



RAIN PORT IRRIGATION – A REPLACEMENT TO SPRINKLER IRRIGATION

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ABSTRACT

Micro-irrigation techniques trekking towards the doubling the farm income by increasing the productivity, viz., doubling farmers' income and increased water use efficiency in bi-directional mode as resource enhancement on one side and judicious use of resources on the other side. The rain port irrigation systems have the edge cutting advantage over the existing micro irrigation systems in terms of cost, ease of operation, water use efficiency etc. Further, it can be adopted for a wide range of the crops like other micro-irrigation systems. This type of system has an advantage over the other micro-irrigation system in increasing the harvestable basket, water use efficiency, and water conservation.

INTRODUCTION

Irrigation was done through flooding from 1950 to 2000, later on, moved to micro irrigations such as drip and sprinkler and ruled over two decades viz., 2006- 2020. Now irrigation concept has become more précised with advanced irrigation methods such as rain port irrigation, laser irrigation, etc. (Reddy *et al.*, 2021). Precision farming practices and plasticulture technologies such as micro-irrigation techniques have proved to be a driving force for enhancing farmers' income through increased productivity and optimum utilization of various inputs. Micro-irrigation technologies (MI) are being expanded horizontally in vast stretches across the length and breadth of the country, covering 3.56 million ha area under micro-irrigation in the sampled 13 states. (Chandra shekeran and Suresh, 2012). The micro-irrigation techniques expanded vertically from orchards to ornamental crops too. These technologies are promoted primarily as (1) a means to save water in irrigated agriculture, (2) a strategy to increase income and reduce poverty, and (3) to enhance the food and nutritional security of rural households. Despite the reported significant economic advantages and the concerted support of the government and NGOs, the current area under micro-irrigation

is trekking on a large scale; still, the water use efficiency has not improved much across the country. There is a dire need to develop an advanced micro-irrigation system with higher water use efficiency. Rain port irrigation system is an innovative and advanced version of sprinkler irrigation with improved water use efficiency.

RAIN PORT IRRIGATION SYSTEM

A rain port system is an advanced version of a sprinkler irrigation system with a discharge rate of 800 litres per hour and 90-95 % uniform made with PVC/ HDPE at a low cost. Rain port sprinkler systems are mini-irrigation systems, i.e., laterals and sprinklers can be easily shifted from one place to another. Reinstallation of the system is also easy and consumes less time and labour. The approximate cost for a one-hectare installation is around 45000 INR.



Fig. 1 Rain port irrigation system field view

In the rain port irrigation system, flexible polyethene tubes are used as lateral and high-performance low; weight plastic sprinklers are connected to these tubes using easily detachable connectors. Sprinklers are fixed on MS riser rods.

- a) The rain port system was made with Linear, Low-Density Polyethene materials and is easily flexible and suitable for transport and layout.
- b) The operating pressure required for the rain port system- is 1.5 kg cm^{-2}



Saddle



Flash cap



HDPE 32 mm lateral



Raiser rod with rain port assembly

Fig. 2 The different components of rain port system

- c) Throwing radius of each rain port sprinkler - 10 m (operates at 1.5 kg cm⁻²)
- d) Distance between each rain port sprinkler for the effective uniformity- 8m x 8m
- e) Each rain port sprinkler covers around 64 m² of area. For 1 acre with the rain port system with 8m X 8m spacing, it requires 63 rain port sprinklers
- f) The discharge of each rain port sprinkler is around 540 l hr⁻¹
- g) The depth of irrigation achieved with one rain port sprinkler is- 2.7 mm hr⁻¹
- h) The available diameter size of the rain port sprinklers is - 25 mm and 32mm

- i) The minimum and maximum operating pressure required for the rain port irrigation system is 2 to 4 kg cm⁻².

Table 1: Difference between the rain port and sprinkler irrigation system

Parameter	Rain port irrigation	Sprinkler irrigation
Spacing between laterals	9 x 9 m	12 x 12 m
Discharge (l hr ⁻¹)	540	1500
Pressure (kg cm ⁻²)	1.5	1.5-2
Depth of Application (mm hr ⁻¹)	8	10
Cost per acre (INR acre ⁻¹) approx.	20000	25000
Radius of operation	10 m	10-12m

Compared to the sprinkler system (10 m), the throwing radius is slightly lower, i.e., 9m in the rain port system. The discharge rate of each rain port came down to 1/3 of the sprinkler discharge to increase the water use efficiency and operate even under low water availability. The operational pressure for the rain port system is 1.5 kg cm⁻², which is 0.5 kg cm⁻² lower than the normal rain port sprinkler system. Though the discharge is lower than the sprinkler irrigation system rain port irrigation system, the depth of application is 8 mm per hour compared to sprinkler, i.e., 10 mm per hour. The distance between the lateral is 9 meters in the rain port system, whereas, in the sprinkler irrigation system, the spacing between the lateral is 10 m.

SUITABILITY OF CROPS

Rain port irrigation systems can be suitable for a wide range of crops, including groundnut and green forage crops.

CONCLUSION

The rain port irrigation system has the advantage over the sprinkler system with ease of operation, shifting of fields, higher water use efficiency with lower discharge rates and lower the cost is the best system to be promoted in future.

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