

AN APPARATUS FOR PLANTING A PLANT OR A VEGETABLE CROP

Field of the invention

5 The present invention relates to an urban farming apparatus and system. In particular, the present invention relates to an apparatus for planting a plant or a vegetable crop. More particular, the apparatus aims to provide a clean and self-sustaining system for the planting and harvesting of plants and vegetable crops.

10 Background of the invention

The present food system faces challenges from environmental risks and a growing demand from the population that is worried about food safety and demands for healthy and responsibly grown food that is free from pesticides and chemicals. Most would select organic
15 crops over non-organic crops but good variety of crops that are available for selection and cost may be a deterrent to buying organic product. Furthermore, the present system places a huge burden on the environment with the use of large amounts of water, electricity and labour. This results in the production of more expensive healthy crops that is made available to the public.

20 Conventional agriculture is centered on vast commercial farms encompassing hundreds of acres planted almost exclusively in monocultures. These conventional farms rely on thousands of tons of nitrate fertilizers, pesticides, and herbicides in order to support monocultures that rapidly deplete soil nutrients and encourage crop specific pathogens.
25 Continued used of synthetic fertilizers leads to long term depletion of micro and macro nutrients in the soil in addition to destruction of the microbial community that is essential to soil health; this results in detrimental environmental effects as well as food that is less nutrient dense, less healthy, and less flavorful. Conventional agriculture is unsustainable and irresponsible and does not even produce the nutritious food needed to nourish the world's
30 population.

Given the scarcity of land, particularly in densely populated area such as Singapore, urban farming may be introduced in an attempt to solve these problems and concerns surrounding the food production and supply. However, urban farming has its own challenges. Particularly,
35 it may not be commercially viable on a large scale given the limited growing space and high production costs which result in a low output of harvested crops.

Due to limited land resources in a densely populated city such as Singapore, most people can only live in a high-rise blocks. However, despite living in a concrete jungle, there is always the desire to go “green”, either through the planting of plants and vegetable crops for aesthetic purposes, providing shade and improving the quality of the air and dwelling places. In addition to the benefits of going “green”, it would be advantageous for city dwellers to also be self-sufficient and grow their own crops for their consumption. This may ease on the demands placed on the global system for providing more vegetables and other agricultural products to meet increasing population needs.

As standards of living in cities continue to increase, the technical requirements of urban farming, particularly household locations such as the balconies, windowsills or rooftops and other vegetable cultivation facilities are also increasing.

In particular, there is quite a bit of work involved in growing crops – work that includes providing a planting medium (e.g. soil etc.), planting the seeds or seedlings using physical methods, the use of fertilisers or a nutrient solution, providing ancillary systems such as pumps and other equipment for supplying oxygen and light to the crops. As such, it can be seen that a system for growing crops involves a complex system that requires professional, relatively large investment, and high technical requirements.

In addition, given that potential growers of urban farming lead busy city lives, the growing of plants and vegetable crops often require daily attention to check soil moisture and water as needed. It is also common for under and overwater to occur when the plants are not checked often enough of if too much water is given.

In the growing and maintenance of plants and agricultural plantings, there is a need to provide water or an applicable nourishing liquid to the root system of a plant in a controlled manner, on a substantially continuous basis, and in correct amounts. This allows the particular plant to feed itself as needed, without the damaging effects of over-watering. The most significant problem in tending to potted plants is watering and feeding them. Generally, the gardener must individually tend to each potted plant, determining when and how much water and food to provide to each plant. Plants of different types may require different amounts of water or water at different intervals. Whether of the same or a different type, plants located in sunny versus shaded areas or located in different types or sizes of pots may all have different levels of water usage. Thus, a gardener may need to tend various plants on an everyday basis, watering and/or feeding different plants on different days. Even

this difficult tending process requires the presence of the gardener. Thus, when a homeowner leaves their home for a period of time, such as for a vacation, the homeowner must find another party to tend to the plants or else they may die.

5 In order to avoid the disadvantages associated with manual watering, various self-watering systems are known in the prior art. In the case of outdoor plants, automated irrigation systems are known. These systems generally utilize pipes to deliver water from a source to a sprinkler head or the like, from which the water is dispensed. A timer may be configured to turn valves on and off, thus controlling the flow of water through the pipes. In other multiple
10 watering systems, such as multiple plant drip systems, each plant generally receives an equal amount of water. Drip systems have developed means to vary the flow rate at each particular drip point. However, they are not very precise. Common drawbacks to drip systems include overly saturated soil, drainage through the bottom of the pot, and under watering.

