

Article Review the Potential of Banana Stems as a Source of Prebiotic

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ABSTRACT

A Prebiotic is a food that cannot be digested by the human body but provides health benefits by increasing the growth or activity of good bacteria in the large intestine. Prebiotics are indigestible foodstuffs that selectively stimulate the growth and/or activity of beneficial bacteria in the colon, improving health and well-being. Prebiotics can be found in high-fibre foods such as whole grains, bananas, leafy greens, onions, garlic, and soybeans. Bananas are one potential source of prebiotics because they contain dietary fibre compounds that can stimulate the growth of good bacteria in the large intestine. Banana stems contain dietary fibre compounds that can stimulate the growth of good bacteria in the large intestine, so it has the potential as a source of prebiotics. Prebiotic flour can be prepared from banana stems by identifying the genotype of amylolytic bacteria

INTRODUCTION

For people outside Bali, they may not know that are trunks or young banana trees can be processed as are vegetables. "Jukut are" is a favorite food of the Balinese people that is cooked when there is a "hajatan" or big ceremony involving many community members. So it is cooked with large portions, with complete spices (basa genep) and a lot of soup, in order to meet the needs of many people. To make it more delicious, jukut are is usually mixed with pork balung (bone) as a broth enhancer. It can also be replaced with chicken bone or duck bone or also beef bone so that jukut are tastes more savory (Lumanauw and Makapagal, 2019)

Banana is a plant that has many benefits, one of which is useful as a traditional medicine by using its stems. Ambon Banana Stems are used as the use of natural materials to reduce the use of synthetic drugs. The stem has active compounds namely flavonoids and tannins that play a role in preventing indomethacin side effects. Banana stem flavonoids can function as antioxidants and anti-inflammatory. Flavonoids work by slowing down the inflammatory process through an inhibitory effect on arachidonic acid metabolic pathways and prostaglandin formation. While tannins play a role in stopping bleeding (Arifin 2006).

Prebiotics are foods that cannot be digested in the small intestine and when they reach the large intestine will be fermented by colonic bacteria into short chain fatty acids (Short Chain Fatty Acid / SCFA) such as acetate, lactate, butyrate, propionate, and also gases (such as CO₂, methane, and hydrogen). These short-chain fatty acids will be absorbed and metabolized by the body (Ngatireh, 2009). Prebiotics are generally in the form of dietary fiber ingredients (Wang, 2009). In addition, the most potent prebiotics also consist of carbohydrates. Food ingredients that are prebiotics can be in the form of vegetables, tubers, and fruits (Hardisari and Amaliowati, 2016). Some previous studies on prebiotic sources or products have used a lot of dietary fiber and high carbohydrate ingredients. One of them from fruits is banana flour which in previous studies was proven to have benefits for the growth of probiotics *Lactobacillus casei*. There are also other studies on the use of prebiotics of Rumbia fruit extract (*Metroxylon sago* Rottb) whose results show the influence of prebiotic sources on ration consumption, final weight gain, and other positive effects on broilers (Daud et al., 2009).

Prebiotics are foods that cannot be digested by the human body, but provide health benefits by increasing the growth or activity of good bacteria within the colon. Prebiotics are foods that cannot be digested by the human body, but provide health benefits by increasing the growth or activity of good bacteria in the large intestine. Prebiotics are indigestible foodstuffs that selectively stimulate the growth and/or activity of beneficial bacteria in the colon, leading to improved health and well-being. Prebiotics can be found in high-fiber foods such as whole grains, bananas, leafy greens, onions, garlic, and soybeans. Bananas are one potential source of prebiotics because they contain dietary fiber compounds that can stimulate the growth of good bacteria in the large intestine (Antarini 2011)

Several studies have researched Banana stem flour as a source of prebiotics. The genotype of indigenous amylolytic bacteria from bananas was identified to be formulated as a starter in the manufacture of prebiotic flour. Several studies have examined the potential of banana stem flour as a source of prebiotics and its benefits for human health.

LITERATURE REVIEW

Future prebiotic research will concentrate on combination products and new brain health, immunity, and metabolism studies. Although the health benefits of currently available prebiotics have not been conclusively proven, side effects are rare, and most healthy adults can safely add prebiotic-containing foods to their diet. benefits of these indigestible foodstuffs. Prebiotics are indigestible foodstuffs that selectively stimulate the growth and/or activity of beneficial bacteria in the colon, improving health and well-being. Prebiotics can decrease the population of harmful bacteria by Lactobacilli and Bifidobacteria. Prebiotics are found in high-fiber foods such as whole grains, bananas, leafy greens, onions, garlic, and soybeans. Prebiotics can also be added to some foods and are available as dietary supplements. Research on prebiotics is ongoing, and studies have shown that prebiotics can improve bioavailability and mineral absorption, reduce the risk of obesity by increasing satiety and weight loss, and improve parameters related to heart health (Haryo et al. 2021)

