What is claimed is:

1. An apparatus for establishing partial root zone drying to improve plant roots in soilless hydroponics, the apparatus comprising:

a) a substrate configured for growing plants and comprising a planting material other than soil, the substrate comprising an upper portion and a lower portion aligned along a longitudinal direction of the substrate; and

b) a porous material covering at least part of the upper portion of the substrate, but not covering the lower portion of the substrate, the porous material exposed to and in contact with air,

wherein pores of the porous material are adapted to expose a portion of traversing roots of a plant grown in the substrate to air trapped in the pores of the porous material, thereby establishing a partial root zone drying for improving roots of the plant.

2. The apparatus of claim 1, wherein the porous material is adapted to allow at least part of the traversing roots of the plant to grow therethrough.

3. The apparatus of claim 1, wherein the porous material completely wraps around the upper portion of the substrate around a central axis of the substrate that is parallel to the longitudinal direction.

4. The apparatus of claim 1 or 3, wherein the porous material is urged against the substrate.

5. The apparatus of any one of the preceding claims, wherein the porous material is hydrophobic.

6. The apparatus of any one of the preceding claims, wherein the planting material is hydrophilic.

7. The apparatus of claim 5, wherein the porous material is chosen from the group consisting of hydrophobic sponge, clay and plastic beads.

8. The apparatus of claim 6, wherein the planting material is selected from the group consisting of rockwool, peat, perlite, hydrophilic sponge and polyurethane.

9. The apparatus of one of the preceding claims, further comprising a container in which the porous material is accommodated; the container comprising a surface that at least partially covers the upper portion of the substrate.

10. The apparatus of claim 9, wherein the porous material comprises clay and/or plastic beads; the clay and/or plastic beads accommodated in the container to keep a shape of the porous material.

11. The apparatus of any one of the preceding claims, wherein the lower portion of the substrate is at least partially immersed into a nutrient solution, and is adapted to allow a taproot of the plant to grow therealong to contact the nutrient solution.

12. The apparatus of any one of the preceding claims, wherein the porous material comprises a first piece and a second piece which are separate from each other.

13. The apparatus of any one of the preceding claims, wherein the porous material is in a hollow cylindrical shape or a polygonal shape.

14. A method for establishing partial root zone drying to improve plant roots in soilless hydroponics, the method comprising steps of:

a) providing a substrate for growing plants, the substrate comprising a planting material other than soil, the substrate comprising an upper portion and a lower portion aligned along a longitudinal direction of the substrate;

b) covering at least part of the upper portion using a porous material, but not covering the lower portion of the substrate using the porous material;

c) transplanting a plant in the substrate; and

d) exposing a portion of traversing roots of the plant to air trapped in the pores of the porous material that is exposed to and in contact with air, thereby establishing a partial root zone drying for improving roots of the plant.

15. The method of claim 14, further comprising the step of growing at least a part of the traversing roots of the plant through the porous material.

16. The method of claim 14 or 15, wherein step b) further comprises completely wrapping the porous material around the upper portion of the substrate.

17. The method of claim 16, wherein the porous material comprises a first piece and a second piece which are separate from each other; and step b) further comprises assembling the first and second pieces together before or during the wrapping step.

18. A system for establishing partial root zone drying to improve plant roots in soilless hydroponics, comprising:

a) a receptacle adapted to hold a nutrient solution; and

b) one or more apparatus according to any one of claims 1-13,

wherein a lower portion of a substrate in each of the one or more apparatus is in contact with the nutrient solution.

19. The system of claim 18, wherein a porous material in each of the one or more apparatus is separated from the nutrient solution.