COMPLETE SPECIFICATION

APPLICANT'S NAME: SHAH RAHUL RAVINDRA

SHAH GEETA RAHUL

CHARLA KEJAL AJAY

TOTAL SHEET NO. 04

SHEET NO. 01

Sr. No	Particulars	Contents
1	Organic Stimulator	1% to 50%
2	Banana stem juice	1% to 25%
3	Biomethanated liquid spent wash (sugar refinery waste)	1% to 25%
4	Biomethanated powder spent wash (sugar refinery waste)	1% to 25%
5	Cow & bullock urine of specific breed	QS

Fig. 1

SHAH RAHUL RAVINDRA

SHAH GEETA RAHUL

CHARLA KEJAL AJAY

COMPLETE SPECIFICATION

APPLICANT'S NAME: SHAH RAHUL RAVINDRA

SHAH GEETA RAHUL

CHARLA KEJAL AJAY

TOTAL SHEET NO. 04

SHEET NO. 02

Composition of Organic Stimulator

S.No	Items	Family	contents
1	Banana stem pulp and juice	Musaceae	1.0% to 60%
2	Roots, leaves,bark & fruits from Moraceae family plants.	Moraceae	1.0% to 50%
3	Fresh leaves from Asphodelaceae/Liliaceae family plants.	Asphodelaceae/ Liliaceae	1.0% to 30%
4	Fresh leaves from Meliaceae family plants.	Meliaceae	1.0% to 30%
5	Fresh leaves and latex from Apocynaceae plants.	Apocynaceae	1.0% to 25%
6	Roots, leaves,bark from Fabaceae family plants	Fabaceae	1.0% to 25%
7	Stem & fresh leaves from Musaceae family plants.	Musaceae	1.0% to 20%
8	Stem and leaves from Pontederiaceae family plants	Pontederiaceae	1.0% to 20 %
9	Bulbs & leaves from Amaryllidaceae family plants	Amaryllidaceae	1.0% to 10 %
10	Grass from Poaceae family plants.	Poaceae	1.0% to 10 %
11	Stem and leaves from Zingiberaceae family plants.	Zingiberaceae	1.0% to 5.0 %
12	Fresh leaves from Malvaceae family plants.	Malvaceae	1.0 % to 5.0 %
13	Fresh leaves from Oxalidaceae family plants.	Oxalidaceae	1.0 % to 5.0 %
14	Natural salts		1.0% to 10 %
15	Leftover fruits and raw vegetable wastes		1.0% to 20 %
16	Water		1.0% to 20 %

