INVERTED PLANT GROWTH AND SELECTION SYSTEM AND METHOD OF USE

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of priority to U.S. Provisional Patent Application No. 63/569,210 filed March 24, 2024, the contents of which is incorporated by reference herein in its entirety.

TECHNICAL FIELD

[0002] The present disclosure relates generally to systems and methods for providing a hydroponics system that may be used to grow plants without the use of soil. More specifically, the present disclosure relates to an inverted plant growth and selection system and method of use.

BACKGROUND

[0003] Hydroponics is a form of horticulture that allows for plants to grow in water rather than in soil. The use of hydroponics is widespread and used for growing a variety of terrestrial plants as hydroponics offers high growth yields in a fraction of the space required for traditional farming. Traditional hydroponic systems allow for terrestrial plants to be grown with only their roots exposed to nutrient enriched water (i.e., an aqueous solution), whereby the roots are physically supported by some form or substrate medium such as rockwool, coconut fiber, perlite, or sand. Traditional hydroponic systems also utilize plastic net pots to contain the growing medium, the plant roots, and the plants themselves. The net pots are then placed into larger sealed enclosures where the net pots and the plant roots are exposed to the aqueous solution.

[0004] Traditional hydroponic systems and methods are premised on drip hydroponics,

flood-and-drain hydroponics, water culture hydroponics, and aeroponics. In each of these basic hydroponic systems, water is supplied to the growing medium or net pot while the terrestrial plant transports the aqueous solution up from the root through the plant xylem (i.e., osmosis) until the aqueous solution reaches the mesophyll cells which, in turn, releases the aqueous solution through the plants stomata.

[0005] The stomata allow for carbon dioxide to enter a plant for photosynthesis, which provides energy to enable plant growth. Various environmental factors impact the functional effectiveness of the stomata, including temperature, carbon dioxide concentrate in the leaf, water quantity, air, and light. The amount of water that is attracted to the plant cells, however, is contingent upon the amount of osmotic pressure present within the plant cell membranes. Unfortunately, traditional hydroponic systems and methods do not impact osmotic pressure and therefore do not impact the rate of plant growth.

[0006] Traditional hydroponic systems and methods are also limited by the means available to harvest the fully-grown plants. These hydroponic systems focus primarily on horizontal production techniques, which are subject to major space restraints. Certain plants, such as garden plants, that obtain any marginal height or width may have their upward and outward growth restricted by the tops and sides of closed hydroponic systems or other closely spaced plants. While smaller plants may be quickly and efficiently removed from the hydroponics system with the roots intact, larger plants may be more difficult to harvest because of the weight of the plant, the folding of the plant leaves, and the size of the plant roots.

[0007] Various attempts have been made, although unsuccessfully, to solve the drawbacks of the traditional hydroponic and plant growth systems. One illustrative attempt can be seen with respect to U.S. Patent Application No. 2011/0126454 A1, U.S. Patent No. 8,904,707 B2, U.S. Patent No. 6,298,600 B1, and U.S. Patent Application No. 2010/0242359 A1, which generally disclose an inverted plant growth bag/bucket that allows a plant to grow

from the roots down (i.e., inverted). While this disclosure indirectly addresses water circulation and osmotic pressure, it is not a hydroponic system. This disclosure also fails to disclose the impact of plant growth and plant harvesting.

[0008] Another example can be seen with respect to U.S. Patent No. 10,888,054 B2 which generally discloses a vertical hydroponic tower system. While this disclosure does address the space restrictions typically found in traditional hydroponic systems, the disclosure does not address the impact of osmotic pressure.

[0009] As can be seen, various attempts have been made to solve the problems which may be found in the related art but have been unsuccessful. A need exists for a new and novel inverted plant growth and selection system and method.

SUMMARY OF THE INVENTION

[0010] It is to be understood that in the present disclosure, all embodiments are provided as illustrative and non-limiting representatives of many possible embodiments. In addition, the terms "is," "can," "will," and the like are herein used as synonyms for and interchangeable with terms such as "may," "may provide for," and "it is contemplated that the present disclosure may" and so forth.

[0011] Furthermore, all elements listed by name, such as inverted, hydroponics, seed, spout, frequency, growth, and so forth are herein meant to include or encompass all equivalents for such elements. Such equivalents are contemplated for each element named in its particular herein.

[0012] For purposes of summarizing, certain aspects, advantages, and novel features of the present disclosure are provided herein. It is to be understood that not all such aspects, advantages, or novel features may be provided in any one particular embodiment. Thus, the disclosed subject matter may be embodied or carried out in a manner that achieves or optimizes one aspect, advantage, or novel feature or group of features without achieving all aspects,

advantages, or novel features as may be taught or suggested.

[0013] In view of the foregoing disadvantages inherent in the known art, the present disclosure relates to an inverted hydroponics system that overcomes the deficiencies of the prior art. The general purpose of the present disclosure, which shall be described subsequently in greater detail, is to provide an inverted hydroponics system and method to allow for maximum plant growth and efficient harvesting for commercial scale applications.

[0014] Implementation of at least one of the embodiments described herein may result in numerous physiological changes that accrue during the growing process. These include:

[0015] **Root Growth Dynamics:** In positive gravitropism, roots exhibit downward growth, a process facilitated by starch accumulation within specialized organelles called statoliths. These statoliths settle in response to gravity, triggering a signaling cascade that directs root growth. In an inverted hydroponic tower (IHT) system, where roots are suspended from above, gravitropic mechanisms still influence root growth, albeit at a slowed pace, thereby altering plant growth patterns.

[0016] **Gene Expression:** Gravity-induced alterations in membrane trafficking and vesicle transport systems are pivotal in orchestrating cell polarization and directional growth. Mechanosensitive channels and receptors residing on the plant cell membrane perceive variations in mechanical forces triggered by gravity, thereby instigating intricate signal transduction cascades.

[0017] **Gravitropic Shoot Growth:** Shoot growth is characterized by positive gravitropism, where shoots exhibit a downward growth trajectory. This gravitational response leads to differential cell elongation, whereby cells on the side of the shoot facing away from gravity elongate at a faster rate. Consequently, the shoot bends either towards or away from the gravitational pull, resulting in its characteristic thin and elongated shape, with a hollow inner wall.

[0018] **Auxin Dynamics:** Auxin Redistribution & Transport: Gravitropic response triggers the redistribution of the plant hormone auxin, inducing growth promotion on the lower side and growth inhibition on the upper side of stems or roots. Within plants, a polar auxin transport system facilitates the movement of auxin towards the lower side in response to gravity.

[0019] **Gravity Regulation:** In response to gravity, the gravitropic response induces gene expression changes that activate specific genes associated with cell elongation, growth regulation, and hormone signaling. This regulatory cascade leads to asymmetric deposition of lignin, a crucial structural component of cell walls, reinforcing tissue structure. This regulatory process massively increases node/ flower production.

[0020] **Gravity Effect:** In response to gravity, microtubule orientation shifts within plant cells, impacting the direction of cell elongation. Additionally, gravity sensing triggers alterations in mitochondrial activity and energy metabolism, potentially influencing gravitropic responses.

[0021] **Calcium Redistribution:** Calcium ions undergo redistribution in plant cells in response to gravity, impacting cellular signaling and growth. Gravity perception can induce calcium oscillations within plant cells, which coordinate cellular responses to gravitational stimuli.

[0022] **Gravitropic Chloroplast:** In response to gravity, chloroplasts exhibit repositioning within plant cells, a phenomenon aimed at optimizing photosynthetic efficiency. Concurrently, fluctuating levels of reactive oxygen species (ROS) may occur, serving as potential signaling molecules in gravitropic responses.

[0023] By way of a non-limiting example, the present disclosure provides a novel solution for inverted hydroponics system and method to allow for paramount plant growth and effective harvesting for commercial scale systems. These and other features, aspects, and

advantages of the present disclosure will become better understood with reference to the following drawings and detailed description.

[0024] By utilizing a plurality of growth areas, cisterns of varying sizes, growth propagation vessels, automatic lifting control modules, hoist modules, automated light control stations, aqueous solution, and aquatic and ambient air frequency stimulations, the present disclosure comprises a plant growing and selection system and method that allows for maximum plant growth and efficient harvesting for commercial applications.

[0025] In accordance with an aspect of the present disclosure, an inverted plant growth and selection system and method of use is provided for growing high quality vegetation yields with fewer resources.

[0026] In a preferred embodiment, the inverted plant growth and selection system and method comprises a plurality of cisterns. Each cistern may be configured to hold a predetermined unit of aqueous solution.

[0027] In an embodiment, each cistern has at least three enclosed sides. In some embodiments, the selected size of the cistern is predicated on the stage of growth of the plant, the weight of the plant, and the species of the plant.