15 Draining through the bottom of the pot is wasteful and can be a nuisance, such as when water drains from the deck of an upper apartment to an apartment below. It is typical for such a planting pot to be placed on the interior of a larger outer container or pot to contain excess watering liquid that the potting soil cannot contain. The result from this configuration
20 sometimes leads to an over-watering which can virtually drown and kill the plant, or result in root rot, which will have the same effect due to water accumulating in the container or pot.

Therefore, it can be seen that the main problem encountered is that most do not adequately regulate the amount of water that is given to a plant. Wick systems tend to allow the soil to
25 remain very wet when the reservoir is full and dry when the liquid in the reservoir runs low. Several self-water planters operate based on a vacuum, but they tend to lead to overwatering. When the filling lid is removed to fill the reservoir, water runs uncontrollable into the soil. Also typically, they rely on soil saturation to stop the flow of water. In addition, soil may leach into the water, thus contaminating the water which makes it difficult to recycle
30 or dispose.

As such, even though there is a desire to grow healthy organic crops in one's home, the amount of complicated equipment available and lack of technical farming know-how prevents most from pursuing this desire. In addition, given the tight living spaces available in
35 cities, there will be challenges in providing a suitable planting system or medium that is clean and easy to maintain. Therefore, based on the foregoing, there is a demonstrable need for an apparatus or system for planting plants or vegetable crops that are clean, easy to use

and maintain, and self-sustaining or self-watering yet producing plants and vegetables better if not closed to open field farming

Additional aspects and advantages of the present disclosure will become readily apparent to those skilled in this art from the following detailed description, wherein only illustrative embodiments of the present disclosure are shown and described. As will be realized, the present disclosure is capable of other and different embodiments, and its several details are capable of modifications in various obvious respects, all without departing from the disclosure. Accordingly, the drawings, equations and description are to be regarded as illustrative in nature, and not as restrictive.

Summary of the invention

In accordance with a preferred aspect, there is provided an apparatus for planting a plant or a vegetable crop, the apparatus comprising: (a) a first container having a base and an interior cavity, the interior cavity is adapted for accommodating at least one planting receptacle and support frame, the planting receptacle for accommodating a planting medium and the support frame for supporting the planting receptacle, the support frame is adapted to be disposed on the base of the first container and has a height; and (b) the first container and at least one planting receptacle are adapted to be in fluid communication with each other such that when, in use, water contained in the first container travels to the planting receptacle via the support frame, wherein the first container comprises an outlet for allowing water to exit the first container, the outlet is positioned in the first container such that the level of water contained in the first container is maintained at a level lower than the height of the support frame.

In various embodiments, the apparatus further comprises a first planting receptacle and a first support frame. Still further, the apparatus may further comprise a wicker disposed intermediate the first planting receptacle and first support frame, wherein a portion of the sheet is in contact with the water, such that water contained in the first container is transferred to the first planting receptacle.

In various embodiments, the apparatus further comprises a plurality of equally spaced apart support frames wherein each support frame comprises a wicker disposed intermediate the planting receptacle and the support frame.

In various embodiments, the outlet is disposed on the base of the first container and comprises a pipe extending into the interior cavity of the first container, the height of the pipe is shorter than the height of the support frame so that the level of water in the first container is maintained at a level lower than the height of the support frame. The difference in height
5 between the support frame and the pipe may be between 5 to 30 mm.

In various embodiments, the pipe comprises a bell siphon.

10 In various embodiments, the apparatus further comprises a second container, wherein water that is allowed to exit the first container is discharged into the second container via the outlet. The second container may further comprise an aerator for aerating water contained in the second container.

15 In various embodiments, the second container further comprising a pump for pumping water contained in the second container to the first container. The pump may be in fluid communication with a conduit and the flow of water through the conduit and into the first container is controlled via the opening or closing of a tap.

20 In various embodiments, the apparatus further comprises a water tray disposed in the interior cavity of the first container and above the level of water contained in the first container, wherein the water tray is adapted to receive water from the conduit and discharge water into the interior cavity of the first container. The water tray may have a gradient for allowing water to discharge into the interior cavity of the first container by gravity. In various embodiments, the gradient may be at an angle of between 5 to 30 degrees.