Fig. 2

SHAH RAHUL RAVINDRA

SHAH GEETA RAHUL

CHARLA KEJAL AJAY

COMPLETE SPECIFICATION

APPLICANT'S NAME: SHAH RAHUL RAVINDRA **TOTAL SHEET NO. 04**

SHAH GEETA RAHUL **SHEET NO. 03**

CHARLA KEJAL AJAY

Bio Organic Liquid Fertilizer with Banana stems Juice

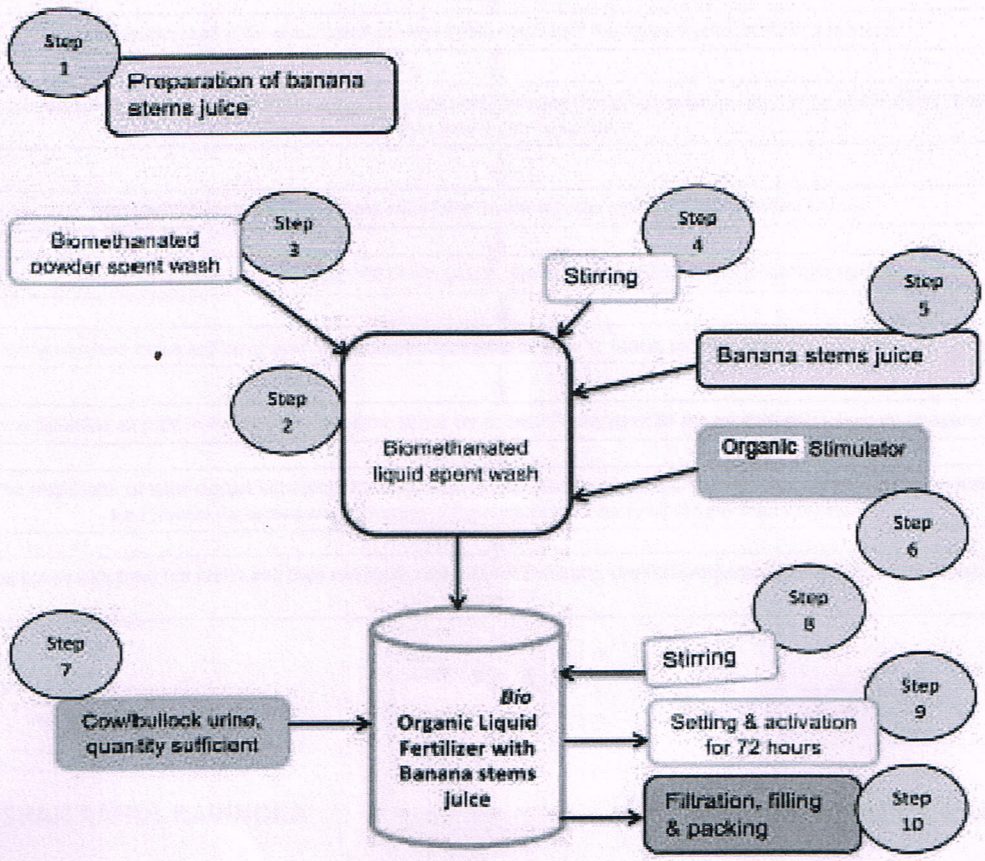


Fig. 3

SHAH RAHUL RAVINDRA

SHAH GEETA RAHUL

CHARLA KEJAL AJAY

COMPLETE SPECIFICATION

APPLICANT'S NAME: SHAH RAHUL RAVINDRA

SHAH GEETA RAHUL

CHARLA KEJAL AJAY

TOTAL SHEET NO. 04

SHEET NO. 04

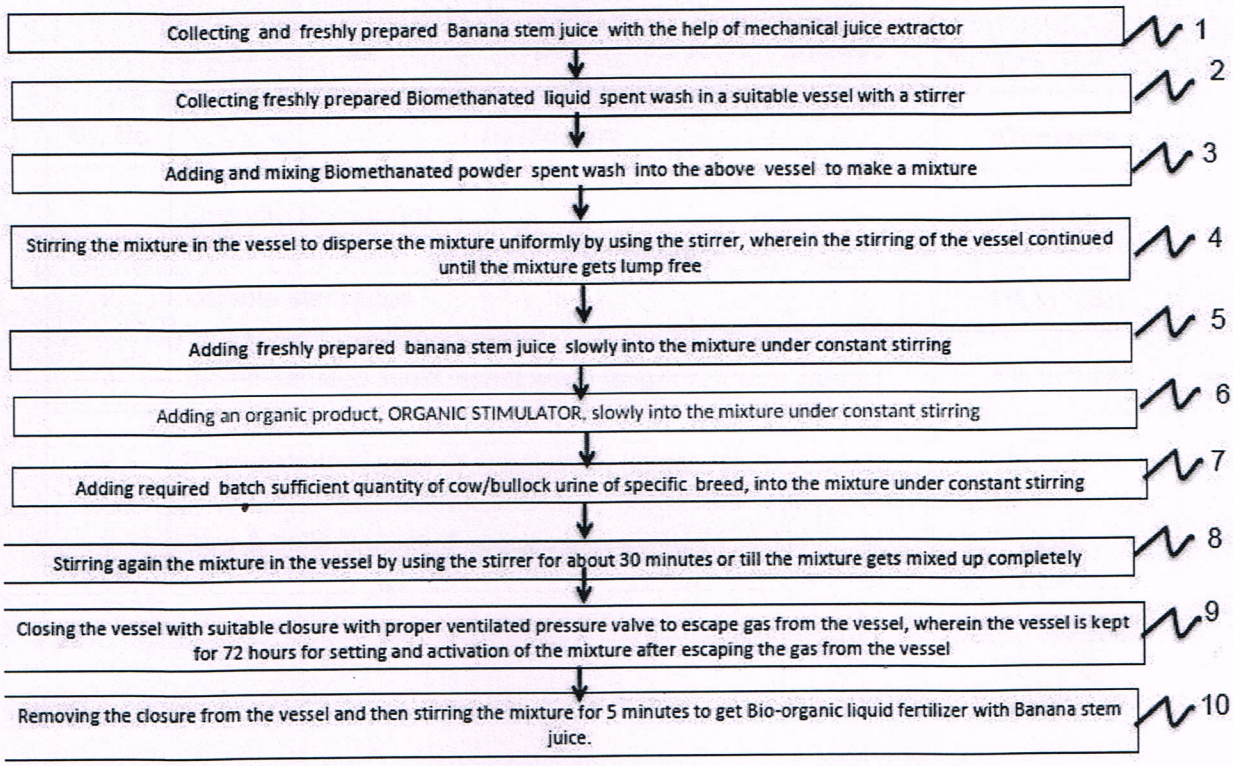


Fig. 4

SHAH RAHUL RAVINDRA

SHAH GEETA RAHUL

CHARLA KEJAL AJAY

FORM 2
THE PATENT ACT 1970
(39 OF 1970)
&
The Patents Rules, 2003
COMPLETE SPECIFICATION
(See section 10 and rule 13)

1. TITLE OF THE INVENTION:

Bio-organic liquid fertilizer containing banana stem juice and method of preparation thereof

2. APPLICANT:

1. a)NAME : Shah Rahul Ravindra
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2. a)NAME : Shah Geeta Rahul
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3. a) NAME : Charla Kejal Ajay
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Maharashtra, India.

3. PREAMBLE TO THE DESCRIPTION

PROVISIONAL The following specification describes the invention	**☑ COMPLETE** The following specification particularly describes the invention and the manner in which it is to be performed

TITLE OF THE INVENTION:

Bio-organic liquid fertilizer containing banana stem juice and method of preparation thereof

FIELD OF THE INVENTION:

The present invention relates to the field of organic fertilizers and describes a bio-organic liquid fertilizer which is prepared using banana stem juice along with biomethanated powder spent wash, biomethanated liquid spent wash, an organic stimulator and cow and bullock urine which promotes plant growth, improves soil structure and degrades pesticide residues.

BACKGROUND OF THE INVENTION:

Farming is the activity of growing crops/plants. Plants need air, water, sunlight and nutrients to grow. Agricultural (fertile) land usually contains most of the nutrients required for the growth of plants. However with repeated growth of plants/crops, the nutrient levels in the soil decrease. Hence farmers need to externally provide the required nutrients for the plants. These nutrients are provided in the form of fertilizers. Since a long time chemical fertilizers dominated the market as being used by farmers to grow crops. However these chemical fertilizers prove to be harmful to the soil as well as to the crops. So since the last few decades, the farmers have limited their use of chemical fertilizers and have started using organic fertilizers.

