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Research Paper :

Hydraulics performance evaluation of porous pipe (Sub surface) irrigation system

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ABSTRACT

Irrigation water is the most critical input and plays a crucial role for realizing the full potential of agriculture. However, water is very scarce and it needs its efficient use for irrigation with most commonly used surface irrigation systems and micro irrigation systems. So it is necessary to determine the hydraulic performance of these irrigation systems. The sub surface irrigation with porous laterals made up of recycled rubber having 12 mm diameter buried at 15-30 cm below surface level was placed 0.6 m apart. Four porous laterals, continuous emitting lateral, the discharges were collected into a PVC pipe made discharge collection device of 6.0 m long having 30 hermitically sealed portions of 0.2 m each at 20 and 30 kPa pressure head maintained through overhead tank. The variation of water application of porous lateral was found to be 13.21 per cent and 23.52 per cent in various tests at 20 kPa pressure head. Similarly, the variation of water application was found to be12.52 per cent and 15.36 per cent at 30 kPa pressure head. The coefficient and exponent of pressure were found to be 28.70 and 0.1871, respectively for pressure discharge relationship. The high values of variation of emissions rate were found with respect to length and the pipe tested did not perform qualities of good micro irrigation lateral.

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From the ancient times man has used irrigation to grow the crops. Water is an important factor to grow the crops and its survival. Development or advancement of irrigation is not comparable to any other field of agricultural development. Irrigation means the artificial supply of water to the crop for its better crop growth sown in the field. India is one of the important countries in the production of agricultural commodities. The present population of India is increasing day by day and it is more than 1000 million. To feed this population we have to produce food grains in ample quantities. Water being a limited natural resource, there is a need to increase production by efficiently utilizing the available water resources of the countries. Most of the farmers apply irrigation water by flooding, with border irrigation system. The other systems are to apply it beneath the soil surface, by spraying it under pressure over surface in raindrop form or by applying it in drops near to plant. So it is necessary to determine performance of each method of application of water and crop performance in each system. Here the efforts had been made to evaluate the hydraulic performance of porous pipe (Sub surface irrigation system). The porous pipe sold for irrigation is a flexible micro porous tube made up of finely ground rubber, mixed with virgin polyethylene granules and extruded into a tube under heat and pressure. It is commonly made from recycled automobile tyres and as such is regarded as an eco-friendly product. Similar products have been used in US in orchards and turf grass plots as sub surface micro irrigation laterals (Alam, 1991; Rauschkolb *et al.*, 1990). The porous pipe emits water throughout its entire length as water is passed through it under pressure. Since the porous pipe is both conveying and emitting water, the relationship between flow and discharge is critical. Melano and Kamaldasa(1993) and Smajstrla (1992,1994) have worked on this aspect and found that emission rates of the pipe decline continuously with the time. Since the porous pipe emits water continuously along its length when used as a micro irrigation lateral, its porosity with respect to its length must be uniform to ensure uniformity in the water application. Yoder *et al.* (1995) reported on some of the quality control problems facing manufacturers of porous pipe. When this type of porous lateral used as a micro irrigation lateral, it's important to know discharge variation within length, where does the variation occur? How stable is the discharge with the time? The answers