

Automatic Slot-Type Planting System for Organic Fruit Vegetables

TECHNICAL FIELD

[0001] The present disclosure belongs to the field of agricultural planting, which is used to growing fruit vegetables of organic vegetables and organic medicinal herbs and the like, and particularly relates to an automatic slot-type planting system for organic fruit vegetables.

BACKGROUND

[0002] In crop growing, an artificial soil cultivation technology is a technology that has great popularization value, and may be widely applied along with the gradually reduced arable lands and continuously increased requirements of people on the nutrient components, quality and safety of the crop variety. Currently, in lots of the advanced countries all around the world, the technologies are developed very fast and are widely applied as a good-quality and high-yield production manner for such crops as vegetables, particularly in planting organic vegetables, and occupy a quite high proportion in the area of facility agriculture. This is because that synthetic soil cultivation serving as an innovative and high technology in the development of modern agriculture not only has the characteristics of fertilizer, water and labor power saving, stable and high yields, convenience in implementing standardization management and satisfied green and organic demands, but also has the characteristics of being free from environment and geographic restrictions and being capable of effectively overcoming various obstructions and preventing the underground damage by disease and insect from being spread. For example, China has a certain foundation on application of this aspect. Research divisions represented by the Institute of Vegetables and Flowers of Chinese Academy of Agricultural Sciences have already studied practical artificial soil cultivation system and method that are suitable for Chinese situations, comply with the sustainable development requirements on organic farming and agriculture, and have

remarkable economic, social and ecological effects, replace the traditional high-cost, great-difficulty and non-environmental friendly chemical nutrient solution soilless cultivation method by an organic solid fertilizer method, obtain satisfying effects, and are spread to enter the pathway of organic agriculture gradually. On this occasion, the planted crops only require fresh water and fine organic fertilizer during the entire process of growth, so that the restriction of required chemical nutrient solution for soilless cultivation is successfully broken through, which reduces the disposable investment by more than 50% and reduces the fertilizer cost by more than 70% than that of the previous simplest nutrient solution slot cultivation method. Moreover, the operation and management procedures are greatly simplified, and the method may be gradually incorporated into "standardization" management. However, as indicated in the relevant data, substances used in the foregoing organic solid fertilizer method are selected from corn stalks, sawdust, mushroom residues, slag, and such coarse soil with fiber as river carbon. Although the substances are cheap abandoned resources that can be continuously regenerated in an ecological system, the substances serving as fertilizer solution carriers, occupy most volumes so that the fertilizer storage volumes thereof are gradually reduced. In addition, because most the fertilizers used are from puffed chicken manure as well as impure sheep manure, the fertilizer efficiency and the nutrition categories, contents and quality of the nutritional crops are much poorer than that of the pure sheep barnyard manure and cow manure. Therefore, with respect to the foregoing situations and with reference to the prior art, the present disclosure firstly uses pure sheep barnyard manure as the main raw material and uses pure cow manure as auxiliary material to manufacture artificial soil mixture, and refine the soil mixture into a soil and fertilizer source integrated solid artificial soil and summarize its use method via unceasing experiments, which is not only suitable for growing plants, but also is simple to manage and operate. Currently, the technology is matured, and is an advanced and practical agricultural technology achievement that has great promotion value. Experiments show that the present

disclosure has multiple advantages than various existing soilless cultivation technologies, and has more advancement and uniqueness in the aspect of promoting organic and green production particularly. In the first place, pollution-free seed-carrying soil and organic fertilizer resources are required to develop organic agriculture. Currently, the solid organic fertilizer used in soilless cultivation are from different sources, which have more uncertain factors, and cannot measure and select the nutrient components and harmful matter contents thereof via science data and standardization, and also is impossible to defect each component. Therefore, it is difficult to uniform the standard during the process of mixing and matching the artificial soil and fertilizers, which has larger randomness and can only be operated by experience and feeling, thus causing larger quality differences to products produced in this manner. Particularly, a certain amount of chemical nutrient solution is required during the entire growing process of the plants due to the heterogeneity of raw material resources thereof, uncertainty of various components included, probability of harmful matters included, incompetence of nutrient components therein and insufficient fertilizers. Therefore, general artificial soil cultivation technologies used currently and the selected artificial soil are not normative, and an artificial soil cultivation standard system in true sense is not formed. Therefore, the artificial soil form and use method can only be used in a small range of local area, and the products thereof cannot be determined on the same level standard naturally, much less for using the method to produce organic food, while further perfection and improvement are required for implementing scale, standardization and factorization production.