Organic fertilizers are naturally available mineral sources which contain nutrients essential for the growth of plants. These fertilizers are derived from organic sources including organic compost, cattle manure, poultry droppings, domestic sewage etc. Apart from providing the nutrient requirements to the plants, organic fertilizers improve soil structure, aeration and texture, increase the water retention capacity of the soil and stimulate healthy

root development. Bio-organic fertilizers are environment friendly and cost-effective renewable sources of plant nutrients which help in solubilising insoluble nutrients so that it can be easily absorbed by the plants.

Different types of organic fertilizers are available in the prior art.

US 11304359 discusses a new method of disposing of waste for the hog industry which avoids use of lagoons. Manure is semi-continuously degritted, anaerobically digested and digested with biomass to produce bio-organic fertilizer and biogas.

US 11299438 describes the production and use of environmentally friendly liquid organic biofertilizer for soils and/or plants which is colonized by natural soil microorganisms. It is proposed the method in which, due to the optimal processing of a starting humus-containing soil or soil mixture colonized by natural soil microorganisms with applying the proposed "soft" controlled turbulence action without cavitation effects, the conditions for preserving and reproducing the natural soil microorganisms in their natural medium are provided, as a result it is obtained the final product in the form of a homogenous fine-dispersed suspension, which contains the solids of 10-50 microns size. This product is mainly composed of water-soluble nitrogen (preferably 40 mg/100 g fertilizer) and water-soluble carbon (preferably 470 mg/100 g fertilizer) and is suitable for packaging and long-term storage. The claimed biofertilizer is uniformly colonized by the hardened natural soil microorganisms which are in the state of anabiosis and spore forms, their concentration being at its maximum. The proposed treating soil, seeds or plants with using this biofertilizer results in higher crop yields, improved fertility of depleted soils and restored fertility of sandy and sandy-loam soils.

US 202220089505 discloses a method of preparing high quality homogenous slow-release bio-fertilizer that may include steps of preparing a liquid concentrate comprising nitrogen, potassium, phosphorus, ammonium nitrate, bacteria, one or more wetting agent, natural

enzymes, azomite powders, trace mineral and basalt rock powders; adding said liquid concentrate to a biosolid; mixing the liquid concentrate-biosolid composition in a mixing means; and drying said composition. In one embodiment, a bio-fertilizer can be a homogenous organic base fertilizer for plant nutrition and soil fertility. Also, the fertilizer in the present invention can be added for plant nutrition and soil fertility, and concentrated liquid formulations/nutrient supplements can be added to the fertilizer in the present invention.

US 20220220042 provides an organic fertilizer for controlling pollution or accumulation of heavy metal cadmium in rice and a preparation method and an application method thereof wherein the fertilizer is, based on 100 kg of organic material with a water content of 15%, added with 0.05-5 kg of iron salt calculated as iron, and is also added with manganese salt, zinc salt and copper salt, wherein a mass ratio of the iron salt calculated as iron, the manganese salt calculated as manganese, the zinc salt calculated as zinc and the copper salt calculated as copper is 1: 0.2-8: 0.08-2: 0.001-0.5.

WO 2022088205 gives a method for producing a bacterial fertilizer by propagating Trichoderma, comprising: inoculating a Trichoderma strain into a PDA culture medium and cultivating for 3-6 days, so as to obtain a Trichoderma species; taking, in parts by weight, 10 parts of corn flour, 10 parts of wheat bran, 5 parts of bran, 2 parts of sucrose, 1 part of calcium carbonate and 0.1 parts of ferrous phosphate, and adding to sterile water, and adding same together into a mixer for thorough stirring and mixing to form a liquid fermentation broth; and obtaining a bacterial fertilizer by means of a series of process methods. In the method for producing a bacterial fertilizer by propagating Trichoderma, cheap raw materials are used and the method is easy to carry out; large-scale devices are not required, the process is simple, a large amount of Trichoderma is produced, and the method is highly efficient and may be applied widely; in addition, the method can be implemented in stages on a large scale,

the obtained intermediate product suspension mixture can be stored as an intermediate product and is extremely convenient to use; furthermore, the produced Trichoderma can assist plant growth.

AU 2020103030 relates to an application of mixed fertilization of a liquid bio-organic fertilizer and a nitrogen fertilizer in improving yield and quality of hot peppers, and belongs to the technical field of fertilizers. The liquid bio-organic fertilizer disclosed in the present invention is a green and environment-friendly organic fertilizer, and fully utilizes animal blood to change waste into treasure. The application of the fertilizer can increase soil organic matter and available nitrogen, phosphorus and potassium, enhance soil fertility and enhance disease resistance, insect resistance and stress resistance of crops. When application of the nitrogen fertilizer is decreased by 40% and the liquid bio-organic fertilizer is applied by 28 kg/667m2, the yield of the hot peppers can be significantly increased; meanwhile, sensory quality and nutritional quality of the hot peppers can be improved; and during field or protective area cultivation, mixed application of moderate amount of the liquid bio-organic fertilizer and the nitrogen fertilizer may realize high-quality synergistic cultivation of outdoor vegetables.

