

Drip Irrigation Systems in Organic Agriculture

Guidelines for Fertilization and Maintenance

Overview

In organic agriculture, drip irrigation systems use a wide range of organic fertilizers, with levels of solubility and cleanness that are not uniform and are often low. The use of these fertilizers may result in considerable damage and clogging of drippers. Moreover, bacteria thrive in organic solutions, damaging the filtration and drip irrigation systems.

The operation and maintenance of the drip irrigation system in organic agriculture should address two aspects:

1. Suitability of the fertilizer for integration into the irrigation water
2. Preventive maintenance to keep drippers sediment-free in the long term

Types of Fertilizers

Solid fertilizers are less suitable for use in the drip irrigation system (fertigation)

Name of Fertilizer (Israel market)	Base Material	Suitability for Drip Irrigation (with appropriate filtration)	General Information
Guano	Bird droppings	Suitable	Contains high level of dirt and soil
Organ 3000	Bovine urine and poultry manure	Suitable	Sensitive to heat and decomposition Store container in shaded area
Tivon	6.5% nitrogen	Suitable	
Tivon Plus 4-0-4 3.5-0-7.5	3.5: 4% nitrogen from amino acid 7.5: 4% potassium chloride	Suitable	
Nu-Gro 6-3-3	Vegetable waste and feather meal	Suitable	The high liquid viscosity can effect the fertilizer pump performances. Bacteria feeding off the fertilizer develop in the drip system and filters can causes clogging
Amino acids	Nitrogen from animal tissue		
KF-20	Concentrated plants extracts Improves soil fertility	Suitable	
Shevach 11 Shevach 200	Humic acids	Suitable	
Uptake 12	12% humic acid Improves soil fertility	Suitable (NOT for use with other fertilizer)	
Ferti-K Potassium Chloride	Potassium chloride, maximum purity	Suitable	
Tov 0-0-15	15% potassium chloride	Suitable	
Nifert 30 (yellow powder)	6.5% amino acid, nitrogen	Suitable	
Terra Sorb	Amino acids, macro- and micro-elements additive	Suitable	
Perfect Blend 6-6-6	Poultry manure and micro-elements	Not suitable	

Guidelines for Preparation and Injection of Organic Fertilizer in Drip Irrigation Systems

In general, do not mix different materials in the fertilizer tank to prevent coagulation or formation of sediment.

Guano

The preparation process takes 5–7 days.

Dilute the fertilizer in the tank: 1:10.

Mix every few hours for two days. The nitrogen is released into the water.

Leave the solution to stand until floating elements sink (clay sinks after 72 hours).

The solution contains 0.7-0.9% nitrogen.

Pump from the side of the tank (not from the top to prevent turbulence), 40 cm from the bottom to prevent the suction of sludge.

Guano can be applied as solid fertilizer, one teaspoon per plant below the dripper.

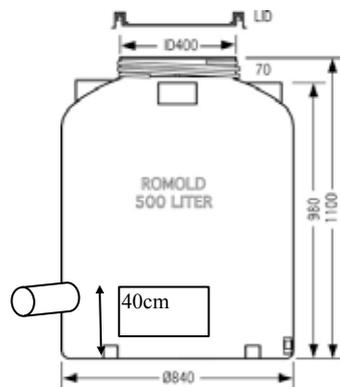
Nu-Gro

Dilute with water: 1:2.

Amino acids

Dilute with water: 1:1.

Do not combine humic acids and nitrogen (check that there is no nitrogen residue in the water system from earlier fertilization). This may result in the formation of aggregates and dripper clogging.



Organ 3000

Dilution not required.

Shevach 200

Dilute with water: 1:4.

Before and after use, flush the drip system with clean water.

Nifert 30

When using Nifert, bacterial slime may develop in the pipes and drippers. After fertilization, flush the drippers with clean water (without fertilizer).

Low dosage and continuous chlorination is very important.

Dilute with water: 1:1.

Add one liter of the diluting solution to one cube of irrigation water, to achieve a nitrogen concentration of 40 ppm.

Maintenance

Preventive maintenance is the most cost-effective treatment!

Flushing the Laterals

Most problems can be prevented by routine flushing of the laterals.

After fertilization, continue flushing with clean water for about two minutes. (Estimate the required time by working out the distance between the inflow point and the last dripper.)

It is recommended to flush the system once a week.

Flushing Line (Collecting Pipe)

A collecting pipe for a number of laterals is an effective solution for flushing (and it saves labor).

The diameter of the collecting pipe is based on the lateral diameter (16/20 mm) and the number of laterals connected to the pipe.

Use the table below to determine the diameter:

Collecting pipe Diameter mm	Recommended number of laterals (average bed width of 1.5 m)	
	16mm dripline	20mm dripline
25	4-5	3
32	6-11	4-6
40	12-15	6-11



Disinfection

Disinfectants prevent development of bacterial slime and maintain clean drippers and drip irrigation systems.

1. Chlorination

Chlorination is approved for organic farming.

As a rule, chlorinate once every two weeks at the end of the irrigation. Use an initial concentration of 10 ppm to achieve residual chlorine concentration of 2.0 ppm at the end of the lateral/plot.

Alternatively, chlorinate after the last irrigation for a few minutes, with a low concentration of 2–3 ppm.

2. Hydrogen peroxide

Hydrogen peroxide is recommended for crops that are sensitive to chlorine.

Apply once every week or once every two weeks.

35% hydrogen peroxide is the commonly used solution.

Required concentration in irrigation water is 30–50 ppm (85–140 cc per every m³/hr water of the treated area flow).

Duration of treatment is 30 minutes.

Flush the irrigation system with water before and after treatment.

3. Organic acid to remove calcium carbonate scales

Organic acids approved for use include citric acid, acetic acid, etc.

The use of acid is effective when there is reduction in the system flow due to mineral deposits.

A guideline for the required concentration in the irrigation water is a solution of PH-4.

Cleaning the tanks

Rinse and clean the tank periodically (after two or three cycles).

Conclusion

Organic fertilizer can be integrated into the irrigation system. Systematic work and simple preventive maintenance allow for the reliable and safe operation of the drip irrigation system.

Good luck!

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