A plant irrigating system and a method.

The invention relates to a plant irrigating system, comprising a collection structure for collecting moisture present in the atmosphere, wherein the collection structure is provided with a water recovery surface which during use at least partly makes an angle with respect to the orientation of gravity. The plant irrigating system further comprises a reservoir for storing the recovered moisture, wherein the reservoir is provided with irrigation means for delivering moisture present in the reservoir to a subsoil located therebelow. The collection structure and the reservoir are manufactured from paper material and/or biodegradable plastic.
The invention relates to a plant irrigating system, comprising a collection structure for collecting moisture present in the atmosphere, wherein the collection structure is provided with a water recovery surface which during use at least partly makes an angle with respect to the orientation of gravity, further comprising a reservoir for storing the recovered moisture, wherein the reservoir is provided with irrigation means for delivering moisture present in the reservoir to a subsoil located therebelow.

International patent application PCT/NL/2010/050581 discloses such an irrigating system that can be used for irrigating young plants or seeds.

It is an object of the invention to provide a plant irrigating system having a reduced cost price. Thereto, the collection structure and the reservoir are manufactured from paper material and/or biodegradable plastic.

By using paper material and/or biodegradable plastic, the plant irrigating system can be manufactured in a very cheap way. Further, the environmental impact decreases. Some cardboard, paper foam and/or fiber paper types easily tear, thereby counteracting any theft of the system.

Further advantageous embodiments according to the invention are described in the following claims.

The invention also relates to a method of manufacturing a plant irrigating system.

By way of example only, embodiments of the present invention will now be described with reference to the accompanying figures in which Fig. 1 shows a schematic perspective cross sectional view of a first embodiment of a plant irrigating system according to the invention;
Fig. 2 shows a schematic perspective top view of the plant irrigating system of Fig. 1;

Fig. 3 shows a schematic perspective cross sectional view of a second embodiment of a plant irrigating system according to the invention;

Fig. 4 shows a schematic perspective cross sectional view of a third embodiment of a plant irrigating system according to the invention;

Fig. 5 shows a schematic perspective view of a fourth embodiment of a plant irrigating system according to the invention;

Fig. 6 shows a schematic perspective cross sectional view of the plant irrigating system of Fig. 5; and

Fig. 7 shows a schematic top view of a multiple number of plant irrigating systems 1 according to the invention.

It is noted that the figures show merely preferred embodiments according to the invention. In the figures, the same reference numbers refer to equal or corresponding parts.

Figure 1 shows a schematic perspective cross sectional view of a first embodiment of a plant irrigating system 1 according to the invention. The system 1 comprises a collection structure 99 for collecting moisture present in the atmosphere, wherein the collection structure 99 is provided with a water recovery surface 24 which during use at least partly makes an angle with respect to the orientation of gravity. The system 1 also includes a reservoir 98 for storing the recovered moisture, wherein the reservoir 98 is provided with irrigation means 19, 21 for delivering moisture present in the reservoir 98 to a subsoil located therebelow.

According to an aspect of the invention, the collection structure 99 and/or the reservoir 98 are manufactured from a paper material or a biodegradable plastic. The paper material may include cardboard, cellulose, such as paper tissue, paper foam and/or fiber paper.

As an example, the fiber paper may include coconut fiber, cotton fiber, banana fiber, jute fiber, wool fiber, straw fiber, grass fiber, hemp fiber,
kenaf fiber, wheat straw paper, sunflower stalks fiber, rags fiber, mulberry paper and/or kozo.

The biodegradable plastic can be based on petroleum based plastics or renewable raw materials, both including a biodegradable additive.

Generally, petroleum based plastics are known as hydro-carbons. During a biodegradation process, microbes are enabled to metabolize the molecular structure of the plastic and to produce inert humus material, water and biogases, such as CH\textsubscript{4} and CO\textsubscript{2}. An example of a biodegradable additive is the commercially available substance, known as EcoPure including organic compounds for opening the polymer chain of the hydro-carbons, and attractants stimulating microbial colonization on the plastics. The biodegradation occurs at the atomic level and is anaerobic or aerobic. As an example, a biodegradable additive can be applied for a wide variety of plastics, such as PVC, PE, PP, PS, PC, PET and PA.

Renewable raw materials for forming a biodegradable plastic may include wood fiber, e.g. 60%, combined with a plastic, e.g. 40%. When a suitable biodegradable additive is added, the material is made biodegradable.

