COMPLETE SPECIFICATION

APPLICANT'S NAME: SHAH RAHUL RAVINDRA

SHAH GEETA RAHUL

TOTAL SHEET NO. 02

SHEET NO. 01

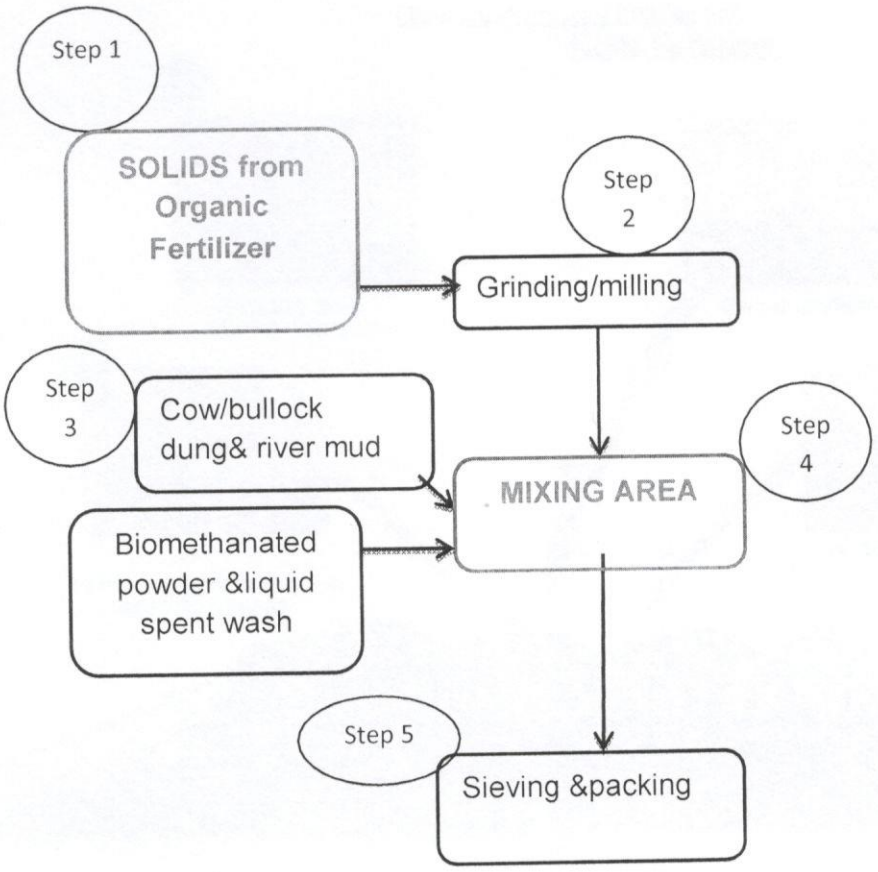


Fig. 1

SHAH RAHUL RAVINDRA

SHAH GEETA RAHUL

COMPLETE SPECIFICATION

APPLICANT'S NAME: SHAH RAHUL RAVINDRA

SHAH GEETA RAHUL

TOTAL SHEET NO. 02

SHEET NO. 02



Fig. 2

SHAH RAHUL RAVINDRA

SHAH GEETA RAHUL

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:

Process for the preparation of an organic root fertilizer

2. APPLICANT:

1.	**a)NAME**	**: Shah Rahul Ravindra**
	b)NATIONALITY	**: Indian**
	c)ADDRESS	**: B-504, Neelkanth Regent Regalia, P-2, Ram Narayan Narkar Marg, Ghatkopar (East), Mumbai - 400077 Maharashtra, India.**
2.	**a)NAME**	**: Shah Geeta Rahul**
	b)NATIONALITY	**: Indian**
	c)ADDRESS	**: B-504, Neelkanth Regent Regalia, P-2, Ram Narayan Narkar Marg, Ghatkopar (East), Mumbai - 400077 Maharashtra, India.**

3. PREAMBLE TO THE DESCRIPTION

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

TITLE OF THE INVENTION:

Process for the preparation of an organic root fertilizer

FIELD OF THE INVENTION:

The present invention relates to the field of an organic fertilizer which is in solid form and is applied to the soil near the roots to increase the fertility of the soil and provide nutrients to the crops.

