

E-BOOK OF EXTENDED ABSTRACT

THE 14TH INTERNATIONAL INVENTION, INNOVATION & DESIGN COMPETITION 2025



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PAPANA: SEED PAPER INNOVATION FROM BANANA STEM WASTE AS A WRITING MEDIA AND PLANTING MEDIA

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ABSTRACT

The increasing demand for paper every year has resulted in an increase in deforestation in Indonesia. The paper industry is one of the largest users of forest resources because conventional paper is made from wood. Increasing tree falling causes various negative environmental impacts, such as air pollution, floods, and landslides. Besides that, the high production of bananas and the high cellulose content of bananas can make bananas as a substitute raw material. Therefore, PAPANA was created as an environmentally friendly paper product that utilizes banana stem waste to support the concept of zero waste and sustainability. As an environmentally friendly paper product, PAPANA has a dual function, namely as a writing medium and a planting medium. PAPANA offers a variety of environmentally friendly paper products, such as A4, A5, A6, A7 paper, wrapping paper and greeting cards in which there are also herbal plant seeds as a planting medium such as, tapak dara, selasih, basil, and kemangi.

Keywords: Paper, waste utilization, zero waste, sustainability, environmentally friendly

1. INTRODUCTION

The demand for paper continues to grow due to the addition of needs from the community and industry (Supriyono, 2022). The ever-growing demand for paper has resulted in an increase in raw materials that result in deforestation. In 2021-2022, deforestation in Indonesia was 104 thousand hectares. Meanwhile, in the next period, namely in 2022-2023, there will be an increase in the net deforestation rate to 257 thousand hectares (Kementerian Lingkungan Hidup dan Kehutanan, 2023). This increase shows a significant impact from various sectors, including industries that are heavily dependent on forest resources, one of which is the paper industry is an important sector in the use of energy and resources because the manufacturing process requires a large amount of wood, water and energy (Energynest, 2025). It causes deforestation and can disrupt environmental ecosystems, causing air pollution, floods and landslides due to lack of water infiltration (Bagaskara, 2022 & Cozma *et al.*, 2025).

According to data from the Badan Pusat Statistik (BPS), the production data of banana plants in Indonesia in 2022 is 9.24 million tons. Then, in 2023 it will increase by 9.33 million tons (Badan Pusat Statistik, 2024). The high production of bananas in Indonesia results in a lot of banana frond waste that is not utilized. In fact, banana stem contains high cellulose, which is above 80% and low lignin content. This makes banana stem a potential substitution raw material for paper making (Dewi *et al.*, 2019). In addition, banana stem also contains nitrogen, phosphorus, potassium, sodium and magnesium that plants need for their survival (Pandia *et al.*, 2017 & Purnomo *et al.*, 2017). Therefore, banana stem can be used as raw materials for making paper and planting media, so that PAPANA is present as an innovative product that supports the concept of zero waste and sustainability and is innovated with the concept of seed paper which also has a positive impact on nature conservation.

2. METHODOLOGY

The method used is an experimental method, divided into three stages of production, namely preparation of tools and materials, pulp making, and paper printing.

In the process of making this paper, the tools and materials used are as follows:

- i. Tools: 1) Digital balance; 2) Hot plate; 3) Blender; 4) Screen printing; 5) Beaker; 6) Measuring flask; 7) Glass mixer.
- ii. Ingredients: 1) Banana stem as the main material in paper making; 2) Seeds as the main material for planting media in paper; 3) Water or aquades, as solvents; 4) NaOH functions to hydrolyze lignin compounds found in banana stem; 5) H₂O₂ serves as an oxidizing agent in paper dye, helping to remove and fade the color of banana stem pigment.

Here are the stages of making PAPANA:

- i. Preparation of tools and materials: 1) Preparing raw materials in the form of waste from banana stem that are no longer used; 2) Drying banana stem; 3) Prepare clean water; 4) Prepare a large tub, screen printing, digital scale, pot and bucket.
- ii. Pulp Making: 1) Banana stem are cut into small sizes and put into a tub to wash so that the sticky dirt disappears; 2) The banana stem are put in a pot to be boiled by adding water and NaOH; 3) After boiling, the banana stem are washed again until clean; 4) The boiled banana stem are then crushed using a blender until smooth; 5) After being in the blender, the resulting pulp is transferred to a container, mix 50% H₂O₂ in a container then dilute the pulp mixture so that the resulting paper is thinner.
- iii. Paper printing and paper drying: 1) Printing the dough using screen printing equipment; 2) Transfer to the drying pad; 3) Drying in the sun.

