

Fertigation

Fertigation is a method of fertilizer application in which fertilizer is incorporated within the irrigation water by the drip system. In this system fertilizer solution is distributed evenly in irrigation. The availability of nutrients is very high therefore the efficiency is more. In this method liquid fertilizer as well as water soluble fertilizers are used. By this method, fertilizer use efficiency is increased from 80 to 90 per cent.



Fertigation

Micro Irrigation and Fertigation

Fertilizer efficiencies of various application methods

Nutrient	Fertilizer use efficiency (%)	
	Soil application	Fertigation
Nitrogen	30-50	95
Phosphorous	20	45
Potassium	50	80

Advantages of fertigation

- Nutrients and water are supplied near the active root zone through fertigation which results in greater absorption by the crops.
- As water and fertilizer are supplied evenly to all the crops through fertigation there is possibility for getting 25-50 per cent higher yield.
- Fertilizer use efficiency through fertigation ranges between 80-90 per cent, which helps to save a minimum of 25 per cent of nutrients.

- By this way, along with less amount of water and saving of fertilizer, time, labour and energy use is also reduced substantially.

Water saving, yield and profit under drip and drip fertigation systems

Crops	Water Saving (%)	Yield (t/ha)			Profit (Rs/ha)		
		Conventional	Drip	Drip+ Fertgn	Conventional	Drip	Drip + Fertgn
Banana	35	26	30	37	81000	98000	120000
Sugarcane	29	120	160	207	30000	47000	68000
Tomato	32	45	56	65	56000	77000	95000

Fertilizer used in fertigation

- Urea, potash and highly water soluble fertilizers are available for applying through fertigation.
- Application of super phosphorus through fertigation must be avoided as it makes precipitation of phosphate salts. Thus phosphoric acid is more suitable for fertigation as it is available in liquid form.
- Special fertilisers like mono ammonium phosphate (Nitrogen and Phosphorus), poly feed (Nitrogen, Phosphorus and Potassium), Multi K (Nitrogen and Potassium), Potassium sulphate (Potassium and Sulphur) are highly suitable for fertigation as they are highly soluble in water. Fe, Mn, Zn, Cu, B, Mo are also supplied along with special fertilisers.

Fertilizers commonly used in fertigation

Name	N – P ₂ O ₅ – K ₂ O content	Solubility (g/l) at 20 C
Ammonium nitrate	34-0-0	1830
Ammonium sulphate	21-0-0	760
Urea	46-0-0	1100
Monoammonium phosphate	12-61-0	282
Diammonium phosphate	18-46-0	575
Potassium chloride	0-0-60	347
Potassium nitrate	13-0-44	316
Potassium sulphate	0-0-50	110
Monopotassium phosphate	0-52-34	230
Phosphoric acid	0-52-0	457

Specialty water soluble fertilizers

Name	N %	P ₂ O ₅ %	K ₂ O %
Polyfeed	19	19	19
Polyfeed	20	20	20
Polyfeed	11	42	11

Polyfeed	16	8	24
Polyfeed	19	19	19
Polyfeed	15	15	30
MAP	12	61	0
Multi-K	13	0	46
MKP	0	52	34
SOP	0	0	50

N fertigation

Urea is well suited for injection in micro irrigation system. It is highly soluble and dissolves in non-ionic form, so that it does not react with other substances in the water. Also urea does not cause precipitation problems. Urea, ammonium nitrate, ammonium sulphate, calcium ammonium sulphate, calcium ammonium nitrate are used as nitrogenous fertilizers in drip fertigation.

P fertigation

Application of phosphorus to irrigation water may cause precipitation of phosphate salts. Phosphoric acid and mono ammonium phosphate appears to be more suitable for fertigation.

K fertigation

Application of K fertilizer does not cause any precipitation of salts. Potassium nitrate, Potassium chloride, Potassium sulphate and mono potassium phosphate are used in drip fertigation.

Micro nutrients

Fe, Mn, Zn, Cu, B, Mo could be used as micro nutrients in drip fertigation.

Fertigation equipments

Three main groups of equipments used in drip system are :

- Ventury
- Fertilizer tank
- Fertilizer pump

Ventury

Construction in the main water flow pipe causes a pressure difference (V_{vacuum}) which is sufficient to suck fertilizer solution from an open container into the water flow. It is very easy to handle and it is affordable even by small farmers. This equipment is most suitable for smaller area.

Fertilizer tank

A tank containing fertilizer solution is connected to the irrigation pipe at the supply point. Part of the irrigation water is diverted through the tank diluting the nutrient solution and returning to the main supply pipe. The concentration of fertilizer in the tank thus becomes gradually reduced.

Fertilizer pump

The fertilizer pump is a standard component of the control head. The fertilizer solution is held in non-pressurised tank and it can be injected into the irrigation water at any desired ratio. Therefore the fertilizer availability to each plants is maintained properly.

Cost of fertigation equipments

Sl.No.	Fertigation devices	Cost (Rs.)
1.	Ventury type	1200
2.	Fertilizer Tank	3000
3.	Injectors	12000

Economics of drip irrigation system

The initial investment in drip irrigation system is mainly depends upon the spacing of crops. The initial cost will be almost 20-25 thousand rupees per hectare for wider spacing crops such as coconut, mango, grapes and for orchard crops. The initial cost is approximately 50-70 thousand rupees per hectare for close spacing crops such as sugarcane, banana, papaya, mulberry, turmeric, tapioca, vegetables and flower crops.