BACKGROUND OF THE INVENTION:

Soil is the major source of nutrients needed by the plants for growth. The three main nutrients which are essential for the growth of plants are nitrogen (N), phosphorus (P) and potassium (K). The other nutrients essential for the growth of plants are carbon (C), hydrogen (H), oxygen (O), sulfur (S), calcium (Ca), magnesium (Mg), iron (F e), boron (B), manganese (Mn), copper (Cu), zinc (Zn), molybdenum (Mo), nickel (Ni) and chlorine (Cl). Apart from carbon, hydrogen and oxygen, which are supplied through carbon dioxide, water and nitrogen fixation, all other nutrients are mainly derived from the mineral components of the soil. Most of these nutrients are absorbed from the soil water in an ionic form. As the nutrients from the soil water are taken in by plants, the soluble pool is replenished from the surface-bound pool. Moreover the decomposition of soil organic matter by microorganisms is another mechanism through which the soluble pool of nutrients is replenished.

However with continued farming, the nutrients in the soil deplete such that crops are not able to give desired yield. To compensate for the lost nutrients, organic fertilizers or chemical fertilizers are added to the soil. Chemical fertilizers are not recommended as they contaminate the produce with chemicals and are harmful to the soil as well as to the

environment. Due to awareness and concern towards the environment, farmers nowadays are looking for easily available, efficient and economical organic fertilizers.

Organic farming is beneficial for human well-being, environment protection (soil, water and air), rebuilding soil fertility by improving its physical, chemical and biological characteristics and improving the quality of the crops produced. Organic fertilizers are in sync with natural requirements for environment sustainability and continuity. Their bio-degradable nature continues the nutrient cycle and supports natural bio-chemical activities. Understanding the nutrient variability and release pattern of organic fertilizers is crucial to supply plants with sufficient nutrients to achieve optimum productivity along with rebuilding soil fertility and ensuring protection of environmental and natural resources. Organic fertilizers not only improve and condition the soil but also enhance the yield and health of the plants. With the use of organic fertilizers the soil is constantly conditioned and rejuvenated thereby enhancing soil texture, drainage and aeration. The mineral and nutrient breakdown of organic fertilizers takes time due to which it slowly nourishes the soil and ensures that the soil remains fertile for many years.

A number of solid organic fertilizers which are applied to the soil are available in the prior art.

US Patent Application 2022089505 describes a method of preparing high quality homogenous slow-release bio-fertilizer that includes 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 Patent Application 2022135493 discusses a method for producing an organic fertilizer enabling an increased microbial diversity and abundance in soil, and use of the organic fertilizer. The method comprises composting fresh S. alopecuroides plants together with sheep and/or goat manure through anaerobic fermentation. It is found through experiments that, by applying the organic fertilizer produced by the method to a soil in which melon plants are grown, both abundance of bacterial and fungal communities in the rhizosphere of the plants and contents of soluble solids and sugar in fruit of the plants are increased. By a combination of taxonomic composition of the microbial communities in the rhizosphere and RDA analysis, it is further found that abundance of multiple bacterial and fungal species conducive to growth and disease resistance of the plants, is substantially increased and positively correlated with the soluble solids and sugar contents in the fruit.

