

# Frustum Shaped Porous Vessels for Sub-surface Irrigation

## Background

In India, Matka irrigation or pitcher irrigation (Fig. 1) was and is practiced from ages. Due to its spheroid shape, its insertion and extraction from the soil is associated with excessive drudgery and soil disturbance. The Frustum shape (Fig. 2) of a porous vessel helps to avoid the above said disadvantages. Therefore, a modified pitcher irrigation technology was developed in a RuTAG IIT Delhi project consisting of a covered frustum shaped sub-surface porous vessel (SSPV) with appended organic wet compost patch and multi-cropping-based agriculture surrounding it.



Fig. 1 Pitcher or Matka Removal



Fig. 2 Frustum Shaped SSPV Removal



Fig. 3 SSPV Moulding Press Machine

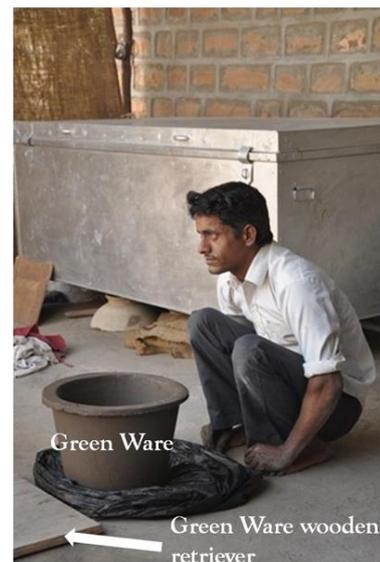


Fig. 4 Shaped Frustum SSPV Composite

## **Area of the Project**

Rural Manufacturing, Horticulture farming, Sub-Surface Irrigation, Potter (*Kumhar*) Skilling, Drainage Management, Soil Remediation.

## **Challenges in Existing Pitcher or Matka Irrigation**

- Spheroid shape, its insertion and extraction from the soil is associated with excessive drudgery.
- Conservation type agriculture becomes impossible due to soil disturbance.
- Due to matka's spheroid shape, structural uniformity cannot be maintained because of controlled variation in porosity requirements.
- Mechanized manufacturing of the spheroidal shaped objects with uniform thickness, controlled porosity and ceramic properties can only be an outcome of high end technology.

## **Salient Features and Advantages of Frustum Shaped Sub-surface Porous Vessel (SSPV)**

- Less soil disturbance while re-inserting and extraction from soils.
- Due to its frustum shape and compositional variation freedom, distinct porosities of SSPVs can be manufactured which can help in different functions such as saline soil remediation, root medication, use as a drainage management tool for an agricultural farm (Fig. 4).
- Mechanized production of frustum shapes is easy using a SSPV Moulding Press Machine (Fig. 3).
- Both manual as well as motorized screw jack option can be provided to the SSPV Moulding Press machine.

## **Project Timeline**

- Problem Identified: 2019.
- Design Modification: 2019-2020.
- Technology Dissemination: 2020 onwards.

## **Impact of the Technology**

- Nearly 78 SSPV vessels are sold and also 2 SSPV molding machine sold.
- Potters in Jodhpur have started to rent the SSPV for saline soil remediation.
- Apart from SSPV manufacture, Machine also helps in the manufacture of clay pots for gardening as well as G-filters for water filtration.
- Ergonomically designed and encourages household pottery manufacture.
- Encourages farmers-potter collaboration examples because of good horticulture yield and income.

## **Success Stories**

- Dr. B. R. Ambedkar Hostels (*Chatravas*) under the Social Justice and Empowerment Department, Govt. of Rajasthan, have adapted SSPV for their kitchen garden development in all its hostels in Jodhpur District.
- Vendors have been identified for manufacturing.
- NGOs such as Rupayan Sansthan have undertaken the task of knowledge dissemination of the SSPV.
- NGOs such as Rupayan Sansthan, S. M. Sehgal Foundation and Enactus, IIT Madras have shown interest in experimenting this technology in some of their adopted field sites in Rajasthan and Tamil Nadu respectively.
- Potters from Tamil Nadu, Kerala, Rajasthan and Bihar have come forward to adapt the technology.

## **Current Funding**

Office of the Principal Scientific Adviser (PSA) to the Govt. of India.

## **Collaborations/Field Agency**

- S. M. Sehgal Foundation, Rohat, Jodhpur, Rajasthan, Pin-342001
- Rupayan Sansthan, Paota B. Road, Manji Ka Hatta, Jodhpur, Rajasthan, Pin-342001

## **Project in Pipeline**

- Experimenting the SSPVs in different scenarios of desert land use for horticulture and household use.
- Technology dissemination.

## **Benefits from Industry Collaboration**

- Improved local industry – academia relations.
- Better rural penetration, and community based advancement in manufacturing.
- Dedicated manufacturers, potters, farmers and organic fruit and vegetable market contributors.

**Tentative Cost of Manual SSPV Moulding Machine is around Rs. 47,500\***

**Tentative Cost of the SSPV Vessels is around Rs. 180\***

\* This cost does not include freight, installation, GST and other levies.