[0028] In some embodiments, each cistern comprises a protruding wall that is permanently affixed to a growth propagation support, wherein the growth propagation support may be configured as a mantel. In accordance with an aspect of the disclosure, the mantel comprises a flat top and bottom surface, and a proximal end that extends beneath the surface of the predetermined unit of aqueous solution disposed within the cistern and a distal end that extends over the ledge of the protruding wall. In accordance with further aspects of the disclosure, the mantel is configured to allow a plant root system to lay over the top flat surface of the mantel whereby the plant roots are submerged beneath the surface of the predetermined unit of aqueous solution disposed within the cistern and the plant's stem extends vertically and

downwardly from the distal end of the top flat surface of the mantel.

[0029] In some embodiments, each cistern has at least one protruding wall that is permanently affixed to a growth propagation support, wherein the growth propagation support may be configured as a grooved root containment support beam. In accordance with an aspect of the disclosure, the grooved root containment support beam is permanently affixed to the inner wall of the cistern where the cistern comprises a hollow interior, and the grooved root containment support beam has a proximal end and a distal end. In some embodiments, the proximal end of the grooved root containment support beam extends parallel along the inner surface of the protruding wall of the cistern and is submerged in the predetermined unit of aqueous solution disposed in the cistern. In a preferred embodiment of the disclosure, the grooved root containment support beam is further configured to provide anchorage for the root system of a plant whereby the roots extend beyond the proximal end of the grooved root containment support beam and are submerged in the predetermined unit of aqueous solution disposed in the cistern. The plant root system extends throughout the chamber of the grooved root containment support beam's hollow interior whereby the plant stem extends from the distal end of the grooved root containment support beam. In such embodiments, the plant stem extends vertically and downwardly from the grooved root containment support beam, thereby allowing the plant to grow while inverted.

[0030] Yet, in other embodiments, the cistern is structured to have four enclosed walls (e.g., four sidewalls), and a bottom surface, thereby forming a chamber to hold a predetermined unit of aqueous solution. In an embodiment, this chamber may comprise an open top that exposes the bottom surface or a surface of aqueous solution (when the chamber is prefilled with the aqueous solution) to the environment. In another embodiment, the chamber comprises a top surface that extends over the bottom surface to at least partially enclose the chamber from the environment.

[0031] In accordance with an aspect of the disclosed embodiment, the cistern may be configured to have a at least one growth propagation support, wherein the at least one growth propagation support may be configured as at least one growth propagation vessel that extends from the bottom surface of the cistern. In such configurations, the growth propagation vessel is a hollow conical shaped cylinder (i.e., a frustum) having a first end defining a first opening at a bottom surface of the cistern and a second end defining a second opening at a height extending from the bottom surface of the cistern, whereby a portion of a plant, such as its stem or the root system, extends through the second opening of the growth propagation vessel and the plant stem extends towards its canopy through the first opening. In accordance with a further aspect of the disclosed embodiment, at least a portion of the network of the plant root system extends over the edge adjacent to the second opening of the growth propagation vessel within the cistern whereby the roots are at least partially submerged in the predetermined unit of aqueous solution disposed in the cistern. Meanwhile, the plant stem extends from the first opening of the growth propagation vessel, allowing the plant with its canopy to grow outwardly and extend a distance from the bottom surface of the cistern in an inverted configuration.

[0032] Other embodiments of the present disclosure allow for a root nourishment membrane configured to provide moisture and support for the plant root systems, to lay over and/or enclose the plant root systems that are submerged in aqueous solution within the cisterns.

[0033] In accordance with certain aspects of the disclosure, the cisterns may be contained within a containerized module, building, or warehouse structure configured to allow the cisterns to be placed near the top thereof and may be supported by engineered racks, thereby allowing the plant to grow inverted from the cistern towards the floor of the containerized module, building or warehouse structure.

[0034] In an embodiment of the present disclosure, at least one automated lifting

control module may be disposed adjacent, but at predetermined or adjustable distances, to each of a corresponding one of the plurality of cisterns and configured to provide customized lighting, air circulation, and growth stimulation frequencies based on the plant type, plant growth cycle, and plant size.

[0035] In accordance with an aspect of the disclosed embodiment, the automated lifting control module is disposed to support, extend or retract the automated fanning light growth stimulation module, which may be removably affixed to a hoist module via at least one connector. The at least one connector may be a rigid and/or flexible connector. A flexible connector may include one or more of a cable (including electric cable), rope, chain, strap or the like. A rigid connector may include one or more of a post, shaft, beam, pole, strut, pillar and the like. A first end of the connector may be removably affixed to a portion of the automated lifting control module, such as to the hoist module. A second end of the connector may be removably affixed to the automated fanning light growth stimulation module (which may comprise a circulating fan, a light growth stimulation module and/or frequency stimulation emitters). The connector may extend along the length of the plant and is extendable and retractable by the automated lifting control module such that the fanning light growth simulation module removably affixed to the second end of the connector can be supported in place, such as at a predetermined distance or moved toward or away from the canopy of the plant as needed to encourage optimal growth and development of the plant. In a preferred embodiment of the present disclosure, the automated lifting control module has sensors that enable automatic adjustment of its distance from the cistern based on the height and growth rate of the plant that is growing from the cistern that is affixed to the automated lifting control module.

[0036] In accordance with further aspects of the present disclosure, the containerized module, building or warehouse structure is configured to allow for plants of the same type,

growth stage, and/or size to be placed in the same growing areas of sections of the containerized module, building or warehouse structure. The placement of plants in each of the aforementioned growing areas is determined by the weight, size, and species of the plant.

[0037] By way of non-limiting example, the areas of sections of the containerized module, building or warehouse structure can include, but are not limited to a "Sprouting Garden" growing area, a "Kender-Garden" growing area, a "Middle Garden" growing area, a "High-Garden" growing area, and a "Main Grow" growing area. In an embodiment, the growth phase includes a plant germination and growth process that begins at the "Sprouting Garden" growing area. As a non-limiting example, plants having a growth size of about nine to thirty inches are placed in the "Kender-Garden" growing area, plants having a growth size of thirty to sixty inches are placed in the "Middle Garden" growing area, plants that have a growth size of sixty to ninety-six inches (or greater) are placed in the "High-Garden" growing area and, at a final phase to maturity, the plants are placed in a "Main Grow" growing area.

[0038] The Sprouting Garden growing area may comprise of a multi-tiered piping system having a plurality of pipes, whereby each pipe contains a hollow interior that is configured with a plurality of plant sprout boxes and misting valves for delivering an aqueous solution. In some aspects, each pipe further comprises of a support beam to hold the plurality of plant sprout boxes in place. Each plant sprout box may be disposed at a top opening facing the hollow interior of the pipe, and a bottom opening that faces downwardly away from the base of the pipe.

[0039] During the plant germination and growth process, the configuration of the plant sprout box enables the plant to grow inverted; that is the sprout box enables the plant roots to grow upwardly towards the hollow interior of the pipe whereby the plant body grows downwardly. The plant roots growing from the plant sprout box receive nutrients from the aqueous solution disbursed from one or more of the misting valves. The Sprouting Garden

growing area may further comprise of lighting systems arranged to provide sufficient light to effectuate optimal growth for the sprouting plants.

[0040] The Kender Garden growing area may comprise a plurality of cisterns arranged in a multi-tiered configuration to allow for the optimal growth environment for plant systems ranging between the size of nine to thirty inches. By way of non-limiting example, the cisterns may be stacked vertically at equal distances. Modular light bars, fans, and an aqueous solution irrigation system may be incorporated into the multi-tiered system to further support the optimal grown environment for the plant systems.

[0041] The Middle Garden and High Garden growing areas may comprise a plurality of cisterns, automated lifting control modules, hoist modules, modular lighting systems, and an aqueous solution irrigation system.

[0042] In accordance with yet further aspects of the present disclosure, the containerized module, building or warehouse structure is further configured to allow for each plant to be accessible by a multi-tiered scaffold apparatus and/or scissor lift when the plants are readied to be transitioned to another growing area, harvested and/or – as pertaining to certain plant types and species –processed accordingly.

[0043] In some embodiments, and to effectuate movement of plants, a transport cistern module may be used. In some aspects, the transport cistern module may be configured to hold plants while protecting the plant's roots. The base of the transport cistern module may be configured to be safely lifted from one area to another area via, for example, a forklift or scissor lift.

[0044] In some embodiments, and to effectuate movement, harvesting, or drying for larger plant systems, a lifting hoist link is removably affixed to each root nourishment membrane disposed in each cistern. In accordance with the disclosed embodiment, the lifting hoist link comprises a flat disk-shaped surface having a hoist stem extending perpendicularly

from the center of said flat disk-shaped surface. The hoist stem is further configured to removably connect to a hoist system while simultaneously lifting the entire plant root system, perpendicularly, out of the predetermined unit of aqueous solution in the cistern chamber.