WO 2022080479 discloses a method for manufacturing an organic fertilizer with an enhanced nitrogen content, the method comprising a step of treating an organic fertilizer with nitrogen plasma. Further, a method for cultivating a plant, comprising a step for manufacturing an organic fertilizer having an enhanced nitrogen content by the manufacturing method, and a step for cultivating a plant in the soil to which the organic fertilizer has been applied. Further, a method for improving soil, comprising a step of manufacturing an organic fertilizer having an enhanced nitrogen content by the manufacturing method, and a step of applying the organic fertilizer to the soil. An apparatus for manufacturing an organic fertilizer having an enhanced nitrogen content, the apparatus comprising: a plasma generation unit, a nitrogen gas supply unit that supplies nitrogen gas to the plasma generation unit, and an organic fertilizer holding unit that holds an organic

fertilizer, wherein the organic fertilizer held by the organic fertilizer holding unit is irradiated with nitrogen plasma generated by the plasma generation unit.

WO 2022104760 provides a biomass-based fertilizer which mainly comprises the following raw materials in percentage by weight: 40-60% of a compound microbial inoculant, 2-8% of chitosan, 0.1-0.5% of a microbial probiotic, 0.001-0.01% of vitamins, 0.001-0.01% of minerals, 1-5% of an organic acid, and the balance of water. The biomass-based fertilizer contains microorganisms and minerals, and can promote plant growth; the raw materials are environment-friendly and pollution-free, the soil microbial community structure can be adjusted, and a good microenvironment of the soil can be maintained; the preparation method is simple, and is suitable for industrial production.

RU 2771225 gives a method for increasing soil fertility in the cultivation of agricultural crops includes feeding the raw material component of organic fertilizer, mixing, homogenization, granulation and drying. Turkey manure with a humidity of 51% is used as an organic fertilizer, bringing it to a humidity of 14-16% and disinfection at a heating temperature of 30°C for 30-35 minutes, while using an OGM-1.5 A installation combining one common processing line. The resulting granules are introduced into the soil at a dose of 28.5 to 57 kg/ha, then the seeds of spring barley or a mixture of haylage herbage are sown to a depth of 2.5...3.0 cm. The seeding rate of spring barley seeds is 325 kg/ha, and haylage herbage up to 35 kg/ha.

CN 114057529 relates to a soil remediation agent and a preparation method thereof. The preparation method comprises the following steps: mixing coal ash, mineral soil and an acid solution and then reacting, and obtaining slurry; and mixing the slurry, organic wastes and microorganisms, and sequentially stacking and fermenting to obtain the soil remediation agent. The soil remediation agent disclosed by the invention contains rich organic matters, mineral elements and trace elements, also contains rich microbial flora, and is relatively high

in nitrogen, phosphorus and potassium contents; the soil remediation agent can effectively improve the contents of soil mineral elements and trace elements and the nitrogen-phosphorus-potassium fertilizer power, also can improve the content of soil organic matters, and promotes microbial reproduction. The soil remediation agent can be used for remarkably improving the crop yield, improving the taste of crops and improving the immunity and disease and pest resistance of the crops.

CN 114075091 describes a preparation method of a biological organic fertilizer capable of resisting continuous cropping obstacles of crops. The preparation method comprises the following steps: adding humic acid accounting for 6-14% of the dry weight of a composted organic fertilizer, fulvic acid accounting for 4-7% of the dry weight of the composted organic fertilizer and an organic carbon fertilizer accounting for 0.5-1.5% of the dry weight of the composted organic fertilizer as a matrix; inoculating beneficial bacteria with disease antagonism and crop growth promoting functions in the matrix; and adding phenolic acid substances into the inoculated matrix to stress and domesticate the beneficial microbial inoculum, introducing oxygen, and carrying out turning culturing until the decomposition ratio of the phenolic acid substances is greater than 80% and the thallus density is greater than a hundred million per gram of matrix to obtain the biological organic fertilizer capable of resisting continuous cropping obstacles of crops. According to the invention, the biological organic fertilizer has the performance of regulating and controlling rhizosphere microflora and converts continuous cropping soil from a fungus type flora to a bacterial type flora; the domestication process is low in cost, easy to operate and easy to popularize; and the technology points to a wide range of objects and has openness and inclusiveness of adjusting technical details according to local conditions.