Preferably, material forming the collection structure and the reservoir includes water impermeable material and/or is provided with a liquid impermeable coating, e.g. on the inner and/or outer side. Further, the forming material can be coated with a biodegradable layer, preferably having a pre-determined thickness so that a desired degree of degradedness can be set. Alternatively or additionally, the degradedness of the biodegradable layer can be set by including a dosed amount of conserving material. Further, the degradedness can be set by localizing specific parts at specific heights with respect to the ground level. In general, material in the collection structure will degrade later than material in the reservoir, due to the position relative to the ground.
Preferably, the base material of the collection structure and/or reservoir includes specific material that is bound to the base material for a specific time period and is then disseminated into the environment, due to degradable properties of the base material. By setting the degradedness of the base material, the degree of dissemination of the specific material can be determined. In this respect it is noted environmental parameters, such as wind, moisture etc may influence the degradedness of the base material.

As an example, the specific material may include aromatic substances, flavourings, (artificial) fertilizer or michorizae, anti-fungal material and/or at least one insecticide, e.g. nicotine for chasing away harmful animals such as termites, and/or fungi. Further, the specific material may include seeds, symbiotic bacteria, eggs, fungi and/or spores that may germinate after leaving the base material, thereby improving the biodiversity of the irrigating system. As an example, the collection structure might include a first specific material and the reservoir may include a second specific material. The number of seeds, fungi and/or spores can be determined before integrating in the base material.

By integrating the specific material in the base material, the base material serves as an agent for the specific material that disseminates in a dosed manner.

According to an aspect of the invention, a paper material carrier is provided including specific material for dissemination into the environment caused by a biodegrading process of the paper material, e.g. due to moisture. The specific material may include the specific materials described above in relation to the base material of the irrigating system.

The paper material carrier may be integrated with or fixed to the irrigating system or can be provided separately. Further, the paper material carrier may be applied without the irrigating system, e.g. for sowing seed in a field.
In the shown embodiment, the water recovery surface 24 has a specific geometry for receiving rain, bloom and other moisture from the atmosphere. The water is collected in a drain 25 and flown to the reservoir 98 via downwardly extending pipes 26, 27. The moisture receiving structure 24 further includes a cap 28 removable closing an aperture 23 in the cover layer 22, and an exit drain 29 flowing excess water to an exit opening 30 in a radial outer wall section 12a of the water reservoir 98. The wall module 2 extends through the cover layer 22 and the moisture receiving structure 24 and forms a radial inner wall of the drain 25.

Further, in the shown embodiment, the plant irrigating system includes an upwardly extending tube 2 forming a radial inner wall section 12b of the water reservoir 98. The tube 2 is connected to the collection structure 99 and has a longitudinal axis A2, for at least partly sideways surrounding a young plant. The water reservoir 98 is thus formed by the radial outer wall section 12a, the radial inner wall section 12b, a bottom side 11 and a cover layer 22 that forms a top section of the water reservoir 98.

During use of the removable plant protection system 1, a single or a multiple number of seeds, plants or small trees are placed in a soil area 9 surrounded by the tube 2, such that it on the one hand throws a shadow on the soil area 4 near the tube 2 when the sun reaches its highest orbit point and on the other hand allows a sun beam on the soil area 4 at a time period on the day when the elevation of the sun is relatively low, e.g. a few hours after sunrise and/or a few hours before sunset, as explained in more detail in the International patent application PCT/NL2010/050581.

Thereto, the system 1 is placed on the Earth’s surface and oriented such that the horizontal orientation of the tube aperture extends substantially parallel to an Earth’s circle of latitude, i.e. along an East-West line 5 extending from the East E to the West W. The East-West line 5 is
perpendicular to a North-South line, not shown, also called a meridian line, extending from the North N to the South S.

The irrigation means for irrigation the subsoil may include an injection needle or to a capillary structure 21 extending through an irrigation point 19 for irrigation the subsoil in a dosed manner. Alternatively, a membrane is applied.

Figure 2 shows a schematic perspective top view of the plant irrigating system of Fig. 1. The tube surrounds an area that is mainly shaped as a bar-bell. However, the tube can also be formed to surround another area geometry, such as a disc, a square, or an elongated area. Further, the water recovery surface 24 comprises a receiving surface which during use makes a first angle with respect to the orientation of gravity, and a collecting surface bounding a bottom edge of the receiving surface, which collecting surface during use makes a second angle with respect to the orientation of gravity, wherein the first angle is smaller than the second angle. In the shown embodiment, the water recovery surface 24 includes a multiple number of radially extending grooves that are interposed by radially extending rims. The water recovery surface 24 is mainly funnel-shaped, so that the water in the grooves flow towards the drain 25, and then, via the pipes 26, 27 into the reservoir 98.