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In various embodiments, the apparatus further comprises a second planting receptacle disposed along a length of the water tray, the second planting is adapted for planting a plant or a vegetable crop that is different to that plant or vegetable crop planted in the first planting receptacle, wherein the second planting receptacle comprises a wicker for transferring water
30 in the water tray to the second planting receptacle.

In various embodiments, the apparatus further comprises a plurality of second planting receptacles along a length of the water tray.

35 In various embodiments, the apparatus further comprises a nutrient supply means for supplying nutrients to the first planting receptacle and/or the second planting receptacle, or

for supplying nutrients to the second container. In various embodiments, the nutrient supply means for supplying nutrients to the second container is provided by aquatic organisms.

In various embodiments, the planting receptacle is made of the same material as the wicker.

- 5 The support frame may comprise at least one perforation and the wicker is disposed within the perforation, a portion of the wicker is in contact with the water and an opposing portion of the wicker is in contact with the first planting receptacle.

- 10 In various embodiments, the apparatus further comprises a planting frame adapted for disposing on the surface of the planting medium in the first planting receptacle, the planting frame comprises a plurality of notches for accommodating seeds or seedlings.

In various embodiments, the apparatus further comprises a light source for providing light to the plant or vegetable crop planted in the first or second planting receptacle.

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It is appreciated that the apparatus may comprise any suitable number of first and second planting receptacles in order to accommodate the growing of any desired number of crops or vegetables.

20 **Brief description of the figures**

In order that the present invention may be fully understood and readily put into practical effect, there shall now be described by way of non-limitative examples only preferred embodiments of the present invention, the description being with reference to the
25 accompanying illustrative figures.

In the Figures:

Figures 1A and 1B show an apparatus according to an embodiment of the present invention;

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Figures 2A and 2B show an apparatus according to an embodiment of the present invention;

Figure 3 shows an apparatus according to an embodiment of the present invention;

- 35 Figure 4 shows a planting frame according to an embodiment of the present invention;

Figure 5 shows the dimensions of an apparatus according to an embodiment of the present invention; and

Figure 6 is a schematic drawing showing the use of an apparatus according to an embodiment of the present invention.

Detailed description of the preferred embodiments

As shown in the Figures, the present invention provides an apparatus 5 for planting a plant or a vegetable crop. In an embodiment, as shown in Figures 1A and 1B, the apparatus 5 comprises a first container 10. By “container”, it is meant to include any structure that contains or stores. In particular, it should have a base 12 and side perimeter walls to define an interior cavity 14. The container may or may not be covered. In various embodiments, particularly as shown in the figures, the container is an opened-top. The interior cavity 14 is adapted for accommodating at least one planting receptacle 15 and a support frame 20 for supporting the planting receptacle 15 in the first container 10. The planting receptacle 15 is adapted for accommodating any planting medium 25.

The planting receptacle 15 may be made of any suitable material and suitably sized container for containing or accommodating the planting medium 25. Seeds, seedlings, or grown plants are planted in this planting medium 25. For example, the planting receptacle 15 may be a planter box, basket, bin, drum, case, tank, vessel, pouch, a bag lining or the like that lines the first container 15. As such, it follows that it may be made of any suitable material, i.e. rigid, flexible or malleable. The material may be porous or semi-permeable such that it allows the transmission of fluids to pass between the interior of the receptacle and its exterior surroundings. In various embodiments, the planting medium 25 is soil that is suitable for growing plants or vegetables. The planting receptacle 15 may be of any suitable size. As will be described in detail below, the planting receptacle 15 may occupy a portion of the interior space of the first container 10 as shown in Figure 1A, or it may occupy most of the interior space of the first container 10 as shown in Figure 1B. In various embodiments, it may have a width of about between 45 cm to 60 cm, and a length of about between 85 cm to 3ft. Similarly, the planting receptacle 15 may be made of any suitable material. In various embodiments, the planting receptacle 15 may be made of any material that is suitable for allowing water to enter the planting media. In an embodiment, the planting receptacle 15 is made of a wicker material.

