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Micro-Irrigation in Virar Region

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Abstract- *The micro irrigation in general and drip irrigation in particular has received considerable attention from policy makers, researchers, economists etc. for its perceived ability to contribute significantly to groundwater resources development, agricultural productivity, economic growth, and environmental sustainability. In this paper, the impact of drip irrigation has been studied on farming system in terms of cropping pattern resources use and yield. The drip method of irrigation has been found to have a significant impact on resources saving, cost of cultivation, yield of crops and farm profitability. Hence, the policy should be focused on promotion of drip irrigation in those regions where scarcity of water and labour is alarming and where shift towards wider-spaced crops is taking place.We have made an attempt to introduce micro-irrigation for a particular area in virar where flooding irrigation is prevailing. Efforts are done to replace it with drip irrigation and study the profitablility by direct introduction with inhabitants and few data from the irrigation department.*

Keywords- Drip irrigation, Farm profitability, Micro irrigation

I. INTRODUCTION

Plants are living beings and do require water and air for their survival, as do human beings require. Their requirement of water varies with their type. Different types of plants require different quantities of water, and at different times, till they grow up completely. Water is normally supplied to these plants by nature through direct rain or through the flood waters of rivers which inundate large land areas during floods. The flood water may saturate the land before the flood subsides. Irrigation may, therefore, be defined as the science of artificial application of water to the land in accordance with the 'crop requirements' throughout the 'crop period' for full-fledged nourishment of the crops.

This is a great necessity of irrigation in Indian agriculture. India has a great diversity and variety of climate and weather conditions. These conditions range from extreme of heat to extreme of cold and from extreme dryness to excessive rainfall. Due to some reasons irrigation is needed in indian agriculture.

- Uncertainty of monsoon rainfall in both in time and place.
- Irregularity in distance of rainfall throughout the year.
- Excessive rainfall causing flood.
- Drought is an annual event in some access.
- Introduction of H.Y.V (High Yielding Varieties) and multiple cropping need water throughout the year.

1.1 Details Of Pipes

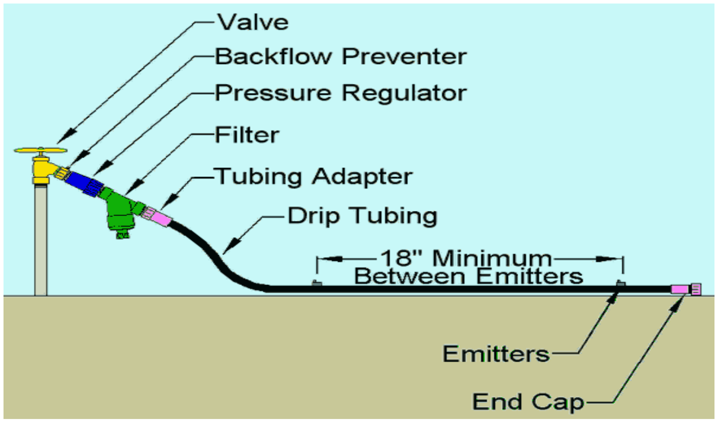

Fig no 1. Typical design of drip irrigation of pipes

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1.1.1 Emitter Type and Flow:

Use pressure compensating emitters if you have an elevation difference of over 1.5 meters (5 feet) in the area you are irrigating. For more level areas turbulent flow emitters will work great and are often less expensive. For gravity flow systems use short-path emitters, they typically work better than the others at very low water pressures.For most soil types 2,0l/hr (0.6gph) emitters work well and are more economical. For sandy soil use 4,0l/hr (1gph) emitter.

1.1.2 How many emitters are required:

1 or 2 emitters per plant, depending on the size of the plant. Trees and large shrubs may need more. Obviously, using two allows for a backup if one clogs up (which happens now and then, even on the best designed and maintained drip systems.) But just as important, more emitters also wet more soil area. This results in more roots, and a healthier, happier plant. Exception: if the plants are very close together you may need to use less than 2 per plant in order to maintain the minimum spacing between emitters.

1.1.3 Minimum spacing for emitters:

In most situations install emitters at least 450mm (18″) apart. A good default spacing for quick and dirty design is to space the emitters 600mm (24″) apart. For supplemental watering of low-water-use plants, use one emitter per plant. Supplemental watering is used for establishment of drought tolerant plants that are not likely to need irrigation once they have developed a good root system, or might be used to apply a little extra water now and then to make them a bit more lush. Use of low-water plants with supplemental drip irrigation is considered very “green” and is the current trend in landscape design.

