A MODULAR AND CUSTOMISABLE PLANTING SYSTEM

FIELD OF INVENTION

The invention relates to a modular and customisable planting system.

BACKGROUND TO THE INVENTION

The following discussion of the background to the invention is intended to facilitate an understanding of the present invention. However, it should be appreciated that the discussion is not an acknowledgment or admission that any of the material referred to was published, known or part of the common general knowledge in any jurisdiction as at the priority date of the application.

Urban heat island effect (UHIE) refers to the phenomenon when city temperatures run higher than those in suburban and rural areas. UHIE occurs primarily due to the growing numbers of buildings being built as a consequence of urbanization and economic growth, and these growing numbers of buildings have supplanted vegetation and trees previously filling the city area. In addition, human activities generate heat and such generation of heat contributes to the rise in city temperatures.

In an attempt to reduce the adverse influence of the UHIE, vegetations are grown on rooftops (i.e. green roof) to compensate for the loss of supplanted vegetation and trees. The vegetations serve to filter greenhouse gases such as carbon dioxide and other toxins in the city. It has been studied and demonstrated that such green roofs help to reduce roof ambient temperature and that heat transfer

from the roof to the rooms directly underneath the roof is lowered. A reduced ambient temperature and a lowered heat transfer from the roof to the rooms directly underneath the roof may result in lesser dependence on air-conditioning, thereby lessening the building's energy consumption.

In a typical green roof system, plants are conveniently housed in individual plant trays connected together to provide a larger surface area of greenery. Even though plant trays are commonly found in a variety of different sizes and shapes, most of them, if not all, are configured in almost the same way, that being a container (conveniently a box-shaped design) having an orifice near the bottom end of a side wall of the plant tray as a drainage means. The drainage means allows excess fluids such as water, fertilizers, chemicals and other liquids poured into the plant soil or plant substrate to advantageously drain out of the plant tray instead of building up in the plant tray and harming the plant (i.e. root rot, leaching of nutrients and the like).

Up to now, the above provides a low maintenance extensive green roof system that may be deployed quickly to provide instant greening or vegetation for both new and existing buildings. For extensive greening, the design of the green roof system is often limited by the choice of plant species due to its limited substrate thickness. In other words, the types of plants suitable for extensive green roof systems are those that do not require deep substrates for healthy growth. There are not many varieties of such plant species and the limited selection therefore translates to a somewhat monotonous green roof system.

It is desirable to provide for a planting system that accommodates more varieties of plant species, including those requiring deep substrates for healthy growth.

SUMMARY OF THE INVENTION

Throughout this document, unless otherwise indicated to the contrary, the terms "comprising", "consisting of", and the like, are to be construed as non-exhaustive, or in other words, as meaning "including, but not limited to".

In one aspect of the present invention, there is provided a modular and customisable planting system comprising a plurality of panels connected to one another to form an enclosure therein, the panels adapted to be connected laterally and/or vertically. Advantageously, the plurality of panels provides modular and customisable design to afford landscape design.

Advantageously, each panel is adapted to be connected to its adjacent panel using locking studes.

Advantageously, the upper and lower end of each panel comprises a flange. When in use, these flanges are flushed to the surface which they contact to provide greater stability and contact area.

Preferably, each panel is formed using lightweight and durable materials for easy portability and installation, so that it is able to withstand harsh weather conditions.

Preferably, such lightweight and durable materials include high density polypropylene, high density polyethylene, acrylics. Alternatively, wood and composites may also be used to form the panels.

BRIEF DESCRIPTION OF THE DRAWINGS

In the figures, which illustrate, by way of example only, embodiments of the present invention,

Figure 1 shows a first embodiment of the present planting system positioned on the ground;

Figure 2 shows the planting system of the first embodiment arranged in a variety of shapes and size.

Figure 3 shows a second embodiment of the present planting system positioned on plant trays.

Figure 4 shows how each panel of the second embodiment may be stacked vertically/laterally with other similar panels to create a 'layering effect'; and

Figure 5 shows an example of the different planting depth arising from the 'layering effect' as depicted in **Figure 4**.

DETAILED DESCRIPTION

The invention relates to a modular and customisable planting system that is capable of accommodating more varieties of plant species, including those requiring deep substrates for healthy growth.

Figure 1 shows an embodiment of the modular and customisable planting system in accordance with a first aspect of the invention. The planting system **10** comprises a plurality of panels **12** connected to one another to form an enclosure therein. Each panel **12** comprises an upper panel part **12a** and a lower panel part **12b**. In the embodiment illustrated, a 6x5-panel rectangular enclosure is formed. It is to be appreciated that the plurality of panels 12 may be arranged to be formed into other shaped enclosures such as triangle, square or polygon, such as those illustrated in **Figure 2**.

The enclosure formed by the plurality of panels **12** may be a closed one (as illustrated in **Figure 1**) or an open one. To form an open enclosure, a wall or any vertical surface such as a fence, may be used in place of one side of the enclosure. For example, a rectangular enclosure may be created by forming a three-sided structure having generally a U-shape, and positioning the three-sided structure against the wall or vertical surface at the open side of the enclosure. In this arrangement, the wall or vertical surface substitutes one side of the rectangular enclosure. This arrangement is particularly useful in areas where spaces are restricted. Besides the ability to customise the shape of the enclosure, there is better utilisation of existing structures and a reduction in the number of panels needed to form the enclosure, thereby saving materials and costs.

