

TOP FOUR ORGANIC FERTILIZER USED FOR PLANTS

(Project– Report)

Submitted in partial fulfilment of the requirements for the award of
Bachelor of Science degree in Microbiology.

BY

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafidework of E.Thamburatti (38300020) who carried out the project entitled "**TOP 4 ORGANIC FERTILIZER USED FOR PLANTS**" under our supervision from October 2020 to March 2021.

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ABSTRACT

The introduction and extended use of liquid fertilizer has been a determinant factor in the development of modern intensive agriculture. However, in recent years, interest has grown in agriculture in the possibility of recycling organic residues and wastes derived from a variety of human activities. Amending with non-toxic organic waste is absolutely necessary to improve soil fertility and crop production. Liquid fertilizers are better at balancing the pH of the soil based on the chemicals they are delivering nitrogen, for example, can be incredibly helpful in the right amounts but also can kill plants if over applied. Potassium based fertilizers can be helpful, but only in the right amount. Too much liquid fertilizer leaving discoloured streaks on the lawn, and damage plant foliage. Liquid fertilizer leads more frequent applications than other types of fertilizer. In these, are A types of liquid fertilizers are taken they are: cow dung liquid fertilizer, egg shell liquid fertilizer, banana peel fertilizer and onion fertilizer. By using these fertilizers as a basic growth reagent seeds have been grown on the normal plastic cup. The sample seeds are fenugreek (*Trigonella foenum-graecum*) and green gram (*Vigna radiata*). Based on the process the seeds have been fixed and cultivated. Finally, the growth rate of the plants have been measured using the normal reading scale and it has been noted. It has been shown as difference between the fertilizers. Results are finding the best liquid fertilizers on these four fertilizers using the sample growth rate (GR). Liquid fertilizer gets the nutrients to plants very quickly, so use can find them when they need it most. The real growth rate (RGR) have been measured almost for 30 days. ONION skins decompose soon and enrich the soil with potassium and calcium such as other fertilizers also enrich nutrients, increased growth rate, decreased growth time and nutrients like nitrogen, potassium, calcium, phosphorus and magnesium.

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LIST OF ABBREVIATION AND SYMBOLS:

cm	-	Centimeter
g	-	Gram
mL	-	Milliliter
mg/kg	-	Milligram per kilogram
°C	-	Degree celcius
%	-	percentage
NPK	-	Nitrogen , phosphorous, potassium
N	-	Nitrogen
K	-	Potassium
Gm	-	gram

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CHAPTER 1: INTRODUCTON

1.1 What is a liquid fertilizer?

A Liquid fertilizer produced from agricultural residues and industrial wastes are becoming increasingly popular. These fertilizers are produced by simple fermentation processes using organic waste as carbon substrates. Liquid fertilizer consists of essential plant nutrients and beneficial microorganisms, which recycle organic matter.

Microorganisms have an important role in the degradation of substrate in the fermentation process. At the end of the fermentation process, phytohormones such as auxin and cytokinin, organic acids and plant growth promoters are present in the liquid fertilizer. It is an important carbon source for microbial growth.

All the organic residues mentioned above have the potential to be used as substrates for liquid organic fertilizer production. The use of organic waste and residues of any nature for soil amending requires appropriate treatment to eliminate or, at least, reduce any compounds that may have harmful effects on soil properties and to optimize the efficiency and the fertility of the final product once in the soil. The process of composting is generally considered as the most efficient treatment for producing environmentally safe and agronomically advantageous organic waste amendments for soil.

Composting is an accelerated version of the decomposition processes naturally occurring in the soil. The humification process typically occurring under natural soil conditions transforms the organic material into a stable and mature humic-like end-product. The close relationship between the humification process and the production of organic fertilizers is well known.

1.2 TYPES OF ORGANIC FERTILIZER :

- 1) BANANA PEEL FERTILIZER
- 2) ONION PEEL FERTILIZER
- 3) COW DUNG FERTILIZER
- 4) EGG SHELL FERTILIZER

1.2.1 BANANA PEEL FERTILIZER :

Banana is important food crop for tropical and subtropical region and play important role in food security and economy. According to FAO 2014, global banana production was around 118 million ton per .

Most plantains varieties require cooking (boiling, roasting or frying) before they can be eaten .Plantains processing industries are generating huge waste in the form of unripe banana peel waste at one place. Unripe plantain peels weighs up to 40% fresh weight of product . Thus, It is indispensible to study the waste managment and utlization of unripe banana peel.

