

Description

Manufacturing and Using Methods of a Special Organic Nutrient Soil for Organic Plants

1. Field of Invention

The invention belongs to agriculture planting field, particularly involving organic plant cultivation.

2. Background of the invention

Artificial soil cultivation technique has high promoting value in crop planting area and its application will be progressively enlarged due to the gradual reduction of arable lands and the increasing demand for crops' nutrition, quality, and safety. Currently, the technique has developed rapidly and been widely used in many developed countries in the world to cultivate the high quality and yield crops especially the organic vegetable, which makes it account for a very high proportion in facility agriculture area. Artificial soil cultivation, a high technology in modern agricultural development, processes the advantages of no environmental and geographical restriction, preventing the underground diseases and pests, and efficiently overcome different obstacles, in addition to the traits of saving water and labor, stable and high yield, convenient implementation for standardization management, and meeting the requests as organic and so on. China already has certain foundation in the application in the area. For example, the research departments represented by The Institute of Flowers Chinese Academy of Agriculture have been developed a practical artificial soil cultivation system and method which suites Chinese situation, conforms to the requirements of agriculture and organic agriculture

Manufacturing and Using Methods of a Special Organic Nutrient Soil for Organic Plants

sustainable development, and achieves the remarkable social, economic, and ecological benefits.

The system and method replaces the traditional high cost, highly difficulty, and non-environmental protective soilless cultivation with organic solid fertilizer technique, which obtained satisfactory results and will be gradually promoted to the organic agriculture application. On this occasion, watering is the only need through the whole growing period for all crops that successfully break through the chemical nutrient solution limitation of soilless cultivation, reduce over 50% of the first-time investment and over 70% of fertilizer cost compared to the original easiest nutrient solution tank cultivation, and also largely simplify the operation procedures to gradually achieve "standardized" management. Nevertheless, there are some documents indicate that this solid organic fertilizer cultivation mentioned above adopt the materials as corn stalks, sawdust, mushroom compost, slag, river peat or other coarse-textured soil, etc. Most of these materials are cheap wasted resources of constantly recycled ecosystem, but as a fertilizer carrier, they will occupy most volume to greatly reduce the fertilizer storage capacity. Besides, it often uses expanded chicken manure as the fertilizer source. Sometimes impure sheep manure will be added too. In addition, the fertility and the nutrition, yield and quality of the crops grown from it are much poorer than the mixture of pure sheep manure plus cattle manure. Therefore, referring to the existing technology, the present invention selects pure sheep manure as the main raw material and mixes it with pure cattle manure as auxiliary material. Through continual experiments and summarizes, a Special Organic Nutrient Soil for Organic Plants which is suitable for plant growing, easy to operate, and integrated of fertilizer sources, has been developed along with its using method. This well-developed invention has become an advanced

Manufacturing and Using Methods of a Special Organic Nutrient Soil for Organic Plants

and practical agricultural achievement with high promoting value. Experiments show that the invention has many more advantages than the variety of existing soilless cultivation techniques, especially in the implementation of organic production. The priority to develop the organic agriculture is to use the pollution-free soil and organic fertilizer resources. Currently, the solid organic fertilizer applied in soilless cultivation has mix sources and multiple uncertain factors, so that it is unable to use the scientific data and standard test to measure the nutrients, harmful substances or every ingredient in it. As a result, it is difficult to develop a standard procedure for the mixing of artificial soil and fertilizer. Since the large arbitrary, the mixing step can only depend on experience and instinct that will lead to the great differences among the crop productions. Due to the inconsistency of the fertilizer sources, the uncertainty of the ingredients, the possibility of the existing of harmful substances, the incompleteness of nutritional components and the lack of fertilizer, a certain amount of chemical nutrient solution must be added during the whole growing period of the plants. That's the reason why the general artificial soil cultivation technique and the selected artificial soil used in current time are not normative. The standard system of the artificial soil cultivation hasn't been established yet. Thus, it can only be used in small range and not possible to make sure the products will reach the standard at the same level, not even mention to grow the organic food out of it. Further improvement must be made in order to implement large-scale, standardization and industrial plantation to grow the organic food.