[0045] The embodiments described herein are exemplary and numerous modifications, variations and rearrangements can be readily envisioned to achieve substantially equivalent results, all of which are intended to be embraced within the spirit and scope of the disclosure. Furthermore, while the preferred embodiment of the disclosure are described in terms of the components and configurations, it is understood that the disclosure is not intended to be limited to those specific dimensions or configurations but is to be accorded the full breadth and scope of the spirit of the disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0046] These and other features, aspects and advantages of the present disclosure will become better understood with regard to the following description, appended claims, and accompanying figures, where:

[0047] **FIG. 1** shows a perspective view of an inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure.

[0048] **FIG. 2** shows a perspective view of an inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure.

[0049] **FIG. 3A** shows a closed front view of a cistern of an inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure.

[0050] **FIG. 3B** shows a cross-sectional front view of a cistern of an inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure.

[0051] **FIG. 3C** shows a cross-sectional front view of a cistern of an inverted plant

growth and selection system and method of use in accordance with an embodiment of the present disclosure.

[0052] **FIG. 4A** shows a perspective view of a cistern of an inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure.

[0053] **FIG. 4B** shows a perspective view of a cistern of an inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure.

[0054] **FIG. 4C** shows a perspective view of a cistern of an inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure.

[0055] **FIG. 5A** shows a perspective cross-sectional view of a cistern of the inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure.

[0056] **FIG. 5B** shows a cross-sectional view of a cistern of the inverted plant growth and selection system and method of use in accordance with an embodiment of the present invention.

[0057] **FIG. 5C** shows a cross-sectional view of a cistern of the inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure.

[0058] **FIG. 6A** shows a cross-sectional view of a cistern of the inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure.

[0059] **FIG. 6B** shows a cross-sectional view of a cistern of the inverted plant growth and selection system and method of use in accordance with an embodiment of the present

disclosure.

[0060] **FIG. 6C** shows a cross-sectional view of a growth propagation vessel of a cistern of the inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure.

[0061] **FIG. 7** shows a perspective view of a scaffold of the inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure.

[0062] **FIG. 8** shows a perspective view of a scaffold of the inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure.

[0063] **FIG. 9A** shows a perspectiveview of a lifting hoist disk of the inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure.

[0064] **FIG. 9B** shows a perspective view of a lifting hoist disk of the inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure.

[0065] **FIG. 10** shows a perspective view of a fanning light growth stimulation module of the inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure.

[0066] **FIG. 11** shows a cross-sectional view of the growth propagation vessel of the inverted plant growth and selection system and method of use in accordance with an alternative embodiment of the present disclosure.

DETAILED DESCRIPTION

[0067] Aqueous Solution: as used herein, the term “aqueous solution” refers to a water based nutrient solution comprising of minerals aimed to assist with plant growth.

[0068] Cistern: as used herein and traditionally in the industry of the art, the term "cistern" refers to a tank or trough for storing a predetermined unit of aqueous solution.

[0069] Growth Propagation Vessel: as used herein, the term "growth propagation vessel" refers to a cylindrical apparatus having a hollow support tube extending throughout the center of the cylindrical apparatus and configured to allow plant root systems to extend through the center of the hollow support tube and over the top of the tube thereby allowing the roots to develop while submerged in water or the aqueous solution. The tube simultaneously supports the weight of the plant in an inverted state.

[0070] Root Nourishment Membrane: as used herein, the term "root nourishment membrane" refers to a nutrient impregnated membrane configured to lay over plant root systems that are partially submerged in the predetermined unit of aqueous solution disposed in a cistern.

[0071] Hoist Module: as used herein, the term "hoist module" refers to an automated system allowing for a hoist beam to raise and lower the fanning light growth stimulation module. An electrical cable may also be affixed thereto.

[0072] Growing Area: as used herein, the term "growing area" refers to the area of the building or warehouse structure that is designated for plant growth and maturity.

[0073] Sprouting Garden: as used herein, the term "Sprouting Garden" refers to the growing area designated for plants in the earlier stages of development, particular plants that are less than about nine inches in length. The length may vary depending on the specific plant species.

[0074] Kender Garden: as used herein, the term "Kender Garden" refers to the growing area designated for plants ranging from about nine to about thirty inches, for example, from about twelve to twenty-four inches in length. The length may vary depending on the specific plant species.

[0075] Middle Garden: as used herein, the term "Middle Garden" refers to the growing area designated for plants ranging from twenty-four to sixty inches in length. The length may vary depending on the specific plant species.

[0076] High Garden: as used herein, the term "High Garden" refers to the growing area designated for plants ranging from sixty inches to ninety-six inches in length.

[0077] Main Grow Area: as used herein, the term "Main Grow Area" refers to the growing area designated for plants to reach full maturity. In the main grow area, plants may be more than ninety-six inches in length.

[0078] Growth Stimulation Frequency: as used herein, the term "growth stimulation frequency" refers to unique and proprietary sound wave frequencies attuned to a plant's type, size, and growth stage, to achieve optimal growth rate and maturity.

[0079] Fanning Light Growth Stimulation Module: as used herein, the term "fanning light growth stimulation module" refers to an apparatus that is removably affixed to the hoist module, allowing the plant system to receive air, light, and/or growth stimulation frequency based on the plant's type, size, and growth stage, to achieve and optimal growth rate and maturity. The fanning light growth stimulation module may include on-board electronics and/or placed in communication with a controller controllable via computer to automate its operation, and may thereby be referred to by the term "automated fanning light growth stimulation module".

[0080] As used herein, words and terms referring to vegetation, plants, growth, plant maturity, harvesting, and frequency shall have their ordinary meaning, as known in the field of the art.

[0081] The present disclosure overcomes the limitations of the prior art by providing a new and more effective inverted hydroponics system and method to allow for maximum plant growth and efficient harvesting for commercial scale applications.

[0082] All dimensions specified in this disclosure are by way of example only and are not intended to be limiting. Further, the proportions shown in these Figures are not necessarily to scale. As will be understood by those with skill in the art with reference to this disclosure, the actual dimensions and proportions of any embodiment or element of an embodiment disclosed in this disclosure will be determined by its intended use.

[0083] It is to be understood that the drawings and the associated descriptions are provided to illustrate potential embodiments of the disclosure and not to limit the scope of the disclosure. Reference in the specification to "one embodiment" or "an embodiment" is intended to indicate that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least an embodiment of the disclosure. The appearances of the phrase "in one embodiment" or "an embodiment" in various places in the specification are not necessarily all referring to the same embodiment.

[0084] Throughout the drawings, reference numbers are re-used to indicate correspondence between referenced elements. In addition, the first digit of each reference number indicates the figure where the element first appears.

[0085] As used in this disclosure, except where the context requires otherwise, the term "comprise" and variations of the term, such as "comprising", "comprises" and "comprised" are not intended to exclude other additives, components, integers or steps.

[0086] In the following description, specific details are given to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these specific details. Well-known features, elements or techniques may not be shown in detail in order not to obscure the embodiments.

[0087] In **FIG. 1**, a perspective view of an inverted hydroponics system in accordance with an embodiment of the disclosure is shown. In the embodiment depicted, a viewer may

observe a warehouse structure **100** comprising a Sprouting Garden growing area **101**, a Kender Garden growing area **102,** a Middle Garden growing area **103**, a High Garden growing area **104**, a Main Grow area **105**, and a Processing Area **106**. The Main Grow area **105** further comprises a plurality of upper bracket beams **107** configured to suspend a plurality of inverted plants **108**.

[0088] In an embodiment, each one of the upper bracket beams **107** is configured to support the weight of at least one of the plurality of inverted plants **108** that weights at least 25 lbs. In an embodiment, each one of the upper bracket beams **107** is configured to support the weight of at least one of the plurality of inverted plants **108** that weights at least 50 lbs. In an embodiment, each one of the upper bracket beams **107** is configured to support the weight of at least one of the plurality of inverted plants **108** that weights at least 100 lbs. In an embodiment, each one of the upper bracket beams **107** is configured to support the weight of at least one of the plurality of inverted plants **108** that weights at least 300 lbs.

[0089] **FIG. 2** is a perspective view of an inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure. In the embodiment depicted, a viewer may perceive an inverted plant growth system **2000** comprising an automated lifting control module **200** affixed to upper bracket beams **107,** the automated lifting control module **200** having an electrical distribution and control system **206** and a hoist module **200a** comprising a hoist **200b** and hoist module connector, such as hoist module cable **207**. The inverted plant growth system further comprises a cistern **201** having a growth propagation vessel (not visible in **FIG. 2**) to which at least one of the plurality of plants **108** is removably affixed in an inverted position, and an automated fanning light growth stimulation module **204**, the hoist module cable **207** having a distal end **203** to which the automated fanning light growth stimulation module **204** is affixed and a proximal end (not visible) affixed to the hoist **200b**. The hoist **200b** is controllable by the electrical distribution and control system **206**

which is in electrical communication with the automated fanning light growth stimulation module **204**. Although shown separately in **FIG. 2**, in some embodiments, the hoist module cable **207** may be combined with an electrical cable **205** into one component, thereby eliminating the need for a separate hoist cable and electrical cable.

