

The Nutritional Composition Analysis of Fermented Fruit Peels and Their Potential Use in Soil Fertilization

Bowen Cui¹, Wenzhu Guan^{1,*}, Yifei Wang², Xufan Hou², Zheng Wu²

¹International Programs Department, Tianjin Fayao High School, Tianjin, China

²General Program Department, Tianjin Fayao High School, Tianjin, China

Email address:

Guanwz2013@163.com (Wenzhu Guan)

*Corresponding author

Abstract

This study is based on a school project, aiming at the evaluation of using fermented fruit peel solution as soil fertiliser. This application, if proven to be successful, will be a potential way to improve the recycling of kitchen waste. In order to reach this goal, the bacteria content, pH value, nutrition and ethanol composition were analysed. The bacteria of the fermented solution may improve the bacterial diversity of the soil. The fermented fruit peels are known to be acidic and may be used to neutralise the alkaline soil in Tianjin. The nutrition analysis included nitrogen, potassium and phosphorus as these meet the main nutritional requirements of plants (Zhou X et al., 2014; Liu T, Lin Y et al., 2021). Ethanol content was also investigated because fermented solution is known to have ethanol content, but too much ethanol will disrupt the bacterial balance in the soil and also damage plant growth. Fermentation receipt is as follow, brown sugar : fruit peel : water = 1 : 3 : 10 (Zhou X et al., 2014). Fermentation happened in a closed container. The fermentation mixture was kept indoors, without direct sunlight. Test the pH value twice a week to monitor the change of acidity of the fermented mixture. Temperature was recorded on daily basis. First round fermentation lasted for 3 months. Second round fermentation lasted for 6 weeks. Nitrogen, potassium, phosphorus and ethanol detection were all carried out by students in the school chemistry lab. Nitrogen was detected by Kjeldahl Method. Phosphorus was tested by Mo-Sb-Ascorbic Acid Colorimetry. Potassium was analysed by Flame Photometry and ethanol was quantified by Hydrometry. The preliminary results are promising so far, with good nutritional content and tolerable ethanol content. Lactobacillus was detected in the fermented solution. The end pH value of fruit peel fermentation was between 3-4. The mild to medium acidic property is useful to neutralize the alkaline soil in Tianjin. Further studies are planned to be carried out to investigate the nutritional contents of other fruit and vegetable peels, and bio-assays should be carried out as well to investigate the effect of fermented mixture on plant growth.

Keywords

Kitchen Waste, Fruit Peel Fermentation, Nitrogen, Phosphorus and Potassium Content, pH Value, Microbial Analysis, Ethanol Content, Soil Fertilization