Therefore, the intention of the invention is to overcome all above deficiencies to provide a novel Special Organic Nutrient Soil for Organic Plants including its using method. The new

Manufacturing and Using Methods of a Special Organic Nutrient Soil for Organic Plants

soil is not only the hotbed and vector of the plants, but also a nutrient repository. There is no need to add extra nutrition during the growing period because of the stable ingredients and comprehensive fertilizer. By using only natural and organic materials, this Special Organic Nutrient Soil for Organic Plants is pollution-free, full nutritional, natural, organic, ecological and safe, and can meet the requests of organic fertilizer production. This invention also possesses the advantages as fertilization saving, labor saving, water saving, time saving, growing fast for plants, high yield and better quality by comparing to other soilless cultivation mediums.

3. Detailed Description of the Invention

In the object described as above, the present invention applies the following technical solution to manufacture the integrated Special Organic Nutrient Soil for Organic Plants.

3.1. Selection of raw materials

The present invention is to use special pollution free organic fertilizer as the main nutrition sources to manufacture the Special Organic Nutrient Soil for Organic Plants to make sure the plants grown from it are organic. During 2007 to 2009, the inventor chose sheep and cattle manure from Chinese Inner Mongolia region as main sources based on this principle. The livestock in Inner Mongolia are fed in a primitive way by only using the natural forage that grows naturally without any pesticides, fertilizers, or artificial additives. Due to extremely cold winter in Inner Mongolia during when the temperature could drop as low as -30°C, herdsmen widely adopt the old habit as not cleaning the sheepfold from October till next April to keep the sheepfold warm during winter and spring, which allows the feces and urine to be able to accumulate and be stamped for six months to naturally form a fecaluria accumulation layer as

Manufacturing and Using Methods of a Special Organic Nutrient Soil for Organic Plants

thick as 30 to 50 cm. The fecaluria cleaned out at early May from the sheepfold is in the shape of bricks and so called “sheep brick fertilizer” by the herdsmen or “sheepfold manure” by the scientists.

Inner Mongolia grassland is a pure natural grassland in China not yet been polluted by pesticides, fertilizers or artificial additives to allow the “sheep brick fertilizer” remain natural and pure. Unlike the manure collected from some large-scale farm had both heavy metal and hormone levels severely exceeding the standard, which is caused by the forages for the livestock come from the fields or artificial preparation that are unavoidable to contain the chemical and pesticides residues. We used to test the heavy metal contents in “sheep brick fertilizer”, and the results are as: arsenic (As) 1.55 mg/kg, chromium (Cr) 3.18 mg/kg, cadmium (Cd) 0.122 mg/kg, mercury (Hg) 0.020 mg/kg, lead (Pb) 4.83 mg/kg, copper (Cu) 8.67-18.55 mg/kg, zinc (Zn) 29.99 mg/kg, all of which are far lower than the maximum allowable level of heavy metal in organic compost of China, USA, Japan and other relevant countries. In addition, “sheep brick fertilizer” also contains rich source of humic acid that has a strong and selective adsorption to heavy metals. Therefore, the “sheep brick fertilizer” shows a significant attenuated effect on heavy metal pollution.

The examinations indicates that the “sheep brick fertilizer” is a complete fertilizer containing essential elements for plants such as macronutrients including nitrogen, phosphorus and potassium, medium elements including sulfur, calcium and magnesium, and trace elements including iron, manganese, zinc, molybdenum and boron. Especially the 1.35-3.58% of the total K and 1-2.5% of available potassium are extremely rare in other organic fertilizers. The rational

Manufacturing and Using Methods of a Special Organic Nutrient Soil for Organic Plants

application of “sheep brick fertilizer” (after fully fermented) can not only increases the yield of various crops, but also significantly improves the quality of agricultural products. “Sheep brick fertilizer” also contains a certain amount of vitamins, natural plant hormones, enzymes, growth hormone, folic acid, etc., all of which can significantly enhance plant stress tolerance, disease resistance, and pest resistance in addition to promote the plant growth. This fertilizer contains a large amount of multi-types of microorganisms, and more than 30% of organic substances and 20% of humid acid respectively. Long term of rational application can significantly enhance the amount of organic substances and active humid acid, increase the amount and activity of the microorganisms in the soil, and roundly improve the physical properties, chemical properties and the fertilizers of soil. Thus, this invention chose the “sheep brick fertilizer” from Inner Mongolia as the main raw source of Special Organic Nutrient Soil for Organic Plants, and mixed it with cattle manure from the same region to guarantee the plants are organic. If the similar natural sheep and cattle manure can be found in other countries or regions like New Zealand and Australia, they can also be used as main raw material for this kind of Special Organic Nutrient Soil for Organic Plants.