[0090] The hoist module is disposed on an upper bracket beam **107** (shown as a cross-section) whereby the hoist module cable **207** extends from the hoist **200b** and through the cistern **202**. An inverted plant **108** grows vertically from the cistern **201** (roots not shown) and extends toward the automated fanning light growth stimulation module **204**. The automated fanning light growth stimulation module **204** is fixedly coupled to the distal end **203** of the hoist module cable **207**.

[0091] During the growth stages of the inverted plant **108,** the hoist **200b** may be automated to raise and lower the automated fanning light growth stimulation module **204**. Specifically, sensors (not shown) may detect the growth stage of the inverted plant **108** and an automated computer system (not shown in entirety), including electrical distribution and control system **206,** signals the hoist **200b** to raise and lower the automated fanning light growth stimulation module **204** thereby allowing the automated light and ambient air frequency stimulation module **204** to maintain an appropriate distance from the plant canopy to allow for maximum plant growth.

[0092] In **FIGS. 3A-3C**, a viewer may perceive an embodiment of the present disclosure as a cistern **301** that includes a base **304** and a perimeter wall **303** extending from the base. Perimeter wall **303** extends from and along a perimeter of the base **304** to define a hollow interior **305** that can be at least partially filled with a volume of liquid, such as a predetermined volume or unit of liquid, such as an aqueous solution **309**. Accordingly, though not limited to any particular shape, cistern **301** may be described as being "bucket-shaped". To assist with preventing movement of cistern **301** once installed in, for example, a receiving

orifice of a support beam (not shown), cistern **301** may include a lip **302** around an upper perimeter thereof. Lip **302** may extend radially, for example, perpendicularly, from perimeter wall **303**. Accordingly, cistern **301** may be inserted into corresponding slots of a platform such that the lip **202** extends over the platform to prevent the cistern from falling through the slots.

[0093] Cistern **301** may comprise at least one growth propagation vessel **306,** illustrated in **FIGS. 3A-3C** as conical-shaped cylinder (i.e., frustum-shaped), though not limited to any particular shape. Growth propagation vessel extends from the base **304** between perimeter wall **303** and terminates at a top edge thereof. Cable guide **301**, shown in **FIG. 3A** as cylindrically shaped (though not limited to any particular shape), extends at least a portion of the height of the cistern **301** and is configured to allow, for example, the hoist cable **207** to pass through the cistern **301** via, for example, a cable guide, in order to avoid interaction of the hoist cable with, for example, the root network of the plant within the cistern. Though not limited to any particular configuration, shape, orientation or location, as shown in **FIG. 3B**, cable guide **301** is located within the hollow interior **305** of the cistern **301** and adjacent to but separate from growth propagation vessel **306**. The hollow interior **305** of the cistern **301** is further configured to hold a predetermined amount of aqueous solution (not shown in **FIGS. 3A-3B**) with the conical cylinder-shaped growth propagation vessel **306** disposed in the center interior of and extending from the base **304** of cistern **301**.

[0094] When in use, and as shown in **FIG. 3C**, a plant stem **308** may be disposed in and extend through a center portion of the growth propagation vessel **306** configured as the conical cylinder. To facilitate inverted plant growth, the plant stem **308** extends through a first opening **306a** and may extend through second opening **306b** of the growth propagation vessel **306** of cistern **301**. The plant roots **310** extend over the top edge **306c** of the growth propagation vessel **306** and, with assistance of gravity, the plant roots **310** are reoriented from an inverted orientation to a right-side up orientation and extend over a sidewall portion **306d**

of the growth propagation vessel **306**. The top edge **306c** surrounds the second opening, and the sidewall portion **306d** extends between an inner surface of the base **304** and the top edge **306c**. At least some of the network of plant roots **310** extend into an aqueous solution **309** disposed within the hollow interior **305** of the cistern **301**. To prevent leakage of the aqueous solution, the growth propagation vessel **306** extends a height from a base **304** of cistern **301** such that the second opening **306b** is above the surface of the predetermined volume of aqueous solution.

[0095] As described above, the plant roots **310** may be supported by surface of the growth propagation vessel **306** such as the top edge **306c** and/or sidewall portion **306d**. The plant roots **310** may be additionally supported and held in place by a root nourishment membrane **307**, such as described above, that is placed and extends over at least a portion of the plant roots **310** and at least a portion of the growth propagation vessel, thereby forcing the plant roots **310** to remain submerged in the aqueous solution within the hollow interior **305** of the growth propagation vessel **306**.

[0096] **FIG. 4A** illustrates a perspective view while **FIGS. 4B-4C** illustrate cross-sectional views of a cylindrical cistern of an inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure. The cylindrical cistern **401** comprises a cylindrically shaped wall **403** with a first vertical sidewall **402** disposed at a first end thereof and a second vertical sidewall (not visible) at a second opposing end thereof defining a hollow interior **405,** the cylindrically shaped wall **403** comprising a curved base **404** extending between a roof **404a**, a protruding edge **404b,** and an access slot **404c** defined by a gap between the curved roof **404a** and the protruding edge **404b**. A predetermined unit of aqueous solution **409** may be provided in the hollow interior **405** of the cylindrical cistern **401**.

[0097] The protruding edge **404b** may be configured to support a mantel **406**. The

mantel comprises a top surface **406a** and bottom surface **406b**, a distal end **406c** that extends over the ledge of the protruding edge **404b**, and a proximal end **406d** that extends toward and may extend beneath the surface of the predetermined unit of aqueous solution **409** disposed within the cistern.

[0098] In accordance with further aspects of the disclosure, a plant comprising plant stem **408** and plant root **410** may be supported in and anchored in an inverted configuration to cistern **401**. To facilitate this, mantel **406** is configured to support at least some of the network of the plant root **410** on the top surface **406a** allowing the plant root to extend to and submerged beneath the surface of the predetermined unit of aqueous solution. The mantel may comprise an opening or a groove through which the plant's stem or root network extends such that the plant is suspended inverted vertically and downwardly from the distal end of the top flat surface of the mantel.

[0099] In an embodiment, as shown in **FIGS. 4A**, mantel **406** comprises a grooved platform configuration having a plurality of grooves **407** extending from the distal end **406c** toward the proximal end **406d**. As illustrated in **FIG. 4B-4C**, a grooved platform configuration of mantel **406** may be affixed to the protruding edge **404b** of the cylindrical cistern **401**. As illustrated FIG. **4C**, the grooved platform configuration of mantel **406** is configured with proximal end **406d** that extends beneath the surface of the predetermined unit of aqueous solution **409** contained within the hollow interior **405** of the cylindrical cistern **401**. In some embodiments, the protruding grooved platform configuration of mantel **406** is further configured to allow a plant root system **408** to lay over the top flat surface **406a** of the mantel **406** whereby the plant roots **410** are submerged beneath the surface of the predetermined unit of aqueous solution **409** contained within the hollow interior **405** cylindrical cistern **401** and the stem **408** extends vertically and downwardly from the distal end of the mantel **406**.

[0100] **FIG. 5A** illustrates a perspective view while **FIGS. 5B-5C** illustrate cross-

sectional views of a trapezoidal shaped cistern of an inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure is shown. The trapezoidal shaped cistern **501** comprises a first vertical side wall **502** disposed at a first end**,** a back wall **503a**, a protruding front wall **503b** a base **504** disposed between the backwall **503a** and protruding front wall **503b,** and a second vertical side wall (not visible) disposed at a second opposing end from first vertical sidewall **502**, that together define a hollow interior **505**. The trapezoidal shaped cistern **501** is further configured to hold a predetermined amount of aqueous solution (not shown in FIG. 5A-5B). In an embodiment, the protruding front wall **503b** may be configured to support a mantel **506**. The mantel comprises a top surface **506a** and bottom surface **506b**, a distal end **506c** that extends over the ledge of the protruding wall **503b**, and a proximal end **506d** that extends toward and may extend beneath the surface of the predetermined unit of aqueous solution **509** disposed within the cistern.

[0101] In accordance with further aspects of the disclosure, a plant comprising plant stem **508** and plant root **510** may be supported in and anchored in an inverted configuration to cistern **501**. To facilitate this feature, mantel **506** is configured to support at least some of the network of the plant root **510** on the top surface **506a** allowing the plant root to extend to and submerged beneath the surface of the predetermined unit of aqueous solution **509**. The mantel may comprise an opening or a groove through which the plant's stem or root network extends such that the plant is suspended inverted vertically and downwardly from the distal end of the top flat surface of the mantel.

[0102] In an embodiment, as shown in FIGS. **5A**, mantel **506** comprises a grooved platform configuration having a plurality of grooves **507** extending from the distal end **506c** toward the proximal end **506d**.