Although a number of organic fertilizers are available in the prior art which improve the nutritional content in the soil and provide nutrients for the growth of the crops, most of

them require special raw materials and processes for their preparation, which make them costly. Moreover many of these organic fertilizers take longer time to act and do not contain all the essential nutrients due to which supplements are required. Hence an organic fertilizer which contains all the essential nutrients for the growth of plants, which can be made from easily available materials and plant and distillery wastes, which acts quickly to increase soil fertility and growth of crops and which is economical, is the need of the day.

OBJECT OF THE INVENTION:

The main object of the invention is to provide a process for the preparation of an organic root fertilizer which is made from wild trees and grass, leftovers of fruits and raw vegetable wastes, cow/bullock urine, natural salts, biomethanated powder spent wash, biomethanated liquid spent wash, river mud and cow/bullock dung, all of which are easily available ingredients.

Another object of the invention is to provide a process for the preparation of an organic root fertilizer which enables waste management of ethanol distilleries by using biomethanated powder spent wash and biomethanated liquid spent wash for the preparation of the organic fertilizer.

Still another object of the invention is to provide a process for the preparation of an organic root fertilizer which improves the fertility of the soil by providing all the required nutrients in abundant quantities to the soil.

Yet another object of the invention is to provide a process for the preparation of an organic root fertilizer which provides all the essential nutrients for the luxuriant growth of crops and increases their growth rate.

A further object of the invention is to provide a process for the preparation of an organic root fertilizer which is easy to prepare and use.

A still further object of the invention is to provide a process for the preparation of an organic root fertilizer which is safe, farmer friendly, non-hazardous, non-polluting, eco-friendly and economical.

SUMMARY OF THE INVENTION:

The present invention is related to a process for the preparation of an organic root fertilizer which is made from wild trees and grass, leftovers of fruits and raw vegetable wastes, cow/bullock urine, natural salts, biomethanated powder spent wash, biomethanated liquid spent wash, river mud and cow and bullock dung. The process for the preparation of the organic root fertilizer involves the preparation of solid organic fertilizer, preparation of biomethanated powder spent wash and biomethanated liquid spent wash and preparation of the root fertilizer by mixing the solid organic fertilizer, biomethanated powder spent wash, biomethanated liquid spent wash, cow and bullock dung and river mud to make a homogenous mixture and sieving the mixture to get the organic root fertilizer.

BRIEF DESCRIPTION OF THE DRAWINGS:

Fig. 1 gives the flow chart for the preparation of the organic root fertilizer.

Fig. 2 gives the complete diagram for the preparation of the organic root 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.

All kinds of life found on the earth is made of organic matter. Organic matter is usually rich in carbohydrates, proteins and fats along with other compounds. This organic

matter can be decomposed and recycled to make humus rich soil amendment known as organic fertilizer. All the parts of plants, whether dead or alive, feces and urine of animals, plant wastes etc can be used for the preparation of an organic fertilizer. Moreover, spent wash from ethanol distilleries contain a high organic load as these distilleries usually use molasses as the raw material. Hence this spent wash from distilleries, which is hazardous and toxic and hence is difficult to manage, can also be used for the preparation of an organic fertilizer.

The present invention relates to a process for the preparation of an organic root fertilizer which is made from different parts of wild trees and grass, leftovers of fruits and raw vegetable wastes, cow/bullock urine, natural salts, biomethanated powder spent wash, biomethanated liquid spent wash, river mud and cow and bullock dung. All these ingredients are rich in organic matter and essential nutrients which are required for the growth of plants/crops and hence are used for making the root fertilizer which is applied to the soil for increasing the fertility of soil and providing nutrients to crops for the luxuriant growth of crops.

The process for the preparation of the organic root fertilizer is a three staged process, which are as follows:

Stage 1: Preparation of spent wash obtained from ethanol distilleries:

For the preparation of the spent wash obtained from ethanol distilleries, the spent wash 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 organic root fertilizer of the present invention.