AU 2021101330 describes a special liquid bio-organic fertilizer for cantaloupes and application thereof, and belongs to the technical field of agriculture. The special liquid bio-organic fertilizer for cantaloupes comprises the following components: amino acid 100 g/l and trace element supplement 20 g/l. The present invention further provides a field fertilization method of cantaloupes and application of the special liquid bio-organic fertilizer for cantaloupes. The present invention can improve the weight of a single cantaloupe, the central lightproof sugar content of cantaloupes, the soil fertility, the soil environment, and the resistance of crops to diseases.

CN 113981012 discusses a method for co-producing biogas and bio-organic fertilizer by using paper pulp production waste. The method is characterized by comprising the following steps: mixing excrement and solid waste and/or liquid waste generated in the paper pulp production process, directly fermenting to prepare biogas, after fermentation is completed, carrying out solid-liquid separation to obtain biogas slurry and biogas residue, directly using the biogas slurry as a liquid bio-organic fertilizer, and composting the biogas residue to obtain a solid bio-organic fertilizer. The bottleneck that solid waste and liquid waste in fiber production are difficult to treat is broken through, and cleaning treatment and resource utilization of the waste in the production process are achieved. According to the paper pulp production waste anaerobic fermentation process, the biogas generation amount is obviously better than that of a conventional method, and meanwhile all indexes of the prepared liquid and solid organic fertilizer can reach the national standard.

CN 114195560 discloses a method for co-producing fibers, biogas and a bio-organic fertilizer from agricultural straws, which comprises the following steps: by taking the agricultural straws and livestock and poultry manure as raw materials, treating the agricultural straws by adopting a mechanical pulping method to obtain material preparation wastes, pulping waste liquid and fibers; mixing the material preparation waste, the pulping waste liquid and livestock and poultry manure, fermenting to obtain biogas, biogas slurry and biogas residue, composting the biogas residue to obtain a solid bio-organic fertilizer, and directly using the biogas slurry as a liquid bio-organic fertilizer. A large number of experiments prove that a large amount of biogas can be generated by adding a proper amount of material preparation waste into the waste liquid generated in the fiber manufacturing process of the chemical-mechanical method for fermentation, meanwhile, biogas slurry and biogas residues obtained through biogas fermentation can be used for production of the bio-organic fertilizer, and full-quality and resource utilization of biomass can be achieved through the method; a new way is

provided for cleaning treatment of agricultural straw, and the method has important significance on new rural construction and green agriculture development.

CN 114380639 reveals a preparation method of a bio-organic fertilizer, which comprises the following steps: S1, preparing raw materials; s2, drying and sterilizing 100 parts of livestock manure which is subjected to anaerobic fermentation and is subjected to fermentation liquid removal and 20-30 parts of mushroom residues which are subjected to microbial fermentation, and crushing to 100 meshes to obtain an organic fertilizer carrier for later use; s3, 8-12 parts of a mixed aqueous solution of humic acid and amino acid and 10-18 parts of a ternary compound inorganic fertilizer are added into an organic fertilizer carrier, a compound microbial agent is inoculated, fermentation is conducted for a period of time, and then granulation is conducted to obtain the finished bio-organic fertilizer. According to the preparation method of the bio-organic fertilizer, the livestock manure which is subjected to anaerobic fermentation and is subjected to fermentation waste liquid removal is adopted as a raw material, other impurities dissolved in water are removed, meanwhile, heavy metal ions are also removed, the fertilizer efficiency of the organic fertilizer is improved, and besides, possible pollution of the heavy metal ions to soil is reduced.

Although a number of bio-organic and organic fertilizers are available in the prior art, most of them are slow acting fertilizers due to which they take longer time in showing their effect. Many of them are prepared using specialized ingredients and procedures due to which these organic fertilizers prove to be expensive. Hardly a few organic fertilizers have the capability to prevent and eliminate diseases and pests in plants. Moreover the spent wash obtained from ethanol distilleries has a high organic load which needs to be treated before its disposal, which proves to be an expensive process. Hence a bio-organic fertilizer which uses easily available natural ingredients for its preparation along with spent wash obtained from

ethanol distilleries to meet all the nutritional requirements of the plants, enhance soil fertility and prevent and eliminate diseases and pests from plants, is the need of the day.

OBJECT OF THE INVENTION:

The main object of the invention is to provide bio-organic liquid fertilizer containing banana stem juice and method of preparation thereof which contains banana stem juice, biomethanated liquid spent wash, biomethanated powder spent wash, an organic stimulator and cow and bullock urine which provides all the essential nutrients for the growth of crops, improves soil structure, degrades pesticide residues and promotes plant growth.

Another object of the invention is to provide bio-organic liquid fertilizer containing banana stem juice and method of preparation thereof which involves a simple and easy method for the preparation of the bio-organic fertilizer.

Still another object of the invention is to provide bio-organic liquid fertilizer containing banana stem juice and method of preparation thereof which involves the use of spent wash from ethanol distilleries, thereby eliminating the requirement for its treatment before discharging.

Yet another object of the invention is to provide bio-organic liquid fertilizer containing banana stem juice and method of preparation thereof which limits environmental pollution by utilizing the spent wash from ethanol distilleries thereby protecting the environment.

A further object of the invention is to provide bio-organic liquid fertilizer containing banana stem juice and method of preparation thereof which prevents diseases in plants and eliminates pests and insects.

A still further object of the invention is to provide bio-organic liquid fertilizer containing banana stem juice and method of preparation thereof which contains proteins,

macronutrients, micronutrients, hormones, minerals, salts, enzymes etc. which are useful for plant growth and yield enhancement.

