

# Science Edupreneurship Training in Making Kombucha Tea Food Biotechnology Products for Students

Nursamsu<sup>1\*</sup>, Ekariana S. Pandia<sup>1</sup>, Mardiah<sup>1</sup>, Ernawati<sup>2</sup>

<sup>1</sup> Biology Education Study Program, Faculty of Teacher Training and Education, Samudra University, Langsa, Indonesia.

<sup>2</sup> State Senior High School 2 Patra Nusa Banyak Payed, Aceh Tamiang, Langsa, Indonesia.

Received: April 28, 2025

Revised: May 25, 2025

Accepted: June 26, 2025

Published: June 30, 2025

Corresponding Author:

Nursamsu

[samsu\\_bio@unsam.ac.id](mailto:samsu_bio@unsam.ac.id)

DOI: [10.29303/ujcs.v6i2.1039](https://doi.org/10.29303/ujcs.v6i2.1039)

© 2025 The Authors. This open access article is distributed under a (CC-BY License)



**Abstract:** Activity devotion to public This aiming For increase knowledge and skills participant educate in field biotechnology food through training making kombucha based tea approach science edupreneurship. Training This designed For integrate understanding scientific regarding the fermentation process with strengthening soul entrepreneurship participant educate, especially in utilise potential local as material standard main. The method used covering socialization, demonstration, training practice direct, and evaluation results activities. Evaluation results show that happen improvement significant in aspect understanding the fermentation process, selection material standard, procedure kombucha production, as well as mark nutrition and benefits health products. In addition, training This also provides impact positive in grow interest and motivation participant educate For develop business ideas science based. Activities This expected can become an implementative model in strengthening applied science literacy and skills entrepreneurship for generation young in the economic era creative.

**Keywords:** Science Edupreneurship, Kombucha, Food Biotechnology, Fermentation.

## Introduction

A secondary education institution in Aceh Tamiang Regency, SMA Negeri 2 Patra Nusa Banyak Payed plays an important role in the development of science and has a strong commitment to continuously improve the quality of science and technology-based learning. School this own potential big in development skills participant educate, especially in field biotechnology and entrepreneurship. However, in in practice, science learning in schools This Still dominated by the method more conventional theory oriented than practice. This is because lack of involvement participant educate in application of science in real, especially in context innovation and entrepreneurship. With approach this, it is expected participant educate can more understand and apply draft biotechnology food in life daily as well as own supporting skills independence and entrepreneurship in the future.

In facing the increasingly global challenges complex, required approach learning that is not only emphasize understanding concept, but also encourages participant educate For think creative, innovative and soulful entrepreneurship. One of the solutions that can applied is with develop entrepreneurship science learning, namely integration between science with entrepreneurship through activity based on project. Through approach this, participants educate No just gain understanding about draft biotechnology, but also has chance for develop product innovative and valuable economical.

One of product biotechnology potential food For developed in Edupreneurship science learning is Kombucha is one of the processed tea fermentation use symbiont known bacteria and yeast with SCOBY (Symbiotic Culture of Bacteria and Yeast) ( Jayabalan et al., 2014). Kombucha tea is one of the drink very interesting traditional because, tea this is results fermentation carried out by the help of symbiotic

## How to Cite:

Nursamsu, N., S. Pandia, E., Mardiah, M., & Ernawati, E. (2025). Science Edupreneurship Training in Making Kombucha Tea Food Biotechnology Products for Students. *Unram Journal of Community Service*, 6(2), 359–363. <https://doi.org/10.29303/ujcs.v6i2.1039>

activity between bacteria and yeast (Pratiwi et al., 2012). The kombucha fermentation process takes place through symbiosis between yeast and bacteria. Microorganisms in kombucha culture, especially yeast and acetic acid bacteria, are known to have various properties that are beneficial to human health. The fermentation process by bacteria and yeast in kombucha tea is known to increase the levels of phenolic compounds, thereby contributing to increasing its antioxidant activity (Wahdaniar et al., 2023). In addition, kombucha tea contains various organic acids that have health benefits, including acetic acid, lactic acid, carbonic acid, folic acid, glucuronic acid, and hyaluronic acid. Kombucha also contains various vitamins, such as vitamins B1, B2, B6, B12, and C, as well as essential amino acids (Juwita et al., 2022). Some of these benefits include antibacterial, antioxidant, improving the balance of intestinal microflora, improving the immune system, and helping to lower blood pressure (Suhardini & Zubaidah, 2016).

