



Bioplastic production from bananas by bacteria isolated from soil



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Abstract

This research focuses on the production of PHAs by bacteria separated from soil using bananas mature as a raw materials. Only 24 isolates can grow and produced PHAs on NB agar with bananas as a carbon source. This study use banana 3 species are *Musa acuminata* 'Lady Finger', *Musa acuminata Cavendish Subgroup* and *Musa ABB cv. Klui* 'Namwa'. However, the maximum PHAs content of 23.08 % were obtained from the isolates A2-12 in MM broth with *Musa ABB cv. Klui* 'Namwa'.

Introduction



Polyhydroxyalkanoates (PHAs) are biodegradable and polyester nature polymers. It is a bioplastics and has properties similar to synthetic plastic in a type of polyethylene. Typically, various microorganisms such as yeast, fungi and bacteria are used for the production of PHAs. For examples, bacterial strain of *A. latus* can accumulate PHAs through sugar fermentation. PHAs production is currently used in agricultural products containing sugar, such as starch, cassava, maize. However, these raw materials are digested into sugar before being cultured and it expensive.

Bananas is one of the most product to the farmer are produced. However, bananas mature are low prices because its dark skin. Thus, this research focuses on PHAs production using bananas mature as a carbon source by isolated bacteria from soil.

Objectives

1. To evaluate the potential of bananas composition to use as a raw material in the production of bioplastic.
2. To study the ability bacterial strain isolated from soil to produce PHAs by using bananas as a carbon source.

Materials and methods

Preparation of bananas mature



Musa acuminata 'Lady Finger'



Musa acuminata Cavendish Subgroup



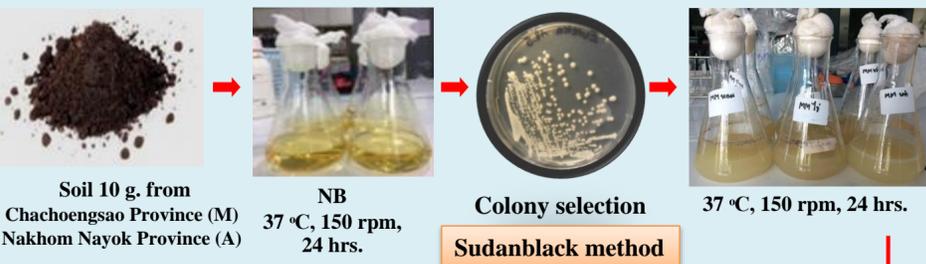
Musa ABB cv. Klui 'Namwa'.