A yet further object of the invention is to provide bio-organic liquid fertilizer containing banana stem juice and method of preparation thereof which is economical.

SUMMARY OF THE INVENTION:

The present invention is related to bio-organic liquid fertilizer containing banana stem juice and method of preparation thereof which is made from banana stem juice, biomethanated powder spent wash, biomethanated liquid spent wash, cow/bullock urine and liquid organic stimulator made from banana stem juices and crushes, leaves, roots, stem, bark, fruits and bulbs of wild trees and grass, leftovers of fruits and raw vegetable wastes, urine of cow/bullock, natural salts and water. The method of preparation of the bio-organic liquid fertilizer involves adding biomethanated powder spent wash and banana stem juice in a vessel containing biomethanated liquid spent wash to which organic stimulator is added along with cow/bullock urine and mixed and allowed to settle and activate for 72 hours following which it is filtered and the fertilizer is ready for packing/filling. The bio-organic liquid fertilizer can be sprayed as a fertilizer by mixing 25 ml fertilizer in 15 litres water, can be used to eliminate the bad effects of pesticides, chemical fertilizers and its residues by spraying within 48 hours of application of the pesticide and can be used for elimination of arsenic and heavy metals by dipping/soaking the roots of sapling in a solution of 50 ml fertilizer in 3 litres of water.

BRIEF DESCRIPTION OF THE DRAWINGS:

Fig. 1 gives the composition of the bio-organic liquid fertilizer.

Fig. 2 gives the table displaying the components used for the preparation of the organic stimulator to be used in the preparation of the bio-organic liquid fertilizer.

Fig. 3 gives the flow chart of the method for the preparation of the bio-organic liquid fertilizer.

Fig. 4 gives the process flow diagram of the method for the preparation of the bio-organic liquid fertilizer.

DETAILED DESCRIPTION:

The nature of the invention and the manner in which it is performed is clearly described in the specification. The invention has various components and they are clearly described in the following pages of the complete specification.

Banana is a herbaceous plant of the Musaceae family and is the most widely grown tropical fruit. Not only the fruit, all parts of a banana plant are useful. The fruit of banana plant is one of the most eaten fruit worldwide. The flowers of banana plant are used as a vegetable in Southeast Asian cuisine. The leaves of banana plant, although not edible due to their tough consistency, are used to make eco-friendly disposable food containers as well as in cooking. The stem of banana tree is tender and contains lots of nutrients. Banana stem juice contains polysaccharide compounds, crude proteins, crude lipid, crude fiber, polyphenols, potassium, antioxidants etc. Due to its high nutritional value, banana stem can be used as a fertilizer.

During sugar production and ethanol distillation, a huge quantity of effluents are generated which are called distillery spent wash. This spent wash is a dark coloured waste having high BOD and COD values and a very good concentration of inorganic minerals and thus is heavily bio-burdened and toxic (as it contains heavy metals), which need to be treated before disposal. Treatment of the high BOD and COD containing waste proves to be costly as

well as environmental polluting. Hence if the high minerals, BOD and COD containing spent wash is used as a raw material for making an organic fertilizer, the environmental pollution is limited and the organic load containing waste becomes useful.

The present invention describes a bio-organic liquid fertilizer containing banana stem juice and method of preparation thereof wherein the bio-organic liquid fertilizer is mainly consists of banana stem juice, biomethanated liquid spent wash, biomethanated powder spent wash, cow/bullock urine and an organic stimulator which is made from banana stem pulp and juice, different parts of wild trees and grass found in the forests, left over of fruits and raw vegetable wastes, cow/bullock urine and natural salts.

The table displayed in Fig. 1 gives the composition of the bio-organic liquid fertilizer of the present invention according to which the components used are 1% to 25% banana stem juice, 1% to 25% biomethanated liquid spent wash, 1% to 25% biomethanated powder spent wash and 1% to 50% organic stimulator along with cow/bullock urine of specific breed. Here, the specific breed is the Gir breed of cows/bullocks.

The method for the preparation of the bio-organic liquid fertilizer of the present invention is a three staged process which include:

Stage 1: Preparation of the organic stimulator.

Stage 2: Preparation of biomethanated liquid spent wash and biomethanated powder spent wash.

Stage 3: Preparation of the bio-organic root fertilizer.

Stage 1: Preparation of the organic stimulator:

The composition of the organic stimulator of the present invention is shown in the table displayed in Fig. 2. The various components used for the preparation of the organic stimulator are as follows:

1.0 – 60 % banana stem pulp and juice from the Musaceae family of plants;.

1.0 – 50 % roots, leaves, bark and fruits from the Moraceae family of plants;

1.0 – 30 % fresh leaves from Asphodelaceae/Liliaceae family of plants;

1.0 – 30% fresh leaves from Meliaceae family of plants;

1.0 – 25% fresh leaves and latex from Apocynaceae family of plants;

1.0 – 25% roots, leaves and bark from Fabaceae family of plants;

1.0 – 20% stem and fresh leaves from Musaceae family of plants;

1.0 – 20% stem and leaves from Pontederiaceae family of plants;

1.0 – 20% leftovers of fruits and raw vegetable wastes;

1.0 – 10% bulbs and leaves from Amarylidaceae family of plants;

1.0 – 10 % grass from Poaceae family of plants;

1.0 – 5.0 % stem and leaves from Zingiberaceae family of plants;

1.0 – 5.0 % fresh leaves from Malvaceae family of plants; and

1.0 – 5.0 % fresh leaves from Oxalidaceae family of plants

Along with the different parts of plants, 1.0 – 10 % natural salt is added. This natural salt is any naturally occurring salt like rock salt, sea salt etc. The composition also contains 1.0 – 20 % water and cow and bullock urine, which initially is added in 1.0 – 20 % quantity and then the final volume of the composition is also made with cow and bullock urine. Urine from Gir cows and bullocks is specially used for the preparation.