[0103] In an embodiment, mantel **506** is configured as a protruding grooved platform that is affixed to the protruding front wall **503b** of the trapezoidal shaped cistern **501**. One or

more plants may be cradled along the protruding grooved platform **506**.

[0104] In an embodiment, as illustrated in **FIG. 5B**, the mantel **506** configured as a protruding grooved platform may be permanently affixed to the protruding front wall **503b** of the trapezoidal shaped cistern **501**. As illustrated in **FIG. 5C**, at least a portion of the mantel **506** configured as a protruding grooved platform is configured to have proximal end **506d** extend beneath the surface of the predetermined unit of aqueous solution **509** contained within the hollow interior **505** of the trapezoidal cistern **501**.

[0105] In some embodiments, the mantel **506** configured as a protruding grooved platform is further configured to allow at least some of the network of plant root **510** to lay over the top flat surface **506a** of the mantel **506** whereby the plant roots **510** are submerged beneath the surface of the predetermined unit of aqueous solution **509** contained within the hollow interior **505** trapezoidal cistern **501**, and the stem **508** extends vertically and downwardly from the distal end of the mantel of the grooved support board **506**. In some embodiments, the mantel **506** is a hollow tube (not shown) and is configured to allow a plant root system **510** to be contained within the hollow interior of the hollow protruding grooved platform **506**.

[0106] **FIG. 6A** illustrates a perspective view of a growth propagation vessel cistern of an inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure. Though not limited to any particular shape or configuration, a growth propagation vessel cistern **601** is illustrated as rectangularly shaped and comprises a first vertical side wall **602** at a first end, side walls **603a, 603b** with base **604** disposed between sidewalls **603a** and **603b**, and a second vertical side wall (not visible) at an opposing end from first vertical sidewall **602**, together defining a hollow interior **605**, and further comprising a plurality of conical-shaped cylinder (i.e., frustum-shaped) growth propagation vessels **606**. The growth propagation vessel cistern **601** is further configured to

hold a predetermined amount of aqueous solution (not shown in **FIG. 6A**).

[0107] As illustrated in **FIG. 6B** and **FIG. 6C**, to facilitate inverted plant growth, each of the plurality of conical shaped cylinder growth propagation vessels **606** are configured to receive at least a portion of at least one plant. For example, the plant stem **608** extends through a first opening **606a** and may extend through a second opening **606b** of the growth propagation vessel **606** of cistern **601**. The plant roots **610** extend over a top edge **606c** of the growth propagation vessel **606** and, with assistance of gravity, the plant roots **610** are reoriented from an inverted orientation to a right-side up orientation and extend over a sidewall portion **606d** of the growth propagation vessel **606**. Accordingly, the plant roots **608** extend over the top edge of the conically shaped growth propagation vessels **606** and into an aqueous solution **609** within the hollow interior **605** of the growth propagation vessel cistern **601**.

[0108] In **FIG. 7** a perspective view of a scaffold of the inverted plant growth system and method of use in accordance with an embodiment of the present disclosure is shown. In the embodiment depicted, a viewer may perceive that the scaffold **701** is crescent shaped with a plurality of levels **702** at least partially surrounding a center interior portion **706** an internal ladder **703** extending between at least two of the plurality of levels **702**, and a plurality of wheels **705**. The interior portion **706** of the scaffold **701** is configured to receive at least a portion of an inverted plant, such as a plant suspended in an inverted configuration, as in the inverted plant growth and selection system of **FIG. 2** as described above. The scaffold **701** is further configured to allow a multi-cart **704** to fit within the base **801** of the scaffold **701** as illustrated in **FIG. 8**.

[0109] Culling, curating, and optimizing processes occurs periodically or at scheduled times at the various growth areas prior to transfer of a plant suspended in an inverted growth configuration to the Main Grow area. The growth system and method described herein may utilize artificial intelligence to automatically select a segment of plants for transitioning

between growth areas and/or into the Main Grow area based on a predetermined state of maturity. The predetermined state of maturity may be based on several factors, for example the plant's size, species, height, genetic makeup, environmental elements, and or length. The non-selected plants are either continuously nurtured to reach the predetermined state of maturity or disposed or processed depending on the species and applicable regulations.

[0110] **FIG. 9A** illustrates a lifting hoist disk 901 of the inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure. The lifting hoist disk **901** can be used to facilitate the movement of a plant from one growth area to another growth area or processing area, for example, for lifting or extracting a plant from a cistern to another cistern, or from a cistern to a harvest area, including from one cistern and replacing back to the same cistern (e.g., during maintenance). The lifting hoist disk **901** is configured to rest over a mantel such as mantel **406**, **506** configured as a protruding grooved platform such as protruding grooved platform **406**, **506** of cistern **401, 501** described as illustrated in **FIGS. 4A-4C, FIGS. 5A-5C** whereby the plant stem extends vertically and downwardly from the protruding grooved platform **406**, **506**.

[0111] **FIG. 9B** illustrates that the lifting hoist disk **901** comprises a circular disk plate **902**, a center stem **903,** a plurality of rings or loops **904**, and a lift hoist hook **905**. The circular disk plate **902** comprises a crescent shaped cutout **906** that is configured to receive the network of the plant root **910** of a plant in an inverted configuration (not fully visible) and allows it to lay over the circular disk plate **902** whereby the stem **908** extends vertically from the base of the circular disk plate **902**. In some embodiments, the plant root **910** may be covered by a mesh material **909** to protect the plant root **910** during the inverted plant growth cycle. While in use, the inverted plant (not fully visible) may be lifted from a cistern **401, 501, 601** by raising the lifting hoist disk **901** from the lift hoist hook **905** and raising the inverted plant (not shown) out of the cistern **401, 501, 601**.

[0112] In **FIG. 10**, a view of an automated fanning light growth stimulation module **204** of the inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure is shown. A viewer may perceive that the automated fanning light growth stimulation module **204** comprises a at least one electronically controlled fanning system **1003** that includes at least one fan, at least one electronically controlled lighting system **1002** that includes a plurality of lights, at least one electronically controlled frequency emission system **1006** that includes at least one air sound frequency modulator, a distance sensor **1007**, a base frame **1004**, and a hoist beam and cable system **1001** that fixedly connect the automated fanning light growth stimulation module **204** to the hoist cable's distal end **203** (not visible in **FIG. 10**). The automated fanning light growth stimulation module **204** is fixedly coupled to the electrical distribution and control system (not shown in **FIG. 10**) via the electrical cable **205**. A viewer may also perceive that the fan of the at least one electronically controlled fanning system **1003** is fixedly connected to base frame **1004** by a plurality of support beams **1005**. The air sound frequency modulator of the at least one electronically controlled frequency emission system **1006** may comprise of a plurality of transmitters and receivers configured to transmit frequencies transmitted that, among other things, encourage the plants to grow and develop more rapidly. The distance sensor **1007** may be incorporated into a computing system that uses signals generated by the distance sensor to automatically adjust the distance from the automated fanning light growth stimulation module **204** and the plant to maximize the stage of the plant's development.

[0113] In **FIG. 11**, a cross-sectional view of a cistern of an inverted plant growth and selection system and method of use in accordance with an embodiment of the present disclosure is shown. A viewer may perceive that an inverted plant growth and selection system and method of use comprises a cistern, such as cistern **301** of **FIGS. 3A-3C**, that further comprises at least two frequency emission systems **1101** that provide predetermined frequency through

the aqueous solution, such as aqueous solution **309** as illustrated in **FIG. 3C** disposed in the cistern **301**.

EXAMPLES

[0114] Example 1: An inverted hydroponics system comprising:

a growing area having a first designated growth area, a second designated growth area, a third designated growth area, a fourth designated growth area, and a fifth designated growth area;

a processing area;

a plurality of upper bracket beam systems;

a plurality of automated lifting control module systems;

a plurality of cisterns;

a plurality of growing propagation vessels;

a plurality of growth stimulation modules;

a plurality of lifting hoists; and

at least one processing area.

[0115] Example 2: The inverted hydroponics system of example 1, wherein the first designated growth area of the growing area further comprises at least one cistern.

[0116] Example 3: The inverted hydroponics system of example 1, wherein the second designated growth area of the growing area further comprises at least one cistern.

[0117] Example 4: The inverted hydroponics system of example 1, wherein the third designated growth area of the growing area further comprises at least one cistern.

[0118] Example 5: The inverted hydroponics system of example 1, wherein the fourth designated growth area of the growing area further comprises at least one cistern.

[0119] Example 6: The inverted hydroponics system of example 1, wherein the fifth designated growth area of the growing area further comprises at least one cistern.

[0120] Example 7: The inverted hydroponics system of example 1, wherein the plurality of upper bracket beam systems comprise a plurality of openings along each upper bracket beam wherein each opening is configured to removably affix to at least one automated lifting control module system.

