



Volume 8, Issue 03, 2021, Pp. 268-272.
Available online at: www.indianfarmer.net
ISSN: 2394-1227 (Online)

ORIGINAL ARTICLE

Fertigation in vegetable crops for enhancing resource use efficiency

Archana Brar, Sumit Deswal, Renu Yadav and Devender Singh

*Department of Vegetable Science
CCS Haryana Agricultural University
Hisar, Haryana, India*

** Corresponding Author: brararchanaarch@gmail.com*

Article Received: 12 March 2021

Published: 20 March 2021

India is the brick of a Golden Revolution in Horticulture with a total annual production of 149 Million tonnes. Vegetables are important constituents of Indian agriculture and nutritional security due to their short duration, high yield, nutritional richness, economic viability and ability to generate on farm and off farm employment. Our country is blessed with diverse agro climates with distinct seasons, making it possible to grow wide array of vegetables. Today, India is the second largest producer of the vegetables (90.8 Million tonnes) in the world, contributing 14.45 per cent of the total world production. Moisture is maintained in the medium through application of water at critical stages of crop. There is vital need to decrease the consumption of water in irrigation by developing new technologies and methods that could help to apply costly input in an effective way. Fertigation is such an innovative technology of applying water soluble fertilizers through drip irrigation. Drip irrigation is having 90 per cent irrigation efficiency. This method increases the crop yield in general to the tune of 25 to 30 per cent with saving of irrigation water to the extent of 50 to 60 per cent, when compared to conventional irrigation method. The fertigation permits application of right quantities of plant nutrients consistently to the wetted root volume zone where most of the active roots are concentrated and this helps in enhancing nutrient use efficiency. It has been found that the productivity and quality of crop produce along with improved resource use efficiency. Fertigation saves fertilizers up to 25 per cent, thus fertigation results in appropriate and efficient use of precious commodities such as water and fertilizer. As the water soluble fertilizers are very expensive inputs, therefore the efforts are made by various researchers to reduce the quantity of water soluble fertilizers (nitrogen and potassium) in conjunction with

straight fertilizer (single super phosphate) to enhance the yield potential of vegetable crops and fertilizer use efficiency. The key point which measured is that changing from single product to creating value added product through a balanced and crop specific plant nutrition concept. The crop competency for nutrients will become more and more crucial, but even more significant to transmit the greater knowledge to the end user is essential. Thus, fertigation is an important concept and the key focus of this article is on supporting the horticulturist in general and vegetable crops in particular.

What is fertigation?

The practice of providing crops in the field with fertilizers via the irrigation water is called fertigation. In fertigation, timing, amounts and concentration of fertilizers applied are easily controlled. Fertigation allows the landscape to absorb upto 90% of the applied nutrients, while granular or dry fertilizer application typically results in absorption rates of 10 to 40%. Fertigation confirms saving in fertilizer (40- 60%), due to “better fertilizer use efficiency” and “reduction in leaching”. Drip irrigation is often preferred over other irrigation methods because of the high water application efficiency on account of reduced losses, surface evaporation and deep percolation. Because of high frequency water application, concentration of salts remains adaptable in the rooting zone. The regulated supplies of water through drippers not only affect the plant root and shoot growth but also the fertilizer use efficiency. Fertigation through drip irrigation reduces the wastage of water and chemical fertilizers, optimizes the nutrient use by applying them at critical stages and at proper place and time, which finally increase water and nutrient use efficiency. Moreover, it is well accepted as the most effective and appropriate means of maintaining optimal nutrient level and water supply permitting to crop development stage, specific needs of each crop and type of soil.

Fertilizer used in fertigation

Urea, potash and greatly water soluble fertilizers are accessible for applying through fertigation.

Application of super phosphorus through fertigation must be escaped as it makes precipitation of phosphate salts. Thus phosphoric acid is more appropriate for fertigation as it is accessible 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 delivered along with superior fertilisers.

Hypothesis for fertigation techniques

- Fertigation boosts fertilizer use efficiency by 40-60%, hence recommended doses of fertilizers may be reduced proportionally.
- Drip irrigation encourages root growth in surface layer (about 70-80%) hence the nutrients from sub-surface layers may not be extracted.

- Drip irrigation leads to moisture content around above field capacity hence may encourage leaching of nutrients.
- Use of water soluble fertilizers may lead to leaching losses beyond surface layer, hence frequent split application of water soluble fertilizers is desirable.
- The frequency of fertigation may increase with fertilizers doses in order to escape leaching losses or toxicity if any.

