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Micro-irrigation of Flowering Crops in Protected Condition.

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***Abstract*:** Horticulture sector requires large volume of water. With the growing demand of the products but lacking resources like land and fresh water, practice of protected cultivation and drip irrigation method seem to be a boon for the farmers and nursery men. Drip irrigation, also known as micro-irrigation is one of the new method of irrigation and is mostly preferred as the mode of irrigation. It is high water use efficient ensuring uniform and quality production. In drip irrigation the water reaches the root zone of the flower crops directly with minimum mater loss. Drip irrigation is also called trickle irrigation as it involves dripping water into the soil at very low rates (2-18 litres/hour) from a system plastic pipes fitted having small diameter with outlets which are known as emitters or drippers. Micro irrigation is one of the best method of irrigation for the flower crops, home gardens, lawns, orchards, row crops, in sloppy field, open field, under protected cultivation. Fertigation term comes from fertilizer + irrigation, that is dissolving of soluble fertilizers in water and supply to the crops through irrigation method. Commercial flowers are mostly grown under protected condition to get round the year production. Most crops are water sensitive. Therefore, irrigation and its methods play a vital role for the quality production of crops. The response of different flowering crops to micro irrigation in protected cultivation is reviewed here.

Index terms – Micro-irrigation, Drippers, Fertigation, Protected Cultivation

INTRODUCTION

The floriculture industry has been influenced by globalisation and competitive concerning the quality and quantity of the products. The demand for high quality flowers is rising both in domestic and international markets. The worldwide competition is driving producers to enhance the level of quality of their products and by growing flowers round the year with the help of various technologies. Ornamental flowering crops are commercially grown both in open field and closed condition that is under protected condition. However, some flowers like gerbera, carnation, orchids, lilium etc. prefer to grow in protected condition for commercial as these crops are sensitive to fluctuating climatic conditions. Protected cultivation is the growing of crops in a controlled environment. Factors such as light, humidity, temperature etc. are regulated as per the requirement. Under protected cultivation, the crops grown is protected from abiotic and biotic stress. One can grow off season crops in hi-tech protected condition. The management practices in protected cultivation is different from that of open field cultivation. Practice of protected cultivation ensures the quality and quantity of the crops, and year round production.

Irrigation plays a significant role in crop production. Lack of irrigation could lead to non-uniform or delay in flowering, wilting of flowers or death of plants. Plants need sufficient water for its proper growth and development. In protected cultivation irrigation is supplied artificially. Irrigation application is done according to the requirements of the plants in different stage. Types of irrigation methods used in protected condition are as follows:

1. Manual irrigation
2. Sprinkler irrigation
3. Drip irrigation
4. Bubbler irrigation etc.

MICRO-IRRIGATION

Micro-irrigation is the application of supplying water with low pressure, and low flow system in continuous drips. Drip irrigation, also known as micro-irrigation has become the standard of irrigation method in various applications such as greenhouses, home garden, landscapes, orchards, row crops etc. It ensures sufficient water supply with reaching directly to the roots of the plant. Simcha Blass, the father of drip irrigation along with Kibbutz Hatzerim, were the first one to develop practical surface drip irrigation emitter [16]. Micro- irrigation is more preferred over conventional irrigation because it carries more advantages over the conventional type of irrigation. It reduces the weed growth and pest infestations [15]. Different types of micro irrigation methods are: individual emitters and drippers, misters, micro-sprayers, sub-surface, mini-sprinklers, emitter tubing, and drip tape. Main components of micro-irrigation system are as follows: Pumping device, fertigation equipments systems, control head, mainlines, sub mains, mainfolds, laterals and emitters. Loamy or sandy soils are more suitable for micro-irrigation.

TABLE: Irrigation Efficiency under Different methods of Irrigation(Percent).

Irrigation efficiency	Methods of irrigation		
	Suface	Sprinkler	Drip irrigation
Conveyance efficiency	40-50	100	100
Application Efficiency	60-70	70-80	90
Surface water moisture evaporation	30-40	30-40	20-25
Overall Efficiency	50-60	50-60	80-90

Source: Sivanappan, R. K. (1998) Status, scope and future prospects of microirrigation in India. Proc. Workshop on microirrigation and sprinkler irrigation system. CBIP New Delhi, April 28-30, 1998: 1-7.

MICRO-IRRIGATION IN DIFFERENT FLOWER CROPS

1. **ROSE**

Rose is a woody perennial of genus *Rosa* from family rosaceae. It is the leading cut flower and the demand is more all around the world. It comes in different color and various sizes making it customers all-time favourite. Roses are more in demand during mother's day, valentine's day and many more occasions which happens to be in different time months of the year. The only way to produce roses around the year is by practicing protected cultivation. Rose is a water sensitive crop. Initial vegetative, flowering and post pruning stages are sensitive to irrigation. Excessive water could lead to the blockage for aeration, abnormal growth of plant, water borne diseases. Whereas, lack of irrigation can lead to delay in flowering, wilting and non-uniform, small size flowers. Irrigation for rose in protected condition is done through drip irrigation with one line along every row. Drip is inserted below 15cm from the soil level so that the water reaches the root zone uniformly. Water soluble fertilizers are added with water and supplied along drip irrigation which is known as fertigation. Generally, 7-6 litres of water is required for $1m^2$ area but in drip irrigation 5-6litres/m^2 area is sufficient.