[0003] Therefore, the inventor of this present disclosure previously invented a "semi-enclosed slot type planting method for organic plants with artificial organic nutrition soil", which was applied a patent in Singapore on December 26, 2013, under the name of "MANUFACTURE AND USE AN ORGANIC NUTRITION SOIL FOR GROWING ORGANIC PLANTS", Singapore Patent Application No.201309584-9, Accorded a Date of Filing 26/12, 2013. The invention aims at

overcoming all the foregoing defects by providing a new-type artificial soil and use method. The soil is not only served as a hotbed and carrier for growing plants, but also is a nutrition storage tank for growing plants. Moreover, the soil includes stable components and comprehensive fertilizer categories, does not need additional fertilizers during the entire growing process, and is a pollution-free full-nutrition, pure-natural, environment friendly and safe integrated solid organic fertilizer artificial soil, which complies with the use principle of the fertilizer for producing organic food, and has the organic, green, ecological and environment friendly characteristics. Meanwhile, compared with other soilless cultivation mediums, the artificial soil has the advantages of fertilizer, labor, water and time saving as well as fast growing, high yield and good quality of plants.

[0004] Based on the foregoing invention, although the semi-enclosed slot type planting method has successfully entered a large-area growing stage after growing experiments, damage by disease and insect cannot be eliminated due to lower land effective availability (60%-70%) of using the semi-enclosed growing slot. Therefore, during the process of growing organic plants, the probability of damage by disease and insect is higher. Moreover, because powerful insecticide cannot be used when growing the organic plants, the damage by disease and insect in case of large area outburst cannot be effectively controlled, which may possible cause large area production reduction. Furthermore, because the foregoing planting manner adopts labor operation whole through the growing process, the consumption of labor is too large, which causes higher product cost due to highly increasing manual labor wage.

[0005] Based on the above mentioned, the present invent accordingly is provided.

SUMMARY

[0006] In order to solve the above-mentioned problems in existing technologies, the present disclosure accordingly provides an automatic slot-type

planting system for organic fruit vegetables, by using full-enclosed and automatic mode, not only can improve the effective availability of lands, but also can reduce the usage amount of manual labor.

[0007] The technical solutions of this present disclosure include as below:

5 An automatic slot-type planting system for organic fruit vegetables includes an intelligent greenhouse, a sieving and disinfection batching system, an input and output material storage, and a mobile ontrack hopper car. The sieving and disinfection batching system and the input and output material storage are arranged outside of the intelligent greenhouse. The input and output material storage
10 exchanges planting materials with a planting slot system inside the intelligent greenhouse by using the mobile ontrack hopper car; the intelligent greenhouse is enclosed, in which a planting slot system, a track system, a mobile canopy frame system, a spraying and disinfecting system, a temperature and humidity monitoring system and a precooling and packaging system are arranged. The planting slot
15 system has multiple parallelly arranged planting slots, and the mobile canopy frame system and the spraying and disinfecting system are arranged over the planting slots. The temperature and humidity monitoring system is attached to the planting slot system. The precooling and packaging system is arranged at one end of the intelligent greenhouse, and includes a precooling system used for precooling the
20 harvested fruit vegetables and a packaging system used for packaging the fruit vegetables.

[0008] Further speaking, the sieving and disinfection batching system includes a used material storage, an elevator, a sieving machine, a refuse material storage, a fresh material storage, a stirring and batching machine, and a
25 disinfection system. The used planting materials from the used material storage are transported into the sieving machine by the elevator. After sieving, the reusable fine particles are transported into the stirring and batching machine, while the unusable used planting materials are transported into the refuse material storage. The fresh planting materials from the fresh material storage are fed into

the stirring and batching machine according to the formula ration and are mixed with the used planting materials in the stirring and batching machine, so as to obtain the qualified planting materials according to the formula. The obtained planting materials are transported into the disinfection system to be disinfected, and then are sent into the input and output material storage.

[0009] Further speaking, the disinfection system is a double disinfection system with a neutron generator and a high-temperature steam generator.

