

## A Literature Review of Hydroponic Crop Cultivation Research

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### Abstract

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Conventional soil-based crop cultivation has various drawbacks, such as access to land, poor soil quality, erosion, low efficiency of water utilization, pests, and the multiple environmental limitations associated with climate change. These drawbacks are exacerbated by a growing human population and associated increase in demand for cereals, fruits, vegetables, and other food crops. Thus, interest has grown in soilless cultivation research in the last two decades. Hydroponics, a form of soilless cultivation, has become popular because it can produce higher yields than traditional soil-based agriculture, it is conducted in a controlled environment that is free from climate and other environmental constraints, and crops can be produced with significantly lower use of pesticides than those grown conventionally. This paper provides a literature review of recent research on hydroponic crop cultivation (HCC), including the historical context, classification, requirements for HCC, and the latest technologies employed in this field. The review closes with an analysis of the challenges ahead for the development of HCC..

### Biography:

Boyang Lu is a second year PhD student in the Department of Environmental and System Engineering at the University of Virginia. He obtained BSc. and MSc. degrees in Industrial Engineering from Nanjing University and University of Arizona, respectively. His research interest is sustainable cultivation technology, which is mainly on hydroponics crop cultivation. Garrick Louis is Associate Professor of Engineering Systems & Environment at the University of Virginia. His research examines local capacity building for sustained access to essential human services in developing communities. He has BSc. and MSc. in Chemical Engineering and PhD in Engineering and Public Policy. Honors include; Presidential Early Career Award for Scientists and Engineers from National Science Foundation and 2006-7 AAAS Energy Environment and Natural Resources Fellow. He was a 2015-16 Jefferson Science Fellow in the Office of Global Food Security at the US Department of State, and is a Fulbright Specialist for the US Department of State.



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