Kombucha is known to have various health benefits, including as an antioxidant, improving the balance of intestinal microflora, slowing the aging process, and improving the body's immune system (Oktavia et al., 2021). Kombucha is also reported to have therapeutic potential in helping to overcome various health conditions, such as rheumatism, swelling in the rectal area, joint pain (gout), liver dysfunction, cancer, constipation, hypertension, and symptoms of dizziness. In addition, microorganisms in kombucha culture act as antibiotic agents, smooth the digestive system, and have antioxidant and antibacterial activities (Aini et al., 2022; Simanjuntak et al., 2016).

Based on the problems that have been described, the community service team carried out the Science Edupreneurship Training activity in Making Kombucha Tea Food Biotechnology Products for Students. The introduction of this fermentation technology is expected to improve the knowledge and skills of students of SMA Negeri 2 Patra Nusa Manyak Payed. In addition, the technology is expected to be a provision in mastering science and technology (IPTEKS) and strengthening soft skills in entrepreneurship for students as preparation for facing the world of work after completing their education at school.

## Method

Methods used in activity devotion this refers to the approach *Society Participatory*, where participants educate play a role as partner active in program implementation. Through method this, partner given knowledge about processing product biotechnology food kombucha tea. In addition, the approach *Persuasive Approach* is also applied through activity training that

emphasizes importance product biotechnology food kombucha tea for health.

For realize objective activity devotion this is the Community Service Team will carry out a number of stages as as follows: (1) Community Service Team will do socialization program to Partners: (2) Implementation activity in making product tea kombucha; (3) Evaluation of activities devotion.

## Result and Discussion

### Result

#### *Socialization Stage*

At the stage survey, Samudra University Community Service Team carried out socialization of activity programs devotion to community at State High School 2 Patra Nusa Manyak Payed Aceh Tamiang Regency. Activities this also includes data collection candidate participants who will given training about making product biotechnology food kombucha tea. Documentation implementation activity the shown in Figure 1.



**Figure 1.** Socialization of Activity Process Devotion

#### *Stage Implementation Activities in Product Manufacturing Tea Kombucha*

Chairman team devotion carry out activity training that aims for increase knowledge and skills public about making product biotechnology food, especially Kombucha Tea. Training this not only give knowledge theoretical regarding the fermentation process as base technology kombucha production, but also provides participant with practice straight away, ahapan activity study this presented in the following description:

#### *Preparation of Materials and Tools*

Prepare material main in the form of tea black pepper, granulated sugar, and SCOBY (Symbiotic Culture of Bacteria and Yeast) starter culture. Prepare

equipment like pot, jar glass or receptacle fermentation, fabric cover, rubber bracelet, spoon stirrer, and bottle for storage. Activities at the stage this can see in the picture under this:



Figure 2. Preparation of Materials and Tools

**Making process Solution Tea**

Boil the water until boil, then brewing tea and add sugar. Solution tea cooled down until reach temperature room for prevent damage microorganisms in *SCOBY*. Activities this seen in the picture under this



Figure 3. Process of Making Tea Solution (a. Boiling Water; b. Brewing Tea in Sugar Solution)

**Fermentation Process**

Enter solution sweet tea to in receptacle fermentation and adding *SCOBY* along with part fluid fermentation from production previously. Close receptacle with cloth clean and tie it with rubber bracelet to stay sterile but still allow exchange air. Save solution at temperature room (around 25–30°C) for 7–14 days, depending level the desired acidity and taste. In this case this can be proven at the stage following:



Figure 4. Fermentation Process

**Kombucha Tea Harvesting Process**

After the fermentation process done, *SCOBY* lifted and solution strained kombucha tea for remove remainder particle solid. Kombucha that has been filtered can direct consumed or enter to stage fermentation secondary. Kombucha is included to in bottle closed meeting for the carbonation process experience.



Figure 5. Kombucha Tea Harvesting Process (a. Kombucha Tea Fermentation Results; b. Kombucha Tea Packaging; c. Kombucha Tea Products)

**Activity Evaluation Stage Devotion**

At the stage this is the Community Service Team do evaluation to usefulness activities that have been implemented. Evaluation is carried out through distribution questionnaire to participant training to obtain related data improvement understanding and skills acquired. The results of the evaluation process the can see in Figure 6.