Stage 2: Preparation of solid organic fertilizer:

To prepare the organic root fertilizer of the present invention, a solid organic fertilizer is prepared. The various components used for making the solid organic fertilizer are as follows:

1.0 – 60 % roots, leaves, bark and fruits from the Moraceae family of plants;

1.0 – 40 % 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 – 40% 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 organic fertilizer composition is also made with cow and bullock urine. Urine from Gir cows and bullocks is specially used for this composition.

The method for the preparation of the solid organic fertilizer, involves the following steps:

- Collect leaves from various plants mentioned in the composition in the required quantities;
- Shred the leaves to make them into small pieces with the help of a cutting machine;
- Add the shredded leaves fragments' in the manufacturing tank;
- Add sufficient quantity of urine of Gir cow/bullock 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;
- Collect roots, stem and bark from various plants mentioned in the composition in the mentioned quantities and cut them into small pieces with a shredder/cutting machine;
- Add the shredded root, stem and bark pieces into the tank and close its lid tightly;
- Add required quantity of fruits and bulbs from various plants mentioned in the composition in the mentioned quantities, into the tank and close its lid tightly;
- Add required quantity of leftovers of fruits and raw vegetables wastes and close its lid tightly;
- Add the remaining materials like latex and water to the tank. Make the batch volume by adding sufficient quantity of cow/bullock urine;
- Mix well for almost 30 minutes such that all the ingredients get mixed properly;
- Close the tank and keep it closed tightly for 90 days with the help of valve closures for activation and maturation;
- After maturation for 90 days, open the tank, 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 and separate the liquids and solids by decantation process;

- During the decantation process the liquid portion will separate from the sediments/solids or residues;
- The solid/residue portion is then sent for milling/grinding which is then used as solid organic fertilizer.

Stage 3: Preparation of the organic root fertilizer:

The process for the preparation of the organic root fertilizer has been displayed in Fig. 1. Fig. 2 also gives the drawing of the complete process for the preparation of the organic root fertilizer. As shown in the figures, the solid organic fertilizer is grinded/milled and added to a mixing area to which cow/bullock dung along with river mud are added and mixed to which biomethanated powder spent wash and biomethanated liquid spent wash are added and mixed well which mixture is then sieved and packed.

The process for the preparation of the organic root fertilizer involves the following steps:

(i) Initially collect 1% to 50% grinded and milled solid organic fertilizer in a mixing area.

(ii) Slowly add predetermined quantity of Gir bullock and Gir cow dung, 1% to 25% river mud, 1% to 25% biomethanated powder spent wash and 1% to 25% biomethanated liquid spent wash to the mixture one by one.

(iii) Mix well for 45 to 60 minutes or till it makes a homogenous and uniform mixture.

(iv) Dry the mixture, if required, to get free flowing powder and sieve it properly and send for packing.

The prepared root fertilizer can be applied to the soil by sprinkling and trenching. Almost 50 kg to 60 kg root fertilizer needs to be used for the growth of an acre of short crops for a period of 3 months.

The organic root fertilizer prepared by the process of the present invention is highly advantageous as it provides a environment friendly method to convert hazardous wastes emitted from ethanol distilleries, into eco-friendly organic fertilizer. All the raw materials required to prepare the root fertilizer are naturally obtained and so the fertilizer prepared is 100% organic. This root fertilizer has homogenous nutritional values and so provides nutrients to soil, soil life and plants. As the fertilizer is rich in easily absorbable nutrients, it enhances the consistent uptake of nutrients by the plants from the soil. This root fertilizer being in solid state, improves the soil structure and enhances water retention in the soil thereby reducing the water consumption by 15 to 20% (as seepage of water is decreased). It also improves the buffering capacity against fluctuations in pH levels. This root fertilizer also enhances the moisture absorbing capacity of the soil. Moreover the organic root fertilizer of the present invention is non-hazardous, non-polluting, farmer friendly, eco-friendly, safe, economical and enhances the nutrients of the soil and crops. Thus the organic root fertilizer of the present invention 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. Process for the preparation of an organic root fertilizer which is a solid fertilizer made from various parts of wild trees and grass, leftovers of fruits and raw vegetable wastes, cow/bullock urine, natural salts, biomethanated powder spent wash, biomethanated liquid spent wash, river mud and cow and bullock dung wherein the process for the preparation of the organic root fertilizer is a three staged process:

   Stage 1: Preparation of spent wash obtained from ethanol distilleries;

   Stage 2: Preparation of solid organic fertilizer; and

   Stage 3: Preparation of organic root fertilizer..

2. The process for the preparation of an organic root fertilizer as claimed in claim 1 wherein the preparation of spent wash obtained from ethanol distillation 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.

3. The process for the preparation of an organic root fertilizer as claimed in claim 1 wherein the solid organic fertilizer, comprises of:

   1.0 – 60 % roots, leaves, bark and fruits from the Moraceae family of plants;

   1.0 – 40 % 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 – 40% stem and fresh leaves from Musaceae family of plants;

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

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 – 20% leftovers of fruits and raw vegetables wastes;

1.0 – 10 % natural salt;

1.0 – 20 % water; and

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

4. The process for the preparation of an organic root fertilizer as claimed in claim 3 wherein the method for the preparation of the solid organic fertilizer involves the following steps:

(i) collecting leaves from various plants mentioned in the composition in the required quantities;

(ii) shredding the leaves to make them into small pieces with the help of a shredder/cutting machine;

(iii)adding the shredded leaves fragments' in the manufacturing tank;

(iv)adding urine of Gir cow or bullock to the tank to soak the leaves fragments';

(v) adding water and natural salts to the tank;

(vi)closing the lid of the tank tightly;

(vii) collecting roots, stem and bark from various plants mentioned in the composition in the mentioned quantities and cutting them into small pieces with the help of shredder/cutting machine;

(viii) adding the shredded roots, stem and bark pieces into the tank and closing the lid tightly;

(ix)adding fruits and bulbs from various plants mentioned in the composition in the mentioned quantities into the tank and closing the lid tightly;

(x) adding leftovers of fruits and raw vegetables wastes mentioned in the composition in the mentioned quantities into the tank and closing the lid tightly;

(xi)adding the remaining materials like latex and water to the tank and making the batch volume by adding sufficient quantity of cow or bullock urine;

(xii) mixing well all the components in the tank for 30 minutes so that all the ingredients get mixed properly;

(xiii) closing the tank and keeping it closed tightly for 90 days with the help of valve closures for activation and maturation;

(xiv) opening the tank after 90 days and checking its appearance and consistency;

(xv) mixing well for 30 minutes;

(xvi) allowing the mixture to settle down and separating the liquids and solids by the process of decantation; and

(xvii) separating the sediments/solids or residues and sending for milling/grinding which is to be used as solid organic fertilizer.

5. The process for the preparation of an organic root fertilizer as claimed in claim 1 wherein the process for the preparation of the organic solid fertilizer from the prepared ingredients and other raw materials involves the following steps:

(i) collecting 1% to 50% grinded and milled solid organic fertilizer in a mixing area;

(ii) slowly adding predetermined quantity of Gir bullock and Gir cow dung, 1% to 25% river mud, 1% to 25% biomethanated powder spent wash and 1% to 25% biomethanated liquid spent wash to the mixture one by one;

(iii) mixing well for 45 to 60 minutes or till it makes a homogenous and uniform mixture; and

(iv) drying the mixture, if required, to get free flowing powder, sieving it properly and sending for packing.

6. The process for the preparation of an organic root fertilizer as claimed in claim 5 wherein the prepared fertilizer is added to the soil by sprinkling and trenching wherein 50 to 60 kg fertilizer is required for one acre field growing short crops for a period of 3 months.

Dated this 13th of June, 2022

Shah Rahul Ravindra

Shah Geeta Rahul