Follow the manufactured recommended design pressure for all emitters unless there is an elevation difference greater than 10 feet between the manifold and the distal end of the lateral. When using pressure compensating emitters, add 5 psi to the operating pressure for every 10 feet rise in elevation above the manifold. For example, if the normal design.

A emitter is designed to put out a specific flow rate. Most commonly, there is a choice between 0.5, 1.0, 1.5, or 2.0 gallons per hour. The 1.0gph emitter is recommended because the flow rate is adequate for the purpose but small enough to extend limited water supplies and avoid excessive pipe friction problems. Emitters with an output rate of 0.5gph can also be used. In circumstances where the windbreak must be watered quickly large flow rate can be used.

The flow rate variation of typical emitters with different lateral water pressure is shown in This example shows that a pressure compensating emitter is not 100 percent effective, but does suppress major flow fluctuations as compared to the non compensating emitters, Pressure compensating emitters try to provide a constant flow rate, through a embedded into the emitter, under varying pressure. A pressure compensating emitter with a self-flushing capability is recommended. This type of emitter presents the fewest design problems and will not clog as often as other types. The maximum length of lateral that can be used with pressure compensating emitters is shown. Allowable lateral lengths and their influence on the selection of an emitter will be discussed late. Many companies manufacture emitters that fulfill the requirements previously outlined and have wide product distribution. If the product is suitable, available and meets the specifications, it can be used. However, the least expensive emitter that will do the job is desirable (as long as there is good dealer reliability to keep the system's cost down. A pressure compensating emitter that is self-flushing will greatly simplify the design and operation of the drip irrigation system and is recommended even if the price is slightly higher.

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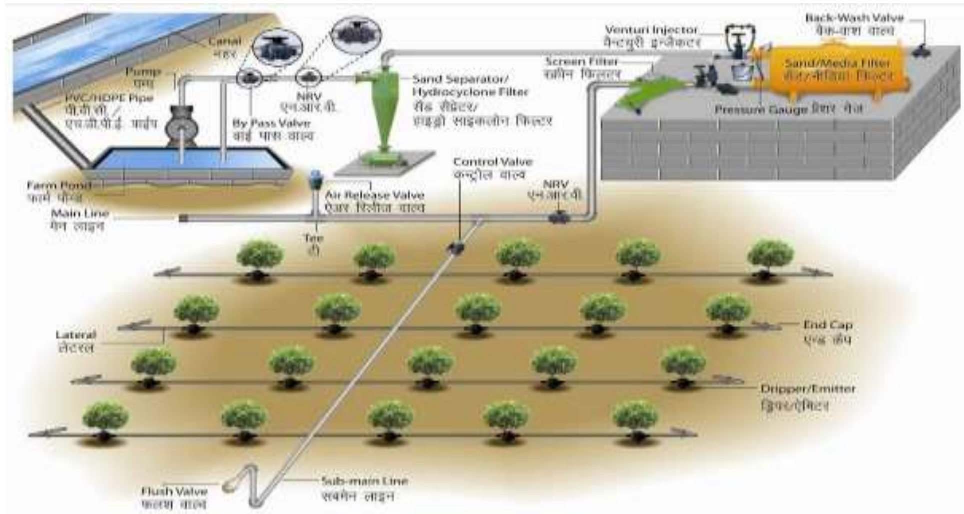

Fig no.1.2 Typical layout of drip irrigation system

1.2 Selection Of Pipe Sizes:

A drip system can be adapted to variable water supplies. Calculation of the water requirement is simple. Multiply the number of trees to be irrigated by the gallous per hour delivered by an emitter. Divide by 60 to determine the gallons per minute. [Example: (120 Tees x 1gph) ^ 60 = 2gpm]. If this figure is too high for the available water supply, any combination of the laterals used can be operated independently with the proper placement of valves. For example, there are six separate laterals in (Figure 2).

Use this water requirement as the design flow rate in the main supply line. Table 1 shows the maximum flow rate for different pipe sizes. Pick the smallest size that will carry the required amount of water. The size of each lateral depends on the number of trees, the irrigation rate at each tree, and the length of the lateral. Table 1 shows the maximum allowable length of lateral that can be used with 1gph pressure compensating emitters, depending on whether the row is planted with trees or shrubs pick the smallest size that will meet the requirements.

