A new microcosm to grow plants in unconventional sites

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A plant is a metabolic factory that uses water, inorganic ions, carbon dioxide, oxygen and light to generate organic metabolites.

The plant metabolism is influenced by many environmental factors (Figure 1), therefore growing plants in sites in which one or more of these factors do not fit plant functions, such as indoor locations and extreme environments, is a challenging task and a resource consuming activity. In addition, pathogens and pests can heavily affect plants grown in these conditions, thus inducing operator to use pesticides that can adversely affect operator and consumer health.

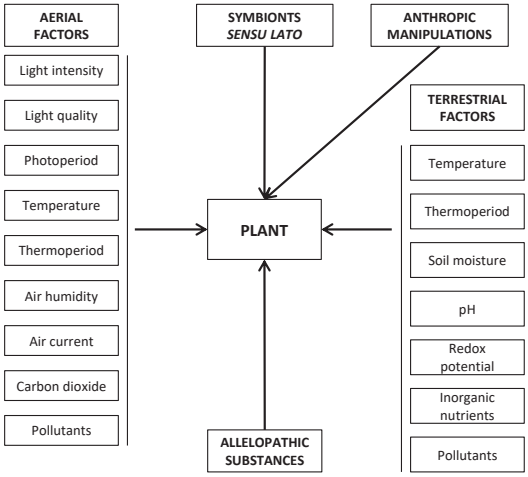

Figure 1. Factors affecting plant metabolism.

To grow plants in such unconventional sites, we devised, designed, realized and patented a *Microcosm for growing plants under biotic and abiotic conditioning* (Figure 2, 3A). The microcosm was designed around the idea of global plant-dependent environmental conditioning, fitting different plant architectures, compact dimensions, modularity, low impact of manipulations by operators on plants, ergonomics, energy saving.

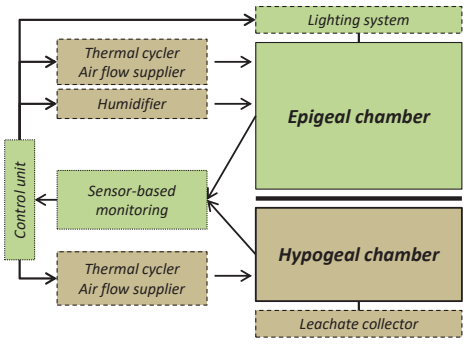

Figure 2. Basic lay-out of the microcosm.

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The *Microcosm* can be used to carry out experiments aimed at studying interactions between plants and environmental factors and also to grow plants for human uses (Figure 3B-G).

Figure 3. Overall view of two microcosms (A), Potato plants grown under white neon (B) and blue-red LED (C) lighting and Basil plants grown under blue-white LED (D, E) and blue-red LED (F, G) lighting.