

## **Fertigation: An Effective Tool For Enhancing Water and Nutrient Use Efficiency in Fruit Crops**

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**ARTICLE ID: 033**

Fertigation has great potential for the enhancing the efficient use of water and fertilizers. Application of water and nutrients through drip irrigation promotes maximum water and nutrient efficiency by reaching the active root zone of plants and thus minimizing the wetting area and therefore reducing various losses pertaining to nutrients and water. Fertigation minimizes the losses of nutrients through leaching. Additionally, application of fertilizer along with drip irrigation water also reduces the costs associated with irrigation and fertilizer application. Through fertigation, water use efficiency could be achieved as high as 90% as compared to 30-40% in comparison to other conventional methods of application.

### **What is fertigation?**

The technique of fertigation was first observed in late 1960s in Israel. Fertigation is the use of combination of drip irrigation and fertilizers to create a controlled nutrient release system resulting in significantly lower leaching losses of nutrients while meeting the water and nutrient requirements of crops throughout their growing stage.

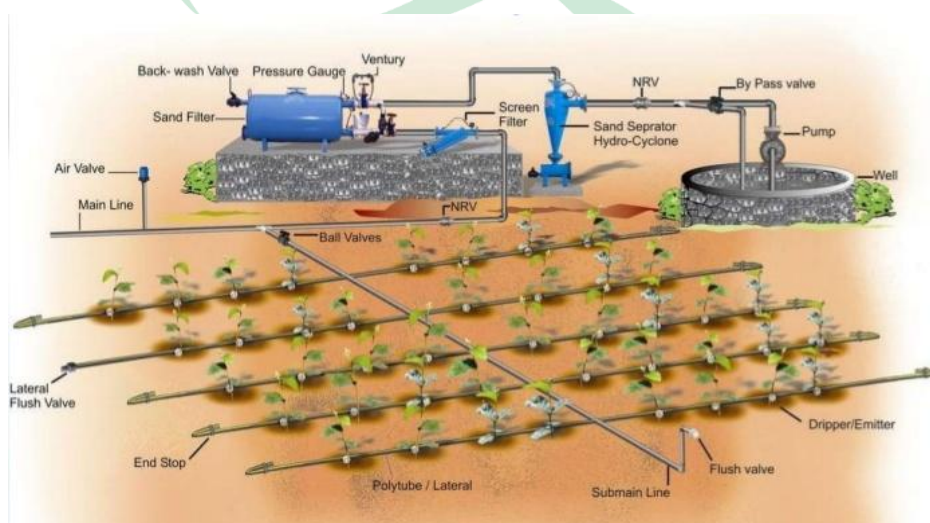
### **Why fertigation?**

The fertilizer and irrigation applied through conventional methods are not efficiently utilized by the plants due to various losses pertaining to evaporation from water surfaces, leaching to deeper layers, surface runoff etc. and therefore has detrimental effects on the soil health due to their poor nutrient and water use efficiency. However, fertigation ensures conjunctive application of fertilizers and irrigation in active root zone of the plant and therefore is a method of higher water and nutrient use efficiency. Frequent application of nutrients reduces fluctuation in nutrient availability to plants and therefore ensures efficient utilization and precise application of nutrients according to the nutritional requirement of the crop. It ensures the application of fertilizers made throughout the wetted zone of the plant, where plant roots

are active, which reduces the loss of the nutrients by leaching or fixation of access available nutrients and therefore increase fertilizers use efficiency. It is believed that drip irrigation has overall efficiency of 80-90% as compared to conventional method (30-35%). Fertigation could decrease the cost of cultivation through less labour requirement. Irrigation and fertilizers are the most important inputs which directly affect the plant growth, development, yield and quality of the produce. Fertigation provides a vast potential for more precise crop nutrition leading to an optimum utilization of inputs, increased yield and quality besides considerable savings in fertilizers, water as well as the cost of application.

### 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 purpose as they are highly soluble in water. Fe, Mn, Zn, Cu, B, Mo are also supplied along with special fertilisers.



### **Effect of Fertigation on Soil Nutrient Status**

Sustainability of any production system requires optimal utilization of resources. Fertilizers are one of the most important farm inputs, which need to be utilized most judiciously and efficiently. It is well known fact that nitrogen (N) is the most required nutrient in nitrate ( $\text{NO}_3^-$ ) form. However, nitrate form of N does not adsorbed on the exchange sites of soils and is loosely held in the soils and therefore vulnerable to various losses. Whereas, Nitrate fertilizers applied through drip irrigation system as per the requirement of the plants' following the uptake of nutrients has positive effects on reducing leaching losses. Potassium, however, is less mobile than nitrate, but its distribution in the wetted soil volume may be more uniform due to interaction with soil's binding sites. Phosphorus, in contrast to K, is readily fixed in many soils although movement of applied P differs with soil texture. Potassium fertigation of prune trees resulted in better K movement to a depth of 60-70 cm where the soil was wet and roots were abundant, thus enhancing K uptake.

### **Conclusion**

Fertigation has greater impact on enhancing fertilizers use efficiency over conventional fertilization methods besides saving about 30% in irrigation water. Higher initial installation cost and comparatively low technical skills of Indian farmers are some of the major constraints limiting the large scale adoption of drip fertigation technology in the country. But, with increasing concerns of water scarcity and escalating fertilizer prices may lead to greater adoption of the technology especially in high return fruit crops.