[0121] Example 8: The inverted hydroponics system of example 7, wherein each upper bracket beam system is further configured to support the weight of at least one plant in an inverted position that weighs at least 25 lbs., wherein the at least one inverted plant comprises a root base, a growing body, and a plant top.

[0122] Example 9: The inverted hydroponics system of example 7, wherein each upper bracket beam system is further configured to support the weight of at least one plant in an inverted position that weighs at least 50 lbs., wherein the at least one inverted plant comprises a root base, a growing body, and a plant top.

[0123] Example 10: The inverted hydroponics system of example 7, wherein each upper bracket beam system is further configured to support the weight of at least one plant in an inverted position that weighs at least 100 lbs. wherein the at least one inverted plant comprises a root base, a growing body, and a plant top.

[0124] Example 11: The inverted hydroponics system of example 7, wherein each upper bracket beam system is further configured to support the weight of at least one plant in an inverted position that weighs at least 300 lbs., wherein the at least one inverted plant comprises a root base, a growing body, and a plant top.

[0125] Example 12: The inverted hydroponics system of example 1, wherein the automatic lifting module comprises at least one control panel, at least one support cable that is fixedly connected to at least one growth propagation vessel, and at least one support cable that is fixedly coupled to the growth stimulation module.

[0126] Example 13: The inverted hydroponics system of example 12, wherein the

automatic lifting module is configured to removably affix to the upper bracket beam system and may be configured to support at least one plant in an inverted position.

[0127] Example 14: The inverted hydroponics system of example 12, wherein the at least one support cable that is fixedly coupled to the growth stimulation module may be configured to raise and lower the growth stimulation module.

[0128] Example 15: The inverted hydroponics system of example 1, wherein the plurality of cisterns each comprise of an exterior shell, a hollow interior, and at least one opening wherein the opening further comprises of at least one protruding edge extending outwardly from the hollow interior.

[0129] Example 16: The inverted hydroponics system of example 12, wherein each cistern comprises at least one grooved root containment support beam that may be fixedly coupled to a portion of the at least one protruding edge.

[0130] Example 17: The inverted hydroponics system of example 12, wherein each cistern is configured to hold a predetermined amount of aqueous solution.

[0131] Example 18: The inverted hydroponics system of example 13, wherein the grooved root containment support beam may be configured to removably affix to a root nourishment membrane and support the root base of at least one plant in an inverted position.

[0132] Example 19: The inverted hydroponics system of example 12, wherein each cistern may comprise a plurality of growth propagation vessels.

[0133] Example 20: The inverted hydroponics system of example 1, wherein the growth stimulation module comprises an automated fanning light growth stimulation module stimulation module, wherein the automated fanning light growth stimulation module comprises at least one electronically controlled fanning system, at least one electronically controlled lighting system, at least one electronically controlled frequency emission system, or combinations thereof.

[0134] Example 21: The inverted hydroponics system of example 20, wherein the growth stimulation module is fixedly coupled to the automatic lifting module by at least one support cable and may be configured to be raised and lowered by the automatic lifting module.

[0135] Example 22: The inverted hydroponics system of example 20, wherein the growth stimulation module may be placed below the plant top at least one inverted plant system.

[0136] Example 23: The inverted hydroponics system of example 20, wherein the at least one electronically controlled fanning system, at least one electronically controlled lighting system, and at least one electronically controlled frequency emission system may be controlled by the automatic lifting module control panel.

[0137] Example 24: The inverted hydroponics system of example 1, wherein the processing area comprises of at least one upper bracket beam system, at least one electronically controlled fan and at least one electronically controlled frequency emission system.

[0138] Example 25: A method for inverted hydroponic plant growth comprising the steps of:

configuring a building or warehouse structure to comprise

a growing area,

a harvesting area, and

a processing area, wherein

the growing area has a first designated growth area, a second designated growth area, and a third designated growth area, a fourth designated growth area, and a fifth designated growth area,

the harvesting area has at least one harvesting scaffold and at least one hoist lifting system, and

the growing area has at least one upper bracket beam system, at least one electronically controlled fan, and at least one electronically controlled frequency emission system;

sprouting a plant from a seed in the first designated growth area;

removably coupling at least one plant into at least one grooved root containment support beam of at least one cistern having an aquatic solution in an inverted position in the second designated growth area;

transitioning and removably coupling the at least one plant into at least one grooved root containment support beam of at least one cistern having an aquatic solution in an inverted position in the third designated growth area;

transitioning and removably coupling the at least one plant into at least one grooved root containment support beam of at least one growing propagation vessel having an aquatic solution in an inverted position in the fourth designated growth area;

transitioning and removably coupling the at least one plant into at least one grooved root containment support beam of at least one growing propagation vessel having an aquatic solution in an inverted position in the fifth designated growth area;

providing air, light, and frequency stimulation to at least one plant in the growing areas;

processing at least one plant in a designated processing area; and

harvesting at least one plant.

[0139] Example 26: The method for inverted hydroponic plant growth of example 25, wherein the first designated growth area of the growing area further comprises at least one cistern.

[0140] Example 27: The method for inverted hydroponic plant growth of example 25, wherein the second designated growth area of the growing area further comprises at least one

cistern.

[0141] Example 28: The method for inverted hydroponic plant growth of example 25, wherein the third designated growth area of the growing area further comprises at least one cistern.

[0142] Example 29: The method for inverted hydroponic plant growth of example 25, wherein the fourth designated growth area of the growing area further comprises at least one cistern.

[0143] Example 30: The method for inverted hydroponic plant growth of example 25, wherein the fifth designated growth area of the growing area further comprises at least one cistern.

[0144] Example 31: The method for inverted hydroponic plant growth of example 25, wherein the height, weight, aquatic solution consumption, and growth rate of at least one inverted plant is monitored and the inverted plant is transitioned from the second designed growth area to the third designated growth area when the inverted plant reaches a growth size of thirty-six to sixty inches.

[0145] Example 32: The method for inverted hydroponic plant growth of example 25, wherein the height, weight, aquatic solution consumption and growth rate of at least one inverted plant is monitored and the inverted plant is transitioned from the third designed growth area to the fourth designated growth area when the inverted plant reaches a growth size of seventy-two to ninety-six inches.

[0146] Example 33: The method for inverted hydroponic plant growth of example 25, wherein at least one inverted plant residing in at least one growing propagation vessel in the fifth growth area is removably coupled to at least one automatic lifting module.

[0147] Example 34: The method for inverted hydroponic plant growth of example 33, wherein the automatic lifting module is fixedly coupled to a proximal end of the growing

propagation vessel and the growth stimulation module is removably coupled to a distal end of the growing propagation vessel.

[0148] Example 35: The method for inverted hydroponic plant growth of example 33,

wherein the growth stimulation module may be placed below the plant top of at least one inverted plant system and may comprise at least one automated fanning light growth stimulation module,

wherein the automated fanning light growth stimulation module comprises at least one electronically controlled fanning system, at least one electronically controlled lighting system, and at least one electronically controlled frequency emission system, and

wherein the automated fanning and lighting growth stimulation module may be controlled by the automatic lifting module control panel.

[0149] Example 36: The method for inverted hydroponic plant growth of example 25, wherein at least on electronically controlled fanning system provides predetermined air circulation to the at least one inverted plant system.

[0150] Example 37: The method for inverted hydroponic plant growth of example 25, wherein at least one electronically controlled lighting system provides predetermined light to the at least one inverted plant system.

[0151] Example 38: The method for inverted hydroponic plant growth of example 25, wherein at least one electronically controlled frequency emission system provided predetermined frequency modulations to the at least one inverted plant system.

[0152] Example 39: The method for inverted hydroponic plant growth of example 25, wherein the height, weight, aquatic solution consumption and growth rate of at least one inverted plant is determined and the inverted plant is transitioned to the processing area when the inverted plant reaches a predetermined state of plant maturity.

[0153] Example 40: The method for inverted hydroponic plant growth of example 25, wherein the height, weight, aquatic solution consumption and growth rate of at least one inverted plant is determined and the inverted plant is transitioned to the fifth grow area when the inverted plant reaches a predetermined state of plant maturity.

[0154] Example 41: The method for inverted hydroponic plant growth of example 40, wherein a first subset of a set of plants are transitioned into the fifth growth area and a second subset of a set of plants remain in the fourth growth area based on the predetermined state of plant maturity.

[0155] Example 42: The method for inverted hydroponic plant growth of example 40, wherein a first subset of a set of plants are transitioned into the fifth growth area and a second subset of a set of plants are discarded based on the predetermined state of plant maturity.

[0156] Example 43: The method for inverted hydroponic plant growth of example 39, wherein a plurality of electronically controlled fans and a plurality of electronically controlled frequency emission systems are placed within the processing area whereby the plurality of electronically controlled fans and plurality of electronically controlled frequency emission systems provide a predetermined level of air circulation and frequency modulation to the inverted plant systems.

[0157] Example 44: The method for inverted hydroponic plant growth of example 28, wherein the at least one harvesting scaffold may be used to harvest the inverted plant when the inverted plant reaches a predetermined state of plant maturity.