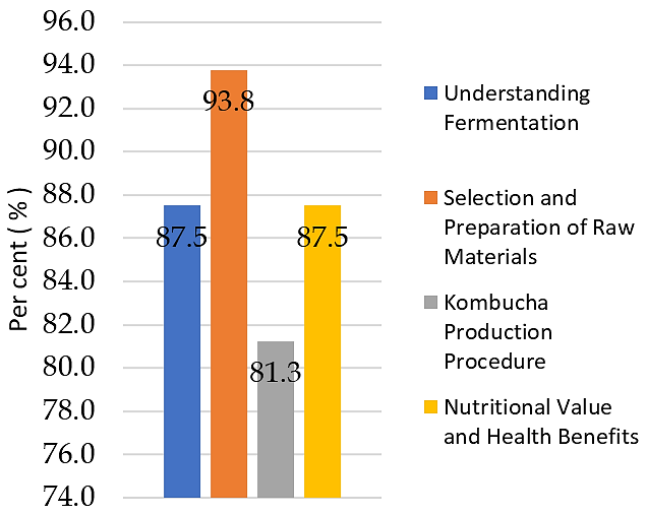


Figure 6. Level of Students' Understanding of Making Kombucha Tea Products



The graphic image above show results evaluation to *understanding participant activity devotion* in various aspect making kombucha tea. This evaluation use indicator percentage (%) for measure level understanding participant after follow training. Here is explanation from each aspect:

1. Understanding Fermentation (87.5%)  
Participant show high level of understanding to draft base fermentation. This is reflect success training in explain role microorganisms (especially bacteria and yeast) in the fermentation process kombucha tea.
2. Selection and Preparation of Raw Materials (93.8%)  
Aspect this gets the percentage highest. This means that participants really understand how select and prepare material quality raw materials, such as type tea, sugar, and water, as well as importance cleanliness in stage beginning production.
3. Kombucha Production Procedure (81.3%)  
Percentage on aspects this is the lowest compared to others, although still is above 80 %. This is show that participant Still experience A little difficulty in understand steps technical making kombucha comprehensive, including stages primary and secondary fermentation, time incubation, and procedures packaging.
4. Nutritional Value and Health Benefits (87.5%)  
Participant Enough understand benefit health from kombucha consumption, such as content Functional antioxidants, vitamins and probiotics increase system digestion and immunity body. Results should be clear and concise. The discussion should explore the significance of the results of the work, not repeat them. A combined Results and Discussion section is often appropriate. Avoid extensive citations and discussion of published literature.

## Discussion

Training science edupreneurship in making product biotechnology food kombucha tea aims for equip participant educate with applied science skills and soul entrepreneurship that is oriented towards utilization potential local. Kombucha, as product results fermentation between solution tea and sugar with symbiotic culture assistance bacteria and yeast (*Symbiotic Culture of Bacteria and Yeast* or SCOBY), has known wide because benefit his health which includes activity antioxidant, repair intestinal microflora, and increase system immune (Oktavia et al., 2021).

Through training this, participants educate No just gain understanding theoretical about draft fermentation and the microorganisms involved, but also trained in a way practical in stages kombucha production, starting from selection material raw materials, fermentation process, until packaging and marketing product.

Evaluation results show existence improvement significant in aspect understanding participants, especially related to the fermentation process (87.5%), selection and preparation material standard (93.8%), procedure kombucha production (81.3%), as well as mark nutrition and benefits health product (87.5%). Increase This reflect success of knowledge transfer as well as effectiveness training in grow applied science literacy among participant educate. Furthermore, training this also encourages participant for develop business ideas based on biotechnology food. Approach applied science edupreneurship aiming for build independence economy since early through strengthening competence student in design, manufacture and market product science -based (Widodo et al., 2023). With Thus, the activities this not only give contribution to improvement quality science learning, but also creating opportunity development sustainable entrepreneurship.

In general overall, training this become a model of devotion that contributes in realize profile student characterful, adaptive and innovative in accordance demands 21st century. The combination of science and entrepreneurship through utilization potential local like leaf tea and butterfly pea flowers in making kombucha, giving mark plus economy at a time increase resilience food public.

