# The Growth of Spinach in Vertical and Horizontal Hydroponics

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The escalating costs of traditional farming has spurred interest in investigating alternative cultivation methods, such as hydroponics. My project aims to compare the efficiency of horizontal and vertical bamboo hydroponic systems of Manoa Lettuce while considering sustainability. Manoa lettuce was chosen because of it's ability to endure Hawaii's year round humidity and heat. Each system was created using the Nutrient Film Technique, where shallow streams of water pass through the roots to provide nutrients and increase growth. Bamboo poles and buckets were used as a structure for the plants to grow in as a more environmentally-friendly and cost effective approach. The growth parameters, including plant length and overall health were closely monitored throughout the experiment. The plants in the vertical structure were found to have significant growth compared to the horizontal structure. The data determined vertical bamboo hydroponics resulted in an increased growth rate. While our world experiences concerns about sustainability and rising prices, these results have a huge impact on those looking to adopt efficient methods of food production.

**Awards Won:**
Arizona State University: Arizona State University ISEF Scholarship (valued at up to $58,000 each)