As such, both Figures 1A and 1B are identical except that, as described in the previous paragraph, the planting receptacle 15 and its support frame 20 occupy most (if not all) of the interior space of the first container 10 as shown in Figure 1B. The description for both Figures 1A and 1B will be the same except for this difference. In Figure 1B, two suitable sized cylinders are disposed within the planting receptacle 15 for allowing the passage of water. A first cylinder 110 allows water to fill the interior space or cavity of the first container 10 within allowing the water to come into direct contact with the planting medium 25. Here, the first cylinder 110 penetrates the base of the planting receptacle 15 (for example, by way of a cut out that fits the diameter of the first cylinder 110) so that it receives water from a first top end, and discharges water into the first container 10 at a second bottom end. In an embodiment, the second bottom end of the first cylinder 110 may rest on the support frame 20. Slots or perforations in the support frame 20 (as will be described later) allow for the passage of water into the interior cavity of the first container 10.

Similarly, a second cylinder 115 is disposed within the planting receptacle 15 and over the standpipe 45 of the outlet 35. Again, the second cylinder 115 penetrates the base of the planting receptacle 15, for example, by way of a cut out that fits the diameter of the second cylinder 115. In this embodiment shown in Figure 1B (and also in Figure 2B), two support frames 20 are disposed on either side of the second cylinder 115 so as to accommodate the second cylinder 15. The base of the second cylinder 115 sits on the base of the first container 10 and there are holes or cut-outs in the base of the second cylinder 115 for water to free move or travel within the interior cavity of the first container 10. Both first and second cylinders 110 and 115 form a closed and tight fit with the planting receptacle 15 such as water and planting medium 25 are not in direct contact with each other.

The support frame 20 may be any rigid material that is adapted to be disposed on the base 12 of the first container 10 for supporting the planting receptacle 15, and for supporting the transfer of water contained in the first container 10 to the planting receptacle 15 by a capillary effect. Simply put, in an example of the invention, the planting receptacle 15 sits on top of the support frame 20. By "support frame", it is meant to include any support structure such a scaffold, framework or mount on which the planting receptacle 15 may sit on. In an example, the support frame 20 has an inverted U-shaped profile such that the planting receptacle 15 is placed on a surface of the support frame 20 with two legs extending at opposite ends of the support frame 20 for support. The support frame 20 has a height 20a which, in the present case, is the height of a leg supporting the frame 20. Alternatively, the support frame 20 may be any solid material that allows for the transfer of water contained in the first container 10 to the planting receptacle 15. The support frame 20 may be made of a

wicker material for allowing the transfer of water from the first container 10 to the planting receptacle 15. For ease of water transfer, the support frame 20 and the planting receptacle 15 may be made of the same material, so that as the support frame 20 provides for the necessary mechanical strength required to support the planting receptacle 15. In an example, the support frame 20 may comprise at least one perforation. Alternatively, the support frame 20 may be a mesh-like structure comprising holes or perforations, where the holes or perforations may form a honeycomb structure. Alternatively, these perforations may be slots such that a wicker may be disposed in these slots where an end of the wicker is in contact with the water in the first container 10 while an opposite end of the wicker is in contact with the planting receptacle 15. In a particular embodiment, a wicker is disposed within a perforation such that a portion of the wicker is in contact with the water and an opposing portion of the wicker is in contact with the planting receptacle 15. The support frame 20 may have any suitable dimensions. In various embodiments, the height of the support frame 20 may be about between 30 mm to 90 mm. Preferably, the height is 60 mm.

In various embodiments, the first container 10 and the planting receptacle 15 are adapted to be in fluid communication with each other such that when, in use, water 30 contained in the first container 10 travels or is transmitted to the planting receptacle 15 via the support frame 20. By "fluid communication", it is meant to include the ability of the water contained in the first container 10 to flow or travel to the planting medium 25. The material of the wicker 40, support frame 20 and planting receptacle 15 all help to achieve this objective. As described here in an embodiment of the invention, water travels up the wicker 40 by capillary action to the planting receptacle 15.

In addition to the above, the first container 10 further comprises an outlet 35 for allowing water to exit the first container 10, the outlet 35 is positioned in the first container 10 such that the level of water 30a contained in the first container 10 is maintained at a level lower than the height 20a of the support frame 20. The outlet 35 may be of any suitable size and may be placed at any location (on a side wall or base of the first container 10) within the first container 10 so long as it serves to maintain the water level in the first container 10 at a level lower than the height 20a of the support frame 20. In various embodiments, the water level is kept at about between 5mm to 30mm from the top of the support frame 20. This ensures that the water does not come into direct contact with the planting receptacle 15 or media.

