A Study on the Flow Rate Performance of Line-type Parallel Arrangement Venturi Injector of Fertigation System[1]

Ling-Hsi Chen, Yun-Sheng Tien and Jung-Hsiang Ho[2]

ABSTRACT

The fertigation system can manipulate the output volume of 5 sets Venturi type nutrient injectors that inject nutrients into the main pipe directly. The nutrients can be mixed during the path by the following filter and pipe lines before being dripped /micro-sprayed into the plant root area. Venturi injector does not have driving part so that can reduce malfunction and power consumption. The testing data reveal that Venturi injectors have good reproducibility and low fluctuation, the error percentage is about ±3%. Nutrient solution outputs depend on the level inside the nutrient tank, the height of the nutrient solution level has decisive impact to the nutrient output, and the error percentage is about 20%. So, the bottom area of nutrient tank is as bigger as possible to reduce the level impact on output. Nutrient actual output value is smaller than float-type flow meter of the setting value and bigger than detected value of electronic-type flow meter, the error percentage is about 0.26% to 8%. This error percentage is lower than the affect of nutrient tank level. The electronic-type flow meter also has good reproducibility after calibration, and can be used to monitoring the flow rate. The actual flow rate is about 3.18 to3.52 l/min when nutrient tank put on the ground, thus the setting value of nutrient flow rate should < 3 ℓ/min. This value may refer to the main pipe line flow rate to get proper nutrient content. Overall performance of the Venturi injector shows that actually can be used to support the fertigation system consists of saving labors, fertilizer and water, energy and reducing carbon emissions.

Key words: Venturi injector, fertigation, level, nutrient.

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[2] Assistant Researcher, Associate Researcher and Researcher of Taichung DARES, respectively.