Figure 3 shows a schematic perspective cross sectional view of a second embodiment of a plant irrigating system 1 according to the invention. Here, the collection surface of the water recovery surface 24 is substantially transverse with respect to the orientation of gravity and forms a channel 25 surrounding the tube 2. The channel 25 is located on a radial position mainly halfway between the tube 2 and an outer wall 12a of the reservoir 98. The water recovery surface 24 includes a radially outwardly tilted inner ring segment 41 extending between the tube 2 and the channel 25. Further, the surface 24 includes a radially inwardly tilted outer ring segment 40 extending between the outer wall 12a of the water reservoir and
the channel 25. In the shown embodiment, the ring segments 40, 41 are mainly flat, forming a single or a multiple number of substantially flat receiving surface segments. In principle, however, the ring segments 40, 41 can be provided with a grooved pattern, e.g. including radially extending grooves, so as to increase a moisture recovery performance, especially condensation of dew droplets. By providing the above-described water recovery surface 24, the exit drain 29, as constructed in the embodiment shown in Fig. 1, is superfluous. If the level of the recovered water on the surface 24 rises about a predetermined level, e.g. during raining, the excess of water flows away across the outer rim 43 of the surface 24.

Figure 4 shows a schematic perspective cross sectional view of a third embodiment of a plant irrigating system 1 according to the invention. Here, the channel 25 is located on a radial position near an outer wall 12a of the reservoir 98. The water recovery surface 24 now includes a single ring segment, viz. a radially outwardly tilted inner ring segment 41 extending between the tube 2 and the channel 25. Apparently, the channel 25 can be located on another radial position between the tube 2 and the outer wall 12a of the reservoir 98. By locating the channel somewhere between the outer wall 12a of the reservoir and the tube, the height of the reservoir can be reduced while maintaining the same volume with respect to the construction shown in Figures 1 and 2, thereby saving material. The channel 25 in Figures 3 and 4 includes at least one outflow pipe 26, 27 extending from the channel 25 downwardly into the reservoir 98. In principle, the outflow pipe 26, 27 can be integrated with the channel 25. However, the outflow pipe can also be formed separately for assembling into an aperture of the channel 25.

Advantageously, the collection structure may include a passive valve system providing an opening for allowing water to flow from the channel 25 into the reservoir 98 when the channel is wet and substantially closing the opening when the channel is dry. As an example, the passive valve system comprises inwardly extending fingers that bend downwardly
when they are wet, and extend in a horizontal plane when they are dry. Then, evaporation of water in the reservoir 98 is minimized.

Preferably, the collection structure extends across the outer wall 12a of the reservoir and is connected therewith using a snap fitting. In the shown embodiments, the snap fitting is formed by a snap on the outer rim 43 of the water recovery surface 24 engaging with the upper part of the reservoir’s outer wall 12a, so that a solid fixture is obtained. In this way collapse of the reservoir 98 is counteracted, while on the other hand, material for forming the reservoir’s outer wall 12a can be saved. Here, the snap extends radially across the outer wall 12a, so that radially outwardly forces exerted on the outer wall 12a can be received. On the tube side, a similar construction can be applied. Specifically, the tube and the collection structure can be interconnected using a construction wherein fingers extend through apertures, thus counteracting undesired deformation of the tube geometry.

The collection structure and the reservoir are preferably detachable coupled, and nestable on their own, thereby saving storage and/or transport space. Further, the cover layer 22 and the cap 28 removably closing an aperture 23 in the cover layer 22 are left in the embodiments shown in Figures 3 and 4, thereby simplifying the design of the irrigating system 1. The collection structure and the reservoir can also be fixed to each other by gluing, thereby preventing that the reservoir is opened, e.g. to counteract theft. Alternatively, the collection structure and the reservoir are integrally formed.

Preferably, the irrigation means include a ring module 42 fixed to the reservoir bottom, and an irrigation element 21 extending through the ring module 42, so that a durable irrigation construction is obtained, without causing unintended water losses. Further, the reservoir 98 is advantageously provided with an air opening, thereby avoiding that the irrigation means are blocked by an under pressure in the reservoir 98.
The system 1 as shown in Figures 3 and 4 further includes sidewardly extending elements for stabilizing the reservoir on the ground, e.g. via nails. The sidewardly extending elements are connected to the bottom 11 or outer side wall 12a of the reservoir 98, e.g. via a rigid or flexible structure 44, such as a pivotable connection. Apparently, the sidewardly extending elements can also be applied to other embodiments of the system as described herein. The sidewardly extending element may include a body extending between two opposite ends, wherein a first end is provided with coupling means for coupling to a side or bottom part of the plant protection system, and wherein the second end is arranged for fixation to the soil, as described in patent application NL 2 003 974.

It is noted that the embodiments shown in Figures 3 and 4 can be manufactured from cardboard, paper foam and/or fiber paper, but also from other materials, such as biodegradable or non-biodegradable plastics.

