From Banana Waste to Lactic Acid – A Sustainable Future

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INTRODUCTION

Bananas are one of the world main food crops, with more than 100 million tons bananas produced worldwide annually. This massive production generates enormous amounts of bio-waste. Novel approaches are needed for handling waste from the production. In addition there is a need for innovative ways of utilising the earths resources to secure a sustainable future. The generated waste residues have a fairly high content of sugars mainly sucrose, fructose and glucose. In that way it makes up a potential good feedstock for production of value added products.

Lactic acid bacteria (LAB) are naturally able to utilize these sugars present in banana waste and additionally LAB can be found in a wide variety of environments. Therefore we hypothesised that it would be possible to find LAB able to utilise the sugars, degrading the bio-waste and simultaneously produce lactic acid. With the use of LAB the problem with disposing of the bio-waste could be alleviated and lactic acid produced at the same time. Lactic acid is traditionally used in the food industry and is gaining ground in the production of biodegradable plastic leading to an increased demand for lactic acid.

RESULTS

We have isolated and identified several suitable LAB with the ability to utilize bio-waste from banana cultivation as a feedstock for production of lactic acid. These LAB will enable a novel and efficient way of turning bio-waste with low economic value into value added products such as lactic acid. The strains have been characterized and selected for their ability to utilize the specific agricultural feedstock. Furthermore enzyme-treatment of the banana feedstock has been conducted, significantly increasing the concentration of free glucose. The best candidates capabilities were analysed by measuring the pH and the lactic acid content in growth cultures.

APPROACH

An isolation procedure favouring LAB have been developed to isolate possible candidates for further research. The candidates and known model strains were tested on solid and in liquid media containing banana-feedstock as sugar source. Through these tests the most promising strain was identified. In addition an experiment resembling on-site fermentation will been conducted showing that it is feasible to use the technology in developing countries. Throughout the experiments we have strived to use a very simple set up to accommodate the production standards in developing countries.

CONCLUSION

We have proved that existing LAB exhibit promising abilities in utilizing the banana-biowaste for lactic acid production. We have identified several promising strains but our own isolated strain *Lactobacillus sakei* subsp. have shown a high lactic acid yield from banana-waste. At the moment the experimental work is still in progress and the final conclusion on the studies is sill to be drawn after the experimental work is completed.