The method for the preparation of the organic stimulator of the present invention involves the following steps:

Step 1: Collect banana stems from banana farm after harvesting and extract its pulp and juice with the help of a juice extractor.

Step 2: Collect leaves from the plants mentioned, which grow naturally in city councils, forests and the wild areas, in the required quantities. Shred the leaves to small bits of pieces with the help of a cutting machine.

Step 3: Add the banana pulp and juice prepared in step 1 in the manufacturing tank.

Step 4: Add the bits of leaves prepared in step 2 in the manufacturing tank.

Step 5: Add a part of the predetermined quantity of Gir cow/bullock urine to the tank to soak the leaves fragments' present in the tank. Add 1.0 – 20% water and 1.0 – 10 % natural salts to the tank. Close the tank tightly with the lid and keep it well closed.

Step 6: Collect the roots, stem and barks from the various plants mentioned in the composition in the mentioned quantities and cut them into small pieces with a shredder/cutting machine. Add these roots, stem, bark shreds into the above tank and keep it well closed.

Step 7: Add predetermined quantity of fruits and bulbs from various plants, as mentioned in the composition, in the manufacturing tank and close its lid tightly.

Step 8: Add other remaining materials like required quantity of leftovers of fruits and raw vegetables wastes, latex etc. to the tank. Make the batch volume by adding sufficient quantity of cow/bullock urine. Mix well for 30 minutes or till all the ingredients get completely mixed. Keep the tank well closed for 90 days with the help of valve closures for activation and maturation.

Step 9: After maturation for 90 days, open the tank, visually check its appearance and consistency for extractions, solubility of salts and leaves etc. and mix well for 30 minutes. Allow the mixture to settle down for a while and separate the liquids and solids by decantation process. The resultant liquid is the organic stimulator of the present invention which is filtered and used.

Stage 2: Preparation of biomethanated liquid spent wash and biomethanated powder spent wash:

For the preparation of the biomethanated liquid spent wash and biomethanated powder spent wash, the spent wash obtained from ethanol distilleries is initially anaerobically treated along

with degassing, to produce the biomethanated liquid spent wash, which is in liquid form. This liquid biomethanated spent wash is concentrated by evaporation and is called biomethanated evaporated spent wash. The biomethanated evaporated spent wash is dried by means of spray drying or other means of mechanical drying process. This dried powder is called biomethanated powder spent wash. Among these the biomethanated liquid spent wash and the biomethanated powder spent wash are used in the preparation of the bio-organic liquid fertilizer of the present invention.

Stage 3: Preparation of the bio-organic liquid fertilizer:

The flow chart for the preparation of the bio-organic liquid fertilizer has been displayed in Fig. 3 and the process flow diagram for the same has been displayed in Fig. 4. As shown in Figs. 3 and 4, the preparation of the bio-organic liquid fertilizer involves the following steps:

Step 1 – Collect stems of banana plant and extract its juice with the help of a mechanical extractor.

Step 2 – Collect freshly prepared biomethanated liquid spent wash in a suitable vessel with a stirring mechanism.

Step 3 – Add biomethanated powder spent wash to the vessel and stir well to disperse uniformly.

Step 4 – Stir the mixture in the vessel to disperse the mixture uniformly with the help of the stirrer. Continue stirring till the mixture becomes lump free.

Step 5 – Add freshly prepared banana stem juice slowly to the mixture with constant stirring.

Step 6 – Add the organic stimulator slowly into the mixture with constant stirring.

Step 7 – Add the required quantity of batch sufficient quantity of cow/bullock urine of specific breed into the mixture with constant stirring.

Step 8 – Stir the mixture in the vessel properly with the help of the stirrer for 30 minutes or till the mixture gets completely mixed.

Step 9 – Close the vessel with suitable closures with proper ventilated pressure valves for the resultant gas to escape from the vessel. Keep the vessel closed for 72 hours for setting and activation of the mixture after the gas has escaped from the vessel.

Step 10 – Remove the closure from the vessel and stir the mixture for 5 minutes which is then filtered, filled and packed to be used as the bio-organic liquid fertilizer.

The bio-organic liquid fertilizer of the present invention can be used for enhancing the growth of the plants, eliminating the bad effects of pesticide, chemical fertilizers and its residues and the elimination of heavy metals and arsenic from crop yields. The dosage for use of the bio-organic liquid fertilizer is as follows:

(i) For enhancing the growth of plants, add 25 ml of bio-organic liquid fertilizer to 15 litre water in a spray pump, mix well and spray once in 7 to 8 days.

(ii) For eliminating the bad effect of pesticide, chemical fertilizers and its residues, add 25 ml of bio-organic liquid fertilizer to 15 litres of water in a spray pump, mix well and spray after 48 hours of application of the pesticide or chemical fertilizer to the crops/plants.

(iii)For elimination of arsenic and heavy metals from the crops/plants, dip/soak the roots of saplings in a solution of 50 ml bio-organic fertilizer in 3 litres of water, before sowing.