In an advantageous manner, the system includes injection moulded product modules, and/or vacuum assisted moulding, thereby potentially reducing the cost price considerably. As an example of such an embodiment, the collection surface forms a channel surrounding the tube and the receiving surface includes a single or a multiple number of substantially flat segments. In another embodiment, the channel is located on a radial position mainly halfway between the tube and an outer wall of the reservoir or on a radial position near an outer wall of the reservoir. Figure 5 shows a schematic perspective view of a fourth embodiment of a plant irrigating system according to the invention. Here, the system includes an overhanging portion 50 extending away from the tube 2, beyond the outer side wall 12a of the reservoir 98. The overhanging portion 50 is part of the collection structure 99. The water recovery surface 24 of the collection structure 99 includes an upper surface section of the overhanging portion. The overhanging portion 50, implemented as a sheet, extends in a direction D substantially transverse with respect to the longitudinal axis A2 of the tube.
2. In the shown embodiment, the overhanging portion 50 extends from a top side of the outer side wall 12a of the reservoir 98 in an outward direction relative to the reservoir 98, away from the tube 2. During sunshine, the overhanging portion 50 generates a shadow 101, in some cases, on a ground surface 102 adjacent to the outer side wall 12a of the reservoir 98, depending on the direction of sunbeams S.

By providing an overhanging portion 50 extending away, outwardly from the tube 2 and beyond the outer side wall 12a of the reservoir, a sunshield is obtained screening objects from direct sunbeams S. The screened objects may include a ground surface 102 adjacent to the outer side wall 12a of the reservoir and extending in a radially outwardly direction and/or a part of the outer reservoir side wall 12a itself. As a consequence, water that is present in the reservoir 98 and in the ground under a screened ground surface 101 can be cooled. By screening at least a part of the reservoir 98 and/or the ground area 56 from the sun, heating up of the water in the water reservoir 98 and/or the ground in at least a part of the ground area 56 is counteracted, thereby counteracting evaporation of water contained in the reservoir and/or in the ground in the ground area 56.

As a result, the temperature of the screened ground around the reservoir 98 is relatively low, providing better surviving and growing conditions for the plant. Also, evaporation of moisture that is present in the screened ground around the reservoir 98 is counteracted, further improving surviving and growing conditions for the plant to be protected.

By integrating the overhanging portion 50 with the collection structure, the water recovery surface 24 may extend beyond the reservoir 98 so that the area of the water recovery surface 24 is relatively large. Therefore, a relatively large amount of water may be recovered.

It is noted that, although the overhanging portion 50 is in the shown embodiment formed as a radially inwardly tilted overhanging ring segment 51 of the water recovery surface 24, the portion 50 can also be
formed otherwise. For example, the system 1 may comprise a single or a multiple number of overhanging portion sections 52, 53 not entirely surrounding the reservoir 98. As a detailed example, the system may include a pair of strip shaped overhanging portions 52, 53 extending in opposite directions, e.g. to the North direction N, and/or to the South direction S, during use of the system.

In the shown embodiment, the overlapping portion 50 is staggered upwardly from a water recovery surface 24 that is located above the reservoir 98, thereby providing a relatively large buffer volume for recovered water, e.g. during a rain shower. However, the overlapping portion 50 can also be arranged in line with other collection structure parts, e.g. by providing a substantially flat water recovery surface.

In an alternative embodiment, the overhanging portion 50 is not part of the collection structure 99, but is formed separately. Then, the overhanging portion 50 may be placed not adjacent to the water recovery surface, but at another location, e.g. half-way the outer side wall 12a of the reservoir 98. The overhanging portion then functions as an awning screening objects to be cooled. The overhanging portion can be integrated with the outer side wall 12a of the reservoir, or can be manufactured separately and attached to the outer side wall 12a.

Preferably, the overhanging portion 50 comprises a material capable of reflecting and/or absorbing sunlight, in order to counteract that sunlight travels through the portion 50. Alternatively or additionally, the overhanging portion 50 may be coated with a coating for reflecting and/or absorbing sunlight.

It is noted that the overhanging sheet 50 does not need to be placed near a top side of the outer side wall 12a of the reservoir 98, nor does the overhanging sheet 50 need to be tilted radially inwardly. For example, if the overhanging sheet 50 is formed as a sunshade, for protecting the ground area 56, the overhanging sheet may be placed lower than the water recovery
surface 24, e.g. halfway the radial outer wall section 12a. Moreover, the overhanging sheet 50 may be oriented substantially horizontal or even radially tilted outwardly.

Figure 6 shows a schematic perspective cross sectional view of the plant irrigating system of Fig. 5. The system 1 comprises a multiple number of separate modules, not manufactured as an integrated part of the system. A first module is a bin formed by the radial outer wall section 12a, the radial inner wall section 12b and the bottom side 11 of the water reservoir 98. A second module of the system 1 is the collection structure 99 including the overhanging portion 50 and the water recovery surface 24. Furthermore, the outflow pipes 26, 27 can be formed as separate modules, or can be formed integrally with the collection structure 99.