Need of fertigation

Rapid increase in area under micro irrigation, now fertigation is getting momentum in number of the countries. The idea of fertigation is new to the Indian subcontinent. Growing popularity to accept of this concept making it easy to adopt Fertigation. This fertigation is the practice to applying water soluble solids or liquid fertilizers through the drip irrigation on weekly or monthly basis so as to reach each and every plant regularly and uniformly. It is the most active, suitable and convenient means of maintaining optimum fertility level and water supply permitting to the specific requirement.

Fertigation permits application of a nutrient straight at the location of a high concentration of active roots and as required by the crop. Planning fertilizer applications on the basis of need offers the opportunity of reducing nutrient element losses related with predictable application. Methods that depend on the soil as a reservoir of nutrients thereby increasing nutrient use efficiency.

Through fertigation fertilizers savings can be upto the tune of 25-50 per cent. Fertilizers and pesticides applied through a drip irrigation system can improve efficiency, save labour and increase flexibility in scheduling of applications to fit crop needs. However, all chemicals must happen the following criteria for the efficacious conservation of the drip irrigation system.

However, increasing water scarcity and value crops and green houses to confirm higher increasing fertilizer prices may lead to greater effectiveness of the two most serious inputs in crop adoption of the technology especially in high production. We should be aware about that “per drop more crop”.

Fertigation scheduling

Fertigation is the technique of supplying dissolved fertilizer to crops through an irrigation system. Fertigation is the technique of supplying dissolved fertilizer to crops through an irrigation system. Small applications of soluble nutrients save labour, reduces compaction in the field, thereby enhancing productivity. Fertigation allows nutrient placement directly into the plant root zone during critical periods in the required dose. Application of high dose of fertilizers not only causes economic loss but also leads to chemical changes in the soil and reduces the yield. Fertilizer requirement can be reduced by 15-25 per cent with fertigation through drip without affecting the yield. Factors that affect fertigation module are soil type, available NPK status, organic carbon, soil pH, soil moisture at field capacity, available water capacity range, aggregate size distribution, crop type and its physiological growth stages, discharge variation and

uniformity coefficient of installed drip irrigation system. The efficient fertigation schedule needs following considerations i.e., crop and site specific nutrient management, Timing nutrient delivery to meet crop needs and Controlling irrigation to minimize leaching of soluble nutrient below the effective root zone.

Benefits of fertigation

Higher nutrient use efficiency

Nutrient use efficiency by crops is greater under fertigation associated that under conventional application of fertilizers to the soil.

Less water pollution

Intensification of agriculture led by use of irrigation water and indiscriminate use of fertilizers has led to the pollution of surface and ground water by chemical nutrients. Fertigation helps lesser pollution of water bodies through the leaching of nutrients such as N and K out of agricultural fields.

Higher resource conservation

Fertigation helps in saving of water, nutrients, energy, labor and time.

More flexibility in farm operations

Fertigation provides flexibility in field operations e.g. nutrients can be functional to the soil when crop or soil conditions would otherwise prohibit entry into the field with predictable equipment.

Efficient delivery of micronutrients

Fertigation provides opportunity for efficient use of compound and ready mix nutrient solutions containing small concentrations of micronutrients, which are otherwise very hard to apply precisely to the soil when applied alone.

Healthy crop growth

When fertigation is applied through the drip irrigation system, crop foliage can be kept dry thus avoiding leaf burn and delaying the development of plant pathogens.

Helps in effective weed management.

Fertigation helps to reduce weed hazard mainly between the crop rows. Use of plastic mulch along with fertigation through drip system allows effective weed control in widely spaced crops.

Effective use of undulating soils

The ability of micro irrigation system to irrigate undulating soils makes it possible to bring such land under cultivation, which otherwise remain as wastelands or used as pasturelands.

Reduced soil compaction

In micro irrigation system reduced need for surface traffic movement during irrigation and nutrient application helps to reduce soil compaction.

Effective use of undulating soils

The ability of micro irrigation system to irrigate undulating soils makes it possible to bring such land under cultivation, which otherwise remain as wastelands or used as pasturelands.

Reduced soil compaction

In micro irrigation system reduced need for surface traffic movement during irrigation and nutrient application helps to reduce soil compaction.

Fertigation provides a variety of benefits to the users like high crop productivity and quality, resource use efficiency.