Banana peels are good fertilizer because of what they do not contain. They contain absolutely no nitrogen. This means potassium-rich banana peels are excellent for plants like tomatoes, peppers or flowers. Banana peels also contain calcium, which prevents blossom end rot in.

Banana contains important nutrients,which could be recycled into useful materials to be reused in different purposes .Banana peels contain 42% potassium ,one of the three major components of fertilizer along with nitrogen and phosphrous and shown on fertilizer lables as npk .In fact banana peels have the highest organic sources of potassium.



. 1.2.1 banana peel fertilizer

1.2.2.ONION PEEL FERTILIZER:

Onion peel fertilizer is a type of one liquid fertilizer.Inorganic chemicals fertilizers have contribute a lot to agriculatural production since 1960s era of green revolution.However continuous use of inorganic /chemical fertilizers has resulted in

depletion in soil fertility & pollution in surface water. Besides, rapid rate of nutrients loss in different forms & increases the soil acidity with nitrification.

It seems that most housewives simply do not know about the value of onion husks, if they allow themselves so wasteful, after peeling a vegetable, to send it to the trash can. The element quercetin, which belongs to the group of flavonoids of plant origin, which onions are so rich in, is concentrated in the onion peel. There is especially a lot of quercetin in red onions.

Since it has been proven that quercetin has antioxidant, immunostimulating, anti-inflammatory, regenerative, anti-allergic, cancer and cardioprotective properties, it is able to strengthen the root system of plants, providing the.

Onion peel as a "waste" product after preparing a vegetable for culinary processing significantly improves the structure of the soil and repels pests. After all, onion husks, like the onion itself, contain substances that destroy pathogenic microorganisms with sufficient nutrition.

Onion skin, use them to create organic potassium –rich fertilizer for all your plant growing indoors. This onion skin fertilizer will also be rich in calcium, iron, magnesium, and copper. The skins of onion are also a rich source of flavonoids, particularly quercetin, a potent antioxidant and anti-inflammatory.



1.2.2.onion peel fertilizer

1.2.3.COW DUNG FERTILIZER:

Cow dung is an important source of bio fertilizer but at the same time cow's urine and cow's horn and a dead body of a cow be used for preparing effective bio-fertilizer.

The farm animals (cow, bullocks, and milk products) provide dung and urine. It is very effective alternatives to chemical fertilizers by enhancing productivity in long term with maintaining the soil health and enhances the microbial population. Cowdung manure and vermicompost increases soil organic matter content, and this leads to improved

water in ltration and water holding capacity as well as an increased cation exchange capacity.

It is one of the renewable and sustainable energy resources through dung cakes or biogas which replace the dependence upon charcoal, fuel wood, and fos-sil fuel etc. Beside it, application of coddung in proper and sustainable way can enhance not only productivity of yield but also minimizing the chances bacterial and fungal pathogenic disease.

Dry cow dung cake of average size cakes gives 2100kJ worth of enegy. Normally composition of cow dung is about 80%water and supports a matrix of undigested plant materials that is rich in nutrients ,micro –organism an their by products. Cow dung an abundant number of bacilli ,lactobacilli and cocci and some identified fungi and yeasts.

The addition of cow dung increases the mineral status of soil ,the resistance of plant against pests and diseases .Stimulated plant growth and other beneficial activites such as sulpho oxidation and phosphours solubilisation.

1.2.4.EGG SHELL FERTILIZER:

Egg shells are primarily made out of calcium carbonate .The determine the nutritional properties of eggshells. This study was conducted to find out the multiple uses of eggshells in nutrition and medicine. Eggshells can be utilized for various purposes that minimize their effect on environmental pollution.

Eggshells present healthy, balanced calcium due to its trace amounts of other minerals and is probably the best natural source of calcium. One whole medium sized eggshell makes about one teaspoon of powder, which yields about 750-800 mgs of elemental calcium plus other micro elements. Eggshell powder has been reported to increase bone mineral density in people and animals with osteoporosis .

Discarded eggshells are often used as a plant fertilizer and are effective liming sources. This is because eggshells contain calcium that raises, or neutralizes, the pH level of overly acidic soil.

