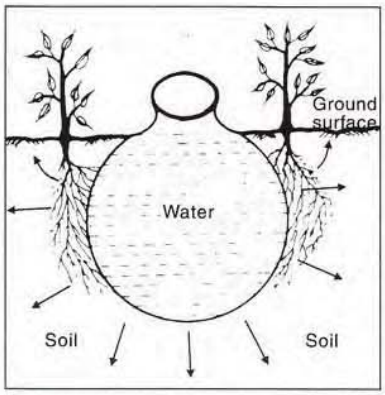
PITCHER IRRIGATION TECHNOLOGY FOR VEGETABLE PRODUCTION IN ARID AREAS

Water being a scarce resource, its conservation strategies would play a very dominating role in achieving higher production levels with limited water. As agriculture in the arid and semi-arid regions has to depend upon saline groundwater, a number of indigenous techniques have been developed and recommended. One such technique advocated by the Central Soil Salinity Research Institute (CSSRI), Karnal is the pitcher irrigation. The pitchers recommended for use are commonly made by the village artisans. The pitcher irrigation has been appropriately named to highlight the basic component of the system, the pitcher. It is an ordinary earthen pitcher commonly used in rural areas to cool water during the summer seasons. Unglazed pitchers, each of 5–8 liter capacity would be appropriate for use.

STEPS IN INSTALLATION



Pitcher irrigation is useful for vegetable production

1. Mark the locations of the pitchers on the farm area. Install pitchers at a wider distance for creeping crops while distance is kept less for erect type crops.

2. At each location dig a circular pit at least 60 cm deep and of 90 cm diameter. Keep separately the soil dug out from the pit.

3. Break the soil clods completely (to less than 1 cm diameter) and mix enough farmyard manure and basal dose of fertilizers (phosphorus and potash). Also add soil amendment for reclamation if needed. Apply Nitrogen along with irrigation water through the pitchers. Place this mixture of the soil in the pit to give at least a depth of 30 cm.

4. Place the unglazed pitcher at the center of the pit. Use the dug out and the mixture to fill the remaining portion so as to cover the whole space from the bottom to the neck of the pitcher. In case of heavy soils, a thin layer of sand is also placed around the pitchers. Tap the mixture thoroughly to ensure good contact between the soil and the

pitcher. In the absence of a good contact, the water will either not flow out of the pitcher or the flow will be irregular.

5. Fill the pitcher with clear water. Rainwater could be used after filtering through a sand filter.
6. After 2–3 days of filling the pitcher, sow at least 6–8 seedlings/seeds around the pitcher. The seeds or seedlings should be equidistant from the pitcher and also from each other. The ideal location for the seeds/seedlings is just outside the outer boundary of the pitcher wall. Start filling the water at pre-determined interval (optimum schedule may be 2 days for saline and 3 days in case of fresh water).

WATER REQUIREMENT

Water requirement in the pitcher irrigation technique depends upon:

- Number of pitchers per ha
- Type of crop grown
- Available quality of water and the filling schedule.

An early filling schedule should be adopted with saline water as compared to fresh water. The water requirement in a 3 day filling schedule is about half of the daily filling schedule. The water requirement could be as low as 2.8 cm/ha to 12.5 cm/ha as the number of pitchers/ha increase from 800 to 5000. Thus water requirement may not exceed a maximum of 2 irrigations equivalent in the surface irrigation method. These calculations are with an assumption that the crop is of three and a half to four months duration with a maximum replenishment rate of 2.5 liters/day.

Precautions

- Keep the mouth of the pitcher closed to prevent sunlight to enter the pitcher so that algae formation and growth is minimized.
- Use only clear water for filling.
- Properly dry the pitchers before storing.

YIELD

A large number of crops can be grown through pitcher irrigation technique. It is more useful for vegetables and horticultural crops. Creeping types

A good crop of grapes through Pitcher irrigation

of crops can be grown with lesser number of pitchers. The yields of several crops, when fresh water was used to irrigate the crop are given below. Even grape and tomato could be established well.

Yield of Various Crops With Fresh Water (EC = 0.5 dS/m)

Crop	Yield (Kg/pitcher)	Crop	Yield (Kg/Pitcher)
Watermelon	11.3	Tomato	5.8
Muskmelon	7.4	Cauliflower	5.2
Bottle gourd	21.5	Brinjal	5.1
Bitter gourd	7.5	Cabbage	4.8
Ridge gourd	4.5	Radish	8.0
Cucumber (Kakri)	14.0	Grapes	3.5

Saline water irrigation through earthen pitcher

USE OF SALINE WATER IN PITCHERS

The vegetable crops are quite sensitive to salts. In most crops saline water of 2–3 dS/m can only be used except for chillies, where water of 4.5 dS/m could also be used. Through pitcher irrigation technology, most of the crops can be grown with waters having EC > 5 dS/m, except ridge gourd and grapes. Cauliflower could be grown even with a saline water of 15 dS/m by adopting improved crop production approaches.

ECONOMICS

The total cost with 2,500 pitchers per hectare is about Rs 11,200 with the variable cost of Rs 9,640 per season. Benefit-cost ratio through pitcher irrigation is about 3 for tomato crop and more than 2 for most of the other vegetables. This is a simple technology, and the economic viability of the technique among others depends upon the life of the pitcher. Unlike surface placed pitchers, buried pitchers transmit the water into the soil and pitcher wall does not act as an evaporating surface. Thus, no salts get accumulated on the pitcher wall.

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