

Introduction

When growing plants, the dissolved oxygen (DO) levels are very important for the nutrient uptake, growth, and metabolic activity of the roots. If there is too little DO, the growth of the plant may become delayed. It is hypothesized that the addition of organic fertilizers in a hydroponics system may decrease to levels of DO due to the microbial decomposition and the breaking down of organic materials.

Objective: To investigate the effects of three different types of liquid fertilizer on the DO concentration over the course of two weeks.

Materials and Methods

Fertilizer Treatments

1. Tap water (control)
2. Chemical fertilizer (Jack's Nutrients 15N-5P₂O₅-20K₂O)
3. Fish based organic fertilizer (AgroThrive 3N-3P₂O₅-2K₂O)
4. Food waste based organic fertilizer (Climate Saver 0.06N-0.026P₂O₅-0.1191K₂O)

Testing Conditions

- Nutrient solution nitrogen concentration: 100 ppm
- Sper Scientific DO meter
- Hannah Instrument pH/EC meter
- 2 replications



Fig 1. Experiment setup.



Fig 2. DO meter (left) and EC/pH meter (right).

Results

Table 1. The mean of the monitored electrical conductivity (EC), pH, and temperature of nutrient solution made with tap water without or with chemical fertilizer, fish based organic fertilizer, or food waste based organic fertilizer (n=2).

	EC (mS/cm)	pH	Temperature (°C)
Tap water	1.2	5.8	22.4
Chemical	1.7	5.8	22.5
Fish	1.7	5.8	22.7
Food	2.2	5.8	22.8

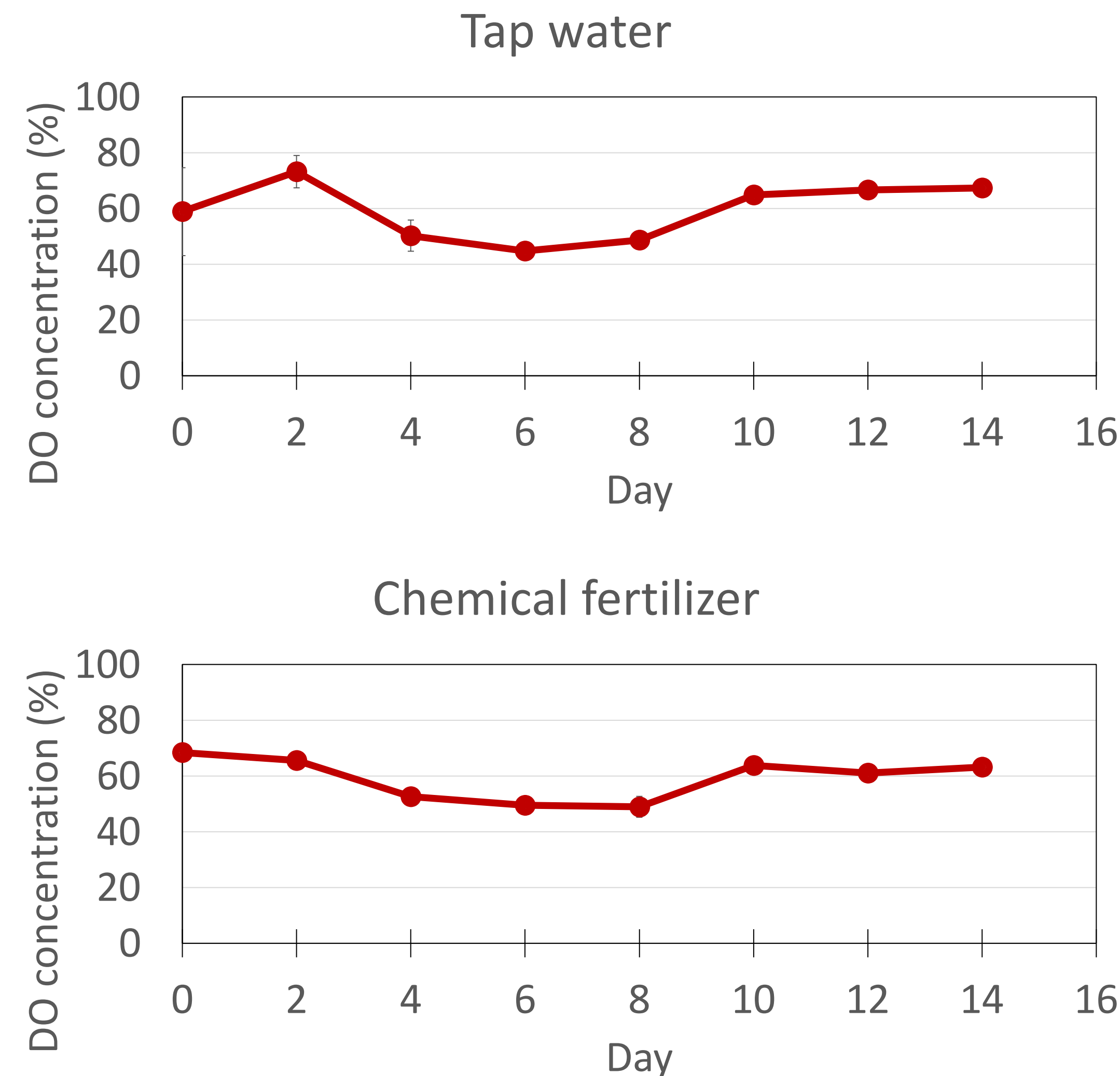


Fig 3. The mean and standard deviation of the monitored dissolved oxygen (DO) concentration of nutrient solution made with tap water without or with chemical fertilizer (n=2).