Eggshell membrane consists of collagen as a component. Collagen is a type of protein, fibrous in nature that connects and supports other bodily tissues, such as skin, bone, tendons, muscles and cartilage. Eggshell membrane collagen is very low in autoimmune and allergic reactions as well as high in bio-safety and is of similar characteristics to other mammalian collagen. Eggshells/shell membranes have multiple uses , concentration and medicine.



1.2.4,Egg shell fertilizer

REVIEW OF LITERATURE

Azeddin El Barnossi, Fatimazhrae moussaid , Abdelilah Iraqi Housseini²⁰²¹, Over the last decade the world has been generating a high quantity of tangerine peel waste (TPW), pomegranate peel waste (PPW) and banana peel waste (BPW). These peels have several economic benefits but there is mismanagement or inappropriate valorisation that could present risks to environment and public health. In the current review, we discussed the use of TPW, PPW and BPW directly for animal feed, soil fertilization, specific compost production and bio-adsorbent. We also discussed the valorisation of these peels for manufacturing the value-added products including enzymes, essential oil and other products that can be used in human food, in medical and cosmetic industry. Additionally, recent studies concerning the valorisation of these peels by biorefinery for bioethanol, biogas and biohydrogen production have been discussed. In the same context some other recent studies about valorisation of microorganisms isolated from these peels for medical, agronomic and industrial interests have been also discussed.

BPW contains cellulose, hemicellulose, lignin, proteins, polysaccharides, chlorophyll, pectin and other compounds of low molecular weight. It also contains beneficial bioactive compounds including phenolics, dopamine, anthocyanins and catecholamines . BPW has a high content of gallocatechins, which makes it a useful dietary source against heart disease and cancer , of flavonoids and certain other bioactive compounds, including pro-vitamin A compounds, trans- β -carotene, trans- α -carotene, cryptoxanthin, sterols, cycloartan-type triterpenes, polyunsaturated fatty acids and linolenic acid . Also, BPW contains essential oil, phenols, lipids and tannins that have been shown to have good antimicrobial activity reports the physicochemical characteristics of BPW.

As discussed in the present study, many microorganisms have isolated from TPW, PPW and BPW are economically interesting in the medical, agronomic and industrial fields. Therefore, further studies need to be conducted to investigate the microorganisms associated with these peels and their effects both the soil in the case of their use as organic soil conditioner and also on the water in the case of their use as bio-adsorbent.

The study of TPW, PPW and BPW valorisation and their applications in the various fields are still a hotspot for scientific research, which requires a detailed exploration of the mechanisms and long-term risks of their valorisation. Moreover, we still have a long road before the perfect valorisation of TPW, PPW and BPW and the best presentation of the environment.

Amit Bhatnagar, Mika Silanpaa ,Anna witek Krowiak²⁰¹⁵ *Agricultural waste peels* have been recognized as an ecological burden for the society. However, *waste*

peels, as lignocellulosic biomass-rich materials, have stimulated new gateways for the production of renewable, low cost and sustainable adsorbents for water treatment applications. This review compiles the work conducted by various researchers over the last few decades on the use of various *agricultural waste peels* as adsorbents for the water and wastewater treatment. In this review, adsorption capacities for organic and inorganic pollutants by different peel-based adsorbents are summarized. Wherever applicable, different modification methods, which have been employed to develop modified peel-based adsorbents, have also been presented to highlight and discuss the key advancements on the preparation of novel adsorbents using *agricultural waste peels*. Adsorption mechanisms responsible for pollutants removal by peel-based adsorbents have also been discussed. Finally, conclusions have been drawn from the literature reviewed. The paper also discusses the future research needs in the area of biosorbent areas.