2.GLADIOLUS

Gladiolus is one of the most popular bulbous cut flower, belonging to the family Iridaceae. It is a slender herbaceous perennial crop with sword like leaf with spikes having florets of different colors, sizes and shapes. It has a great economic value both as cut flower and for decoration as well. It has a long keeping quality and the demand is high in domestic and international as well. Irrigation plays a vital role in the quality production. pre-flowering stage of gladiolus is the most water sensitive stage of gladiolus. Water stress should be avoided during the critical stages, such as during spike emergence and floret initiation. Overhead sprinklers irrigation is also used as the method of irrigation. Overhead sprinkler prevents the leaf tip burning but at the same time it can also cause botrytis leading to florets. 50 mm of weekly water application in well-drained soil gives quality production. Irrigations at the intervals of 7-8days should be given depending upon the requirement and the moisture in soil. Irrigation should be withheld atleast for 4-5weeks before the harvesting of corms.

3.ANTHURIUM

Anthurium is a tropical ornamental flower belonging to family Araceae. Since these crop require 75% shade, therefore it is mostly grown shade net for commercial purpose. Anthurium is popular cut flower with lush shiny foliage and attractive flowers. These flowering crop give good production in well-aerated growing media with good water retention quality. Anthurium being a tropical crop, grows well in humid condition and moderate temperature. Type of irrigation practised is mist or overhead sprinkler irrigation. Irrigation is given twice a day. The water used for irrigation of anthurium must be 0.5 elecrtrical conductivity, above which is not suitable for irrigation purpose. Two lines on sprinkler is enough to reach the plants on the bed easily[5].

4.LILIUM

Lilium is one of the most important bulbous flowering crop, belongs to the family liliaceae. Lilies are excellent cut flower and are highly in demand in national and international. There are different types of lilium, especially oriental and asiatic liliums are highly in demand in international floriculture trade. Lilium cultivation for commercial is done in a greenhouse structure. Lilium requires optimum level of relative humidity of 80% for its quality flowering. The growing media should be well moisten. The amount of water mostly depends on the type of greenhouse structure and the variety. 6-8 litres of water is given for $1m^2$ bed during summer, whereas during wing winter 4-5 litres of water is given. For the first 2 weeks irrigation is done by sprinkler or manually with the help of cans. Third week onwards drip irrigation is recommended.

5.CHRYSANTHEMUM

chrysanthemum, belongs to the family Asteraceae, is an important flower all around the world. Flowers are used for making garlands, cut flowers, bouquet etc. it is a herbaceous perennial plant, which produces flowers different colors, varying shape and sizes. Chrysanthemum is a water sensitive crop. Sufficient water if given, increases the stem length and the quality flower production. In a study the irrigation treatments were arranged as three different irrigation intervals (I1:2-, I2:4-, and I3:6-day) and 4 different crop pan coefficients (T1:kcp1=1.20, T2:kcp2=0.90,T3:kcp3=0.60, and T4:kcp4=0.30). The longest stem (79.81 cm), the thickest stem diameter (7.69 mm) and the highest stem weight (123.61 g) were obtained from combination I1T1,(I1T1: 560.5 mm,) while the largest number of flowers per plant (30.09 flowers/plant) and the longest vase life were determined in the combination (I3T1: 553.4mm)I3T1 (19.67 days). When it is intended to save water, treatment I1T2 ((I1T2: 504.6 mm,) or I2T2(I2T2: 491.3 mm) might be selected as the irrigation scheduling [7]. In this case, there is minute reduction in flower quality. Usually 8-9 litres of water per square metre bed is supplied. Irrigation is done in 2days intervals for high yield.

6.GERBERA

Also known as Transvaal daisy and belongs to the family Asteraceae.it is a perennial herb having a flower on long thick leafless stem Gerbera is one of the most leading cut flower. For commercial production, gerbera is cultivated under greenhouses providing favourable climatic conditions. The soluble fertilizers are supplied through drip irrigation. Gerbera is very much susceptible to botrytis. Drip irrigation is much convenient and suitable method of irrigation gerbera grown under protected condition. Irrigation is applied after every intervals depending on the moist level of the soil. A grown gerbera requires around 700ml water per day through drip irrigation.

7.ALSTROMERIA

Alstromeria is also known as Peruvian lily or Incas belongs to family Alstromeriaceae. It is a bulbous, hardy perennial with erect stem producing attractive flowers. It grows well in cool and moist climatic condition. It requires moisture medium for its profuse flowerings. Proper and regular irrigation can improves the flowering quality. The irrigation in alstromeria highly influence the flower quality and yield suitable for cut flowers. Drip irrigation most commonly used for this flower. The requirement of water varies seasonally. During mar-october $12.5L/m^2$ water is given and during oct-feb, $10L/m^2$ irrigation is supplied[5].

CONCLUSION

Technology of micro-irrigation acts as the means of saving water. It has been widely successful for horticulture, ornamental in all type of topographic condition regardless of any climatic condition. It plays a vital role in conservation of soil and water. Micro irrigation ensures uniform water application. Growers are shifting to use of micro irrigation and becoming to know the importance of saving water. Micro irrigation reduces the labour cost and it also improves the crop quality and yield. A micro irrigation system can be easily automated using electrical solenoid valves and a controller. This allows the system to operate at any time of the day and for any duration. This technology saves time and resources.

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