[0158] Example 45: An inverted hydroponics system comprising a growing area with designated growth areas, a processing area, upper bracket beam systems, automated lifting control module systems, cisterns with circulating aqueous solutions and dissolved nutrients (misting), growing propagation vessels, growth stimulation modules, lifting hoists, and at least one processing area.

[0159] Example 46: The system of example 45, wherein each designated growth area includes at least one cistern.

[0160] Example 47: The system of example 45, wherein upper bracket beam systems support plants in inverted positions, each capable of supporting plants of varying weights.

[0161] Example 48: The system of example 45, wherein the automated lifting module is configured to support plants in an inverted position and coupled to the upper bracket beam system.

[0162] Example 49: The system of example 45, wherein cisterns comprise grooved root containment support beams and hold aqueous solution.

[0163] Example 50: The system of example 45, wherein the growth stimulation module includes electronically controlled fanning, lighting, and frequency emission systems.

[0164] Example 51: The system of example 45, wherein the processing area comprises upper bracket beam systems, electronically controlled fans, and frequency emission systems.

[0165] Example 52: A method for inverted hydroponic plant growth comprising configuring a structure, sprouting plants, coupling plants to grooved root containment support beams in cisterns and growth propagation vessels, providing growth stimulation, processing plants, and harvesting.

[0166] Example 53: The method of example 52, further comprising providing designated growth areas that include at least one of the cisterns.

[0167] Example 54: The method of example 52, wherein plants are transitioned between growth areas based on growth size between designated growth areas.

[0168] Example 55: The method of example 52, wherein plants are coupled to automatic lifting modules in at least one growth area.

[0169] Example 56: The method of example 52, wherein growth stimulation modules control air, light, and frequency for providing growth stimulation to the plants.

[0170] Example 57: The method of example 52, wherein the plants are transitioned to processing or between growth areas based on maturity.

[0171] Example 58: The method of example 52, wherein a subset of plants is transitioned or discarded based quality size and maturity.

[0172] Example 59: The method of example 52, wherein the processing area includes fans and frequency emission systems for plant treatment.

[0173] Example 60: The method of example 52, wherein the sprouting of the plants occurs in a sprouting area, and the coupling of the plants to grooved root containment support beams in cisterns and growing propagation vessels occurs in one or more growth areas.

[0174] Example 61: An inverted hydroponics system comprising:

a plurality of growth areas;

at least one processing area;

a plurality of upper bracket beams associated with at least one of the plurality of growth areas;

a plurality of automated lifting control modules, each supported by a corresponding one of the plurality of upper bracket beams;

a plurality of lifting hoists,

wherein each of the plurality of automated lifting control modules comprises a corresponding one of the plurality of lifting hoists, and

wherein each of the plurality of lifting hoists comprises a corresponding one of a plurality of connectors removably affixed thereto;

a plurality of cisterns disposed in at least one of the plurality of growth areas, each of the plurality of cisterns comprising at least one growth

propagation support and a hollow interior configured to receive aqueous solution; and

a plurality of fanning light growth stimulation modules, wherein at least one of the plurality of fanning light growth stimulation modules is removably affixed to a corresponding one of the plurality of automated lifting control modules via a corresponding one of the plurality of connectors,

wherein each of the plurality of cisterns are disposed between a corresponding one or more of the plurality of automated lifting hoists and a corresponding one or more of the plurality of fanning light growth stimulation modules, and

wherein each of the plurality of cisterns are configured to receive and support one or more of a plurality of plants suspended in an inverted growth position.

[0175] Example 62: The inverted hydroponics system of example 61, wherein the at least one growth propagation support comprises at least one growth propagation vessel configured as a hollow conical shaped cylinder comprising a first opening, a second opening, an upper edge surrounding the second opening and a surface extending from an inner surface of a base of the cistern to the upper edge.

[0176] Example 63: The inverted hydroponics system of example 61, wherein the at least one growth propagation support comprises a mantel configured with a top surface and bottom surface, a distal end, and a proximal end, wherein the proximal end extends toward a surface of a volume of the aqueous solution disposed within the cistern.

[0177] Example 64: The inverted hydroponics system of example 63, wherein the mantel comprises a grooved platform configuration having a plurality of grooves extending from the distal end toward the proximal end.

[0178] Example 65: The inverted hydroponics system of any one of examples 61- 64, wherein at least one of the plurality automatic lifting control modules further comprises at least one control panel configured to control a corresponding one of the lifting hoists to cause an extending or retracting of a corresponding one of the connectors removably affixed thereto at a first end thereof, to cause a raising and lowering of the growth stimulation module removably affixed thereto at a second end thereof, whereby the raising and lowering of the growth stimulation module adjusts a distance between the one or more of the plurality of fanning light growth stimulation modules and one or more of the plurality of plants.

[0179] Example 66: The inverted hydroponics system of any one of example 61 or examples 63- 65, wherein each of the plurality of cisterns further comprise:

a cylindrically shaped wall comprising a curved base extending between a roof and a protruding edge;

an access slot defined by a gap between the curved roof and the protruding wall;

a first vertical sidewall disposed at a first end of the cylindrically shaped wall; and

a second vertical sidewall disposed at a second opposing end of the cylindrically shaped wall,

wherein the first vertical sidewall, the second vertical sidewall and the cylindrically shaped wall define the hollow interior, and

wherein the protruding edge supports the growth propagation support.

[0180] Example 67: The inverted hydroponics system of any one of examples 61 - 65, wherein each of the plurality of fanning light growth stimulation modules comprises at least one electronically controlled fanning system, at least one electronically controlled lighting system and at least one electronically controlled frequency emission system.

[0181] Example 68: The inverted hydroponics system of any one of examples 61, or examples 63-67, further comprising:

a lifting hoist disk that comprises

a circular disk plate,

a center stem, a plurality of rings extending from the center stem, and

a lift hoist hook connected at the plurality of rings for attaching to the connector,

wherein the circular disk plate further comprises a crescent shaped cutout configured to receive a network of plant root.

[0182] Example 69: The inverted hydroponics system of any one of examples 61-68, further comprising:

a crescent-shaped scaffold comprising:

a base;

a center interior portion;

a plurality of levels extending from the base and at least partially surrounding the center interior portion;

an internal ladder extending between at least two of the plurality of levels, and

a plurality of wheels, and

a multi-cart configured to fit within the base of the scaffold,

wherein the interior portion of the scaffold is configured to receive at least a portion of one of the plurality of inverted plants.

[0183] Example 70: A method for inverted hydroponic plant growth comprising the steps of:

providing a plurality of growth areas;

providing at least one processing area;

providing at least one harvesting area;

providing a plurality of automated lifting control modules, each supported by a corresponding one of the plurality of upper bracket beams;

providing a plurality of upper bracket beams associated with at least one of the plurality of growth areas;

providing a plurality of lifting hoists, wherein each of the plurality of automated lifting control modules comprises a corresponding one of the plurality of lifting hoists, and wherein each of the plurality of lifting hoists comprises a corresponding one of a plurality of connectors removably affixed thereto;

providing a plurality of cisterns disposed in at least one of the plurality of growth areas, each of the plurality of cisterns comprising at least one growth propagation support and a hollow interior configured to receive aqueous solution;

providing at least one of the plurality of cisterns with a predetermined volume of aqueous solution; and

providing a plurality of fanning light growth stimulation modules, wherein at least one of the plurality of fanning light growth stimulation modules is removably affixed to a corresponding one of the plurality of automated lifting control modules via a corresponding one of the plurality of connectors,

wherein each of the plurality of cisterns are disposed between a corresponding one or more of the plurality of automated lifting hoists and a corresponding one or more of the plurality of fanning light growth stimulation

modules,

wherein each of the plurality of cisterns are configured to receive and support one or more of a plurality of plants suspended in an inverted growth position, and

wherein the harvesting area comprises at least one harvesting scaffold and at least one of the plurality of lifting hoists, wherein the at least one harvesting scaffold is used for harvesting the inverted plant when the inverted plant reaches a predetermined state of plant maturity.

[0184] Example 71: The method for inverted hydroponic plant growth of example 70, further comprising: sprouting at least one plant from a seed in the at least one growth propagation support.

[0185] Example 72: The method of any one of examples 70-71, further comprising:

coupling, in an inverted orientation, at least one plant to at least one of the plurality of cisterns having aqueous solution therein;

transitioning and removably coupling the at least one plant to another one of the plurality of cisterns having aqueous solution therein in another one of the plurality of growth areas;

providing one or more of air, light, and frequency stimulation to at least one plant in at least one of the growth areas;

processing at least one plant in the processing area; and

harvesting the at least one plant.