Diksha Tinna , Naveen Garg , Sandeep Sharma , Gulab Pandove , Neena Chawla 2020 The present study was conducted on onion variety 'Punjab Naroya' in a factorial randomized block design during 2016–17 and 2017–18 in a loamy sand alluvial soil of semi-arid region. There were 14 treatments consisting of two factors. Factor I comprised two levels of mineral fertilizers (100% NPK and 75% NPK) and factor II consisted of six combinations of microbial inoculants along with a control. Microbial inoculants were applied through root dipping of seedlings for 30 min before transplanting. The study was aimed to identify microbial consortia that can reduce the use of mineral fertilizers by 25% without any loss in bulb yield and to identify microbial consortia that can act as potential supplement to recommended dose of mineral fertilizers (100% NPK) in improving bulb yield of onion. We have identified two treatments viz., 100% NPK + T₆ (*Azotobacter* sp. + *Sphingobacterium* sp. + *Burkholderia* sp.) and 100% NPK + T₁ (*Azotobacter* sp. + *Bacillus* sp.) that have registered 12.0% and 7.5% increase in bulb yield over uninoculated control (100% NPK). The study has also led to the identification of three treatments viz., 75% NPK + T₆, 75% NPK + T₁ and 75% NPK + T₅ (*Azotobacter* sp. + *Bacillus* sp. + *Burkholderia* sp.) manifesting 8.6%, 6.1% and 3.7% higher bulb yield over uninoculated control (100% NPK). Besides, various microbial inoculants significantly improved the plant growth parameters (plant height, number of leaves), yield attributes (bulb yield, 20-bulb weight and equatorial diameter of bulb), bulb quality attributes (ascorbic acid, total soluble solids, pyruvic acid and dry matter) and reduced the

physiological loss in weight during 15–120 days of storage at room temperature. The triple inoculation treatment with *Azotobacter* sp. + *Sphingobacterium* sp. + *Burkholderia* sp. gave the best results for most of the traits followed by dual inoculation treatment with *Azotobacter* sp. + *Bacillus* sp. However, the soil chemical (pH, electrical conductivity, organic carbon, available nitrogen, phosphorus and potassium) and microbial properties (bacterial, actinomycetes and fungal count) exhibited non-significant improvement after harvest of onion crop. The interaction effects between mineral fertilizers and PGPRs were non-significant for all the traits. Therefore, it can be concluded that the integrated utilization of these microbial inoculants as root dip of seedlings along with 75% NPK offers the scope of reducing the application of mineral fertilizers to onion crop by 25% without any loss in bulb yield and to reduce environmental pollution.

CHAPTER 3: AIM AND SCOPE

3.1 AIM:

To study the preparation and application of liquid fertilizers .

3.2 OBJECTIVES:

1. To evaluate the best liquid fertilizer from the four prepared fertilizer such as banana peel ,onion peel ,egg shell and cow dung.
2. To in the growth rate of seed apply with liquid fertilizer.
3. To estimate the reading measured by normal reading scale
4. To show the difference between normal seed and fertilizer used seed growth.
5. To evaluate the highly grown green gram used applying fertilizer.

CHAPER 4: MATERIALS AND METHODS

4.1 MATERIALS

4.1.1 Equipments used

1. Water bottle
2. Seeds
3. Banana peel
4. Onion peel
5. Egg shell
6. Dry cow dung
7. Water
8. Measurement scale
9. Vermi compost

4.2 METHODOLOGY :

4.2.1 SAMPLE COLLECTION:

The sample was collected from the home waste product and they were thoroughly washed with tap water and then shade dried.

4.2.2 Sample preparation:

Collected samples were washed with running tap water to remove the dust and dried in sunlight in 4 days.



4.2.2.1 Dried banana peel



4.2.2.2 Cow dung



4.2.2.3 Egg shell

4.2.2.4 Onion peel



4.2.3 METHODS OF PREPARATION:

Banana peel fertilizer:

Banana peel has been collected from fruit shop about 250 gm .after collection of sample make it dry at sun light for 4 days without adding anything . Drying has been completed the it crushed and poured into the 1L OF normal distilled water . the ratio was 1:4 .place it without disturbance for 4 days by noting the colour changing an observe capacity of banana peel fertilizer. After that completion of processing it has been applied on soil while applying seeds on sand.

Onion peel fertilizer:

Onion peel has been collected from fruit shop about 250 gm .after collection of sample make it dry at sun light for 4 days without adding anything .Drying has been completed the it crushed and poured into the 1L of normal distilled water . the ratio was 1:4 .place it without disturbance for 4 days by noting the colour changing an observe capacity of onion peel fertilizer. After that completion of processing it has been applied on soil while applying seeds on sand.

Egg shell fertilizer:

Egg shell has been collected from fruit shop about 250 gm .after collection of sample make it dry at sun light for 4 days without adding anything . Drying has been completed the it crushed and poured into the 1L of normal distilled water . the ratio was 1:4 .place it without disturbance for 4 days by noting the colour changing an observe capacity of egg shell fertilizer. After that completion of processing it has been applied on soil while applying seeds on sand.