The apparatus 5 further comprises a wick (in an example, a wicking sheet 40) disposed intermediate the first planting receptacle 15 and first support frame 20. The wicking sheet 40 is placed over the surface of the support frame 20 such that most of it is exposed to a

surface of the first planting receptacle 15. A portion of the wicking sheet 40 is in contact with the water, such that water contained in the first container 10 is transferred to the first planting receptacle 15. For the avoidance of doubt, the wicking sheet 40 mentioned here may be any wicker in any form, for example it would be a strip, so long as the wicks are constructed in such a way in the first container 10 that a part of it is in direct contact with the water contained in the first container 10 while another part of it is in direct contact with the planting receptacle 15. In various embodiments, a combination of wicker sheets and wicker strips may be used to efficient transfer of the water by capillary effect. Wicker strips may be used for directing water toward the centre of the planting receptacle 15, while a wicker sheet may be used at all four sides of the planting receptacle 15 to improve overall wicking effect.

In order to accommodate the planting of a larger number of plants or vegetable crops, a plurality of planting receptacles 15 and support frames 20 may be disposed within the interior cavity of the first container 10. In other words, there may be any number of permutations of planting receptacles and support frames so long as the planting receptacle is supporting by a support frame and the level of water allowed to remain in the first container 10 is at a level lower than the height 20a of the support frame 20.

As shown in Figures 2A and 2B, in alternative embodiments, the apparatus 5 further comprises a plurality of equally spaced apart support frames 20 wherein each support frame 20 comprises a wicking sheet 40 disposed intermediate the first planting receptacle 15 and the support frame 20. Once again, similar to the description above, each support frame 20 may comprise a honeycomb structure having a wicker interwoven the structure. Advantageously, the plurality of the equally spaced apart support frames 20 allow for the even distribution of water to the planting receptacle 15.

In various embodiments, the outlet 35 is disposed on the base 12 of the first container 10 and comprises a pipe 45 extending into the interior cavity 14 of the first container 10, the length or height of the pipe 45 is shorter than the height 20a of the support frame 20 so that the level of water 30a contained in the first container 10 is maintained at a level lower than the height 20a of the support frame 20. The difference in height between the support frame and the pipe may be between 5 to 30 mm.

In various embodiments, as shown in Figure 2A, the pipe further comprises a bell siphon 50. Bell siphons and their construction are well known in the art. Essentially, it works on this basis. As the water level in the first container 10 rises, water is forced through the teeth on the bottom of the bell and up between the walls of the standpipe and the bell 50. As the

water level exceeds the height of the standpipe 45 and the drain begins to fill, a siphon is created. Most of the water in the first container 10 is then drained by the siphon until the water level reaches the height of the teeth and tip of the snorkel. Air is then forced through the snorkel, and as a result, the siphon is broken, resulting in a first container 10 beginning to fill again, and the cycle then repeats itself. This happens when the tap is open such that water is cycled between first 10 and second containers 55.

The standpipe 45 of the bell siphon 50 is joined to the outlet pipe 35. As such, the height of the stand pipe 45 is shorter than the height 20a of the support frame 20.

Advantageously, the use of a bell siphon creates a gush or agitation of water at the outlet 35 which allows more air (and hence, oxygen) to be infused or aerated into the water. Thus, the use of a bell siphon does away with the need for an aerator. This prevents the water from remaining stagnant in the first container 10.

Also shown in Figures 2A and 2B is a second container 55, wherein water 30 that is allowed to exit the first container 10 is discharged into the second container 55 via the outlet 35. In various embodiments, the outlet 35 exterior the first container 10 includes an S-shaped pipe. Alternatively, this can be L-shaped or straight depending on the position and vertical height of the container. The second container 55 may further comprise an aerator for aerating water contained in the second container 55.

In various embodiments, the second container 55 further comprising a pump 60 for pumping water 30 contained in the second container 55 to the first container 10. The pump 60 may be in fluid communication with a conduit 65 and the flow of water through the conduit 65 and into the first container 10 is controlled via the opening or closing of a tap 70. The conduit 65 may be any suitable pipe or channel for transporting the water 30. By "tap", it is meant to include any device or valve that can regulate the flow of water between the first container 10 and the second container 55. In the present invention, the valve for regulating the flow of water is useful because the flow rate of water through pipes or conduits may differ, particularly over time when dirt accumulates in them. As such, a tap is useful to adjust the rate of flow of the water given that it would be beneficial that the rate of flow of water from the tap should not be faster than the rate of flow of water exiting the first container 10 via the outlet 35. The tap also provides for easy maintenance of the apparatus since the amount of water contained in the first container 10 may be controlled or stopped completely for maintenance.