[0186] Example 73: The method of any one of examples 70-72, further comprising:

monitoring height, weight, aqueous solution consumption, growth rate, or combinations thereof, of the at least one plant, and transitioning the at least one plant from one of the plurality of growth areas to an other one of the

plurality of growth areas when the at least one plant reaches a first growth size; and

transitioning the at least one plant from the other one of the plurality of growth areas to the processing area when the at least one plant reaches a second growth size.

[0187] Example 74: The method for inverted hydroponic plant growth of any one of examples 70-73, further comprising:

removably coupling at least one inverted plant disposed in at least one of the plurality of cisterns in one of the plurality of growth areas to at least one of the plurality of automatic lifting control modules.

[0188] Example 75: The method for inverted hydroponic plant growth of any one of examples 70-74, further comprising:

providing, via at least one of the plurality of fanning light growth stimulation modules, one or more of a predetermined air circulation, predetermined light, or predetermined frequency modulations, to at least one of the plurality of plants suspended in an inverted growth position.

[0189] Although embodiments of the present disclosure are described with a degree of particularity, it is understood that the present disclosure has been made by way of example and that other versions are possible. As various changes could be made in the above description without departing from the scope of the disclosure, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be illustrative and not used in a limiting sense. The spirit and scope of the appended claims should not be limited to the description of the preferred versions contained in this disclosure.

[0190] All features disclosed in the specification, including the claims, abstracts, and drawings, and all the steps in any method or process disclosed, may be combined in any

combination, except combinations where at least some of such features and/or steps are mutually exclusive. Each feature disclosed in the specification, including the claims, abstract, and drawings, can be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

[0191] While the present embodiments generally described herein are disclosed in connection with a number of embodiments shown and described in detail, various modifications should be readily apparent to those of skill in the art.

CLAIMS

What is claimed is:

1. An inverted hydroponics system comprising:

a plurality of growth areas;

at least one processing area;

a plurality of upper bracket beams associated with at least one of the plurality of growth areas;

a plurality of automated lifting control modules, each supported by a corresponding one of the plurality of upper bracket beams;

a plurality of lifting hoists, wherein each of the plurality of automated lifting control modules comprises a corresponding one of the plurality of lifting hoists, and wherein each of the plurality of lifting hoists comprises a corresponding one of a plurality of connectors removably affixed thereto;

a plurality of cisterns disposed in at least one of the plurality of growth areas, each of the plurality of cisterns comprising at least one growth propagation support and a hollow interior configured to receive aqueous solution; and

a plurality of fanning light growth stimulation modules, wherein at least one of the plurality of fanning light growth stimulation modules is removably affixed to a corresponding one of the plurality of automated lifting control modules via a corresponding one of the plurality of connectors,

wherein each of the plurality of cisterns are disposed between a corresponding one or more of the plurality of automated lifting hoists and a corresponding one or more of the plurality of fanning light growth stimulation modules, and

wherein each of the plurality of cisterns are configured to receive and support one or more of a plurality of plants suspended in an inverted growth position.

2. The inverted hydroponics system of claim 1, wherein the at least one growth propagation support comprises at least one growth propagation vessel configured as a hollow conical shaped cylinder.
3. The inverted hydroponics system of claim 1, wherein the at least one growth propagation support comprises a first opening, a second opening, an upper edge surrounding the second opening and a surface extending from an inner surface of a base of the cistern to the upper edge.
4. The inverted hydroponics system of claim 1, wherein the at least one growth propagation support comprises a mantel configured with a top surface and bottom surface, a distal end, and a proximal end.
5. The inverted hydropnics system of claim 4, wherein the proximal end extends toward a surface of a volume of the aqueous solution disposed within the cistern.
6. The inverted hydroponics system of claim 4, wherein the mantel comprises a grooved platform configuration having a plurality of grooves extending from the distal end toward the proximal end.
7. The inverted hydroponics system of claim 1, wherein at least one of the plurality automatic lifting control modules further comprises at least one control panel configured to control a corresponding one of the lifting hoists to cause an extending or retracting of a corresponding one of the connectors removably affixed thereto at a first end thereof, to cause a raising and lowering of the growth stimulation module removably affixed thereto at a second end thereof, whereby the raising and lowering of the growth stimulation module adjusts a distance between the one or more of the plurality of fanning light growth stimulation modules and one or more of the plurality of plants.
8. The inverted hydroponics system of claim 1,

wherein each of the plurality of cisterns further comprise:

a cylindrically shaped wall comprising a curved base extending between a roof and a protruding edge;

a first vertical sidewall disposed at a first end of the cylindrically shaped wall;

and a second vertical sidewall disposed at a second opposing end of the cylindrically shaped wall,

wherein the first vertical sidewall, the second vertical sidewall and the cylindrically shaped wall define the hollow interior.

9. The inverted hydroponics system of claim 8, wherein the protruding edge supports the growth propagation support.

10. The inverted hydroponics system of claim 8, wherein each of the plurality of cisterns further comprise an access slot defined by a gap between the curved roof and the protruding wall.

11. The inverted hydroponics system of claim 1,

wherein each of the plurality of fanning light growth stimulation modules comprises at least one electronically controlled fanning system, at least one electronically controlled lighting system and at least one electronically controlled frequency emission system.

12. The inverted hydroponics system of claim 1, further comprising:

a lifting hoist disk that comprises a circular disk plate, a center stem, a plurality of rings extending from the center stem, and a lift hoist hook connected at the plurality of rings for attaching to the connector, wherein the circular disk plate further comprises a crescent shaped cutout configured to receive a network of plant root.

13. The inverted hydroponics system of claim 1, further comprising:

a crescent-shaped scaffold comprising:

a base;

a center interior portion;

a plurality of levels extending from the base and at least partially surrounding the center interior portion;

an internal ladder extending between at least two of the plurality of levels; and

a plurality of wheels, and

a multi-cart configured to fit within the base of the scaffold,

wherein the interior portion of the scaffold is configured to receive at least a portion of one of the plurality of inverted plants.

14. The inverted hydroponics system of claim 1, wherein each of the plurality of cisterns further comprise at least two frequency emission systems that provide predetermined frequency through the aqueous solution.

15. A method for inverted hydroponic plant growth comprising the steps of:

providing a plurality of growth areas;

providing at least one processing area;

providing at least one harvesting area;

providing a plurality of automated lifting control modules, each supported by a corresponding one of the plurality of upper bracket beams;

providing a plurality of upper bracket beams associated with at least one of the plurality of growth areas;

providing a plurality of lifting hoists, wherein each of the plurality of automated lifting control modules comprises a corresponding one of the plurality of

lifting hoists, and wherein each of the plurality of lifting hoists comprises a corresponding one of a plurality of connectors removably affixed thereto;

providing a plurality of cisterns disposed in at least one of the plurality of growth areas, each of the plurality of cisterns comprising at least one growth propagation support and a hollow interior configured to receive aqueous solution;

providing at least one of the plurality of cisterns with a predetermined volume of aqueous solution; and

providing a plurality of fanning light growth stimulation modules, wherein at least one of the plurality of fanning light growth stimulation modules is removably affixed to a corresponding one of the plurality of automated lifting control modules via a corresponding one of the plurality of connectors,

wherein each of the plurality of cisterns are disposed between a corresponding one or more of the plurality of automated lifting hoists and a corresponding one or more of the plurality of fanning light growth stimulation modules,

wherein each of the plurality of cisterns are configured to receive and support one or more of a plurality of plants suspended in an inverted growth position, and

wherein the harvesting area comprises at least one harvesting scaffold and at least one of the plurality of lifting hoists, wherein the at least one harvesting scaffold is used for harvesting the inverted plant when the inverted plant reaches a predetermined state of plant maturity.

16. The method of claim 15, further comprising:

sprouting at least one plant from a seed in the at least one growth propagation support.

17. The method of claim 16, further comprising:

coupling, in an inverted orientation, at least one plant to at least one of the plurality of cisterns having aqueous solution therein;

transitioning and removably coupling the at least one plant to another one of the plurality of cisterns having aqueous solution therein in another one of the plurality of growth areas;

providing one or more of air, light, and frequency stimulation to at least one plant in at least one of the growth areas;

processing at least one plant in the processing area; and

harvesting the at least one plant.

18. The method of claim 15, further comprising:

monitoring height, weight, aqueous solution consumption, growth rate, or combinations thereof, of the at least one plant, and

transitioning the at least one plant from one of the plurality of growth areas to an other one of the plurality of growth areas when the at least one plant reaches a first growth size; and

transitioning the at least one plant from the other one of the plurality of growth areas to the processing area when the at least one plant reaches a second growth size.

19. The method of claim 15, further comprising:

removably coupling at least one inverted plant disposed in at least one of the plurality of cisterns in one of the plurality of growth areas to at least one of the plurality of automatic lifting control modules.

20. The method of claim 15, further comprising:

providing, via at least one of the plurality of fanning light growth stimulation modules, one or more of a predetermined air circulation, predetermined light, or

predetermined frequency modulations, to at least one of the plurality of plants suspended in an inverted growth position.