- Total soluble solid (°Brix)
- pH
- Sugar concentration

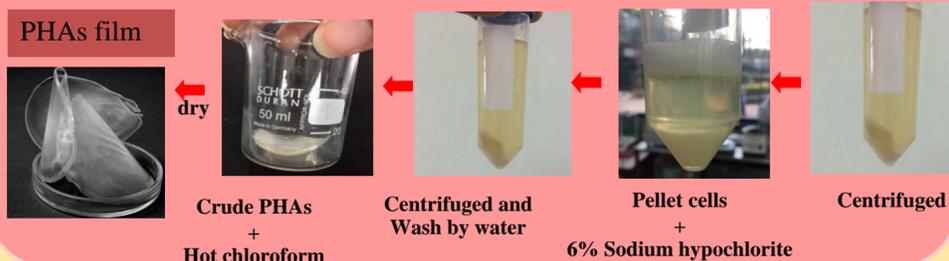
Bananas juice

PHAs production

Screening of PHAs producing bacterial strain



Extraction of PHAs

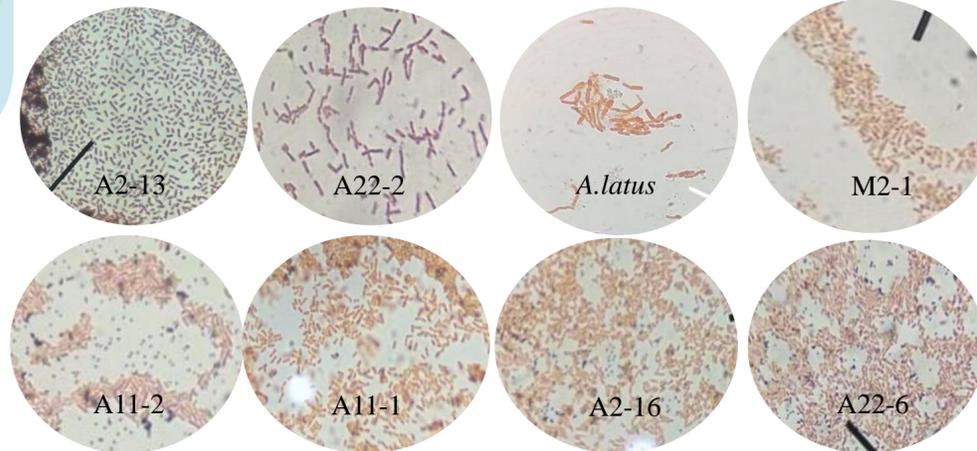


Results and discussion

The compositions of bananas

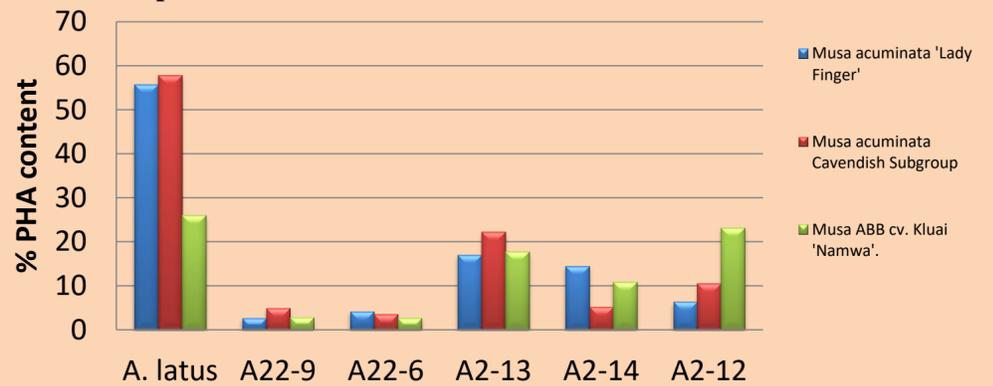
Type of bananas	pH	%Brix	Sugar concentration (g/L)
<i>Musa ABB cv. Klui</i> 'Namwa'.	5.54	28	587
<i>Musa acuminata</i> 'Lady Finger'	4.46	23	663
<i>Musa acuminata Cavendish Subgroup</i>	4.88	23	592

Isolation of bacteria from soil

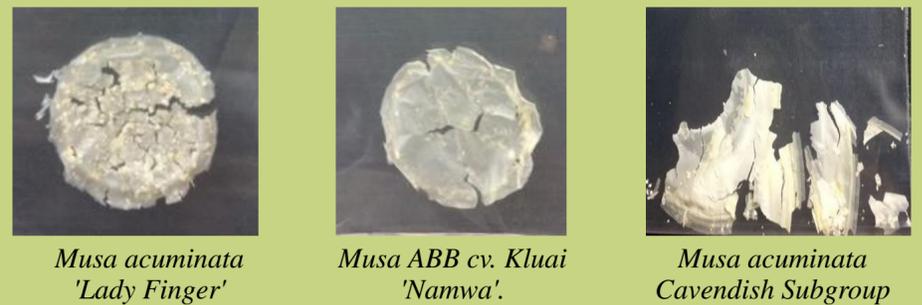


Photomicrograph of PHAs accumulated in the isolated cells and the reference strain of *A. latus* by Sudan black B staining method
*A; soil from Nakhon Nayok and M; soil from Chachoengsao.

PHA production from the isolates strain.



The PHAs film obtained *A. latus* in the difference bananas juice as a carbon source.



Conclusion

PHA producing bacterial strain was isolated from soil. Only 24 isolates can produced PHAs in medium with bananas. The isolates strain can utilize bananas for PHAs production. The results suggested that banana could be a potential alternative feedstock for the production of bioplastic such as PHAs.

References

- Sajida, M., Shagufta, I., Nazia J., 2015. Polyhydroxyalkanoates (PHA) Production using Paper Mill Wastewater as Carbon Source in Comparison with Glucose. Pure and applied microbiology.
- Yu, H.W., Wei, C., Chin, K.H., Ho, S.W., Yi, M.S., Chi, W.L., Om, M.J., 2011. Screening and Evaluation of Polyhydroxybutyrate-Producing Strains from Indigenous Isolate *Cupriavidus taiwanensis* Strains. Molecular Sciences. 12, 252-265