INNOVATED SYSTEM TO INCREASE GREENHOUSE VEGETABLE PRODUCTION

By

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ABSTRACT

The study aims to use modern technologies based on ultrasound to increase production of vegetables in greenhouses. The experiment was carried out using hydroponic Nutrient Film Technique system (NFT) with three levels (A shape) in Giza governorate, through four productive periods during the agricultural seasons of 2016/2017 under greenhouse growing conditions. Ultrasound device designed and assembled locally to generate different frequencies, sound pressure levels (SPLs), exposure periods, and distances from the source of generator and plant in vertical and horizontal level. The present study investigates the influence of ultrasound wave exposure on growth of lettuce (*Lactuca sativa* L.) and strawberry (*Festival)*. The experiment include of: two types of ultrasound electronic circuit: first circuit applied at 40 kHz and adjustable power 18W. The second circuit applied at 20, 30 and 40 kHz and adjustable power 40 W, each group was exposed to various ultrasound interval times range from (0, 60, 300 and 600 sec), at different source (0-30-60 cm) in vertical level; It found that the used of ultrasound waves was suitable to improve in plant growth for lettuce in most growth characters especially when used at time 60sec, distance zero cm (horizontal) of device and frequency 30kHz second circuit -100dB - 40W which gave the increased of about 3.60, 14.16, 21.27, 23.87, 20.49, 10.17, 0.49, 15.41, 16.10, 4.8, 3.60% for the properties of number of leaves, plant height, fresh weight of shoot and root, shoot dry weight, root dry weight, stem diameter, stem length, root length, chlorophyll ratio and leaves area of lettuce at harvest, respectively. While decreased stem firmness at 12.84%. And found that parameters all of fruits number, flowers number and yield distribution increase comparison control with 20, 36.1, 50%, respectively, while number of leaves, plant height, fruit thickness and fruit firmness same control with 4, 9.36, 25.36, 2.30% on other hand total soluble solids decrease comparison control with 13.89% for strawberry plants at frequency 20kHz second circuit -100dB - 40W and time 60sec, distance zero cm. The results showed that the emphasize specific value variations of the analyzed indicators according to the species and the experimental conditions. Ultrasonic treatment significantly influence the growth of plants and the ultrasound treatment influences positively the chlorophyll pigment synthesis the best effect being obtained when the time of exposure was short.

Key words: Biophysics methods, ultrasound, hydroponic, greenhouse, lettuce plants, strawberry plants.

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