Conveniently, each panel **12** is rectangular in shape and comprises a first face **14** and a second opposing face **16**, a first lateral side **18** and a second opposing lateral side **20**, a top end **22** and a bottom end **24**. The top end **22** and bottom end **24** of the panel **12** are typically flanges bent substantially perpendicular to the first face **14** and second face **16**. For the convenience of orientation and illustration, the first face **14** may be defined as the side facing the interior of the enclosure and the second face **16** may be defined as the side facing away from the interior of the enclosure.

The first lateral side **18** and the second lateral side **20** are each provided with at least one hole **26**. The position of the at least one hole **26** in the first lateral side **18** and the second lateral side **20** are at identical interval and location. The first lateral side **18** of the panel **12** is positioned immediately adjacent the second lateral side

20 of an adjacent panel **12**. The first lateral side **18** of the panel **12** is connected to the second lateral side **20** of the adjacent panel **12** by connecting means such as locking studes via the corresponding holes in the first lateral side **18** and the second lateral side **20**. Advantageously, the locking studes provide a strong connection between adjacent panels **12** and yet at the same time they may be easily unlocked for dismantling purposes. It is to be appreciated that other connecting means such as brackets, hinges, slide bolts, or hook/eye fasteners may also be used.,

The bottom end **24** and/or top end **22** of each panel **12** or panel part **12a, 12b** is preferably provided with at least one hole **28**. When the planting system **10** is to be positioned on the ground, securing means such as screws or pipes may be inserted into the ground via the hole **28** to hold the planting system **10** firmly in place. Alternatively, when the planting system **10** is to be positioned on a horizontal platform such as a table or stage, securing means such as screws, bolts and nuts may be inserted through the hole **28** to hold the planting system **10** firmly in place. The advantage of doing so is to prevent accidental toppling or slipping of the planting system **10**.

The panel **12** is preferably formed of lightweight and durable materials for easy portability and installation, and able to withstand harsh weather conditions. Such materials include plastics such as high density polypropylene, high density polyethylene, acrylics, etc. Wood and composites may also be used as panels. The panel may also be made transparent for viewing pleasure or opaque for

privacy. The planting system **10** may also comprise a combination of transparent panels **12** and opaque panels **12** for decorative purpose, for example.

Figure 3 shows a typical arrangement of a plurality of plant trays **40** for use in a green roof system. In the simplest and most common form, the plant trays **40** are formed of a rectangular structure having a base having four walls extending upwards therefrom to define a tray interior. The tray interiors are subsequently filled with plant substrates. The commonly available trays come in standard, non-customisable sizes and dimensions. Some species of plants require a deeper substrate depth than others. Hence, the depth of the commonly available trays may not be adequate for optimal plant growth for such plants.

Utilisation of the present planting system **10** will provide a customisable plant tray depth. The panels **12** are stacked onto the plant trays **40** and are secured to the plant trays **40** by locking studes, for example. The plant trays preferably have corresponding holes provided on the top end **22** to accommodate the locking studes inserted through the holes **28** provided on the bottom end **24** of the panels **12**. Conveniently, the dimensions of each panel **12** correspond to those of each plant tray **40**. With the stacking of panels **12** on top of the plant trays **40**, the depth for accommodating plant substrates may be customised and varied. The panels **12** help to ensure that the plant substrates are contained within the planting system **10** and will not collapse. Although it has been illustrated in **Figure 3** that the panels **12** are formed on the perimeter of the 3x3 plant trays arrangement, it is to

be appreciated that panels **12** may additionally be formed in the interior of the arrangement to form several sections therein. In this manner, the arrangement may contain different sections having different plant substrate depths, and therefore different species of plants. This creates a more varied viewing pleasure and surrounding. Advantageously, the top ends **22** of the panels **12** may be used to support irrigation pipes providing irrigation to the interior of the arrangement.

The afore-described planting system provides a cost effective and low maintenance system for achieving variable and customisable plant substrate depths. The planting system is easily assembled and dismantled for re-construction, and the panels are reusable. The planting system affords simplicity: one type of connecting means may be used for both vertical stacking and lateral joining of panels, and one standard panel size as the basic building structure. Further, the vertical stacking and lateral joining of panels **12** may be easily customized to achieve a layering effect, as illustrated in **Figure 4**. Such layering, as mentioned earlier, allows for different planting depth within the planting system as illustrated in **Figure 5**.

By using low cost panels and connecting them together laterally and/or vertically, it is possible to construct a modular planting system on existing green roofs and achieve instant greening effects, stimulating creativity and promoting community harmony. Communal activities such as urban gardening help to promote and encourage more people to participate in the same activity. For example, the green roof may comprise different sections having different heights and different plant species. A mixture of children, adults and elderly may be simultaneously involved

in maintaining the different sections of the green roof. Besides improving the landscape designs of green roofs, community harmony and social responsibility may be instilled within the community.

Although the foregoing invention has been described in some detail by way of illustration and example, and with regard to one or more embodiments, for the purposes of clarity of understanding, it is readily apparent to those of ordinary skill in the art in light of the teachings of this invention that certain changes, variations and modifications may be made thereto without departing from the spirit or scope of the invention as described in the appended claims. For example, one of the panels 12 may be pivotally connected via a hinge at either the first lateral side 18 or second lateral side 20. That panel 20 may then serve as a swinging door for entry into and exit from the enclosure.

While each panel **12** comprises an upper panel part **12a** and a lower panel part **12b** as depicted in **Figure 1**, it is easily appreciated that each panel 12 may comprise entirely of an upper panel part 12a or 12b lower panel part 12b (see **Figure 4**).

WE CLAIM:

1. A modular and customisable planting system comprising a plurality of panels connected to one another to form an enclosure therein, the panels adapted to be connected laterally and/or vertically.