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Design and development of gravity flow water conveyance system for irrigation in Himalayan foot hills

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ABSTRACT

Increasing demand of water for industrial, domestic and power sectors necessitates urgent need for development of water saving technologies to ensure accessibility of water to every field (*Har khet ko pani*) through following the approach - “*per drop more crop*” in agriculture. Efficient water management in agriculture is the major challenge to ensure sustainable food production in India. While, the situation is more aggravating in mostly rainfed type of farming in hill and mountains. Low productivity and cropping intensity, subsistence level of farming is attributed to poor water resource development in the hilly areas. To enhance the productivity and livelihood in the Himalayan foothills, a participatory gravity-flow Irrigation System has been developed with major emphasis on the participation of beneficiary farmers in all activities starting from surveying, planning, implementation, monitoring and operation of the system. In this endeavor, 1830 m GI pipeline (100 mm diameter) from source to Distribution Tank (DT) as a water conveyance and 1500 m PVC pipeline (110 mm) as a water distribution are laid out in the command area (26.28 ha) in the adopted villages-Pasauli and Devthala of Dehradun district in Uttarakhand.

The conveyance efficiency was recorded >95% of the system starting from source to remotest riser in the command area. Discharge of randomly selected risers were taken in 2016 and found a 10-16% variation between designed (estimated) and observed data. Check basin border size for efficient irrigation were optimized using SIRMOD. Productivity of major crops increased by 48% with enhanced cropping intensity by 29% due to intervening crop of *Toria* in between Maize-Wheat sequence. Cultivation of *rabi* wheat on fallow land resulted increased additional net income of ₹ 17500/- ha.

Key words:

Gravity flow system,
Participatory irrigation,
Water conveyance system,
Underground PVC pipeline,
On-farm water management