In various embodiments, as shown in Figure 3, the apparatus 5 further comprises a water tray 75 disposed in the interior cavity 14 of the first container 10 and above the level of water 30a contained in the first container 10, wherein the water tray 75 is adapted to receive water 30 from the conduit 65 and discharge water 30 into the interior cavity 14 of the first container 10. The water tray 75 may have a gradient for allowing water 30 to discharge into the interior cavity 14 of the first container 10 from a height of about between 10 cm to 15 cm by gravity. In various embodiments, the gradient may be at an angle A of between 5 to 30 degrees. By “water tray”, it is meant to include any structure such as a channel that guides the water into the interior of the first container 10.

The apparatus 5 may further comprise a second planting receptacle 80 disposed along a length of the water tray 75. In various embodiments, the apparatus 5 may further comprise a plurality of second planting receptacles 80 along the length of the water tray 75. Such second planting receptacles 80 may be any suitable planting pots. Figure 3 shows two such pots. The second planting receptacles 80 is adapted for planting a plant or a vegetable crop that is different to that plant or vegetable crop planted in the first planting receptacle 15.

In various embodiments, each second planting receptacle 80 comprises a wicker 85 for transferring water 30 that travels in the water tray to the second planting receptacle 80.

The apparatus 5 may also comprise a nutrient supply means 90 for supplying nutrients to the first planting receptacle 15, and/or for supplying nutrients to the second container 55, and/or optionally supplying nutrients to the planting receptacles 80. In various embodiments, the nutrient supply means 90 for supplying nutrients to the second container is provided by aquatic organisms.

As shown in Figure 4, the apparatus 5 may comprise a planting frame 95 adapted for disposing on the surface of the planting medium 25 in the first planting receptacle 15, the planting frame 95 comprises a plurality of notches for accommodating seeds or seedlings.

In various embodiments, the apparatus 5 may further comprise a light source (not shown in the Figures) for providing light to the plant or vegetable crop planted in the first 15 or second planting receptacle 80.

Figure 5 shows the various dimensions according to an embodiment of the present invention.

In operation, water is introduced into first container 10. Given that the outlet 35 is positioned in the first container 10 such that water will always be at a level below the height 20a of the support frame, the water will not be in contact with the first planting receptacle 15. Advantageously, this absence of contact prevents soil contained in the first planting receptacle 15 from leaching into the water. Water 30 can be introduced in a continuous manner so that there will always be water contained in the first container 10 for watering plants in the first planting receptacle 15. The wicking sheet 40 transferred the water 30 onto the base of the first planting receptacle 15 so that soil is received water by the capillary action. As shown in Figures 2A and 2B, there is a plurality of support frames 20. Each support frame 20 has its own wicking sheet 40 for transferred water 40 to the first planting receptacle. Advantageously, the plurality of support frames 20 allow for the even distribution of water to the planting medium 25 contained in the first planting receptacle 15. This is compared to the embodiment shown in Figure 1A where there may be a case of “under-watering” of planting medium 25 towards the centre or in the central portion of the first planting receptacle 15.

In another embodiment of the present invention, water 30 is cycled between first 10 and second containers 55. This is a particularly useful embodiment for carrying out aquaponics. Aquatic animals may be contained in second container 55 so that nutrients in the form of waste material excreted by these aquatic animals may be transferred to the planting medium 25 through the cycling of the water.

Here, as shown in Figures 2A and 2B, water 30 in second container 55 is pumped into first container 10 and enters the first container 10 by an inlet or tap 70. Any excess water exits the first container 10 through the outlet 35 and returns to the second container 55. The pipe 45 ensures that the water level is always maintained at a level lower than the height 20a of the support frame 20. This continuous water flow allows constant supply of flowing water to the wicking sheet 40 or wicker and to the planting medium 25. In order to ensure good water quality circulating in the system, the planting media does not come into direct contact with the water contained in the first container 10. In other words, the water level contained in the first container will not reach the base of the planting receptacle 15 that is sitting on the support frame 40. This is achieved by ensuring that the height of the pipe 45 is at a height lower than the height of the support frame 40.

It should be appreciated that the apparatus would work without the existence or use of aquatic animals. Such an apparatus still affords a self-watering apparatus. A benefit of using aquatic animals is that nutrients from the animals’ waste material may be used to fertiliser

the planting medium 25 hence less frequent fertilizing is required for optimal plant growth. However, if no aquatic animals are used, then a nutrients supply means 90 may be employed to introduce nutrients and fertilisers to the water 30 (either in the first 10 or second container 55) or directly onto the planting medium 25.