Results

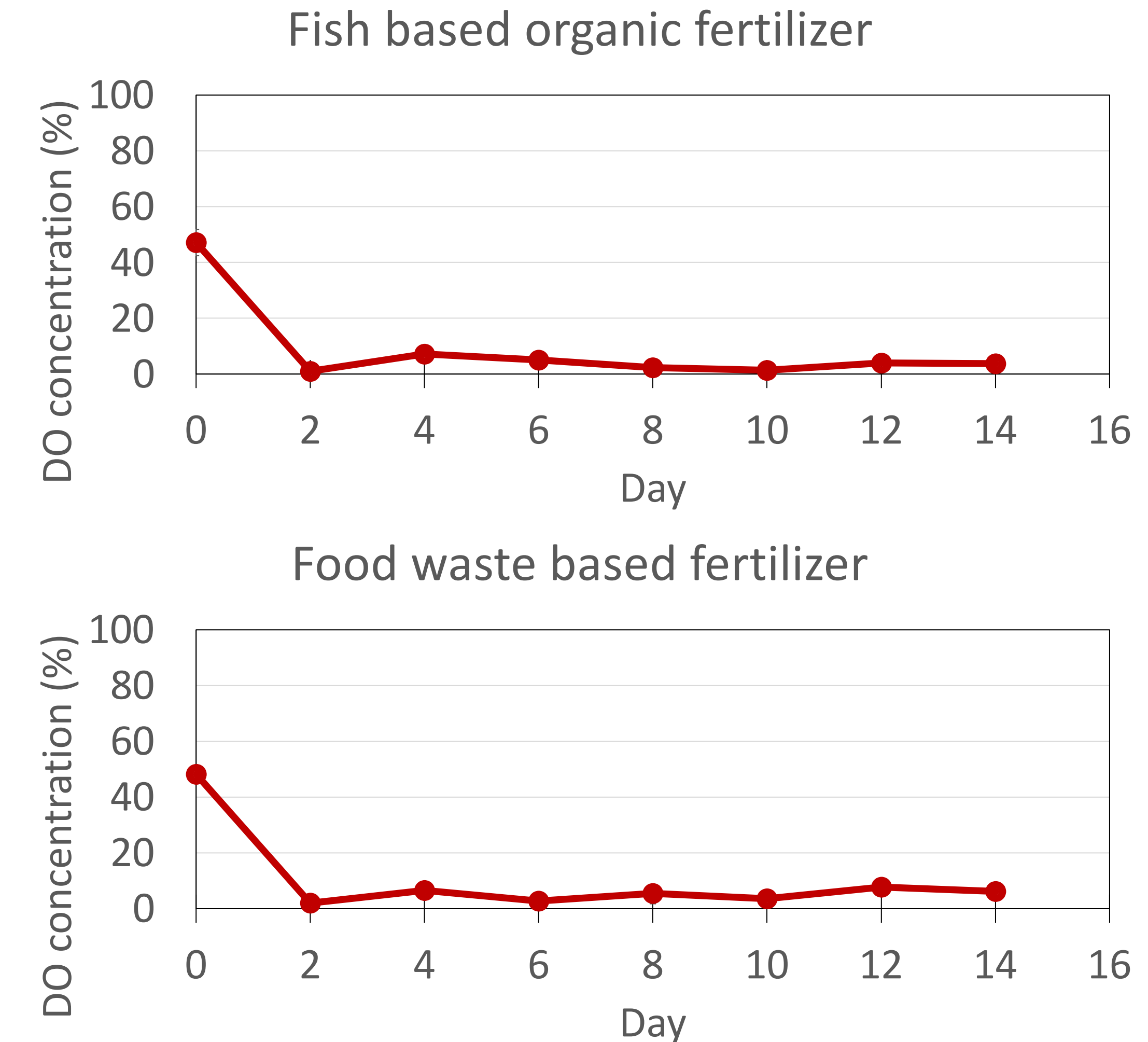


Fig 4. The mean and standard deviation of the monitored dissolved oxygen (DO) concentration of nutrient solution made with tap with fish based organic fertilizer or food waste based organic fertilizer (n=2).

Conclusion

- Adding chemical fertilizer had little to no effect on the DO concentration compared to tap water.
- The addition of organic fertilizers decreased the DO concentration of nutrient solution regardless of the type.

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