After years of cultivation experiments, the crop products have been tested by authoritative inspection institutions and all of them met the technical indexes in AAA level of organic food. Besides, the organic vegetables cultivated in Singapore obtained the NOP organic certification of America USDA in October 2013. The vegetables from this organic soil have been certified as 100% organic.

3.2. Manufacturing of the Special Organic Nutrient Soil for Organic Plants

3.2.1. Manufacture of main raw fertilizers and nutrient sources

The pure sheepfold manure and pure cattle manure are chosen to mixed (80% of sheepfold manure and 20% of cattle manure by weight), grinded, fully fermented, performed with harmless treatment, air dried until the particle sizes are between 0.2 to 0.5 mm, and packing for storage, shipping and further use.

Simple Method:

In accordance with the total weight, sheep manure accounting for 80% and cattle manure accounting for 20% are thoroughly mixed, grinded, watered to control the moisture at $55\% \pm 5\%$ to benefit the fermentation, and then mixed with anaerobic bacteria. The mixture will be piled up on plastic film or hardened ground in the shape of trapezoidal stack (the bottom width is 3m, the upper width is 2m, the height is 2m and the length is 20-30m). All the stacks will be covered completely by the plastic films to fully perform the anaerobic fermentation. During the fermentation, the temperature can reach 70°C , and sometimes the instantaneous temperature can be as high as 75°C . The high temperature continuously meeting or exceeding 70°C can last more than 24 hours. After about 45 days, the materials can be fully fermented as brown product with no smell, no worm eggs, no harmful bacteria, and no active weed seeds. Then open the plastic films to let it dry naturally. If you want to accelerate the drying process, spread out the fermented materials. The main source of Special Organic Nutrient Soil for Organic Plants is completed when the moisture dropped to 20% or less. Then pack all these materials for storage, shipping and further usage.

Manufactured in large-scale by using aerobiotic fermentation in the fermentation tank

Manufacturing and Using Methods of a Special Organic Nutrient Soil for Organic Plants

with turner:

In accordance with the total weight, sheep manure accounting for 80% and cattle manure accounting for 20% are thoroughly mixed, grinded, watered till the moisture reaching $55\% \pm 5\%$, and then mixed with aerobic bacteria. The mixture will be put into a fermentation tank with the width of 4-8 m (specific width will be decided by the size of the turner), the depth of 2 m and the approximate length of 60 m. The ventilation facility will be installed into the tank to supply the air in order to accelerate the fermentation. The turner will throw all the materials once every 48 hours. During the fermentation, the temperature can reach 70°C , and sometimes the instantaneous temperature can be as high as 75°C . The high temperature continuously meeting or exceeding 70°C will last more than 24 hours that can kill all the harmful bacteria, worm eggs and weed seeds to complete the harmless treatment. After 2 or 3 weeks, the materials will be fully fermented as dark brown product with no smell. The materials will be spread up on hardened ground to dry up till the moisture dropped to 20% or less. Then pack all these materials for storage, shipping and further usage.

3.2.2. Fully mix the main source prepared as above with sand and nature peat according the proportions as 10-50%, 20-70%, and 10-30%, and then finish the manufacturing process.