Future prebiotic research will focus on combination products and new studies on brain health, immunity, and metabolism. Although the health benefits of currently available prebiotics have not been conclusively proven, side effects are rare, and most healthy adults can safely add prebiotic-containing foods to their diet. More research is needed to fully understand the potential health benefits of prebiotics and their mechanisms of action (Anggraeni, 2012)

Journal research on banana stems as a food source has shown promising results. Here are some of the key findings from recent studies. A study on Tongka Langit banana flour found that it has a high nutritional content, including 331.03 calories, 4.66% protein, and carbohydrates. Bananas are a good source of prebiotics, which are nutrients that promote the growth of beneficial bacteria in the gut. Research on prebiotics is ongoing, and studies have shown that prebiotics can improve bioavailability and mineral absorption, reduce the risk of obesity by increasing satiety and weight loss, as well as improve parameters related to heart health. Journal research on prebiotics is a broad field, and there is a wealth of research and articles available on the topic (Saputra et al. 2019)

METHODOLOGY

The method used in the preparation of this article review is the literature study method. The literature used is scientific articles that have been published in national and international IMIAH journals in the last 10 years. Search for online-based scientific articles on portals such as Google Scholar (GS), Neliti, Research Gate, Pubmed, Science Direct, and so on with keywords banana stems, products from banana stems

RESULTS AND DISSCUSION

Based on journal reviews, it was obtained that banana stems contain nutrients necessary for health. Giving banana stem extract is also able to prevent various diseases, such as gastric disease, diabetes, can lower cholesterol and prevent high blood pressure (Kurnijasanti and Putri 2017). The use of banana ares as sweets is also expected to reduce organic waste waste, especially banana stems and improve community welfare (Margianti 2020).

Ares stems near the base contain many calories, protein, carbohydrates, fiber, calcium, phosphorus, iron, vitamin B, vitamin C Reinventory of traditional Buleleng food as one of the efforts to preserve Balinese culinary arts and processed into snacks gedebong Taro (Lumanauw and Makapagal, 2019), (Sukerti, et al. 2016), (Zuryani 2020).

Based on phytochemical screening and Antioxidant Activity Test of Stem Frond and Banana Flower (*Musa acuminatae*, L.) IC50 obtained for ethanol extract of stem frond is 191.75 µg/ml and banana flower kepok is 13.21 µg/ml. The results of phytochemical screening showed that extracts of the stem sheath and flowers of banana kepok contain flavonoids, saponins and polyphenols (Nurhaeni 2019).

Table 1. Banana Steam Treatment

No	Banana stem treatment	Research Results	Reference
1	Utilization of Banana Tree Ares Waste into Candied Banana Ares	processing banana ares into candied banana ares by adding cinnamon and to find out the level of acceptance of panelists	(Margianti, 2020)
2	Giving ambonese banana stem extract (<i>Musa paradisiaca</i> var. <i>sapientum</i>)	Prevent gastric injury and observe the indomethacin-induced histopathology of the rat stomach.	(Kurnijasanti and Putri 2017)
3	Processing banana stems into ares vegetables by the Balinese people	Near the base of Ares stems are abundant in calories, protein, carbohydrates, fiber, calcium, phosphorus, iron, vitamin B, and vitamin C. Traditional Buleleng dishes are being recreated	(Lumanauw and Makapagal, 2019) (Sukerti et al., 2016) (Zuryani 2020)

		as part of efforts to preserve Balinese cuisine.	
4	Banana stem waste treatment	Become a snack for Taro gedebong	(Hiden and Ningsih 2021)
5	Phytochemical Screening and Antioxidant Activity Test of Sheath of Stem and Flower of Kepok Banana (<i>Musa acuminata</i> , L.)	The IC50 for stem frond ethanol extract is 191.75 g/ml and 13.21 g/ml for kapok banana flower. Extracts of the stem and floral sheath of banana kepok contain flavonoids, saponins, and polyphenols, as revealed by phytochemical analysis.	(Nurhaeni 2019)
6	Production and characterization of cellulose powder from banana stems (<i>Musa paradisiaca</i> L.)	Cellulose banana kepok stems obtained as much as 49.66% and 55.6%.	(Pine et al. 2021)
7	Potential of Banana Stems (<i>Musa Pardisiaca</i> L.) In the healing of burns	Banana tree stem extract contains tannins, saponins, and flavonoids, each of which has a role in the process of healing wounds	(Ananta 2020)
8	Effectiveness of Kepok Banana Stem Extract (<i>Musa x paradisiaca</i> Linn.) Against the Growth of <i>Streptococcus pyogenes</i> Bacteria.	At concentrations between 50 and 100 percent, Kepok banana stem extract can inhibit the growth of <i>Streptococcus pyogene</i> bacteria, with a zone diameter between 6.71 and 9.45 mm.	(Marhamah and Putri 2018)
9	Antibacterial activity of Mas banana frond (<i>Musa acuminata</i> colla), Kepok banana (<i>Musa x paradisiaca</i> L) and kluthuk banana (<i>Musa balbisiana</i> colla) against <i>Staphylococcus aureus</i> and <i>Staphylococcus epidermidis</i>	Ethanol extract of banana kluthuk frond has an average resistance of 8.81 mm, 10.81 mm, 12.03 mm, and 15.78 mm against <i>Staphylococcus aureus</i> bacteria and 8.72 mm, 10.78 mm, 12.2 mm, 15.68 mm against <i>Staphylococcus epidermidis</i> bacteria.	(Primadiamanti et al. 2022)
10	Test of antibacterial activity of ethanol extract of stem and	Ethanol extract of banana plant stems is better in inhibiting the growth of	(Adilang et al. 2019)