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In the embodiment where aquatic animals are reared in the second container 55, the second container 55 may have an aerator or an air pump for aerating the water. Alternatively, as described above, a bell siphon 50 may be used.

10 As shown in Figure 3, a nutrient supply means 90 in the form of a box can provide fertiliser to the planting medium 25 via a drip stick using a drip method. The rate of flow of the fertiliser may be controlled by a valve.

15 In another embodiment of the present invention as shown in Figure 3, the water that exits the tap 70 enters the interior cavity 14 of the first container 10 via a water tray 75. The water flows along the length of the water tray 75 by gravity. In various embodiments, the flow by gravity is assisted by providing a gradient, i.e. tilting the water tray 75 at an angle A of between 5 to 30 degrees. As water flows along the water tray 75, it provides for an easy and economically distribute or transfer of water to the plurality of second planting receptacles 80
20 disposed along the length of the water tray 75. The transfer of water to the second planting receptacles 80 is similar to the that achieved for the first planting receptacle 15. Each second planting receptacle 80 comprises a wicker 85 disposed at the base of the second planting receptacle 80 where an end or a portion of the wicker 85 is in contact with any water that is passing along the water tray 75. The wicker 85 also prevents dirt or soil from getting
25 into the water. In various embodiments, the plurality of second planting receptacles 80 may be planting pots suitable for planting smaller or micro greens, which may include herbs. Such herbs may be rather invasive, so they are not planted in the first planting receptacle 15. Hence, all herb pots are designed to have a separate growing environment yet shares the same watering and oxygen generation mechanism enjoyed by plants planted in the first
30 planting receptacle 15. Water that is discharge at the opposite end of the water tray 75 falls into the interior cavity 14 of the first container 10 allows the generation of air or oxygen into the water.

The second planting receptacle 80 may accommodate compost as a planting medium for
35 growing herbs to simulate a soil planting environment.

Figure 4 shows an example of a planting frame 95 comprising a plurality of notches 100 such as each notch may contain a seed or a seedling. In a non-limiting example, such planting frame 95 may also be known as a netting frame having holes and notches 100 for planting peas. The netting or planting frame 95 is then placed over or on the surface of the planting medium 25. Roots can then get through the notches and into the planting medium 25 and the plants are allowed to grow. After the sprouts have been harvested, the whole frame 95 can then be lifted which results in the quick harvest of a plurality of plants/shoots.

In a non-limiting example, Figure 5 shows a various dimensions used in accordance with an embodiment of the invention. It is understood that the dimensions may be varied according to the type of plants planted.

Figure 6 shows another embodiment of the invention. In this embodiment, there exists a system comprising a plurality of apparatus 5. In Figure 6, there are two apparatuses 5 stacked on each other, i.e. there are two first containers 10. These are in fluid communication with a single second container 55. Each apparatus 5 works in the same way as that described above, i.e. each receives water that is pumped from the second container 55 and excess water from each first container 10 is collected into the second container 55 via the respective outlets 35. In each apparatus, there is provided a light source 120 so that crops or vegetables grown in the planting tray of each apparatus can receive the required amount of light for efficient growth.

In this particular embodiment, the second container 55 may be a fish tank that is suitably adapted to house fish or other aquatic organisms. Level 1 may be used for growing large sized vegetables, Level 2 may be used for growing potted herbs (including the planting frame 95, while Level 3 may be used for growing seedlings and/or other micro-greens. The light source 120 may be any suitable number of rows of lights, e.g. LED lighting.

While various embodiments of the invention have been shown and described herein, it will be obvious to those skilled in the art that such embodiments are provided by way of example only. Numerous variations, changes, and substitutions may occur to those skilled in the art without departing from the invention. It should be understood that various alternatives to the embodiments of the invention described herein may be employed.

The invention includes any combinations or sub-combinations of any of the compounds disclosed in the application, such as it is intended that the appended claims be interpreted to include all modifications, permutations, additions and sub-combinations as are within the

true spirit and scope of the embodiments discussed. It can also be achieved by explicitly reciting various combinations of the compounds, the various combinations composed of all but one or more of the compounds.

- 5 Whilst there has been described in the foregoing description preferred embodiments of the present invention, it will be understood by those skilled in the technology concerned that many variations or modifications in details of design or construction may be made without departing from the present invention.