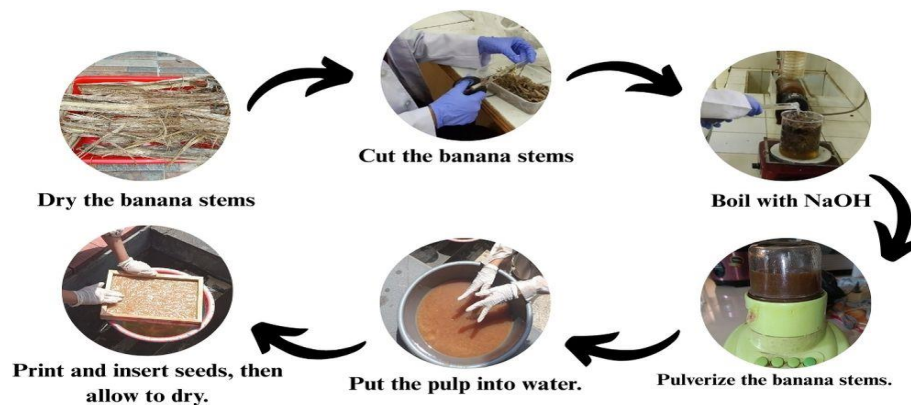


Figure 1 PAPANA making process

3. FINDINGS

PAPANA products are the latest innovative paper products made from banana fronds waste. The advantages of this product are as a writing medium and planting medium. The name PAPANA is taken from the combination of the words Paper and Banana Stem which means paper made from banana fronds. PAPANA's tagline is Write, Plant, Grow with Nature because in the use of PAPANA it will save the earth from deforestation and can grow new plants. PAPANA is made with the aim that if the use of paper is no longer used, then the paper can be planted and grow into a new plant because in the paper there are seeds. In addition, PAPANA has a variety of products such as A4, A5, A6, A7 paper, wrapping paper and greeting cards in which there are also herbal plant seeds as a planting medium.



Figure 2 PAPANA prototype

4. CONCLUSION

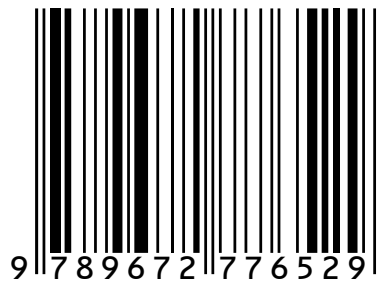
PAPANA is an innovative seed paper product made from banana stem waste which has a dual function as a writing medium and planting medium. Banana stem waste is used as an alternative to wood as the main raw material for paper making. The use of banana stem waste as the main raw material of PAPANA aims to reduce tree felling in Indonesia and increase the selling value of banana stem waste. Therefore, the presence of PAPANA is expected to be an innovative and solutive product that can reduce tree felling, regrow plants and preserve the environment.

REFERENCES

- Badan Pusat Statistik. (2024). *Produksi Tanaman Buah-buahan, 2021-2023*. Badan Pusat Statistik
- Bagaskara. (2022). *Mengenal Apa Itu Deforestasi Hutan, Berikut Dampak dan Pencegahannya*. Mutu Internasional. <https://mutucertification.com/deforestasi-hutan-dampak-pencegahan/#:~:text=Dampaknya%2C%20berbagai%20keseimbangan%20akan%20berkurang,sewajarnya%2C%20misalnya%20sampai%20ke%20pemukiman>
- Cozma, A.-C., Achim, M. V., Mare, C., & Coros, M. M. (2024). The moderating role of tourism in the impact of financial crime on deforestation. *Journal of Cleaner Production*. Vol 486. 1.
- Dewi, I. A., Ihwah, A., Setyawan, H. Y., Kurniasari, A. A. N., & Ulfah, A. (2019). Optimasi Proses Delignifikasi Pelepeh Pisang Untuk Bahan Baku Pembuatan Kertas Seni. *Wicida Journal*. Vol Sec. 23. 447.
- Energynest. (2025). *Sustainability in the paper industry*. How thermal energy storage systems contribute to the green transformation. <https://energy-nest.com/sustainability-paper-industry/>
- Pandia, E. S., Saipul, Fitri, R., Sundari, S. (2017). Pemanfaatan limbah batang pisang sebagai media tanam di desa peunaron lama kecamatan peunaron kabupaten aceh timur. *Jeumpa Journal*. Vol 4. 31
- Purnomo, E. A., Sutrisno, E., Sumiyati, S. (2017). Pengaruh variasi C/N Rasio terhadap produksi kompos dan kandungan kalium (K), pospat (P) dari batang pisang dengan kombinasi kotoran sapi dalam sistem vermicomposting . *Journal of Environmental Engineering*. Vol 6. 2.
- Supriyono, A. (2022). Pembuatan kertas dari limbah kulit matoa dan ampas teh dengan perbedaan konsentrasi NaOH. *Indonesian Multidisciplinary Scientific Journal*. Vol 1. 781.

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