

**Livelihood Improvement of Dug well
Dependent Vulnerable
Communities through Energy
and Water Efficient
Responsive Drip
Irrigation Systems**

**Dr. Bashir Ahmad
Director
Climate, Energy and Water Resources
Institute (CEWRI)
National Agricultural Research Center (NARC)**

What is the Innovation?

- * The innovation is to customize operation of RDI (responsive drip irrigation) on Solar power. RDI is an irrigation system which consumes 50% less water and almost 60 – 70 % less energy. As RDI functions 24 hrs, there is need to make assessment of day and night irrigation requirements and accordingly customize solar pumping system

Why is the innovation needed- what challenges are addressed through this innovation?

- * Pakistan is facing immense water and energy crises.
- * Rainfed areas are under serious threats of agricultural water scarcity
- * Influential (big land holders) farmers are the prime beneficiary of public subsidy schemes on drip/sprinkler and water harvesting
- * 90% farmers are small landholders whom neither have viable and economical irrigation system nor access to public subsidy schemes

This innovation will provide a solution:

- * Viable irrigation and agri production system for small farmers – dugwell/open well
- * Low, un-even water availability and water scarcity,
- * Low energy consumption and clean solar energy to pump water
- * This will also enhance irrigation efficiency which is currently very low
- * Rehabilitate dugwell based production system and improve livelihood

What is RDI

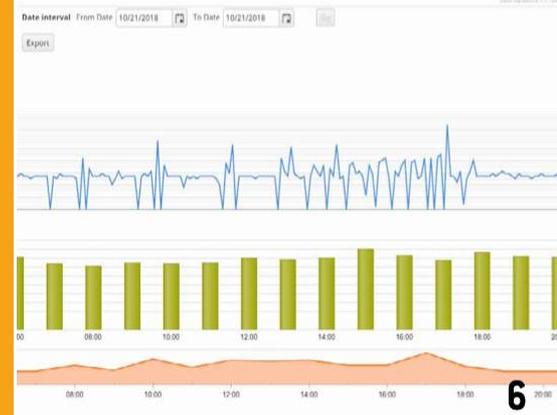
RDI  RESPONSIVE
DRIP
IRRIGATION

GROWSTREAM - HOW IT WORKS

PLANTS EMIT ROOT SIGNALS TO UPTAKE MOISTURE FROM SOIL

The GrowStream™ smart micropores only respond to these root signals and release water and nutrients—mimicking wet soil.

WATER DELIVERY IS DYNAMIC AND VARIABLE MINUTE BY MINUTE PLANT BY PLANT



Schematic of RDI integration with solar pumping for crop production



Solar Pump on Dug-well



Underground Responsive Drip Irrigation Line (RDI Line)



Underground Responsive Drip Irrigation Line (RDI Line)

Component of RDI

Responsive Drip Irrigation (RDI)