## Conclusion

Activity devotion to the community that raises theme *Training Edupreneurship Science in Making Product Kombucha Tea Food Biotechnology for Learners* has succeed implemented with good. Training This capable increase knowledge and skills participant educate in understand draft base fermentation, selection material standard, procedure kombucha production, as well as mark nutrition and benefits his health. In addition to strengthening aspect cognitive, activities This also provides outlook relevant entrepreneurship (edupreneurship) with context local, so that push participant educate For think innovative and independent in create opportunity business based on biotechnology food In general general, activities This give contribution positive to strengthening applied science literacy and the formation of entrepreneurial soft skills in participants educate, and can used as an educational model in development science based learning projects and wisdom local.

## Acknowledgments

We deliver appreciation and thanks the greatest love to the Research and Community Service Institute to the Community (LPPM) of Samudra University which has give support full in form funding activity Devotion to the

Community (PKM ) through the DIPA Fund of Samudra University in 2025 Budget with Contract Number 176/UN54.6/PM.03.03/2025.

kemampuan literasi sains dan kreativitas siswa.  
*Jurnal Pendidikan Sains Terapan*, 11(1), 45–53.

## References

- Aini, Q., Suwarniati, Suhendra, T., & Ramadhani, A. (2022). Pelatihan Teknik Pembuatan Teh Kombucha untuk Siswa SMA Insan Qur'ani Aceh Besar. *Jurnal Pengabdian Kepada Masyarakat*, 28(2), 185–190.
- Jayabalan, R., Malbasa, R.V., Loncar, E.S., Vitas, J.S. and Sathishkumar, M. (2014). A review kombucha tea microbiology, composition, fermentation, beneficial effect, toxicity and tea fungus: *Comprehensive Reviews in Food Science and Food safety*, 13(4), 538-550.
- Juwita, R., Haryono, N. Y., Artasasta, M. A., Rahayu, S. A. A., Santoso, F. A., & Wulandari, D. E. (2022). Teh Kombucha Rosela Untuk Meningkatkan Imun Tubuh Pasca Pandemi Covid-19. *Prosiding Seminar Nasional Pengabdian Kepada Masyarakat (SINAPMAS)*, 240–245.
- Oktavia, S., Novi, C., Handayani, E. E., Abdilah, N. A., Setiawan, U., & Rezaldi, F. (2021). Pelatihan Pembuatan Immunomodulatory Drink Kombucha untuk Meningkatkan Perekonomian Masa New Normal pada Masyarakat Desa Majau dan Kadudampit Kecamatan Saketi Kabupaten Pandeglang, Banten. *Jurnal Pengabdian Pada Masyarakat*, 6(3), 716–724.  
<https://doi.org/10.30653/002.202163.811>.
- Pratiwi, A., Elfita. And Aryawati, R. (2012). Pengaruh Waktu Fermentasi Terhadap Sifat Fisik dan Kimia Pada Pembuatan Minuman Kombucha dari Rumput Laut *Sargassum* sp: *Jurnal Mapari*, 04, 131–136.
- Suhardini, P.N. & Zubaidah,. E. (2016). Studi Aktivitas Antioksidan Kombucha dari Berbagai Jenis Daun Selama Fermentasi: *Jurnal Pangan dan Agroindustri*, 4(1), 221– 229.
- Simanjuntak, D. H., Herpandi, H., & Lestari, S. D. (2016). Karakteristik Kimia dan Aktivitas Antioksidan Kombucha dari Tumbuhan Apu-apu (*Pistia stratiotes*) Selama Fermentasi. *Jurnal Fishtech*, 5(2): 123-133.
- Wahdaniar, Irma, A., & Miladiarsi. (2023). Pelatihan Pembuatan Minuman Kombucha Sebagai Upaya Peningkatan Fungsi Fisiologis Tubuh di Kantor Desa Moncongloe Bulu, Kecamatan Mongcoloe, Kabupaten Maros. *Jurnal Nusantara Berbakti*, 1(1), 74–79.
- Widodo, S., Fadilah, R., & Maulidiyah, L. (2023). Integrasi kewirausahaan dalam pembelajaran sains berbasis produk lokal untuk meningkatkan