[0010] Further speaking, the mobile ontrack hopper car includes a hopper, a vacuum and negative pressure transporter, supporting legs and walking wheels.

The hopper is arranged on the supporting legs, and there are a feed port arranged on the top of the hopper and a discharge port arranged on the bottom of the hopper. The vacuum and negative pressure transporter is arranged on the hopper, the walking wheel is arranged on the bottom of the supporting leg, and the walking wheel is able to move on the tracks of the system.

[0011] Further speaking, the mobile canopy frame system includes a net canopy frame, and the net canopy frame comprises a fixed part and a movable part which are connected by a hinge. The net canopy frame is arranged over the planting slots. When the movable part is opened around the hinge axis, the mobile ontrack hopper car can lay down the planting materials to the planting slots or to suck the planting materials from the planting slots.

[0012] Further speaking, the spraying and disinfecting system includes piping supports, a spray pipeline, spray nozzles, a disinfection pipeline and disinfection nozzles. The spray pipeline and the disinfection pipeline are parallelly set up on the piping supports, the spray nozzles connect with the spray pipeline, and the disinfection nozzles connect with the disinfection pipeline.

[0013] Further speaking, the temperature and humidity monitoring system includes an automatic hygrothermograph.

[0014] Further speaking, the precooling and packaging system includes a precooling system and a packaging system, the precooling system is used for

precooling the harvested fruit vegetables, so as to be convenient to preserve the packaged fruit vegetables.

[0015] This present disclosure has these advantages as below:

By implementing this present disclosure, the planting process of organic fruit
5 vegetables is achieved in the full automation, quantification and standardization mode. Because an effective planted material disinfection system is adopted, damage by soilborne disease and insect can be completely and effectively prevented during the planting process, which develops a completely new and effective method for growing organic leaf-vegetable plants on the aspect of plants
10 protection. Because the entire system of the invention is completely automated, the consumption of labor is only 10%-20% of that of the semi-enclosed slot type planting method for organic plants with the organic nutrition soil, for example, a 10-thousand-square-meter planting system can be operated by 6-8 workers, which greatly saves the labor cost, and plays a definitiveness role of reducing the total
15 cost of the organic products.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] Fig. 1 is a schematic plane structural view of an automatic slot-type planting system for organic fruit vegetables according to an embodiment of the
20 present disclosure;

Fig. 2 is a schematic view of a sieving and disinfection batching system of an automatic slot-type planting system for organic fruit vegetables according to an embodiment of the present disclosure;

Fig. 3 is a schematic structural view of a mobile ontrack hopper car of an
25 automatic slot-type planting system for organic fruit vegetables according to an embodiment of the present disclosure;

Fig. 4 is a schematic structural view of mobile canopy frame system of an automatic slot-type planting system for organic fruit vegetables according to an embodiment of the present disclosure; and

Fig. 5 is a schematic structural view of a spraying and disinfecting system of an automatic slot-type planting system for organic fruit vegetables according to an embodiment of the present disclosure; wherein the spraying and disinfecting system is configured on the planting slot and the canopy frame.

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[0017] Wherein, 1-intelligent greenhouse; 2-sieving and disinfection batching system; 21-used material storage; 22-elevator; 23-sieving machine; 24-refuse material storage; 25-fresh material storage; 26-stirring and batching machine; 27-disinfection system; 3-input and output material storage; 4-mobile ontrack hopper car; 41-hopper; 411-feed port; 412-discharge port; 42-vacuum and negative pressure transporter; 43-supporting leg; 44-walking wheel; 5-planting slot system; 51-planting slot; 6-track system; 7-mobile canopy frame system; 71-fixed part; 72-movable part; 73-hinge; 8-spraying and disinfecting system; 81-piping support; 82-spray pipeline; 83-spray nozzle; 84- disinfection pipeline; 85-disinfection nozzle; 9-precooling and packaging system.

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[0018]

DETAILED DESCRIPTION

[0019] The present disclosure will now be further described hereinafter with reference to the accompanying drawings.

