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Improving Soil Quality and Enhancing Quality Production of Vegetables Through Banana Peel

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Abstract: ***The study focused on the determination of phytonutrients found in Banana Peels as an alternative organic fertilizer which was presented into two objectives of the study. First, was to study the effects of using Banana peel as organic manure on production of tomatoes. Second, was to study the improvement of soil quality by adding Banana peel to the soil. Banana fruit peels are good source of nutrients like potash, calcium, iron, zinc etc. Thus, this project aims to give an in-depth overview of the preparation method of Banana peel-based liquid fertilizer due to their high potassium content on to improve crop yielding and Soil fertility. To prepare the liquid Banana peel based fertilizer is added to the soil and the plant growth is observed. The growth parameters such Root length, Shoot length, Number of leaves, Length and width of leaves also showed enhanced growth. In conclusion, the results revealed that application of organic liquid fertilizer such as Banana peel water enhanced the plant growth and soil fertility.***

Keywords: Phytonutrients, Banana peel, Soil fertility, Bio fertilezers.

I. INTRODUCTION

The Banana (Musa paradisiaca) is one of India's most significant fruit crops and is widely cultivated in tropical regions due to its essential uses in the food industry. Banana fruit peels are good source of nutrients like potash, calcium, iron, zinc etc. There are two types of fertilizer used in agriculture. Organic fertilizer contains different antioxidants and carbonaceous matter. Inorganic fertilizer is usually wholly manufactured, as in case of sulphate of ammonia; or they may be processed from quarries. These are cheapest and harmless materials are used for plant growth. The present study deals with the utilization of fruit peels for the effective growth of plants and higher yield.

Chemical fertilizers are industrially manufactured to contain a specific number of nutrients required by the soil to enhance plant growth. The most common chemical fertilizer is NPK, which contains nitrogen, phosphorus, and potassium in different ratios. Superphosphate, urea, and potash are also popular. For a substance to be classified as a fertilizer, it should contain a minimum of 5% N, P, or K, known as the primary or macro-nutrients. They play a vital role in enhancing plant development and growth. Indeed, their functions and how they contribute to soil fertility are well documented. However, due to their efficiency in increasing soil fertility and enhancing plant growth, chemical fertilizers are often applied in excess. As a result, they cause adverse effects on the environment, such as global warming, and biodiversity loss. Besides their excessive use, their huge procurement, shipping, and transportation costs make them unsustainable. These include applying organic-based fertilizers such as fruit peels (e.g., Banana peels), nano-fertilizers, using improved methods of application, and slow-nutrient-release fertilizers.

Organic fertilizers consist of moderate amounts of the essential nutrients for plant growth, i.e., nitrogen, phosphorous, and potassium. They are environmentally friendly, ensure the conservation of biodiversity, and are economical and easily attainable since they are acquired from agri-waste, compared to inorganic fertilizers, which are made from various synthetic chemicals. This project focuses on Banana peel-based fertilizers. Thus, this project aims to give an in-depth overview of the preparation method of Banana peel-based liquid fertilizer due to their high potassium content on to improve crop yielding and Soil fertility.

II. OBJECTIVES

1) To study the effects of using Banana peel as organic manure on production of Tomatoes.
2) To study the improvement of soil quality by adding Banana peel to the soil.
3) To study improvement in Nitrogen levels and water holding capacity of the soil.
4) To study the level of pest control.
5) To analyse quality and quantity of various nutrient levels assimilated by the plant.

