthetic chemical fertilizers actually creates new environmental problems. The quality of the soil in Nagari Cubadak which is classified as organic soil, the use of syntetic fertilizers is not a major requirement because organic soil is an ideal type of soil that already provides all the needs of plants to grow. The ideal soil for agriculture is soil that contains 50% solid material (consisting of 45% mineral compounds, 5% organic compounds), 25% air and 25% water (Gusmara dkk, 2016). Based on the composition above, farmers should no longer need to add synthetic chemical fertilizers whose main purpose is to add mineral compounds because all minerals are already available in the soil. The organic compound composition is only 5% of the total soil, but it will play an important role for the survival of living things in the soil and plants (Arisandi et al., 2015).

In 2013 Dr Rasukon Poompanvong from Thailand introduces a formula that can increase agricultural yields. This formula is known as Eco Enzymes. The existence of this formula is able to improve the quality of agricultural soil by utilizing the microbes produced so that the quantity and quality of agricultural product has increased. Eco Enzymes is a liquid extract which is the result of a fermentation process from fruits and vegetables added to water so that it is easier to use (Nusantara, 2021). Utilizing

a variety of vegetables and fruits as an local wisdom Cubadak village, it is hoped that eco-enzyme formulas that are environmentally friendly, local wise and able to reduce the use of synthetic chemical fertilizers. Based on these facts, it is deemed necessary to carry out Community Service with the aim of providing assistance to farming communities in effort to increase agricultural yields through the development of ecoenzymes as well as conducting reaserch to see the effect more accurately on the significance of increasing agricultural yields.

## METHODOLOGY

*Implementation.* The activity implementation phase consist of three stages; Forum Group Discussion with stake holder of Nagari Cubadak; (2) Conducting Trials in the laboratory; (3) workshop development of ecoenzymes in Nagari Cubadak (Susilawaty et al., 2016).

*Equipments.* Blender, knife, bucket, polybag 8 x 10 cm, polybag 30 x 40 cm, hand sprayer, measuring cup, plastic bottle, label, plastic. Pineapple, papaya, mango, kale, palm sugar, long beans, young corn, bananas, tape yeast, tilapia intestine, coconut water, agarose gel, TBE B, Byethidium Bromide, Morgan Wolf reagent, Sodium Ferrate, Hypochlorite,  $\text{KNO}_3$ , Brucines' solution,  $\text{H}_2\text{SO}_4$  (p.a),  $\text{LaCl}_3 \cdot 7\text{H}_2\text{O}$ , HCl, topsoil, tomato varieties (Harahap et al., 2021)

*Preparation of Ecoenzyme.* All vegetables, fruit and tilapia ingredients are sterilized by soaking the ingredients in hot water, then blending until smooth. Add Plam sugar to a boil with 5 litres of coconut water, let it cool. Mix the two ingredients, then stor in a plastic container. Wait 14

days for the fermentation process. Fermentation is considered successful if after 14 days the solution smells sour and no more gas is found (Alkadri & Asmara, 2020)

*Microorganisms isolation.* Make a  $10^{-1}$  –  $10^{-6}$  dilution of pure bacterial cultures with the diluent solution. Take a test tube containing a pure culture of bacteria, open and burn the neck of the tube. Transfer 0,1 ml of bacterial culture aseptically to the surface of the NA medium in a petri dish. Bake the spreader that has previously been dipped in alcohol, let it cool. Spread the bacterial culture with the spreader evenly and allow the surface to dry. After the surface to dry, then incubate in reverse for 24 hours at room temperature and observe the growth. Compare the growth of each dilution and compare the growth with the result of the spread plate technique (Sarbanini., Iesje., 2015)

*Plant Growth Measurement.* This research method uses the split plot design method with 1 factor. Tomato seeds were sown in polybags. Planting was carried out after 2 weeks. The polybags are torn on the sides and then transferred to each polybag according to the treatment. Each polybag consists of one tomato seedling. Tomatoes are harvested when they are 58-85 DAP, fully formed and the color of the fruit is yellowish green (Subardja et al., 2014)

## RESULT AND ANALYSIS

Based on FGD implementation in Nagari Cubadak, Batusangkar was obtained that there were several problems in the agricultural sector, including the low agricultural production and the high price of synthetic fertilizer. Figure 1 shows FGD at the Office of Walinagari Cubadak, Batusangkar.



Figure 1. Forum Group Discussion in Nagari Cubadak, Batusangkar

Ecoenzyme product which has been fermented for 14 days is subjected to laboratory testing to examine the number and types of microbes contained. The figure 2 below is the result of microbial testing for 2 x 24 hours. Based on the research of Ahmet who succeeded in identifying acetic acid bacteria from fermentation using yeast (Šuranská et al., 2016) In the manufacture of ecoenzymes, yeast is also used as a fermentator. Therefore, it is suspected that the ecoenzymes also contains acetic acid bacteria. Abubakar, et al. succeeded in isolating acetic acid from cocoa fermentation with the same microbial morphology as the research results (Yetiman & Kesmen, 2015). Although further research



Figure 2. The microbial test result

After microbial test results were obtained, the ecoenzymes were applied to tomato plants for plant growth testing using the separate plot design method. Figure 3 below is a picture of a tomato plant that was given two different treatments. In plot A, there were tomato plants without add ecoenzyme, while in plot B the tomato plants were given the ecoenzymes.





Figure 3. The growth of tomato with addition ecoenzyme and without ecoenzyme

From the data described in Figure 3 above, it can be concluded that there is an effect of the addition of ecoenzymes in the growth of tomato plants. This can be seen from the plant height and the number of leaves and fruit observed between the two plants. It caused the microbial content produced by ecoenzymes is thought to activate growth hormones found in plants. These hormones are auxins, cytokinins and gibberellins Ogunyale O.G, et al explained that increased growth can only occur when growth hormone is maximally active (Swee-Sen Teo et al., 2021). It indicates the difference of tomato growth were applied with ecoenzyme and without addition of ecoenzyme.

Workshop development of Ecoenzyme in Nagari Cubadak, Batusangkar carry out after research about ecoenzymes in the Laboratory. Figure 4 below shows the condition of the workshop.



Figure 4. Workshop development of ecoenzyme in Nagari Cubadak, Batusangkar.

## Conclusion

The developed ecoenzyme has been tested for microorganisms in the laboratory, the result shows that ecoenzyme contains 14 to 202.10<sup>6</sup> microorganisms. It indicates that the high content of probiotics is considered capable of maximizing the work of plant growth hormones. Ecoenzyme was tested on plants, and the result showed that there was a difference in the growth rate of tomato plants. Addition of ecoenzyme effects for growth, the number of leaves and the number of fruits.

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