Cow dung fertilizer:

Cow dung has been collected from fruit shop about 250 gm .after collection of sample make it dry at sun light for 4 days without adding anything . Drying has been completed the it crushed and poured into the 1L of normal distilled water . the ratio was 1:4 .place it without disturbance for 4 days by noting the colour changing an observe capacity of cow dung fertilizer . After that completion of processing it has been applied on soil while applying seeds on sand.



4.3.1 DAY 1

4.3.2 DAY 3





4.3.3 after filtration

CHAPTER 5: RESULT AND DISCUSSION :

TABLE5.1.1 SEED GROWN IN USED FERTILIER

The liquid fertilizers have prepared before the application on soil. And seeds have been counted before adding into the soil to know how much seeds have grown by using these fertilizers. After the growth of seeds again the seed sample have been taken out and counted for the calculation of grown and non growth seeds on soil at the days of 2.

S NO.	NAME OF FERTILIZER USED	NUMBER OF SEEDS	NUMBER OF SEEDS GROWN
1	Banana fertilizer	20 – 40	38
2	Onion fertilizer	20 – 45	36
3	Cow dung fertilizer	15 – 40	20
4	Egg shell fertilizer	18 – 45	-

5.1 egg shell



5.2 banana peel



5.3 onion peel





5.4 water



5.5 cow dung

TABLE 5.2.1 READING OF PLANT GROWN IN PLANT

On used four types of fertilizer ,here banana fertilizer have grown as best one when compared with other three fertilizer and cow dung fertilizer have grown well as second one .Onion fertilizer shows well growth at 20 days of about 3.8 cm of shoot . At last the egg shell fertilizer it shows lower contribution on growth of green gram due to the high level of water concentration of suppress the growth of seeds on soil . banana fertilizer have shown very good growth fig 5.2.2 due to the perfect degradation and application. Cow dung fertilizer has given a better growth on seeds of green gram while adding with green gram on soil.

DAY	BANANA PEEL FERTILIZER	COW DUNG FERTILIZER	EGG SHELL FERTILIZER	ONION PEEL FERTILIZER	NORMAL WATER
DAY 5	Shoot- 1.5cm Root-0.9 cm	Shoot- 1 cm Root-0.6 cm	Shoot-0 Root-0.1 cm	Shoot- 1 cm Root-1.8 cm	Shoot- 1.2 cm Root- 0.7cm
DAY 10	Shoot- 2.9cm Root-2.4cm	Shoot- 2.5cm Root-1 cm	Shoot-0 cm Root- 0 cm	Shoot-2cm Root-1.5cm	Shoot- 2.7cm Root- 2.2cm
DAY 15	Shoot-5.7 cm Root-5.3cm	Shoot3.9cm Root-3cm	Shoot-0cm Root- 0 cm	Shoot-.3cm Root-2.3cm	Shoot-4.7 cm Root-4.3 cm
DAY 20	Shoot-6.1 cm Root-5.7 cm	Shoot- 4.1cm Root-3.8cm	Shoot-0 cm Root-0 cm	Shoot- 3.7cm Root-2.9cm	Shoot-5.9 cm Root-4 cm



5.2.1 early growth of onion fertilizer 5.2.2 early growth for banana fertilizer



5.2.3 early growth for cow dung fertilizer



5.2.4 early growth for egg shell fertilizer



5.2.5 early growth for water

CHAPTER : 6 SUMMARY AND CONCLUSION :

The onion, the peel, Banana peel, Egg shell and the Cow dung of liquid basis preparation of liquid fertilizers were used as a sample. These are the samples were all collected from home waste products except the cow dung collected from a cattle farm. These fertilizers are applied with green gram. From the day 1 – 5 it has been measured with normal reading scale vice versa for 30 days of measurements. The banana peel fertilizer have shows a better growth than the other fertilized samples. Onion peel fertilizer shows moderate level of growth on seeds of green gram used. The cow dung fertilizer shows normal level of growth on applied seeds. And last, the egg shell fertilizer it shows a poor growth rate ,it may be due to the environmental conditions and so the concentration of fertilizer have not suitable for the seeds on soil for growth. From the prepared liquid fertilizers the banana fertilizer was the best one for the growth of seeds. It has showed the contribution and performance of the banana peel on soil. The measurements have been tabulated and figures too

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