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[0020] As shown in Fig. 1, the present disclosure includes: an intelligent greenhouse 1, a sieving and disinfection batching system 2, an input and output material storage 3, and a mobile ontrack hopper car 4. The intelligent greenhouse 1 is cable of automatically adjusting and controlling the temperature of the greenhouse. The sieving and disinfection batching system 2 and the input and output material storage 3 are configured outside of the intelligent greenhouse 1. There are multiple input and output material storages 3 equally arranged along with the length direction of the intelligent greenhouse 1. The input and output material storage 3 exchanges planting materials with a planting slot system 5 inside the

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intelligent greenhouse 1 by using the mobile ontrack hopper car 4. For example, the output of the used planting materials and input of the fresh materials both are achieved by the mobile ontrack hopper car 4. The intelligent greenhouse 1 is enclosed, the whole growing process of the fruit vegetables is strictly enclosed, and
5 the intelligent greenhouse 1 will be open only when the fruit vegetables are ripe, so as to transport the ripe fruit vegetables as well as the vines, branches and trunk outside from the intelligent greenhouse 1. There are a planting slot system 5, a track system 6, a mobile canopy frame system 7 (shown in Fig. 4), a spraying and disinfecting system 8 (shown in Fig. 5), a temperature and humidity monitoring
10 system (not shown in drawings) and a precooling and packaging system 9 arranged inside the intelligent greenhouse 1. The planting slot system 5 occupies the vast majority area of the intelligent greenhouse 1, and includes multiple parallelly arranged planting slots 51. The mobile canopy frame system 7 and the spraying and disinfecting system 8 are arranged over the planting slots 51, and the
15 temperature and humidity monitoring system is attached to the planting slot system 5. The precooling and packaging system 9 is arranged at one end of the intelligent greenhouse 1, and includes a precooling system used for precooling the harvested fruit vegetables and a packaging system used for packaging the fruit vegetables.

[0021] The temperature and humidity monitoring system includes an
20 automatic hygrothermograph, so as to automatically measure the temperature and humidity of the fruit vegetable planting system in real time.

[0022] As shown in Fig. 2, the sieving and disinfection batching system 2 includes a used material storage 21, an elevator 22, a sieving machine 23, a refuse material storage 24, a fresh material storage 25, a stirring and batching machine 26,
25 and a disinfection system 27. The used planting materials from the used material storage 21 is provided by the input and output material storage 3 in which the used planting materials are sucked from the planting slots 51 of the planting slot system 5 by using the mobile ontrack hopper car 4. The used planting materials which are used for one growth cycle are passed into the sieving machine 23 by the elevator

22, after sieving, the reusable fine particles are transported into the stirring and batching machine 26, while the unusable used planting materials (mixed with such impurity as vines, branches and trunks of the fruit vegetables) are transported into the refuse material storage 24. The fresh planting materials from the fresh material storage 25 are fed into the stirring and batching machine 26 according to the formula ration and are mixed with the used planting materials in the stirring and batching machine 26, so as to obtain the qualified planting materials according to the formula. After that, the obtained planting materials are passed into the disinfection system 27 to be disinfected and then are sent into the input and output material storage 3.

[0023] As shown in Fig. 3, the mobile ontrack hopper car 4 includes a hopper 41, a vacuum and negative pressure transporter 42, supporting legs 43 and walking wheels 44. The hopper 41 is arranged on the supporting legs 43, and there are a feed port 411 arranged on the top of the hopper 41 and a discharge port 412 arranged on the bottom of the hopper 41. The vacuum and negative pressure transporter 42 is arranged on the hopper 41. The walking wheel 44 is arranged on the bottom of the supporting leg 43 and is able to move on the tracks of the track system 6. The vacuum and negative pressure transporter 42 is able to create negative pressure so as to suck the planting materials into the hopper 41 through the feed port 411, and the planting materials are automatically dropped out under its own weight when it needs to discharge the planting materials.

[0024] As shown in Fig. 4, the mobile canopy frame system 7 includes a net canopy frame, the net canopy frame includes a fixed part 71 and a movable part 72 which are connected by a hinge 73, and the movable part 72 is able to rotate around the hinge axis 73. The net canopy frame is arranged over the planting slots 51. When the movable part 72 is opened around the hinge axis 73, the mobile ontrack hopper car 4 can lay down the planting materials to the planting slots 51 or to suck the planting materials from the planting slots 51.