By applying the modular approach, lateral dimensions of the modules are relatively small. Further, the modules can be optimized, e.g. in terms of materials and/or costs. Another potential advantage is that modules can be designed such that they are efficiently nestable, e.g. the bins and/or the collection structures 99, thereby reducing space that is needed for storing and/or transporting the modules. As a consequence, a large number of modules can be stored on a transport pallet or another transporting unit.

By keeping dimensions of the separate manufactured modules relatively small, the manufacturing process can be relatively cheap. As an example, when a mould is used for producing the bin, e.g. for injection moulding, vacuum assisted moulding and/or transfer moulding, the dimensions of the bin, including its diameter 60 and height 62 can be optimized for cost price. A similar optimization can be applied to a mould for producing the collection structure 99. A relatively small mould may reduce its cost price.

Also when the system, or parts thereof, are manufactured from paper material such as cardboard, cellulose, paper foam and/or fiber paper, the cost price can be kept low. When a module is formed by dipping a fine
wire mesh into a tub filled with a fibrous pulp slurry and sucking the slurry toward the mesh, a relatively low cost price can be obtained if the modules have a relatively small dimension.

As an example, if the diameter of the bin is chosen relatively small, a relatively large number of bins can be formed simultaneously. Although the diameter of the bin is then relatively small, still a large water recovery surface area can be realized with the system, since the collection structure is manufactured separately. If a specific reservoir volume can be obtained by selecting a proper height of the bin in combination with a fixed relatively small bin diameter. Then the manufacturing costs can be kept relatively low, also if a larger reservoir volume is desired.

When considered in terms of reservoir volume, i.e. the amount of water that can be stored in the reservoir, base material can be saved by making the reservoir relatively high and the dimensions in the horizontal plane relatively small. Then, a relatively large number of reservoirs can be manufactured simultaneously in the tub. On the other hand, by making the water recovery surface relatively large, a large area is obtained for recovering moisture that is present in the atmosphere, independent of the horizontal dimensions of the reservoir.

It is noted that the collection structure and the reservoir of the plant irrigating system can be made from paper material and/or biodegradable plastic. Alternatively, the collection structure and/or the reservoir of the plant irrigating system comprising an overhanging portion extending away from the tube, beyond an outer side wall of the reservoir are made from other materials, such as non-biodegradable petroleum based plastics.

It is also noted that the tube can be formed as a wall defining a barbell, a disc or a square, seen in a top-down view. However, the tube can also be formed in another way, e.g. forming an elongated closed or half-open slot, seen in a top-down view.
Figure 7 shows a schematic top view of a multiple number of plant irrigating systems 1 according to the invention. Here, the systems are mainly shaped as rectangular boxes having two shorter sides 46 and two longer sides 47. As shown in Fig. 7 the plant irrigating systems have in this embodiment locally inwardly bending structures providing a plant space 45 outside the system 1 when multiple systems are placed next to each other. In the plant space 45 a single or a multiple number plants can be planted, thereby further improving the efficiency of the used material for forming the plant irrigating system.

According to an aspect of the invention, a method is provided of manufacturing a plant irrigating system, comprising a collection structure for collecting moisture present in the atmosphere, wherein the collection structure is provided with a water recovery surface which during use at least partly makes an angle with respect to the orientation of gravity, further comprising a reservoir for storing the recovered moisture, wherein the reservoir is provided with irrigation means for delivering moisture present in the reservoir to a subsoil located therebelow, and wherein the method includes the step of manufacturing the collection structure and the reservoir from cardboard, paper foam and/or fiber paper.

Preferably, when constructing the collection structure and the reservoir, the height of the reservoir wall is determined by starting from a predetermined dimension of the outer reservoir wall’s upper side and selecting a desired reservoir volume. Then, for a range of reservoir volumes, a single collection structure fits, since the outer reservoir wall’s upper side has a fixed measure.

The invention is not restricted to the embodiments described herein. It will be understood that many variants are possible.

It is noted that the plant irrigating system can have any closed periphery, in principle, when seen in a top view, such as a U-profile, a polygon, a square, a rectangle, a triangle, a circle, an ellipse, etc. Further,
the irrigating system can be formed without the above described tube. Then, the irrigating system can be formed as a bag, bin, tank or pot.

The tube can also have a desired contour, such as a square, a circle, a rectangle, or a semi-closed or half-opened contour, such as an U-shape.

It is noted that the cover layer 22 applied in the system shown in Fig. 1 can in principle also be applied in the systems as shown in Figures 3 and 4, e.g. for isolation purposes, to counteract that the temperature of the water in the reservoir becomes too hot.

The collection structure and/or the reservoir can be provided with a heat isolating layer to prevent excessive increase of water in the reservoir. As an example, the collection structure may include hollow spaces or heat isolating material, e.g. perlite particles.