	leaf sheath of Ambonese banana plant (<i>Musa paradisiaca</i> var <i>sapientum</i> (L.) Kunt) against <i>Staphylococcus aureus</i> bacteria	<i>Staphylococcus aureus</i> bacteria with average clear zone concentrations of 10% (10.00 mm), 30% (17.00 mm), 50% (19.00 mm), 70% (19.33 mm), and 90% (20.33 mm).	
11	Maximizing the Potential of Local Food Prebiotics for Health	Sago, palm starch, young banana fronds, taro sticks, lemongrass, cinnamon, bamboo shoots can be a source of prebiotics	(Stephanie 2021)
12	The effect of banana frond prebiotics (<i>Musa paradisiaca</i>) on commercial feed on the growth and survival of tilapia (<i>Oreochromis niloticus</i>)	Treatment C (30 ml/kg) produced the most significant growth in terms of absolute weight growth rate (6.26 grams), specific growth rate (4.91%), and absolute length growth (3.44 cm). The most significant survival rate of 76.6% was observed with treatment B (20 ml/kg).	(Akbarurrasyid et al. 2021)
13	The effect of adding banana stems (<i>Musapardisiaca formatpyca</i>) fermented with probiotics in commercial feed on the growth of milkfish (<i>Chanos chanos</i>)	The addition of prebiotics to banana stems can enhance milkfish growth and survival..	(Seran et al. 2020)
14	Modification of Banana Flour "Mulu Bebe" (<i>Musa Acuminata</i>) Indigenous North Halmahera as a Prebiotic Food Source	Modification of spontaneous fermentation and cooling heating can affect the physicochemical properties of the resulting "mulu bebe" banana flour. To improve the prebiotic properties of banana flour can be done by increasing resistant starch	(Lumba et al. 2017)

Banana tree stem extract contains tannins, saponins, and flavonoids, each of which has a role in the wound healing process (Ananta 2020). At concentrations of 50%-100%, with a zone diameter of 6.71-9.45 mm, Kepok banana stem extract can inhibit the growth of *Streptococcus pyogenes* bacteria. (Marhamah and Putri 2018). Ethanol extract of banana kluthuk frond has an average resistance in *Staphylococcus aureus* bacteria of 8.81 mm, 10.81 mm, 12.03 mm, 15.78 mm and in *Staphylococcus epidermidis* bacteria of 8.72 mm, 10.78 mm, 12.2 mm, 15.68 mm (Primadhamanti et al. 2022). Ethanol extract of banana plant stems is better in inhibiting the growth of *Staphylococcus aureus* bacteria with average apparent zone concentrations of 10% (10.00 mm), 30% (17.00 mm), 50% (19.00 mm), 70% (19.33 mm), and 90% (20.33 mm) (Adilang et al. 2019) .

Sago, palm starch, young banana fronds, taro / banana stems, lemongrass, cinnamon, bamboo shoots can be a source of prebiotic (Stephanie 2021). The greatest growth was observed in treatment C (30 ml/kg), with weight growth of 6.26 grams, specific weight growth of 4.91 %, and absolute length growth of 3.44 cm. Treatment B (20 ml/kg) yielded the most incredible survival rate, 76.6% (Akbarurrasyid et al. 2021). Adding prebiotics to banana stems can increase the growth and survival of milkfish (Seran et al. 2020). Modifying spontaneous fermentation and cooling heating can affect the physicochemical properties of the resulting "mulu bebe" banana flour. To improve the prebiotic properties of banana flour can be done by increasing resistant starch (Lumba, et al. 2017)

CONCLUSIONS AND RECOMMENDATIONS

Banana stems contain dietary fiber compounds that can stimulate the growth of good bacteria in the large intestine, so it has the potential as a source of prebiotics. Prebiotic flour can be prepared from banana stems by identifying the genotype of banana indigenous amylolytic bacteria to be formulated as a starter in manufacturing prebiotic banana stems. Consumption of banana stems as a source of prebiotics can provide benefits for human health, such as improving intestinal and digestive health. Optimizing the use of banana stems as a source of prebiotics in functional food products, such as drinks that incorporate probiotics and prebiotics, is possible.

FURTHER STUDY

The ability of banana stem biocapsules to encapsulate carrageenan and chitosan will be investigated further.

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