3.3. Using methods of the Special Organic Nutrient Soil for Organic Plants

The methods of the invention using Special Organic Nutrient Soil for Organic Plants can be varied; the key lies in water management. We take the semi-closed planting trough in Singapore as an example to describe. If a semi-closed trough is used for planting crops, accurate knowledge of humidity and temperature of organic nutritional soil is needed. Different crops

Manufacturing and Using Methods of a Special Organic Nutrient Soil for Organic Plants

require different humidity, and in general, it should be decided by experience. In order to know the temperature and humidity of the Special Organic Nutrient Soil for Organic Plants, thermometer and hygrometer could be inserted into the Special Organic Nutrient Soil for Organic Plants. Water management could primarily be adjusted based on the condition of plant growth and climate change. No water or less water is given in rainy days and cloudy days; more water is given in high temperature, the hot sunny days, or windy days. However, do not irrigate during the afternoon with high temperature under the burning sun. Otherwise, it could easily deprive the oxygen from the roots of the plants and makes the plants withered and even dead.

The principle governing release and absorption of nutrients embodied by the present invention is similar to that of liquid cultivation. The difference is that liquid cultivation uses artificial chemical synthetic nutrients to directly supply the plants by the way of adjusting the amount of water in the form of aqueous solution. Since chemical fertilizers are used, those plant products cannot meet the standards set forth for organic products. However, in the present invention, the Special Organic Nutrient Soil for Organic Plants is both a carrier and nutritional source. The release of the nutrients is through its solubility in water, and the absorption of the nutrients is through proper temperature and photosynthesis in plants. Thus, nutrients are completely from pure natural organic fertilizer and its components, so the products can meet the standards set forth for AAA grade organic products. However, this method of nutrient absorption has to consider the energy accumulation, that is, not to allow the excessive release of nutrients to avoid the excessive absorption by the plants, or "burned ", so to speak. In order to let the nutrients from Special Organic Nutrient Soil for Organic Plants to release in a reasonable and

Manufacturing and Using Methods of a Special Organic Nutrient Soil for Organic Plants

timed manner, greenhouse management must be applied to control the amount of water and watering time, so that the temperature and humidity are under control, making the crops grow healthily at the proper temperature and humidity range.

3.4. Advantages of the Special Organic Nutrient Soil for Organic Plants

In addition to all the characteristics the currently available soilless media possess, the present invention of Special Organic Nutrient Soil for Organic Plants has the following advantages:

(1) Achievement of a quantitative nutrient management and standardization: Based on the characteristics of roots of the crops, we designed and used a semi-enclosed planting trough. Its main role is to separate it from the soil, to avoid the loss of nutrients and moisture, to prevent soil-borne pests and diseases, and to achieve nutrient quantitative management and standardization.

Inspection and testing shows that Special Organic Nutrient Soil for Organic Plants using high-quality pure organic fertilizers (cow dung, sheep manure, etc.) as main components can fully meet the requirements of nutrients, water, ventilation, heat and other growth conditions for different crops, thereby improving yield and quality. Its heavy metals, E. coli, and other health indicators are all in line with relevant standards. Its heavy metals, nitrates levels are far below the health indicators set forth for organic product growing media, in line with the requirements of AAA grade organic vegetables growing conditions. It achieves a standardized and normalized soilless cultivation fertilization management. It takes a big step toward making organic vegetable production with high quality, safe, and high yield.

(2) Outstanding water-saving performance: This planting method is isolated from soil, no leakage during irrigation, and evaporation is very small. A comparison with conventional soil cultivation test found that for a 1000 M2 greenhouse, conventional soil cultivation requires 40 tons of water supplies per irrigation, and this planting method requires only four tons, saving 90% of water usage.

(3) Saving fertilizers: Fertilizer utilization rate of conventional soil cultivation is only about 50%, or even less than 30%. More than half of the nutrients are lost. While this farming system is a closed circulatory nutrient system, and fertilizer utilization rate is 90% or more. There is almost no loss of nutrients.