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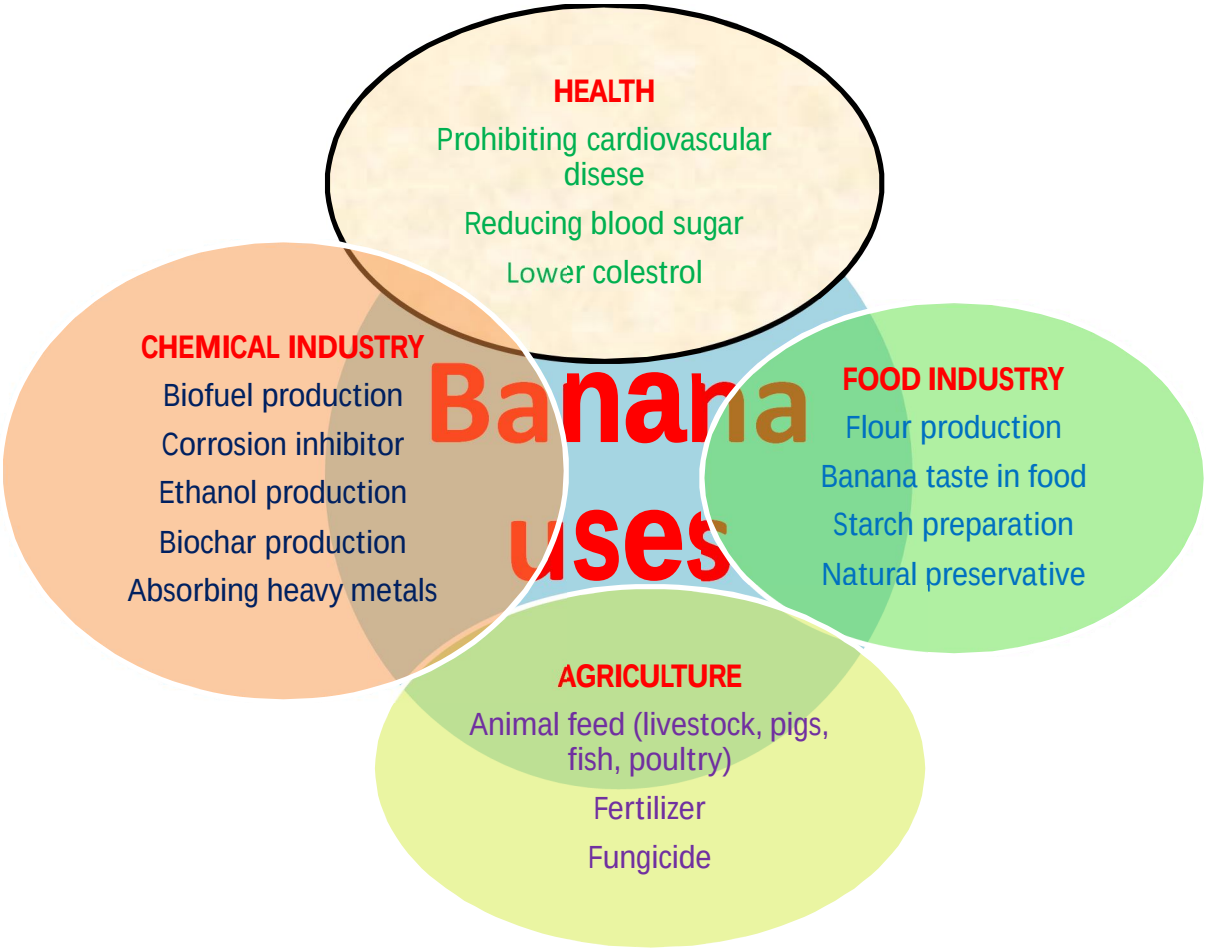
III. METHODOLOGY

Banana peels have been used for decades, and some of their recent applications are attributable to technological advances. Traditionally, this Banana by-product was used for acne, warts, hair, face masks, and food wrappings. Burns, ulcers, anemia, diarrhea, excessive menstruation, coughing, snakebites, and inflammation were treated using these peels. Modernization and technological advances have enabled researchers to extract some of the compounds and elements found in the peels for use in various disciplines, as summarized in below Figure.



The peels are rich in phenolic compounds, which have multiple health benefits, such as prohibiting cardiovascular disease, cancer, and diabetes, when incorporated into food. Their antifungal properties enable treatment against various fungi. They are directly used as feed for animals such as livestock, monkeys, fish, poultry, and pigs because of their high fiber content. Recently, the cover or shell of the Banana fruit has received considerable recognition in farming as a green or organic fertilizer due to its high potassium content and minute amounts of other nutrients required by the soil, as seen in below Table.