[0025] As shown in Fig. 5, the spraying and disinfecting system 8 includes

5 piping supports 81, a spray pipeline 82, spray nozzles 83, a disinfection pipeline 84, disinfection nozzles 85. The spray pipeline 82 and the disinfection pipeline 84 are parallelly set up on the piping supports 81, the spray nozzles 83 are connected with the spray pipeline 82, and the disinfection nozzles 85 are connected with the disinfection pipeline 84. In order to meet the needs of disinfecting the whole intelligent greenhouse 1, it can produce the sanitized and purified air in the intelligent greenhouse 1 through the way like watering.

10 [0026] The precooling and packaging system 9 includes a precooling system and a packaging system, the precooling system is used for precooling the harvested fruit vegetables, so as to be convenient to preserve the packaged fruit vegetables. The packaging system is used for automatically weighing and packaging the precooled fruit vegetables.

[0027] An exemplary embodiment of the implementing process of the present disclosure as below:

15 (1) The used planting materials which are used for one growth cycle are sucked into the input and output material storage 3 by using the mobile ontrack hopper car 4, and then are passed into the used material storage 21 of the sieving and disinfection batching system 2.

20 (2) The used planting materials of the used material storage 21 are lifted and supply to the sieving machine 23 by using a bucket-type lifting system or a spiral lifting system, the used artificial organic nutrient solution (i.e. the used planting materials) are sieved by using the sieving machine 23, so as to remove the roots, stems, leaves, vines. After sieving, the useful and used planting materials are passed into the stirring and batching machine 26, while the useless and used planting materials are passed into the refuse material storage and are gotten rid of as rubbish.

(3) The adding amount of the fresh planting materials to be added is decided by the formula of the planting materials.

(4) The fresh planting materials are stored in the fresh material storage 25 in

advance, and are fed into the stirring and batching machine 26 through the automatic weighing and charging machine, so as to be mixed with the useful and used plating materials.

5 (5) After stirring evenly, the planting materials are transported to the disinfection system 27, and are disinfected through the disinfection system 27 which is a double disinfection system with a neutron generator and a high-temperature steam generator. Generally, the temperature of disinfecting is 120 DEG C, and the duration of disinfecting is 5-7 minutes.

10 (6) After disinfecting, the planting materials are passed into another input and output material storage 3.

(7) The planting materials are sucked into the hopper 41 from the input and output material storage 3 by using the vacuum and negative pressure transporter 42, and then enter into the intelligent greenhouse 1 along with the tracks of the track system 6, so as to fill the planting slots 51 with the depth of 40 centimeters. The hopper 41 of the mobile ontrack hopper car 4 can be loaded with about 5 tons of the planting materials each time, and is driven to the input and output material storage 3 to proceed the feed stock operation after laying down all the planting materials loaded each time. Repeat this process until the whole planting slot 51 is filled up with the planting materials. After the first planting slot 51 is filled up, the mobile ontrack hopper car 4 moves to the next planting slot to repeat the above process until all the planting slots of the whole planting slot system 5 are filled up with the planting materials.

(8) Adopt the method of direct seeding or transplanting to plant such vegetables like the fruit vegetables.

25 (9) It is convenient to grow the fruit vegetables with vines by adopting the mobile canopy frame system 7. When the mobile ontrack hopper car 4 is working, the movable part 72 of the canopy frame can be rolled up and lifted up to a certain height which is suitable as it does not impact the loading and unloading operations

of the mobile ontrack hopper car 4.

(10) According to the requirements of the plants, conduct the spraying operation onto the plants and conduct the disinfecting operation to the air in the intelligent greenhouse 1 by using the spraying and disinfecting system 8.

5 (11) When the fruit vegetables are ripe, all kinds of the fruit vegetables are harvested and sorted automatically by using automatic mechanical arms, and then the harvested and sorted fruit vegetables are transported to the precooling and packaging system 9.

(12) The qualified fruit vegetables are precooled and automatically packaged
10 by the precooling and packaging system 9, and the packaged products are assigned to distributors or customers by a logistics system.

[0028] A specific example of implementing the present disclosure as below:

1. Selecting the planting materials

For the planting system of the present disclosure, the artificial organic
15 nutrition soil manufactured through the inventor's patent of "MANUFACTURE AND USE AN ORGANIC NUTRITION SOIL FOR GROWING ORGANIC PLANTS" is selected as the planting material, and the material selection and manufacture method is as follows.