(4) Achievement of a breakthrough in the prevention of diseases and pests: In agricultural production, diseases and pests are mainly come from soil-borne, fertilizers and seedling carriers, personnel carriers and airborne transmission. (A) "Semi-closed trough farming system" is away from the soil and separated from ground. Before cultivation, the ground is completely covered with plastic film and then the planting trough or cement tank is made. Diseases and pests from soil have been effectively controlled. (B) Special Organic Nutrient Soil for Organic Plants used in trough farming is fully prepared by fermentation, and harmless treatment by high temperature, so it's not susceptible to pests and diseases. (C) With "semi-closed trough farming system", water consumption is only 10% of that of conventional soil cultivation system. Greenhouse high humidity will not happen due to less water evaporation; plant diseases and pests are not likely to breed since there is no dew on leaf. (D) "Semi-closed trough farming system" sits in greenhouse 20-40 cm above ground surface (the actual height

Manufacturing and Using Methods of a Special Organic Nutrient Soil for Organic Plants

should be decided according to crop root condition). Good air circulation, multiple planting cycles alternate (determined by the fertility test results from Special Organic Nutrient Soil for Organic Plants, but usually no more than two years. In order to effectively prevent the diseases and pests and provide quality assurance during farming process, it may also be replaced once a year), make it not susceptible to germs. (E) As an independent farming unit, "semi-closed trough farming system" could be immediately separated out to eliminate spreading if you find the trough is infected. This is the unique advantage of "semi-closed trough farming system" in controlling and preventing diseases and pests. It is a major breakthrough of organic agriculture in plant protection, as well as pest and disease prevention.

(5) Labor savings: In a closed greenhouse soilless facility, "semi-closed trough farming system" at least skips seven procedures, including plowing, ridging, ripping, fertilizing, weeding, cultivating, and earthing-up compared to traditional soil cultivation. It saves more than 50% of labor force.

(6) High yield: "Semi-closed trough farming system" creates good nutrients, water, air, heat, and other growth conditions for different vegetables, fruits, and crops, leading to the high yield.

(7) Good quality: Due to the raw components of Special Organic Nutrient Soil for Organic Plants are selected from the regions of pollution-free, hazard-free, chemical fertilizer-free, and pesticide-free, they are extremely pure. Farming process does not use synthetic fertilizers, pesticides, growth regulators and so on; the products are bright-colored, beautiful, with authentic taste, comprehensive nutrients, and a long shelf life. They meet the

Manufacturing and Using Methods of a Special Organic Nutrient Soil for Organic Plants

requirements set forth for AAA grade organic products quality standards.

(8) Low cost: Our practice proved that "semi-closed trough farming system" has the advantages of low cost, less labor, easy operation, high quality, high efficiency and other characteristics. The cost of production is only half of hydroponics. It is a new practical technology of vegetable greenhouse cultivation transformation from traditional to modern agriculture.

(9) Wide application: Special Organic Nutrient Soil for Organic Plants has the advantages of small size, light weight, and comprehensive nutrients with a very broad scope of applications. In addition to cultivate in greenhouse facilities and a variety of horticultural applications, it also can be used in desert, wasteland, ravine, saline-alkali soil, and barren. Not only it can be used in organic vegetable crops for high yield, high quality cultivation, but also it could be very suitable at facilities in which organic flowers and fruit are cultivated. Moreover, it can be widely used as city's decoration in rooftops, living room, garden landscaping and lawn greening.

(10) Safety and environmental protection of the entire cultivation: Because of the semi-closed trough farming system, the entire cultivation process runs without any spills. The trough is an independent, small circulatory system of water and nutrients. It will not bring any adverse effects to the surrounding environment.

(11) The differences between the present system and other types of soilless cultivation technologies

A. Comparing to liquid type soilless cultivation technology: Liquid type soilless

Manufacturing and Using Methods of a Special Organic Nutrient Soil for Organic Plants

cultivation technology is the modern agricultural high and new technology. However, because its nutritional components are mainly chemical ingredients, the agricultural products contain high levels of nitrites. Its production facilities need large investment, complex process, and high cost. Meanwhile, its difficult operation and non-green shortcomings greatly hamper the popularization and application of the technology in the field of organic vegetable production. The application of “pure organic fertilizer in Special Organic Nutrient Soil for Organic Plants with semi-closed trough soilless farming technology” replaced the chemical nutrient solution, and successfully introduced organic agriculture into the soilless cultivation. Only water is irrigated in the entire cultivation process of the crops, which breaks the traditional concept about soilless culture must use chemical nutrient solution. The invention and application of this technology opened up a new way in the field of soilless cultivation technique of organic ecotype. Therefore, this technology designed for overcoming the disadvantages of high level of chemical components associated with the chemical nutrient solution soilless culture technology demonstrated green organic, ecological, environmental protection, and other unique features.