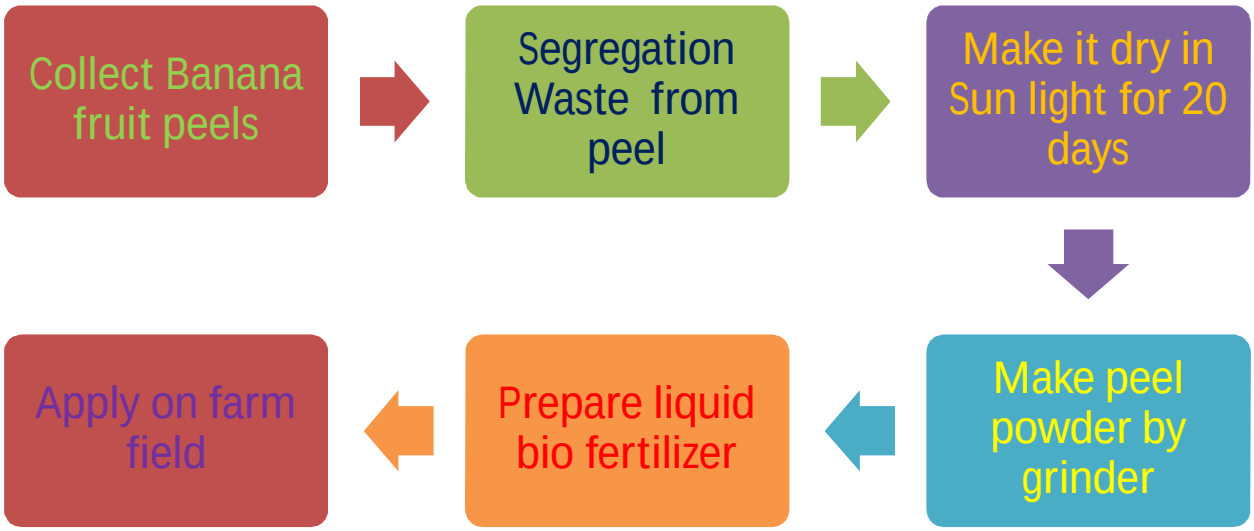
Elemental composition of Banana Peels

S.No.	Element	Content (mg/100g)
1	Potassium	475.6
2	Calcium	323.0
3	Sodium	148.9
4	Phosphorous	122.5
5	Iron	0.40
6	Manganese	69.0

Nutritive components of Banana peel

S.No.	Nutritive Componenets	Content (%)
1	Carbohydrates	59–67
2	Proteins	0.9–5.3
3	Starch	3.5–6.3
4	Fibre	19.2–31.7
5	Crude fat/lipids	1.24–5.93
6	Ash	3.95–9.60

Generally Banana fruit peels are collected from students and fruit juice vendors in Kagaznagar market. Fruit peels, which are thrown in garbage by household or vendors. These Banana fruit peels are collected from vendors and removed unnecessary substances from that.



Preparation of Banana peel based liquid Bio fertilizers.
The Banana peels are soaked in a bucket of water. The bucket is closed with a lid and the Banana peels are allowed to ferment until they turn into liquid fertilizers. The bucket is kept aside for 2 days to allow the water to ferment. After 2-4 days, liquid fertilizer is transferred into another container. The liquid fertilizer is added to the soil and the plant growth is observed.

IV. RESULT

From the table, the results are interpreted as follows. It is observed that liquid Banana fertilizer enhances the plant growth compared to control. The growth parameters such Root length, Shoot length, Number of leaves, Length and width of leaves also showed enhanced growth. Similar studies of the effectiveness of liquid organic fertilizer made by Banana peel as a potassium source is observed in Tomato plant (Lycopersicum esculentum L.) growth.

S.No.	Tomato	Root length	Shoot length	Number of leaves	Length of leaf	Width of leaf
1	Control (15th day)	02 cm	4 cm	03	1.2 cm	01 cm
2	Treated with Banana peel water (05th day)	2 cm	3 cm	02	02 cm	0.5 cm
3	Treated with Banana peel water (10th day)	2.5 cm	4.5 cm	04	2.3 cm	01 cm
4	Treated with Banana peel water (15th day)	2.7cm	6 cm	05	03 cm	1.9 cm

V. CONCLUSION

The study of this project reviewed in this it was observed that Banana peel-based liquid fertilizers improved the growth and yield of the vegetable crops. The study showed that the organic Banana peel liquid fertilizers have the potential to enhance the growth in especially Tomato plants. Application of organic liquid fertilizers showed the effect on growth parameters such as plant height, root length, number of leaves length and width of the leaves. Tomato plants showed more growth in soil supplemented with Banana peel fermented water. Chemical fertilizers disturb the natural nutrient content of the soil, but liquid fertilizers enhance the nutrient content of the soil. In conclusion, the results revealed that application of organic liquid fertilizer such as Banana peel water enhanced the plant growth and soil fertility.