Other such variants will be apparent for the person skilled in the art and are considered to fall within the scope of the invention as defined in the following claims.
Conclusies

1. Plantirrigatiesysteem, omvattende een verzamelstructuur voor het verzamelen van in de atmosfeer aanwezig vocht, waarbij de verzamelstructuur is voorzien van een waterterugwinoppervlak dat tijdens gebruik tenminste gedeeltelijk een hoek maakt ten opzichte van de oriëntatie van de zwaartekracht, verder omvattend een reservoir voor het opslaan van het teruggewonnen vocht, waarbij het reservoir is voorzien van irrigatiemiddelen voor het leveren van in het reservoir aanwezig vocht aan een daaronder gelegen ondergrond, en waarbij de verzamelstructuur en het reservoir zijn vervaardigd van papiermateriaal en/of biologisch afbreekbare kunststof.

2. Plantirrigatiesysteem volgens conclusie 1, waarbij het papiermateriaal omvat karton, cellulose, papierschuim en/of vezelpapier.

3. Plantirrigatiesysteem volgens conclusie 1 of 2, waarbij het vezelpapier omvat kokosvezel, katoenvezel, banaanvezel, jutevezel, wolvezel, strovezel, grasvezel, hennepvezel, kenafvezel, tarwestropapier, vezel van zonnebloemstengel, voddenvezel, moerbeipapier en/of kozo.

4. Plantirrigatiesysteem volgens één der voorgaande conclusies, waarbij het papiermateriaal een voor water ondoordringbaar materiaal omvat en/of voorzien is van een voor vocht ondoordringbare coating.

5. Plantirrigatiesysteem volgens één der voorgaande conclusies, waarbij de biologisch afbreekbare kunststof is gebaseerd op herwinbare grondstoffen omvattend een biologisch afbreekbaar additief, of kunststoffen op basis van aardolie omvattende een biologisch afbreekbaar additief.

6. Plantirrigatiesysteem volgens één der voorgaande conclusies, verder omvattende een buis die verbonden is met de verzamelstructuur, voor het tenminste gedeeltelijk zijwaarts omgeven van een jonge plant die plaatsbaar is in de verzamelstructuur.
7. Plantirrigatiesysteem volgens één der voorgaande conclusies, waarbij de buis een gebied omgeeft dat hoofdzakelijk gevormd is als een schijf, een vierkant, een halter, of een langgerekt gebied.

8. Plantirrigatiesysteem volgens één der voorgaande conclusies, waarbij de verzamelstructuur en het reservoir losneembaar gekoppeld zijn.

9. Plantirrigatiesysteem volgens één der voorgaande conclusies, waarbij de verzamelstructuur en/of het reservoir nestbaar is.

10. Plantirrigatiesysteem volgens één der voorgaande conclusies, waarbij de buis een binnenwand van het reservoir vormt.

11. Plantirrigatiesysteem volgens één der voorgaande conclusies, waarbij het waterterugwinoppervlak een ontvangstroppervlak omvat dat tijdens gebruik een eerste hoek maakt ten opzichte van de oriëntatie van de zwaartekracht, en een verzameloppervlak omvat dat een bodemrand van het ontvangstroppervlak begrenst, welk verzameloppervlak tijdens gebruik een tweede hoek maakt ten opzichte van de oriëntatie van de zwaartekracht, waarbij de eerste hoek kleiner is dan de tweede hoek.

12. Plantirrigatiesysteem volgens één der voorgaande conclusies, waarbij het waterterugwinoppervlak in hoofdzaak trechternormig is.

13. Plantirrigatiesysteem volgens één der voorgaande conclusies, waarbij het verzameloppervlak in hoofdzaak dwars staat ten opzichte van de oriëntatie van de zwaartekracht.

14. Plantirrigatiesysteem volgens één der voorgaande conclusies, waarbij het verzameloppervlak een kanaal vormt dat de buis omgeeft.

15. Plantirrigatiesysteem volgens één der voorgaande conclusies, waarbij het ontvangstvlak een enkelvoudig of een meervoudig aantal in hoofdzaak vlakke segmenten omvat.

16. Plantirrigatiesysteem volgens één der voorgaande conclusies, waarbij het kanaal is geplaatst op een radiale positie in hoofdzaak halverwege tussen de buis en een buitenwand van het reservoir.
17. Plantirrigatiesysteem volgens één der voorgaande conclusies, waarbij het kanaal is geplaatst op een radiale positie nabij een buitenwand van het reservoir.

18. Plantirrigatiesysteem volgens één der voorgaande conclusies, waarbij de verzamelstructuur ten minste één uitstroompijp omvat die zich van het kanaal naar beneden uitstrekt tot in het reservoir.

19. Plantirrigatiesysteem volgens één der voorgaande conclusies, waarbij de verzamelstructuur een passief klepsysteem omvat dat is voorzien van een opening om water van het kanaal het reservoir in te laten stromen wanneer het kanaal nat is, en dat de opening in hoofdzaak afsluit wanneer het kanaal droog is.

