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COMPUTER INTELLIGENT CONTROL TECHNIQUES IN AEROPONICS SYSTEM

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COMPUTER INTELLIGENT CONTROL TECHNIQUES IN AEROPONICS SYSTEM

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Present, global climate change is expected to raise the risk of frequent drought. Agriculture is in a phase of major change around the world and dealing with serious problems. In future, it would be difficult task to provide a fresh and clean food supply for the fast-growing population using traditional agriculture. Under such circumstances, the soil-less cultivation is the alternative technology to adapt effectively. The soil-less system associated with the Hydroponic and Aeroponics system. In the aeroponics system, plant roots are hanging in the artificially provided plastic holder and foam material replacement of the soil under controlled conditions. The roots are allowed to dangle freely and openly in the air. However, the nutrient rich-water deliver with atomization nozzles. The nozzles create a fine spray mist of different droplet size at intermittently or continuously. This review concludes that aeroponics system is considered the best plant growing method for food security and sustainable development. The system has shown some promising

returns in various countries and recommended as the most efficient, useful, significant, economical and convenient plant growing system then soil and other soil-less methods.

The Aeroponics system is gaining maximum popularity as plants grow up to 45% faster than in traditional in-soil farming methods and plants yield cleaner, safer, tastier, and more aromatic produce.

There are several seed production techniques that are currently used worldwide such as tissue culture, hydroponics and aeroponics. Among these techniques, aeroponics is one of the most effective techniques because of its perceived numerous advantages over these other techniques. The technology is based on the concept that it uses no soil and grows the root systems in the air.

The problems include minimum crop production with high population: (i) Highly dependent on climatic conditions and poor growing season due to starving in different parts of the world, (ii) Higher demand for biofuels could further influence on inputs, prices of farm produce, land, water, and endanger a global food security. As mentioned above, resource constraints for agricultural production have become more stringent than in the past while the growth of yields is slowing down. It is a primary reason why people express fears that there are growing risks that world food production may not be enough to feed a growing population and ensure food security for all. However, it could be challenging to provide supplemental food products to feed the entire population using traditional/open field cultivation system. Although, the open field cultivation associated with enormous risks and uncertainties from biotic and abiotic



stresses, such as pest attacks, droughts, floods and high winds. As it required the larger area for cultivation, higher land preparation cost, number of labors and the excess amount of water.

ADVANTAGES OF AEROPONICS SYSTEM

Martin-Laurent et al. (1999) suggested that Aeroponics technique is a current innovative and appropriate technology. It has the potential to cultivate plants in large quantities, tree saplings associated with soil microorganisms, such as AM fungi, for reforestation of degraded land in the humid regions. Aeroponics is an indoor horticulture practice. It is the best to adopt aeroponics in areas where the soil is not suitable for plant growth. Aeroponics is an incredible amount of water as little as compared with other plant growing systems. The system reduces the labor cost, consumes less water usage by 98%, fertilizer usage by 60%, pesticide and herbicides usage by 100% and maximize plant yield by 45% to 75% than either hydroponics or geponics system (Stoner 1983; NASA 2006). The nutrient solution could be recycled easily for reuse. The system allows for vertical farming, thus increasing the yield by more space for the plant. The possibilities of multiple harvests of a single perennial crop and accelerated cultivation cycle due to the increased rate of growth and maturation. The diseases could not expand quickly because of clean root material free from soil, soil-borne organisms and adulteration from foreign plant species contaminants. While in other soil-less system plant diseases could spread through nutrient distribution in growth chamber from plant to plant. The plant receives 100% of the available carbon dioxide and oxygen to the leaves, stems, roots, and accelerates growth with reducing rooting time.

DISADVANTAGES OF AEROPONICS SYSTEM

- Expensive for long scale production
- The plant grower must need a specific level of proficiency to operate the system.
- The grower must have the information about the appropriate quantity of required nutrient for plant growth in the system.
- It is important to supply the required concentration of the nutrients.
- There is no any solid culture to absorb the excess nutrients if supply excess plant will die.
- The system design material is little expensive. As the well-designed system requires advanced equipment.
- It mainly constant high-pressure pumps, atomization nozzles, EC, and pH measuring devices, temperature, light intensity and humidity sensors and timer to control the system.

CONCLUSION

The demands for clean and fresh food increases alarmingly with the population. People will turn to new plant growing technologies to fill up increasing food demands. Moreover, this review article concluded that aeroponics is the modern, innovative and informative technology for plant cultivation without corporation of the soil. The system is the best plant growing technology in many aspects comparing with different cultivation system. The system is quickly increasing momentum, popularity and is the fastest growing sector of modern agriculture. It would be effectively employed in various countries for vegetable production where natural resources are insufficient.