Claims

1. An apparatus for planting a plant or a vegetable crop, the apparatus comprising:
- 5 (a) a first container having a base and an interior cavity;
- (b) at least one planting receptacle for accommodating a planting medium;
- (c) a plurality of support frames supporting the at least one planting
10 receptacle, the interior cavity is adapted for accommodating the at least
one planting receptacle and the support frame, the support frame is
adapted to be disposed on the base of the first container and has a height,
each support frame comprises a wicker disposed on an upper surface of
the support frame and is in contact with the at least one planting
receptacle;
and
- 15 (d) the first container and the at least one planting receptacle are adapted to
be in fluid communication with each other such that when, in use, water
contained in the first container travels to the planting receptacle via the
wicker in each of the plurality of support frames, wherein a first portion of
each wicker is in contact with the water,
- 20 wherein the first container comprises an outlet for allowing water to exit the first
container, the outlet is positioned in the first container such that the level of
water contained in the first container is maintained at a level lower than the
height of the support frame.
- 25 2. The apparatus according to claim 1, wherein the support frame is a wire-mesh like
structure.
3. The apparatus according to any one of the preceding claims, wherein the support
frame has an inverted U-shaped profile such that the planting receptacle is placed on a
30 surface of the support frame with two legs extending at opposite ends of the support
frame for support.
4. The apparatus according to claim 3, wherein the wicker is placed on the surface of
the support frame.
- 35 5. The apparatus according to any one of the preceding claims, wherein the outlet is
disposed on the base of the first container and comprises a pipe extending into the
interior cavity of the first container, the height of the pipe is shorter than the height of

the support frame so that the level of water in the first container is maintained at a level lower than the height of the support frame.

6. The apparatus according to claim 5, wherein the difference in height between the support frame and the pipe is between 5 to 30 mm.

7. The apparatus according to any one of claims 5 or 6, wherein the pipe comprises a bell siphon.

8. The apparatus according to any one of the preceding claims, further comprising a second container, wherein water that is allowed to exit the first container is discharged into the second container via the outlet.

9. The apparatus according to claim 8, wherein the second container further comprising an aerator for aerating water contained in the second container.

10. The apparatus according to claim 8, wherein the second container further comprising a pump for pumping water contained in the second container to the first container.

11. The apparatus according to claim 10, wherein the pump is in fluid communication with a conduit and the flow of water through the conduit and into the first container is controlled or regulated via the opening or closing of a tap.

12. The apparatus according to claim 11, further comprising a water tray disposed over or in the interior cavity of the first container and above the level of water contained in the first container, wherein the water tray is adapted to receive water from the conduit and discharge water into the interior cavity of the first container.

13. The apparatus according to claim 12, wherein the water tray has a gradient for allowing water to discharge into the interior cavity of the first container by gravity, the gradient is at an angle of between 5 to 30 degrees.

14. The apparatus according to any one of claims 12 or 13, further comprising a second planting receptacle disposed along a length of the water tray, the second planting receptacle is adapted for planting a plant or a vegetable crop that is different to that plant or vegetable crop planted in the first planting receptacle, wherein the second

planting receptacle comprises a wicker for transferring water in the water tray to the second planting receptacle.

15. The apparatus according to claim 14, further comprising a plurality of second
5 planting receptacles along the length of the water tray.

16. The apparatus according to any one of the preceding claims further comprising a
nutrient supply means for supplying nutrients to the first planting receptacle and/or the
second planting receptacle, or the apparatus according to any one of claims 8 to 15
10 further comprising a nutrient supply means for supplying nutrients to the second
container.

17. The apparatus according to claim 16, wherein the nutrient supply means for
supplying nutrients to the second container is provided by aquatic organisms.
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18. The apparatus according to any one of the preceding claims, wherein the planting
receptacle is made of the same material as the wicker.

19. The apparatus according to any one of the preceding claims, wherein the support
20 frame comprises at least one perforation and the wicker is disposed within the
perforation.

20. The apparatus according to any one of the preceding claims, further comprising a
planting frame adapted for disposing on the surface of the planting medium in the first
25 planting receptacle, the planting frame comprises a plurality of notches for
accommodating seeds or seedlings.

21. The apparatus according to any one of the preceding claims, further comprising a
light source for providing light to the plant or vegetable crop planted in the first or
30 second planting receptacle.