20. Plantirrigatiesysteem volgens één der voorgaande conclusies, waarbij de verzamelstructuur zich uitstrekt over de buitenwand van het reservoir en daarmee verbonden is met behulp van een klikverbinding.

21. Plantirrigatiesysteem volgens één der voorgaande conclusies, waarbij de irrigatiemiddelen een ringmodule omvatten die bevestigd is aan het reservoir, en een irrigatie-element omvatten dat zich uitstrekt door de ringmodule.

22. Plantirrigatiesysteem volgens één der voorgaande conclusies, waarbij het reservoir voorzien is van een luchtopening.

23. Plantirrigatiesysteem volgens één der voorgaande conclusies, waarbij de buitenwand van het reservoir een locaal binnenwaarts buigende structuur heeft, die een plantruimte buiten het systeem verschaf wanneer er een meervoudig aantal systemen naast elkaar zijn geplaatst.

24. Plantirrigatiesysteem volgens één der voorgaande conclusies, dat is ingericht voor het verspreiden van aromatische substantie, smaakstoffen, antischimmel materiaal en/of ten minste één insecticide voor het verdrijven van schadelijke dieren en/of schimmels.
25. Plantirrigatiesysteem volgens één der voorgaande conclusies, verder omvattende een overhangend deel dat zich uitstrekt van de buis vandaan, voorbij een buitenste zijwand van het reservoir.

26. Plantirrigatiesysteem volgens conclusie 25, waarbij het overhangende deel onderdeel is van de verzamelstructuur.

27. Plantirrigatiesysteem volgens conclusie 25 of 26, waarbij het waterterugwinoppervlak een bovenvlakgedeelte van het overhangende deel omvat.

28. Werkwijze voor het vervaardigen van een plantirrigatiesysteem, omvattende een verzamelstructuur voor het verzamelen van in de atmosfeer aanwezig vocht, waarbij de verzamelstructuur is voorzien van een waterterugwinoppervlak dat tijdens gebruik ten minste gedeeltelijk een hoek maakt ten opzichte van de oriëntatie van de zwaartekracht, verder omvattende een reservoir voor het opslaan van het teruggewonnen vocht, waarbij het reservoir is voorzien van irrigatiemiddelen voor het leveren van in het reservoir aanwezig vocht aan een daaronder gelegen ondergrond, en waarbij de werkwijze de stap omvat van het vervaardigen van de verzamelstructuur en het reservoir van papiermateriaal en/of biologisch afbreekbare kunststof.

29. Werkwijze volgens conclusie 28, waarbij de hoogte van de wand van het reservoir wordt bepaald door uit te gaan van een vooraf bepaalde dimensie van de bovenkant van de buitenwand van het reservoir en door een gewenst reservoirvolume te selecteren.
# SAMENWERKINGSVERDRAG (PCT)
## RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

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### I. CLASSIFICATIE VAN HET ONDERWERP (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)
Volgens de internationale classificatie (IPC)

A01G13/02; A01G29/00

### II. ONDERZOECHTE GEBIEDEN VAN DE TECHNIEK

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Onderzochte andere documentatie dan de minimum documentatie, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

### III. GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES (opmerkingen op aanvullingsblad)

### IV. GEBREK AAN EENHEID VAN UITVINDING (opmerkingen op aanvullingsblad)

Form PCT/ISA 201 A (11/2000)
ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE

Nummer van het verzoek om een onderzoek naar de stand van de techniek

NL 2006384

A. CLASSIFICATIE VAN HET ONDERWERP

INV. A01G13/02 A01G29/00

ADD.

Volgens de Internationale Classificatie van octrooien (IPC) of zowel volgens de nationale classificatie als volgens de IPC.

B. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimum documentatie (classificatie gevolgd door classificatiesymbolen)

A01G

Onderzochte andere documentatie dan de minimum documentatie, voor dergelijke documenten, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

Tijdens het onderzoek geraadpleegde elektronische gegevensbestanden (naam van de gegevensbestanden en, waar uitvoerbaar, gebruikte trefwoorden)

EPO-Internal, WPI Data

C. VAN BELANG GEACHTE DOCUMENTEN

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* bladzijde 13, regel 25 - regel 28; conclusies; figuren          | 1,5-18, 20-23, 25-29             |
* alinea [0106] - alinea [0110] *                                  | 2-4                              |
* alinea [0043] - alinea [0044] *                                 | 1,6-8, 10-12, 18,28              |
* het gehele document *                                           | 2-4                              |

