

Biofilm and Worm Power Liquid Extract

Introduction.

Biofilm formation is when the cells of bacteria stick together and form a film on surfaces such as irrigation lines, emitters, tanks, etc. This is a naturally occurring process and is present in almost all irrigation systems. One of the biggest potential issues with biofilm is that buildup will occur and clog lines that limits water and nutrient flow. Worm Power Liquid Extract (WPLE) is teeming with hundreds of beneficial microbial species for plant health and development. Due to the microbial aspect of WPLE, an experiment was conducted to evaluate if there were any observable effects from WPLE on biofilm in a hydroponic growing system.

Methods.

Three separate hydroponic tanks were treated with a standard fertility program. The treatments were a control with no additional product, the addition of WPLE, and the addition of an enzyme-based biofilm treatment. Biofilm was ranked on a visual scale and the pH was measured weekly. This study was replicated twice.

Results.

Over the course of the study, pH levels stayed within the 6-7.5 ranges. The treatments were ranked on a scale of 1 to 3 with 1 being the least amount of observable biofilm and 3 being the most. In both studies, the addition of the biofilm treatment was ranked as 1, followed by the addition of WPLE at 2, and then the control as 3. All three treatments had observable biofilm formation. The study concluded that the addition of WPLE does not increase the amount of biofilm found in irrigation systems.

Discussion.

The growing media of all seed pods were afflicted with a white mold that killed off most of the seedlings. In the WPLE and Biofilm treated systems, only Thai basil and mint survived the fungus. The WPLE treated plants were observed to be more robust and larger than the other surviving plants in the biofilm treated system (shown below).

WPLE



Biofilm Treatment



Shown below is mint growing in the hydroponic systems. The mint in the WPLE treatment is healthy and displays a small amount of fungal growth. The mint in the Biofilm treatment is still alive but is under extreme stress. The mint in the control treatment germinated and then died when the fungus was present. The difference in disease presence with WPLE demonstrates what previous research has shown; beneficial microbes can inhibit pathogenic fungi while also helping the plant tolerate stress.



Biofilm is caused by microorganisms that stick together and this buildup can cause blockage in irrigation lines. Prevention is an important part of controlling biofilm from happening before the buildup becomes an issue. This can be done using chemical treatments like chlorine or sanitizing chemistries. Physical removal by flushing of the irrigation system dislodges biofilm but this method works best with other treatment measures.

WPLE is a source of beneficial microbes that are safe for use in irrigation systems. When used in any type of growing media, the microbes help promote plant health and root development. The addition of WPLE into a hydroponic system or water lines does not increase the development of biofilm. The rate table below suggests rates that can be incorporated into current hydroponic systems.

Weekly Feeding Rates by Growth Stage				
Fertility Regiment	Seedling	Vegetative	Reproductive/Flower	Ripen/ Mature
Light	8mL/Gal	16mL/Gal	16mL/Gal	8mL/Gal
Medium	8-15mL/Gal	30mL/Gal	30mL/Gal	15mL/Gal
Heavy	15-25mL/Gal	50mL/Gal	50mL/Gal	25mL/Gal
Weekly Feeding Rates by Pot Size				
	4 inch	1 quart	1 gallon	
	0.5 mL/plant	1 mL/ plant	4 mL/ plant	