The bio-organic liquid fertilizer of the present invention is highly advantageous as it contains all the essential nutrients required for the luxuriant growth of plants and has high fertilizer efficiency. This fertilizer enhances the growth rate of plants thereby increasing its production. It prevents the occurrence of diseases in plants and eliminates insects and pests in plants thereby giving a healthy yield. As it utilizes the spent wash from distilleries (making them zero discharge units) the environmental pollution occurring while treatment and disposal of the spent wash is prevented, thereby decreasing pollution and improving the environment. In this manner hazardous effluents are converted into eco-friendly organic

fertilizer. It improves the soil characteristics by preserving moisture and fertility in the soil. It enhances crop alimentary quality and improves its yield. The banana pseudo stem juice contains abundant vegeto-alkali and crude proteins along with other requisite plant nutrients like N, P, K micronutrients and growth promoting hormones like Cytokinin & Gibberellic Acid GA3, etc. thereby providing balance rich nutrients for the plant growth. The biomethanated liquid spent wash and biomethanated powder spent wash contains organic matter, minerals and macronutrients for the growth of plants while the cow and bullock urine contain minerals, salts, hormones and enzymes which are useful for plant growth and yield enhancement. This fertilizer saves 80% dose of chemical fertilizer along with yield advantage of 10-15% increase. It can be used as a replacement for di-ammonium phosphate (DAP) and urea, thus saving the country from financial loses faced due to importing these fertilizers. The bio-organic liquid fertilizer acts as a single solution for soil improvement, increasing water retention in soil, enhancing nutrition values in crop yields, plant protection, reducing heavy metal content and pesticide residues from plants. Only one litre of this fertilizer is sufficient for short crops growing in one acre field until their harvesting. Moreover this bio-organic fertilizer is economical, farmer friendly, non-hazardous, non-polluting, eco-friendly, safe and enhances crop nutrients along with crop yield. Thus this fertilizer is highly advantageous.

Although the preferred embodiment as well as the construction and use have been specifically described, it should be understood that variations in the preferred embodiment could be achieved by a person skilled in the art without departing from the spirit of the invention. The invention has been described with reference to specific embodiments which are merely illustrative and not intended to limit the scope of the invention as defined in the claims.

We claim,

1. Bio-organic liquid fertilizer containing banana stem juice and method of preparation thereof wherein the bio-organic liquid fertilizer mainly consists of banana stem juice, biomethanated liquid spent wash, biomethanated powder spent wash, cow/bullock urine and an organic stimulator which is made from banana stem pulp and juice, different parts of wild trees and grass found in the forests, left over of fruits and raw vegetable wastes, cow/bullock urine and natural salts;

wherein the method of preparation of the bio-organic liquid fertilizer is a three staged process which are as follows:

stage 1 which involves the preparation of the organic stimulator from banana stem pulp and juice, fresh leaves, root, stem, bark, fruits and bulbs of wild trees and grass, left over of fruits and raw vegetable wastes, cow or bullock urine, natural salts and water;

wherein the pulp and juice of stem is taken from banana plant which belongs to Musaceae family of plants;

wherein the fresh leaves used are from Moraceae, Asphodelaceae/Liliaceae, Meliaceae, Apocynaceae, Fabaceae, Musaceae, Pontederiaceae, Amarylidaceae, Zingiberaceae, Malvaceae, Oxalidaceae families of plants;

wherein the grass used is from Poaceae family of plants;

wherein the roots used are from Moraceae and Fabaceae families of plants;

wherein the fruits used are from Moraceae family of plants;

wherein the bark used is from Fabaceae and Moraceae family of plants;

wherein the latex used is from Apocynaceae family of plants;

wherein the stem used is from Musaceae, Pontederiaceae and Zingiberaceae families of plants;

wherein the bulbs used are from Amarylidaceae family of plants;

wherein the leftovers of fruits and raw vegetables wastes are procured from common market yards;

wherein the urine used is of Gir cow or bullock; and

wherein the natural salt used is any naturally occurring salt like rock salt, sea salt etc;

stage 2 which involves the preparation of the biomethanated liquid spent wash and biomethanated powder spent wash wherein the spent wash obtained from ethanol distilleries is anaerobically treated along with degassing to prepare the biomethanated liquid spent wash which is evaporated and dried to prepare the biomethanated powder spent wash; and

stage 3 which involves the preparation of the bio-organic liquid fertilizer by mixing biomethanated powder spent wash in biomethanated liquid spent wash and adding banana stem juice, organic stimulator and cow/bullock urine wherein after mixing the vessel is closed for 72 hours for setting and activation of the mixture, the filtrate of which is the bio-organic liquid fertilizer.

2. The bio-organic liquid fertilizer containing banana stem juice and method of preparation thereof as claimed in claim 1 wherein the composition of the bio-organic liquid fertilizer (Fig. 1) is 1% to 25% banana stem juice, 1% to 25% biomethanated liquid spent wash, 1% to 25% biomethanated powder spent wash and 1% to 50% organic stimulator along with cow/bullock urine of specific breed;

wherein the specific breed of cow/bullock denotes the Gir breed of cow/bullock.