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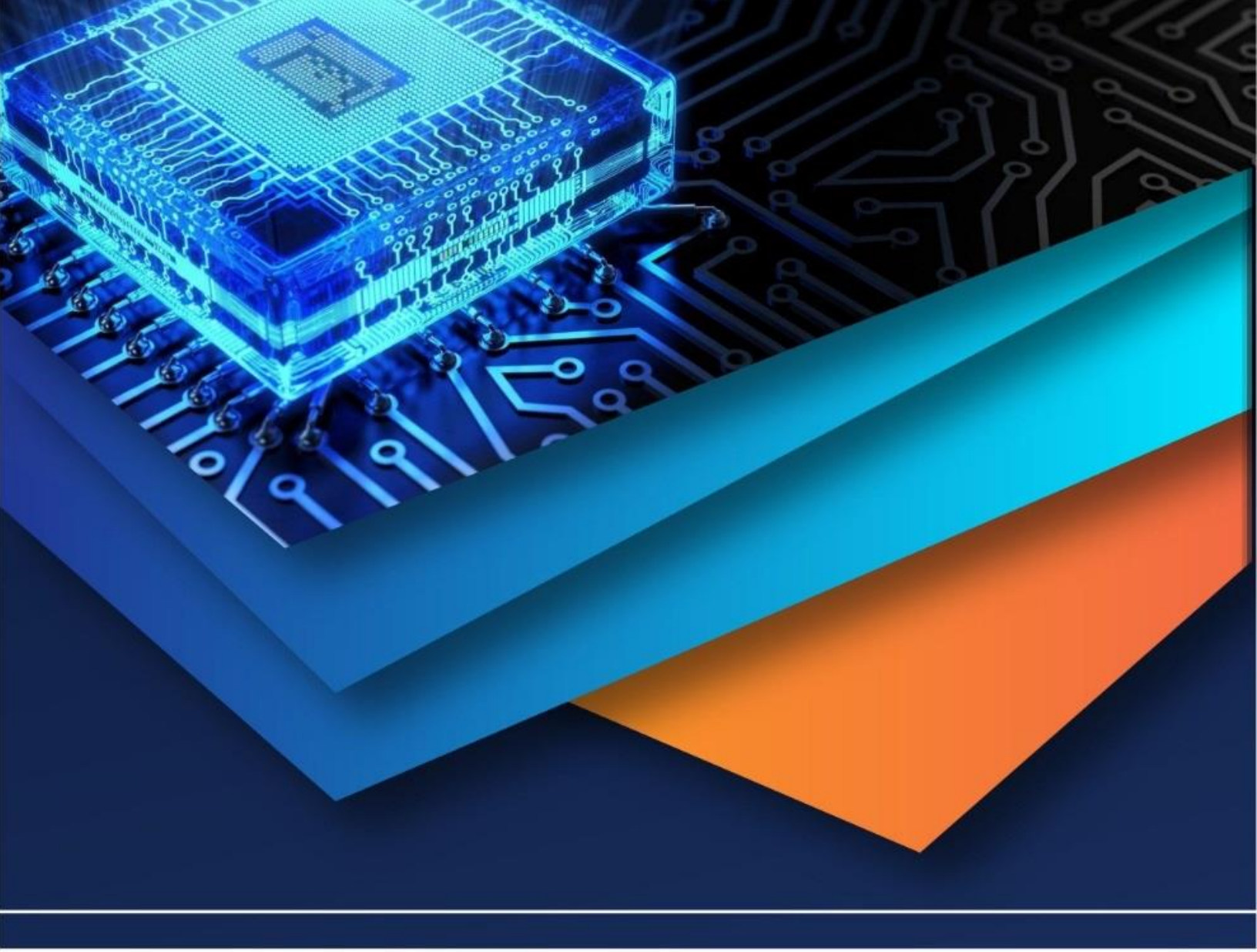

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