FERTIGATION AND ITS SHEDULING

DR. VIKAS GUPTA, COLLEGE OF HORTICULTURE, REHLI

Fertigation is the application of soluble fertilizers (plant nutrients) through an irrigation system. It is a process in which fertilizer is dissolved and distributed along with water in your drip or spray irrigation system. Most fertigation systems for residential use require the use of liquid fertilizers since they are unable to dissolve higher concentration, water-soluble fertilizers. Most companies that produce fertilizers for fertigation produce liquid fertilizers since that is the only option that their dispensing units can handle.

The drawback of liquids is that when they are manufactured, they must be pre-diluted with water to make them weaker and less concentrated. Producers do this because they must keep the fertilizers in suspension and can only do that when N-P-K are at low concentration levels. Therefore you rarely see a balanced fertilizer's rating (N-P-K) in a liquid form above 20%.

Advantages of Fertigation:

(1) Improves efficiency of fertilizer use
(2) Increases nutrient availability
(3) Saves 20-40% fertilizer without affecting growth and yield
(4) Reduce fertilizer needed by **70-90%** which virtually eliminates fertilizer runoff.
(5) Save from **20-50%** on your water usage.
(6) Improve the health and vitality of your landscape,
(7)Saves laboures and energy in application of fertilizer
(8) Reduce environmental contamination
(9)Reduces leaching of nutrients

Limitations :

(1) Initial investment is high
(2) Chemical reaction in drip system leading to corrosion and precipitation of fertilizer
(3) Clogging of emitter

Fertigation equipments:

(1) Ventury
(2) Injector
(3) Fertilizer tank
(4) Fertilizer pump

Advantages :

(1) Does not require an external source to operate
(2) Its cost is relatively low compared to other fertigating devices
(3) Easily connected to computer system

Disadvantages:

(1) Requires pressure loss in main irrigation line or a booster pump
(2) Quantitative fertigation is difficult
(3) Batch tank system
(4) The principle of operation includes a narrow valve causing a portion of the mainline flow to be diverted through a batch tank
(5) Fertilizer tanks are available in 90, 120, and 160 liters capacity
(6) Automation is difficult.

Fertilizer injector pump (Fertigation pump):

(1) These are piston or diaphragm pumps which are driven by water pressure of irrigation system and such as the injection rate is proportional to the flow of water in the system
(2) Suction rates of pumps varies from 40- 160liter per hours

Advantages:

(1) Injection pumps can be adjusted over a scope of different range to provide a continuous and uniform concentration of chemical in irrigation water
(2) There is no pressure loss in the system.

Fertilizer applied through the drip system should meet following criteria

(1) Should avoid clogging of emitter
(2) Should be completely soluble in water
(3) If more than one chemical is used they must be compatible and not reactive

Fertilizer preparation:

Generally two fertilizer tanks that contain the concentrated fertilizer solutions are used to separate those fertilizers that can interact.

(1) A possible combination is: a tank "A" containing calcium nitrate, potassium nitrate magnesium nitrate and microelements, whereas tank "B" contains ammonium sulphate, phosphoric acid and nitric acid; in this way P and Ca/Mg are in different tanks to avoid their precipitation.

(2) A third tank "C" contains an acid solution to control the pH of the fertilizer solution and to wash the irrigation system to avoid drippers clogging.

Nitrogen Fertigation

(1) Nitrogen is most commonly used nutrient through drip Fertigation .
(2) Almost all nitrogen fertilizer are suitable for drip Fertigation, except ammonium sulphate which cause precipitation of calcium sulphate and magnesium sulphate.
(3) Among the nitrogen fertilizer urea is well suited for in for injecting through drip irrigation, since it is readily dissolve in non ionic form and dose not react with the substance in the water (Haynes, 1985)

Phosphorus Fertigation

(1) It was not been generally recommended for application through drip irrigation system because of its tendency to cause clogging.
(2) If irrigation water has high amount of calcium and magnesium causes the precipitates of insoluble Ca and Mg.

Tracer elements:

(1) Tracer elements such as Mg, Zn, B, Fe, Cu etc ., are difficult to apply through drip irrigation because they need in very low quantities, may reacts with salt in water and causes clogging.
(2) How ever chelated form such as Fe- EDDHA (Ethylene Diamine Bis Hydroxyphenyl Acetic Acid), Fe- DTPA (Diethylene Triamine Pentaacetic Acid).

TABLE - RECOMMENDED DOZE OF FERTILIZERS FOR FERTIGATION:

S. No.	CROP	SPACING	FYM	Recommended Fertilizer (g/NPK/YEAR)
1.	Mango	10 m X 10m, 5m X 5m	25 tha^{-1}	738:180:680
2.	Banana	1.8 m x 1.8 m	25 t/ha	200 : 100 : 200 (For ratoon crop, the requirement of N, P2O5 and K2O remains the same as that of the main crop)
3.	Sapota	8 m x 8 m	40 kg/ plant	1-3 years : 250:125:125; 4-6 years: 500:250:250; 7-10 years : 1000:500:500; 11 years and above : 1000:500:750
4.	Papaya	1.8 m x 1.8 m	25 t/ha 40 kg/ plant	250: 250 : 500
5.	Grapes**	3 m x 2m (Seedless varieties)	50 kg /plant	300:300:600 kg NPK/ha/year, for seedless cultivars
6.	Guava	4 m x 4 m	20 kg/plant	900:600:600