3. The bio-organic liquid fertilizer containing banana stem juice and method of preparation thereof as claimed in claim 1 wherein the quantities of various components used in the preparation of the organic stimulator (Fig. 2), prepared in stage 1 are as follows:

1.0 – 60 % banana stem pulp and juice from the Musaceae family of plants;

1.0 – 50% roots, leaves, bark and fruits from the Moraceae family of plants;

1.0 – 30 % fresh leaves from Asphodelaceae/Liliaceae family of plants;

1.0 – 30% fresh leaves from Meliaceae family of plants;

1.0 – 25% fresh leaves and latex from Apocynaceae family of plants;

1.0 – 25% roots, leaves and bark from Fabaceae family of plants;

1.0 – 20% stem and fresh leaves from Musaceae family of plants;

1.0 – 20% stem and leaves from Pontederiaceae family of plants;

1.0 – 20% leftovers of fruits and raw vegetable wastes;

1.0 – 10% bulbs and leaves from Amarylidaceae family of plants;

1.0 – 10 % grass from Poaceae family of plants;

1.0 – 5.0 % stem and leaves from Zingiberaceae family of plants;

1.0 – 5.0 % fresh leaves from Malvaceae family of plants;

1.0 – 5.0 % fresh leaves from Oxalidaceae family of plants;

1.0 – 10 % natural salt;

1.0 – 20 % water; and

cow or bullock urine q.s. (quantity sufficient).

4. The bio-organic liquid fertilizer containing banana stem juice and method of preparation thereof as claimed in claim1 wherein the method for the preparation of the organic stimulator in stage 1 involves the following steps:

(i) collecting banana stems from banana farm after harvesting and extracting its pulp and juice with the help of a juice extractor;

(ii) collecting leaves from various plants mentioned in the composition in the required quantities and shredding them into small bits of pieces with the help of a cutting machine;

(iii)adding the banana pulp and juice prepared in step (i) in the manufacturing tank;

(iv)adding the shredded leaves fragments' prepared in step (ii) in the manufacturing tank;

(v) adding a part of the predetermined quantity of Gir cow/bullock urine to the tank to soak the leaves fragments' present in the tank followed by adding 1.0 – 20% water and 1.0 – 10 % natural salts to the tank and closing the lid tightly;

(vi)collecting roots, stems and barks from various plants mentioned in the composition in the required quantities and cutting them into small pieces with a shredder/cutting machine and adding these shreds into the tank and closing the lid tightly;

(vii) adding predetermined quantity of fruits and bulbs from various plants mentioned in the composition in the required quantities into the tank and closing the lid tightly;

(viii) adding the remaining materials like predetermined quantity of leftovers of fruits and raw vegetable wastes, latex etc. to the tank, making the batch volume by adding sufficient quantity of cow/bullock urine, mixing well for 30 minutes or till all the ingredients get completely mixed and keeping the tank well closed with the help of valve closures for 90 days for activation and maturation; and

(ix)opening the tank after 90 days of maturation, visually checking the appearance and consistency for extractions and solubility of salts and leaves, mixing well for 30 minutes, allowing the mixture to settle down and separating the liquid and solid by decantation process wherein the resultant liquid is the organic stimulator.

5. The bio-organic liquid fertilizer containing banana stem juice and method of preparation thereof as claimed in claim 1 wherein the preparation of the

biomethanated liquid spent wash and biomethanated powder spent wash in stage 2 involves the following steps:

(i) anaerobically treating the spent wash along with degassing to produce the biomethanated liquid spent wash;

(ii) concentrating the liquid biomethanated spent wash by evaporation; and

(iii) drying the evaporated biomethanated spent wash by spray drying or other mechanical drying process to produce the biomethanated powder spent wash.

6. The bio-organic liquid fertilizer containing banana stem juice and method of preparation thereof as claimed in claim 1 wherein the preparation of the bio-organic liquid fertilizer in stage 3 (Fig. 4) involves the following steps:

(i) collecting stems of banana plant and extracting its juice with the help of a mechanical extractor;

(ii) collecting freshly prepared biomethanated liquid spent wash in a suitable vessel with stirring mechanism;

(iii) adding biomethanated powder spent wash to the vessel and stirring well to disperse uniformly;

(iv) stirring the mixture in the vessel to disperse it uniformly with the help of the stirrer and continuing stirring till the mixture becomes lump free;

(v) adding freshly prepared banana stem juice slowly to the mixture with constant stirring;

(vi) adding the organic stimulator slowly into the mixture with constant stirring;

(vii) adding batch sufficient quantity of Gir cow/bullock urine into the mixture with constant stirring;

(viii) stirring the mixture in the vessel with the help of a stirrer for 30 minutes or till the mixture gets completely mixed;

(ix) closing the vessel with suitable closures with proper ventilated pressure valves for 72 hours for setting and activation of the mixture after the gas has escaped; and

(x) removing the closure from the vessel and stirring the mixture for 5 minutes followed by its filtration, filling and packing.

7. The bio-organic liquid fertilizer containing banana stem juice and method of preparation thereof as claimed in claim 1 wherein 25 ml of bio-organic liquid fertilizer is added to 15 litre water in a spray pump and sprayed once in 7 to 8 days as a fertilizer.

8. The bio-organic liquid fertilizer containing banana stem juice and method of preparation thereof as claimed in claim 1 wherein 25 ml of bio-organic liquid fertilizer is added to 15 litre water in a spray pump and sprayed after 48 hours of application of the pesticide/chemical fertilizer to the plants to eliminate their harmful effects.

9. The bio-organic liquid fertilizer containing banana stem juice and method of preparation thereof as claimed in claim 1 wherein 50 ml of bio-organic liquid fertilizer is added to 3 litres water and the roots of saplings are dipped/soaked in the solution before sowing, to eliminate the effect of arsenic and heavy metals from the plants/crop yields.

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