If the drip irrigation system is to be installed on a relatively flat site, pressure sensitive (non-pressure compensating) emitters can be use and may be less expensive than pressure compensating emitters. To ascertain if it is possible pressure sensitive emitters, determine the required length for each lateral, the maximum difference in elevation for each lateral, and the species that will be planted on the lateral. Compare the required length of lateral with the maximum allowable length shown in table 2 for both the ½ inch and the ¾ inch pipe. If the maximum allowable length is greater than the required length, a pressure sensitive emitters can be used. For example, considered a lateral that must be 500 feet long for a row planted with trees and the difference in elevation between highest and lowest point.

It should be noted that if the difference in elevation over 9 feet, pressure compensating emitters must be used. Using pressure compensating emitters eliminates the need for a survey of the elevations along each lateral, but if the distal end of a lateral is higher than the manifold, an approximation of that difference must be made to select a design operating pressure.

It is recommended that black polyethylene (P.E) pipe he ordered in 400-foot rolls. This reduces the number of connections that must be made. If part of the laterals can be irrigated with 1/2-inch diameter pipe but the rest must be 3/4-inch pipe, consider using all 3/4-inch Pipe for convenience.

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II. PUBLISHED PAPER

Table No.1
Published papers

Sr no.	Name	Author	Conclusion
1	Impact of drip irrigation on farming system	DR. SURESH KUMAR	The study has revealed that adoption of drip irrigation technology has increased the net sown area, net irrigated area and thereby has helped in achieving higher cropping intensity and irrigation intensity.
2	Drip irrigation management using wireless sensor	NEHA SHARMA, SUKHJIT SHARMA	By using the fizzy based algorithm in wireless sensor drip irrigation technique, we can control the wastage of water and secondly by using wireless sensor, there is no need of labour.
3	Comparison of drip vs furrow irrigation	BIANCHI, CHAAN HOONG	Drip irrigation is more conservative in water use and increases water availability for households as compared to furrow irrigation. In traditional furrow irrigation about 20-30% of water is absorbed by roots of growing plants and about 70-80% is lost, causing erosion.
4	Selection of irrigation method	C.M BURT	In highly dry areas it is possible to cultivate tomatoes, broccoli, pepper and other vegetables with drip irrigation method.
5	Intelligent drip irrigation system	ALOK TUPE	This involves one way of controlling drip components like valves by using internet.

III. RANDOM RESULTS AND CONCLUSION

3.1 Field identification test:

Table No.2
Test result

Sr no.	Test	Sample 1	Sample 2
1	Dry strength	Crumble easily when crushed between fingers.	Crumble easily when crushed between fingers.
2	Dispersion test	Particle settles down in 3 seconds.	Particle settles down in 4 seconds.
3	Dilatary test	Water gives shine surface.	Water gives shine surface.
4	Plasticity test	Thread formation.	Thread formation.
5	Identification	Silt	Silt

3.2 Determination Of Specific Gravity By Using Pycnometer

- Empty weight of bottle (W1):- 640 gm
- Weight of soil + Weight of bottle(W2):- 740 gm
- Weight of soil + Weight of bottle with water (W3):- 1749 gm
- Water + Weight of bottle (W4):- 1630 gm

Fig: Pycnometer

3.3 Formula:

Specific gravity = (W2-W1)/(W2-W1)-(W4-W3)

= (740-640)/(740-640)-(1630-1749)

= 0.45 (between 0 to 3)

SR NO	Test	Content	Conclusion
1	pH	Ideal	It ensure good plant growth and availability of plant nutrients.
2	Phosphorous (P)	Medium	It stimulates root development. It also improve flower formation and seed production.
3	Nitrogen (N)	Low	It is beneficial for plants producing fruits ,vegetables, flowers.
4	Potassium (K)	Low	It provides disease resistance. It helps to make plant carbohydrate.

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3.4 Quantity of water used

Pump used:-

Kirloskar 0.5 HP

- Material: Aluminium
- Dimensions: 24x22x16 cm
- Head: 6 to 24 meters
- Capacity: 1800 to 2000 LPH
- Voltage rating: 220 volts

Marigold: 7200 lit (4 hrs/day in winter)

10,800 lit (6 hrs/day in summer)

Hibiscus: 8,500 lit (4 hrs/day in winter)

10,300 lit (6 hrs/day in summer)

Jasmine: 4,000 lit (4 hrs/day in winter)

5,600 lit (6 hrs/day in summer)

IV. CONCLUSION

Expected that even though drip irrigation in terms of initial investment it is, costly the yield of the crop can be increased by having more number of plantations in a year.

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