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Development and characterisation of Hydroponics medium for salad cucumber

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Growing of plants with their roots in solutions of a mixture of mineral salts instead of in soil, hydroponics, has led to a vastly increased understanding of plant nutrition. The future of hydroponics will greatly depend on the development of systems of production and nutrient formulations that are competitive in cost. A nutritionally balanced, cost-effective formulation having all necessary ingredients would have the capability of increasing yields under suitable production systems. In Sri Lanka, it is a national requirement to formulate and test hydroponics nutrient mixtures, since the commonly available formulations in the market are expensive, have precipitation problems with pH variations during the crop cycle, not crop-specific and also the formulation is not revealed. Among the number of crops, which are grown under hydroponics, the rapid growth and high productivity make cucumbers an excellent choice for a hydroponics garden.

A hydroponics mixture, which contains the nutrients requirement for salad cucumber was developed using low cost, available chemicals and the formulation was characterised using computer aided chemical speciation programs. The new medium was developed to supply required chemical species in correct concentrations for salad cucumber in the medium at the pH range 5 – 6. Modeling was done to find out the optimum amounts of compounds that can be added to the solutions to avoid precipitation due pH change during the crop cycle. A chelating agent was to be added to the solution to resemble the bulky groups like humic acids in soil to provide a controlled supply of nutrients to the plant.

It was resulted that the best chelating agent that can be added to the hydroponics solution is EDTA. Within the optimum pH range for salad cucumber all the metals are in the solution as either in free form or complexed with EDTA and they are readily available for the plant. All the nutrients are in completely soluble form in the entire pH range that is needed for the plant and the results obtained from the field trials using this nutrient mixture shows that this formulation can be used as a low cost hydroponics mixture for salad cucumber.

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