[0029] manufacture of the fertilizer source and the nutrient source of the
20 main raw materials:

select pure barnyard manure of the prairie sheep and cow's manure, mix them together in accordance with the weight proportion of 80% sheep barnyard manure and 20% cow manure; grind the manure, sufficiently ferment and thoroughly decompose, and air-dry the manure to make the particle size of the
25 manure about 0.2mm-0.5mm; and then bag the manure for convenient storage, transport and use.

[0030] Simple manufacture method: raw materials containing 80% sheep barnyard manure and 20% cow manure are sufficiently mixed, grinded and added with water to control the moisture of the raw materials at $55\% \pm 5\%$, so as to be

beneficial for fermenting and thoroughly decomposing; and then anaerobic zymophyte is evenly mixed in the raw materials and stacked on a ground paved with a plastic film or being hardened. The raw materials are stacked into a trapezoid square pile with the width of 3m in bottom and 2m in top, 2m in height and
5 20-30m in length; and the pile is completely covered by a plastic film, which is beneficial for using an anaerobic fermentation method to make the raw materials sufficiently fermented and decomposed. During the process of fermenting and decomposing, the temperature of the material can reach to 70 DEG C, and the instantaneous temperature may reach to 75 DEG C sometimes. The duration of
10 continuously reaching or exceeding 70 DEG C exceeds 24 hours. After 45-day around sufficient fermenting and decomposing, when the finished product has no offensive smell, no live worm ovum, no harmful bacteria, no activity in weed seeds, and goes black brown, the plastic film is opened to air-dry the finished product naturally. The decomposed main raw materials of the organic nutrition soil
15 specialized for growing organic plants may be spread for quickening the air-drying speed. After air-drying, when the moisture is less than or equal to 20%, the main raw materials of the organic nutrition soil specialized for growing organic plants can be bagged and stored so as to be conveniently transported and used.

[0031] Factory manufacture method: the raw materials are produced by
20 using a fermenter with a turner through an aerobic fermentation method. Specific steps include: raw materials containing 80% (weight) sheep barnyard manure and 20% (weight) cow manure are sufficiently mixed, and grinded with the moisture at $55\% \pm 5\%$; the anaerobic zymophyte is added into the raw materials, and the raw materials are placed into a fermenter which is 4-8m in width (determined according
25 to the specification of the turner), 2m in depth, and about 60m in length, wherein the fermenter is arranged in an oxygen-supply ventilation device which may quicken to ferment and decompose the raw materials. The raw materials are turned over for once in every 48 hours. The temperature of the fermented raw materials can reach to 70 DEG C, and the instantaneous temperature may reach to 75 DEG C

sometimes. The duration of continuously reaching or exceeding 70 DEG C exceeds 24 hours. After 2-3 weeks in this way, the materials can be completely fermented and decomposed. Because the duration of continuously reaching or exceeding 70 DEG C exceeds 24 hours, worm ovum, harmful bacteria and weed seeds in the raw materials can be completely killed or inactivated, which achieves the objective of harmless treatment. When the fermented materials go black brown and have no offensive smell, the materials are spread out on the hardened ground for air drying, and can be bagged and stored for transporting and using when the moisture of the materials is less than or equal to 20%.

[0032] The main raw materials of the foregoing artificial organic nutrition soil specialized for growing organic plants are sufficiently and evenly mixed with sand and natural peat according to a proportion of 10-50% raw material, 20-70% sand and 10-30% natural peat, so as to manufacture the artificial organic nutrition soil specialized for growing organic plants.

[0033] 2. The application of the artificial organic nutrition soil in the system of this disclosure:

The inventor of this present disclosure describes method for using the foregoing artificial organic nutrition soil in details in "AND USE AN ORGANIC NUTRITION SOIL FOR GROWING ORGANIC PLANTS", and describes the use of the artificial organic nutrition soil in planting slots 51 hereinafter: Firstly, the prepared artificial organic nutrition soil is disinfected, and then the disinfected artificial organic nutrition soil is placed in the planting slots 51 according to differences of the grown plants. When using the planting slots 51 to plant crops, it needs to accurately control the temperature and the humidity of the artificial organic nutrition soil in the planting slot 51. The humidity for different crops is different and is generally determined according to general experiences. In order to know the temperature and the humidity of the artificial organic nutrition soil in the planting slots 51, there are a thermometer and a hygrometer arranged in the planting system to automatically measure the temperature and the humidity of the artificial organic

nutrition soil in the planting slot 51. It needs to control and adjust the moisture mainly according to the growth situation of the plants and the changes of the climatic. For the rainy days or cloudy days require, no watering or watering less, while for the days with a high temperature, very hot or gale, it is suitable for more watering. However, do not watering in the afternoon with the high temperature and burning sun; otherwise the roots of the plants are easily short of oxygen so that the plants are atrophied or even dead.

