

Rain Tank Drip Irrigation System (RTDIS): A New Rain Water Harvesting Structure for High Rainfall NEH Region (India) to Adapt Climate Change

Rain Tank Drip Irrigation System (RTDIS) is a new kind of rain water harvesting structure suitable for the area of high rainfall and PET rate like north-eastern hill (NEH) regions of India. For NEH region, many rain water harvesting structures (check dams, terraces, Jalkund) has been evaluated and standardized but there has been some limitations of almost all rain water harvesting structures evaluated yet for the NEH regions, like poor potential in reducing the seepage loss or percolation loss, direct evaporation loss. The limitations of Jalkund are its short life span (average 3 years) and high ET loss owing to open surface. To overcome the lacunae of above structures, this new structure has been considered. In RTDIS, The seepage loss and PET loss of stored water is almost negligible and stored water can be utilized efficiently under drip (also low cost) irrigation system.

The experiment has been conducted at the fields of Farming System Research-I and Division of Soil Science, ICAR research complex for NEH region, Tripura Centre to standardize the design consideration of RTDIS, to evaluate the suitable crops and location for construction of RTDIS and to estimate the economics of RTDIS. RTDIS constitutes an antenna to harvest water direct falling rainfall (called “rain water harvesting antenna”) and a tank to store harvested water. Design consideration of RTDIS includes, basically, capacity of tank, shape, dimensions of tank, dimension of the water harvesting antenna and tank height etc. Different formulas have been generated to calculate all design consideration of RTDIS. Based on these design considerations, two RTDIS unit has been designed and constructed under climatic condition of Tripura and considering high value vegetable crops like tomato, okhra, brinjal, cabbage, cauliflower, chilly and cucumber etc. As per above design consideration, rectangular shape tank of size 4m x 3.5m x 1.5m (length x width x height) has been constructed which can store 21,000 litres of water at a time and 30,000 litres of water throughout the rainy season. 21,000 and 30,000 litres of water can be used for growing 97 and 139 tomato plants having spacing of 0.6m x 0.45m. Under RTDIS, when stored water utilized efficiently, it supports more than 300 tomato plants. As the source of water was pure rain water, there was very less dissemination of water born disease as well as soil born disease in the crop. The fertilizers, micronutrients, bio-nutrients, pesticides can also be applied directly under drip system. RTDIS cost higher initially, about 2.0 lakhs, but due to onetime installation for more than 15 year, the benefit:cost ratio increases yearwise. Further researches under RTDIS required evaluating the materials for water harvesting antenna, their dimension and shape, evaluating the suitable crops and to design it with low cost material to make cost effective. With introduction of this new system, there is scope of crop diversification and to increase water productivity in the high rainfall NEH regions. Thus, RTDIS is proven as best rain water harvesting structure for high rainfall NEH regions of India to adapt climate change.



Water Harvesting Antenna and Rain tank unit of Rain Tank Drip Irrigation System (RTDIS)



Plot preparation for bhindi cultivation