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PITCHER IRRIGATION PRACTICES PERAMBALUR REGION IN TAMILNADU

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Abstract: ***Water is the primary input for crop production and increasingly becomes scarce due to its high demand in agricultural sector. Quality of water is assuming great importance with the increasing demand in industries, agriculture and rise in standard of living. Agriculture is the major user (89%) of India's water resources. Pitcher irrigation is an ancient and very effectual irrigation system employed in many arid and semiarid counties. Among traditional irrigation systems, pitcher irrigation is one among the foremost efficient and compatible for little farmers in many areas of the planet. Small pitchers are often used because they are less expensive than large ones. Water seeps out of a buried pitcher due to the pressure head gradient across the wall of the pitcher directly into the root zone of the irrigated crop. Pitcher irrigation entails burying an unglazed, porous clay pot with in soil before seedling. Water poured into pot seeps slowly into the soil, feeding the seedling's roots with a gentle supply of moisture. It also helps to improve soil physical properties particularly the structural status in soil and also enhances the water use efficiency of the crop, soil organic carbon and builds up soil fertility.***
Keywords: Pitcher irrigation, Traditional method, Root zone and soil fertility.

Introduction:

Irrigation is the most important input for growing crops that require high water supply in agriculture. Pitcher irrigation is cost effective, farmer-friendly, and easy to install. Pitcher irrigation involves no high tech gadgets and does not require any maintenance. It is ideal for small holdings (1-2 acres) and suitable for growing vegetables, coconuts, and areca nuts. It consists of a clay pot with a cotton wick fixed at the bottom of the pot, and buried in the soil (up to its neck) and filled with water (Adhikary et al., 2020). Pitchers gradually release water through their porous walls into the root zone by the action of static pressure and soil suction pressure. Pitcher irrigation is claimed to be a self-regulative system with a very high water saving potential and good capabilities for irrigation of various types of crops (Mondal, 1978; Chigura, 1994). While burying the pitcher in the soil, farmers should take care to see that the neck region of the pot is positioned in such a manner that rainwater runoff does not enter into the pitcher. Otherwise small sand particles will block the pores of the pitcher.

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The main advantage of the wick which is attached at the bottom of the pot is to increase the water penetration into the soil and to deliver the water directly to the plant roots. The number of pitchers required per acre depends on the crop variety grown. For coconut seedlings about 170 pots per hectare (that is 70 pots per acre), and for areca nut about 1100 pots (440 pots per acre) will be required. A farmer can save 90 per cent of water as compared to flood irrigation. Fertilizers can also be mixed along with the water and poured into the pot. Weed growth has been found to be very minimal because water delivery is limited to the roots. Many farmers in the coastal districts are following this method. If you have a garden at home try this irrigation method (Adhikary et al., 2020).

Fig. 1: Implementation process of Pitcher irrigation

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History of Pitcher Irrigation:

Pitcher irrigation is an ancient technique that has been practiced in many parts of the arid world including Iran, India, African and South American countries (Mondal, 1974; Stein, 1997). The technique is simple, cheap and could have large water-saving potential (Mondal, 1978). Pitcher irrigation has been mentioned in a book written some 2000 years ago in China (Sheng, 1974). The method reportedly has been used to irrigate watermelons in India and Pakistan (Soomro, 2002); horticultural crops in Brazil, Germany, and Indonesia (Stein, 1997; Setiawan et al., 1998); and corn, tomato, and okra in Zimbabwe (Batchelor et al., 1996). A few researchers have indicated that pitchers could have self-regulative capability in conditions where seepage is controlled by the soil water pressure head, which is, in turn, a function of the soil water content around the pitcher (Chigura, 1994).

Advantages of Pitcher Irrigation:

- Pitcher irrigation is still used on a limited basis in the dry-lands of India.
- It has been successfully used for a wide range of annual and perennial plants including many vegetables and fruits.
- It is especially useful in difficult conditions of high salinity, extreme aridity, limited water supply and limited resources.
- The water use efficiency of irrigation systems depends on many factors including soil type, crop type, weed competition and microclimate.
- The experimental test has been suggested of pitcher irrigation may use as little as 10% of the water used in conventional surface irrigation.
- Pitcher irrigation facilitated rapid establishment and faster growth of plants.
- It can be used to establish plant on steep slopes and fast draining areas where conventional irrigation is impractical

Effect of Pitcher Irrigation on Crops Cultivation:

Batchelor (1997) carried out irrigation trials and experiments in south-east Zimbabwe and northern Sri Lanka during 1985 to 1995 and found that subsurface irrigation using clay pipes was particularly effective in improving yields, crop quality and water use efficiency as well as being cheap, simple and easy to use. Comparing the field experiment conducted by Mondal (1974) and Scheuring (1983), it was found that yield of pitcher pot irrigated melon in India was 25 t ha-1 using only 2 cm water ha-1, whereas the yields of melon was 33 t ha -1using 26 cm of water with flood irrigation. Balakumaran et al., (1982) conducted a detailed study of cucumber production which showed that irrigation of 1.9 mm ha-1 with pitcher pots provided yields comparable to 7.3 mm ha-1 by hand irrigation. Pachpute (2010) also concluded that the increase in total yield due to package of water management practices including pitcher irrigation method is 203 per cent and water use efficiency obtained is 12.06 kg m-3. Saha et al., (2005) conducted an experiment with pumpkin (C. moschata) involving three methods of irrigation (drip irrigation by direct pitcher, drip irrigation by pipe from pitcher and basin system of irrigation). The direct pitcher method recorded significantly

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higher values for vine length, number of nodes per vine, stem girth and significantly lower values for inter node length compared to the other two methods of irrigation at all stages of plant growth.

Effect of Pitcher Irrigation with Saline Water:

The stable soil moisture maintained by pitcher pot irrigation enables crops to be grown in very basic or saline soil or with saline water under conditions in which conventional irrigation would fail (Rai, 1982). High tomato yields of 27 t ha-1, were obtained in India using saline irrigation water, EC 10.2 mmhos cm-1, while typical yields in this area with fresh water, EC 0.4, ranged from 15-25 t (Mondal, 1983). In Kenya 61% of normal crop yield was achieved with irrigation water of EC of 8 dS m-1, when typical irrigation failed at EC of 4 dS m-1 (Okalebo et al., 1995). Alemi (1980) stated that pitcher pot irrigation moved salt out of the plant root zone better than drip irrigation.

Conclusion:

Effective irrigation, water controlling and its suspicious use, by encouraging water-saving irrigation techniques – such as clay pot, drip and sprinkler irrigations – will help sustain food production structures in our water-stressed country. Clay pot irrigation as a substitute to drip or sprinkler irrigation can be a feasible option for water-scarce area mainly for farmers those are looking to living out of their small holdings of land. Irrigation water saving by clay pot irrigation can be further enhanced by altering the porosity of pots and hence, appropriate clay: sand composition, wall thickness and firing temperature for various vegetables should be further investigated.

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