-/-

* Speciale categorieën van aangehaalde documenten

** Speciale categorieën van aangehaalde documenten

**X** niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft

**O** in de octrooiaanvraag vermeld

**E** eerdere octrooiaanvraag, gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvoering wordt beschreven

**L** om andere redenen vermeld litteératuur

**O** niet-schriftelijke stand van de techniek

**P** tussen de voorrangssdatum en de indieningsdatum gepubliceerde literatuur

Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltrokken

25 april 2012

Verzenddatum van het rapport van het onderzoek naar de stand van de techniek van internationaal type

Naam en adres van de instantie

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel: (+31-70) 440-2040,
Fax: (+31-70) 340-3016

De bevoegde ambtenaar

Merckx, Alain

Formuleer PCT/ISA/001 (tweede blad) (Januari 2004)
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WRITTEN OPINION

File No
SN56359

Filing date (day/month/year)
14.03.2011

Priority date (day/month/year)
16.12.2010

Application No
NL2006384

International Patent Classification (IPC)
INV. A01G13/02 A01G29/00

Applicant
P.M.M. Hoff Holding B.V.

This opinion contains indications relating to the following items:

☒ Box No. I Basis of the opinion
☐ Box No. II Priority
☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐ Box No. IV Lack of unity of invention
☒ Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐ Box No. VI Certain documents cited
☒ Box No. VII Certain defects in the application
☒ Box No. VIII Certain observations on the application

Examiner
Merckx, Alain

Form NL237A (Dekblad) (July 2006)
Box No. I  Basis of this opinion

1. This opinion has been established on the basis of the latest set of claims filed before the start of the search.

2. With regard to any nucleotide and/or amino acid sequence disclosed in the application and necessary to the claimed invention, this opinion has been established on the basis of:
   a. type of material:
      - a sequence listing
      - table(s) related to the sequence listing
   b. format of material:
      - on paper
      - in electronic form
   c. time of filing/furnishing:
      - contained in the application as filed.
      - filed together with the application in electronic form.
      - furnished subsequently for the purposes of search.

3. □ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Box No. V  Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

<table>
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<tr>
<th>Description</th>
<th>Yes: Claims</th>
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<td>Industrial applicability</td>
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2. Citations and explanations

   see separate sheet
Box No. VII  Certain defects in the application

see separate sheet

Box No. VIII  Certain observations on the application

see separate sheet
Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1  Reference is made to the following documents:

2  Lack of novelty: independent claims 1, 28
   The present application does not meet the criteria of patentability, because the subject-matter of claims 1 and is not new.

2.1  Document D1 discloses (inserted references apply to this document):
    A plant irrigating system, comprising a collection structure (1) for collecting moisture present in the atmosphere, wherein the collection structure is provided with a water recovery surface (9) which during use at least partly makes an angle with respect to the orientation of gravity, further comprising a reservoir (13) for storing the recovered moisture, wherein the reservoir is provided with irrigation means (14) for delivering moisture present in the reservoir to a subsoil (7) located therebelow, and wherein the collection structure and the reservoir are manufactured from paper material and/or biodegradable plastic (page 13, lines 25-28).
    D1 also discloses, by inference:
    A method of manufacturing such a plant irrigation system.

2.2  Therefore, as it appears that all the technical features of independent claims 1 and 28 are known from this document D1, the subject-matter of those claims can not be considered as new.

2.3  Document D3 also discloses a plant irrigation system having all the features of claim 1 and, by inference, its manufacture.
3 Lack of novelty or inventive step: dependent claims 2-18, 20-23, 25-27, 29

Dependent claims 2 to 18, 20 to 23, 25 to 27 and 29 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of novelty (claims 5-15, 18) or inventive step (claims 2-4, 16, 17, 20-23, 25-27, 29), for the following reasons:

3.1 - The features of dependent claims 2 to 4 have already been employed for the same purpose in a plant protector (see document D2). It would therefore be obvious to the person skilled in the art to apply these features with corresponding effect to a plant irrigating system according to D1, thus arriving at a plant irrigating system according to claims 2 to 4.

3.2 - The features of claims 5 to 15 and 18 are disclosed in D1, at least.

3.3 - The claims 16, 17, 20 to 23, 25 to 27 and 29 relate to slight constructional changes in the plant irrigating system of claim 1, which come within the scope of the customary practice followed by persons skilled in the art, especially as the advantages thus achieved can readily be foreseen. Consequently, the subject-matter of those claims also lacks an inventive step.

4 Dependent claims complying with the requirements of novelty and inventive step: 19, 24

The combination of the features of dependent claims 19 and 24 is neither known from, nor rendered obvious by, the available prior art.

Re Item VII

Certain defects in the international application

5 Lack of references to the drawings

The features of the claims are not provided with reference signs placed in parentheses.
Re Item VIII
Certain observations on the international application

6 Lack of clarity: dependent claims 26, 27

Claims 26 and 27 have been made dependent on claim 24. However, they both refer to the overhanging portion, which is defined in claim 25.