[0034] Because the sheep barnyard manure and cow manure used in the artificial organic soil belong to slow-release-type and full nutrient organic fertilizer, the contents of effective nitrogen, phosphorus and potassium therein beneficial for the growth of plants are quite high, and all secondary elements, microelements and the like required for the growth of plants are contained; when planting vegetables, the plants can absorb various required nutrition from the matrix uniformly and continuously during the entire growing process. Till harvesting, there is no need to add any other fine organic fertilizers. The nutrition release and absorption principles reflected by the present disclosure are similar to the nutrition absorption principle during liquid cultivation, but the difference is that: for the liquid cultivation, it adopts artificially and chemically composed nutrient substances which is in a liquid state manner through the adjustment of water and directly supplies the nutrient substances to the plants for absorption, but the product produced cannot reach the standard of organic products, because the chemical fertilizers are used; while for the present disclosure, it adopts the artificial organic nutrition soil which is both a carrier and a nutrient source, which releases nutrition through the resolution of water for the plants to absorb under the effects of temperature and photosynthesis, the nutrient substances are completely from pure natural organic fertilizers and materials, thus the produced product can reach AAA grade organic product standard, but for this nutrition absorption manner, it also needs to consider energy aggregation to prevent that the energy is released excessively, that is to prevent the plants from "death from burning" caused by excessively absorbing the

nutrient substances. Thus , in order to reasonably and regularly release the nutrient substances in the artificial organic nutrition soil, the watering amount and watering time need to be controlled through greenhouse management, so as to control the temperature and the humidity, so that the crops are growing normally in a proper temperature and humidity range.

[0035] The present disclosure has all the advantages of the patent of “MANUFACTURE AND USE AN ORGANIC NUTRITION SOIL FOR GROWING ORGANIC PLANTS”, still has outstanding advantages as followings.

[0036] 1. Realize the full automation of the planting system.

[0037] 2. Provide assurance for the quantification and standardization of nutrient management, and realize the quantification, standardization and normalization of fertilizing management for soilless cultivation.

[0038] 3. Adopt a double disinfection system with the neutron generator and the high temperature steam, so as to completely eliminate all the harmful bacteria, ovum and other harmful viable tissues in the planting materials, so that the damage by disease and insect is completely and effectively prevented.

[0039] 4. Adopt the automatic slot type planting method, so as to greatly improve the productivity.

[0040] 5. There is no geographic restrictions on the automatic planting system, this full-automatic planting system does not need to use local soil and is able to grow organic vegetables under any environment, which provides a workable method for planting organic vegetables under remote and severe environments.

[0041] 6. Because adopting the standardization planting method by using the planting slots, a simplified background platform is provided for realizing full-automatically harvesting plants.

[0042] The mentioned above is only exemplary embodiments of the present disclosure but not limitation for the present disclosure, it should be indicated that various modification and improvement can be devised by those skilled in this art, and it should be understood that any modification, equivalent and improvement

devised without departing from the spirit and scope of the present disclosure belong to the protection scope of the present disclosure.

CLAIMS

What is claimed is:

1. An automatic slot-type planting system for organic fruit vegetables, comprising: an intelligent greenhouse (1), a sieving and disinfection batching system (2), an input and output material storage (3), and a mobile ontrack hopper car (4); wherein: the sieving and disinfection batching system (2) and the input and output material storage (3) are arranged outside of the intelligent greenhouse (1); the input and output material storage (3) exchanges planting materials with a planting slot system (5) inside the intelligent greenhouse (1) by using the mobile ontrack hopper car (4); the intelligent greenhouse (1) is enclosed, in which a planting slot system (5), a track system (6), a mobile canopy frame system (7), a spraying and disinfecting system (8), a temperature and humidity monitoring system and a precooling and packaging system (9) are arranged; the planting slot system (5) has multiple parallelly arranged planting slots (51); the mobile canopy frame system (7) and the spraying and disinfecting system (8) are arranged over the planting slots (51); the temperature and humidity monitoring system is attached to the planting slot system (5); the precooling and packaging system (9) is arranged at one end of the intelligent greenhouse (1), and includes a precooling system used for precooling the harvested fruit vegetables and a packaging system used for packaging the fruit vegetables.