**Adjustable Pressure Regulator (APR)
and Pressure Gauge**



**Water Tank with Float Valve and
Water Metre for Water Counting**



**Installation of GrowStream Tube for
Vegetables**

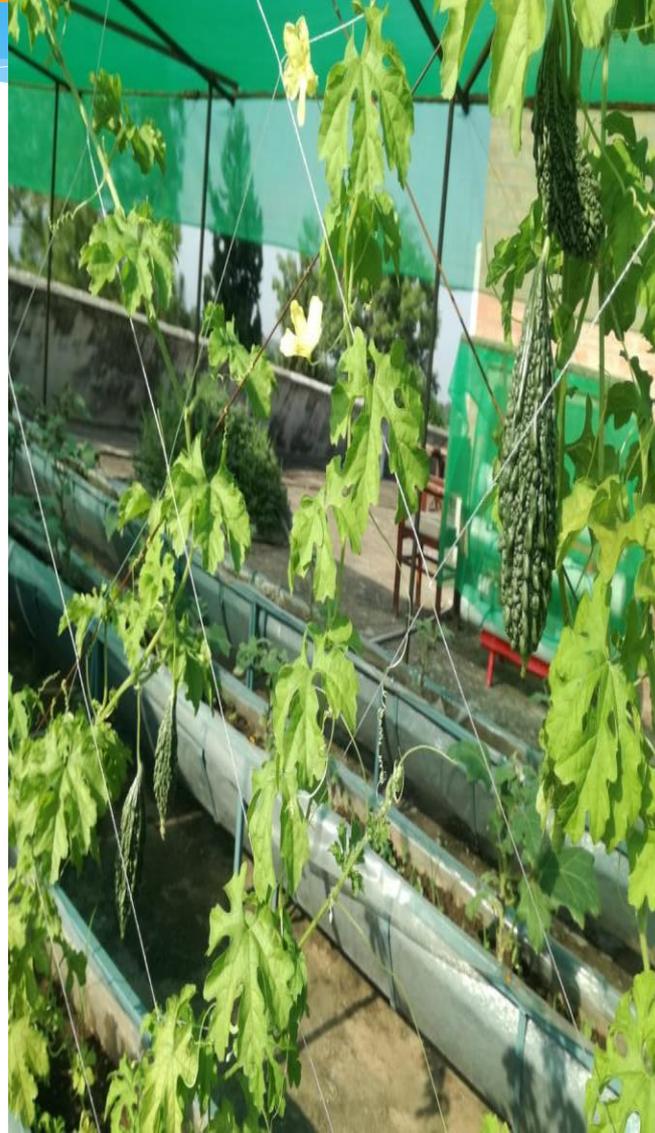


**Vegetable Production at Zero Energy
Cost Through RDI**

RDI Installation



Rooftop Gardening at NARC



Why is this an innovation?

- * RDI (responsive Drip irrigation) is a newly developed sub-surface piped irrigation system, having microspores through the length of pipe.
- * These pores respond to chemical signals emitted by plant roots.
- * The system operates at very low pressure as compared to conventional drip irrigation system.
- * The innovative system has been tested rigorously, however its operation on solar energy has not been tested.
- * Due to extremely low pressure operation, and very low discharge from RDI tubing, the energy requirement for its operation becomes very low.

- * It has been **theoretically** calculated that system will use 60-70% less energy as compared to conventional drip irrigation system.
- * Through IF grant we will develop a practical “micro solar Pumping System” for operation of RDI system.
- * Assessment of irrigation needs day/night to optimize night time pumping or water storages
- * Optimize the pumping and recharge of dugwell
- * Solar energy integration with RDI is an innovative idea which hasn't been developed or implemented anywhere till to date.

Where will the innovation be implemented?

- * The innovation will be implemented in areas rainfed areas, less groundwater, high evapotranspiration low annual rainfall, for example Thal desert in Punjab, Thar in Sindh, low rain fall areas in UIB, etc.
- * One farmer field site will be developed during first year of project in Potohar region , then 04 demonstration sites will be developed in different ecologies.

Partners

- * **CEWRI**, (Climate, Energy, Water Research Institute), PARC will be main implementer.
- * **EVA-ANA Agro & livestock** farms a private entity will also be a partner in the project
- * **Provincial water management departments** will guide for proper selection of farmers in different provinces.
- * **RDI** an International company will provide technical backstopping on operation of Responsive drip irrigation system.

How is it addressing the gender and social inclusion challenge?

- * Women in different parts of country usually either grow or support vegetable production in lands around their dug wells, the changing climate and water scarcity is severely effecting their livelihood.
- * By using this one push start irrigation system the women can now easily continue growing vegetables for earning much needed livelihood for herself and family.
- * This automated irrigation system will empower women managing irrigation themselves and non-dependence on male members

How can the innovation be up scaled and who might be interested in upscaling

- * In the past the Pakistan government through its various projects provided significant subsidies to promote the adoption of drip, sprinkler and solar pumps for irrigation. But big and influential farmers had been the benefices of these public subsidies.
- * Proposed project have been designed particularly beneficial to small scale and marginal farmers having scarce and limited water availability.

How can the innovation be up scaled and who might be interested in upscaling

- * Successful demonstrations of innovation at farmer's field will help up-scaling the innovation in different agro ecological regions.
- * Provincial water management departments, federal water management department and other development agencies will be interested in adoption through mega project with public subsidies

Project implementation plan

Activities	Year -1												Year-2														
	1 Q tr			2 Q tr			3 Q tr			4 Q tr			1 Q tr			2 Q tr			3 Q tr			4 Q tr					
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3			
Field based experiment of “micro Solar Irrigation system” with RDI.	■	■	■	■	■	■	■	■	■	■	■	■															
Start-up activities:	■	■	■																								
Designing of system:				■	■	■																					
Selection of experimental site							■	■																			
Experiment and Data collection							■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Results compilation and data analysis										■	■	■															
2. Demonstration of technology in										■	■	■	■	■	■	■	■	■	■	■	■						



* THANKS