B. Comparing to other solid type soilless cultivation technologies: Currently, solid soilless cultivations have widely used sawdust, coal cinder, mushroom residue, peat, vermiculite and crop straw mixture as matrix, chicken manure as fertilizer sources. These materials are collected from different sources with a lot of uncertainties. Especially for the content of nutrients and harmful substances, they are not easy to be evaluated and selected using scientific data and standardization. However, our “Special Organic Nutrient Soil for Organic Plants with semi-closed trough soilless farming technology” demonstrates the features of comprehensive

Manufacturing and Using Methods of a Special Organic Nutrient Soil for Organic Plants

nutrients and stable components, which belongs to the category of non-pollution and safe cultivation. The implementation of the planting process is easy to understand and easy to manage. It greatly simplifies the operation and management procedures of soilless culture, saves a lot of costs, and achieves quantification and standardization of production management process in soilless culture.

4. Detailed Implementation Methods

4.1. Construction of Greenhouses

This Special Organic Nutrient Soil for Organic Plants should be used in greenhouse to grow organic vegetables. Therefore, greenhouse construction should be made first, and we should build a variety of different greenhouses in different regions. However, the objectives are A) separate from the outside world inclement weather effects on crops; B) effectively prevent and control diseases and pests; and C) separate from man-made pollution of harmful substances such as drugs on crop quality. Let's take Singapore cultivation as an example:

For organic vegetable production, traditional cultivation methods do have many uncertain risks, especially natural disasters. Quality assurance is utmost important in planting. Let's start from the natural disasters. During the traditional soil cultivation, if no facility is used, then all the wind, rain, hail, frost, frozen, cold, heat, diseases, and pests are likely to have a fatal blow to the crops. Now we have a breakdown analysis about how to prevent the above mentioned uncertain risks. For wind, rain, hail, and heat, the measures we have taken are to build greenhouses, use these facilities to avoid the damage of the vegetables from these disasters. After long-term and extensive application, it is already a very mature technology. Therefore, unless there is a large

Manufacturing and Using Methods of a Special Organic Nutrient Soil for Organic Plants

disaster, we usually can prevent threats caused from wind, rain, hail, and heat. Moreover, Singapore is located near the equator, and there are no too strong storms to occur there. There is no frost, frozen, and cold in Singapore either, so we don't worry about those. The remaining risks are disease and pest. For those, after farming experiences of up to four cropping cycles, we have mastered in our greenhouse cultivation system as to how to prevent the disease and pests. We have a set of feasible scheme of prevention and treatment, which can avoid the risk of diseases and pests.

4.2. Method for Making Semi Closed Planting Trough

(1) First, clean up the cultivation environment by evenly sprinkling with lime disinfection on leveling greenhouse land, which is then covered with thick plastic film. Plastic film should completely cover the interior area of greenhouse in order to isolate the soil-borne plant diseases and pests. Planting trough should be built on plastic-covered ground using cement bricks or other materials, which will not cause pollution. In order to facilitate the farming operation and crop growth, the size of the planting trough should be 50-150 cm wide, 20-40 cm high, and the length should be based on the dimension of the greenhouse. Planting trough should be completely covered by thick plastic film all around except the top surface. Care should be taken to avoid damaging the plastic film to prevent pest entry and fertilizer leakage.

(2) The one-piece cement plating trough should have all the functions mentioned above.

4.3. Placement of the Special Organic Nutrient Soil for Organic Plants

Place the Special Organic Nutrient Soil for Organic Plants mentioned in the previous chapters into an already built semi closed planting trough. The thickness of newly added Special

Manufacturing and Using Methods of a Special Organic Nutrient Soil for Organic Plants

Organic Nutrient Soil for Organic Plants should be determined by different types of crops. For example, planting leafy vegetables only needs about 15 cm thickness of soil; but planting solanaceous vegetables requires 30-40 cm thickness of soil. Check the thickness of the Special Organic Nutrient Soil for Organic Plants every time before planting. If there is a loss, soil should be added to the appropriate depth. The Special Organic Nutrient Soil for Organic Plants should be used not more than 2 years for every batch. Since a certain amount of Special Organic Nutrient Soil for Organic Plants is added every time a new crop is cultivated, over the time, the soil will become thicker and thicker. To solve this problem, you can replace a portion of the soil according to the actual situation, or increase the height of planting trough. Every three months to half a year, the Special Organic Nutrient Soil for Organic Plants should be sterilized. The simplest way to accomplish this is to repeatedly turn the Special Organic Nutrient Soil for Organic Plants over under the blazing sunlight exposure, with each exposure time preferably not less than five days.