2. The automatic slot-type planting system for organic fruit vegetables according to Claim 1, wherein the sieving and disinfection batching system (2) comprises a used material storage (21), an elevator (22), a sieving machine (23), a refuse material storage (24), a fresh material storage (25), a stirring and batching machine (26), and a disinfection system (27); the used planting materials from the used material storage (21) are transported into the sieving machine (23) by the elevator (22); after sieving, the reusable fine particles are transported into the stirring and batching machine (26), while the unusable used planting materials are transported into the refuse material storage (24); fresh planting materials from the fresh material storage (25) are fed into the stirring and batching machine (26) according to the formula ration and are mixed with the

used planting materials in the stirring and batching machine (26), so as to obtain the qualified planting materials according to the formula; the obtained planting materials are transported into the disinfection system (27) to be disinfected and then are sent into the input and output material storage (3).

3. The automatic slot-type planting system for organic fruit vegetables according to Claim 2, wherein the disinfection system (27) is a double disinfection system with a neutron generator and a high-temperature steam generator.

4. The automatic slot-type planting system for organic fruit vegetables according to any one of Claims 1 to 3, wherein the mobile ontrack hopper car (4) comprises a hopper (41), a vacuum and negative pressure transporter (42), supporting legs (43) and walking wheels (44); the hopper (41) is arranged on the supporting legs (43), and there are a feed port (411) arranged on the top of the hopper (41) and a discharge port (412) arranged on the bottom of the hopper (41); the vacuum and negative pressure transporter (42) is arranged on the hopper (41); the walking wheel (44) is arranged on the bottom of the supporting leg (43).

5. The automatic slot-type planting system for organic fruit vegetables according to any one of Claims 1 to 3, wherein the mobile canopy frame system (7) comprises a net canopy frame, and the net canopy frame comprises a fixed part (71) and a movable part (72) which are connected by a hinge (73).

6. The automatic slot-type planting system for organic fruit vegetables according to Claim 4, wherein the mobile canopy frame system (7) comprises a net canopy frame, the net canopy frame comprises a fixed part (71) and a movable part (72) which are connected by a hinge (73).

7. The automatic slot-type planting system for organic fruit vegetables according to any one of Claims 1 to 3, wherein the spraying and disinfecting system (8) comprises piping supports (81), a spray pipeline (82), spray nozzles (83), a disinfection pipeline (84), disinfection nozzles (85); the spray pipeline (82) and the disinfection pipeline (84) are parallelly set up on the piping supports (81), the spray nozzles (83) connect with the spray pipeline (82), and the disinfection nozzles (85) connect with the disinfection

pipeline (84).

8. The automatic slot-type planting system for organic fruit vegetables according to Claim 4, wherein the spraying and disinfecting system (8) comprises piping supports (81), a spray pipeline (82), spray nozzles (83), a disinfection pipeline (84), disinfection nozzles (85); the spray pipeline (82) and the disinfection pipeline (84) are parallelly set up on the piping supports (81), the spray nozzles (83) connect with the spray pipeline (82), and the disinfection nozzles (85) connect with the disinfection pipeline (84).

9. The automatic slot-type planting system for organic fruit vegetables according to Claim 5, wherein the spraying and disinfecting system (8) comprises piping supports (81), a spray pipeline (82), spray nozzles (83), a disinfection pipeline (84), disinfection nozzles (85); the spray pipeline (82) and the disinfection pipeline (84) are parallelly set up on the piping supports (81), the spray nozzles (83) connect with the spray pipeline (82), and the disinfection nozzles (85) connect with the disinfection pipeline (84).

10. The automatic slot-type planting system for organic fruit vegetables according to Claim 6, wherein the spraying and disinfecting system (8) comprises piping supports (81), a spray pipeline (82), spray nozzles (83), a disinfection pipeline (84), disinfection nozzles (85); the spray pipeline (82) and the disinfection pipeline (84) are parallelly set up on the piping supports (81), the spray nozzles (83) connect with the spray pipeline (82), and the disinfection nozzles (85) connect with the disinfection pipeline (84).