4.4. Water Supply System

Water supply pipes and valves are installed inside the greenhouse. It would be better to adopt a drip irrigation, sprinkler irrigation, or infiltration irrigation system. Drip irrigation system is the two irrigation pipes laid on top along the sides of the planting trough. When water is needed, water supply is switched to open. Water drips slowly and evenly through drip irrigation pipes into the Special Organic Nutrient Soil for Organic Plants. After the irrigation, water supply is switched to close. Infiltration irrigation system is to install an irrigation pipe along the longitudinal axis beneath the central planting trough. When water is needed, water supply is

Manufacturing and Using Methods of a Special Organic Nutrient Soil for Organic Plants

switched to open. Water from the bottom infiltrates slowly into the Special Organic Nutrient Soil for Organic Plants. After the irrigation, water supply is switched to close. Sprinkler irrigation is installed from the top of the greenhouse to irrigate.

4.5. Two Cultivation Methods

A. Direct seeding cultivation method: The Special Organic Nutrient Soil for Organic Plants in the planting trough is first irrigated to be suitable for seed germination. Then the seeds to be cultivated are sown in accordance with the planting instructions in the irrigated Special Organic Nutrient Soil for Organic Plants. Some seeds should be covered with soil, and soil depth is varied based on the type of the crop.

B. Transplanting cultivation method: The cultivated plant seedlings are transplanted to the Special Organic Nutrient Soil for Organic Plants in the planting trough, and irrigated based on the plant needs. During the course of the greenhouse management, irrigation schedule of planting trough should be applied depending on the degree of evaporation and plant growth condition. Water should be given reasonably and scientifically in accordance with the different habits and water and nutrient demands of the plant. In principle, the crops with high nutritional demands should be in the planting trough for a longer time; while the crops with less nutritional demands should be in the planting trough for less time. The core technology is to master the time and volume of the irrigation. Pay attention to accumulate the knowledge of time and volume for the same type of crop, summarize to a written quantitative management method. Our Special Organic Nutrient Soil for Organic Plants using pure sheep manure and cow dung as the main raw material is a cultivation soil with comprehensive nutrients. It provides all the nutritional elements

Manufacturing and Using Methods of a Special Organic Nutrient Soil for Organic Plants

for plant growth. So that the whole farming process is organic planting, and all products are green. This is an innovation of the technology system, as well as the effective measures to achieve the organic ecotype completely for the soilless cultivation techniques.

Claims

1. A manufacturing method of a special organic nutrient soil for organic plants, comprising:

choosing manure of sheep and cattle fed by natural forage as main raw fertilizer sources and nutrient sources, the natural forage being grown naturally without use of pesticides, fertilizers or artificial additives;

forming a mixture containing 80% of sheep manure and 20% of cattle manure by weight, the sheep manure containing an active substance to form organic fertilizer for plant growth;

drying the mixture;

grinding the mixture to attain particle sizes of between 0.2 to 0.5 mm;

adding water to the mixture to control moisture at $55\% \pm 5\%$;

mixing with anaerobic bacteria; and

mixing the mixture with sand and natural peat according to proportions of 10-50%, 20-70%, and 10-30% .

2. A special organic nutrient soil obtainable by a manufacturing method of claim 1.

3. A special organic nutrient soil as manufactured in claim 1 being able to be used in all planting areas without any geographical restrictions.

4. A method of using the special organic nutrient soil as manufactured in claim 1, wherein organic plants can either be straight seeded or seedling planted in a cultivation tank, and wherein row and plant spacing is adjusted for growth spacing.