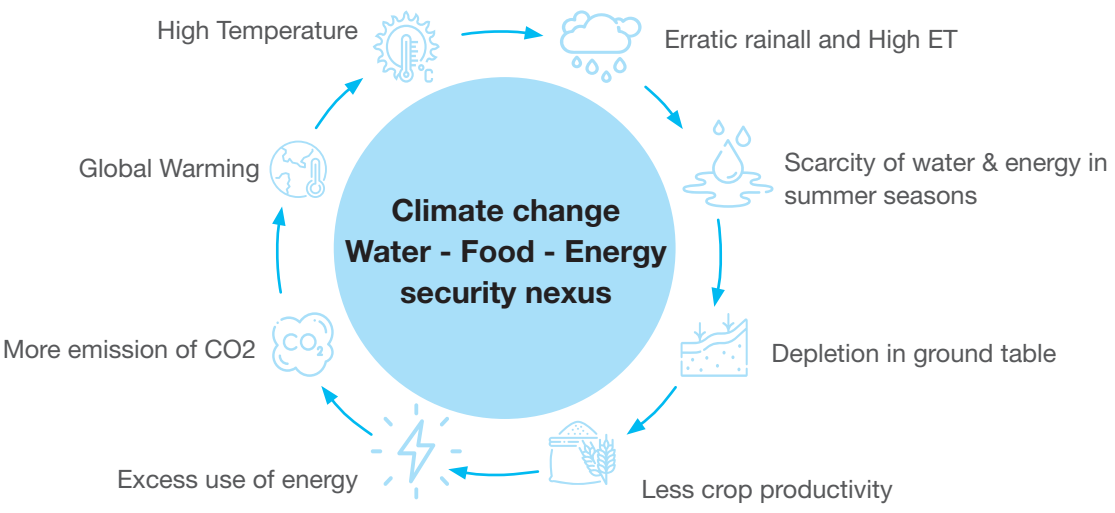
Ultra Low Energy Drip Irrigation System

India has 17% of the world's population. We have to feed this large population with only 2.4% of the land available out of which only 21% land is irrigated and 43% land is under cultivation. Moreover, India has only 4% of the world's water available. Rainfall is erratic, ground water levels are depleting. There is power shortage and associated power quality problems. The quality of grid supply is characterized by large voltage and frequency fluctuations, scheduled and unscheduled power cuts and load restrictions.

Irrigation is one major input that consumes the lion's share of water and energy in agriculture. Almost 60 to 70% of the water and energy is utilized by irrigation. Both these resources are getting scarcer day by day. This has become a major limitation in development of Agriculture in under developed and developing countries

It is need of an hour to provide innovative technological interventions to make agriculture sustainable and reduce dependency on water-food-energy security nexus.

Drip Irrigation Technology has the potential to combat this burning issue. It is proven that drip irrigation helps to save water and increase crop yields substantially. Though Drip irrigation requires low energy to operate, it is still a limiting factor for adoption of the same in some parts of the world/ segment. Drip Irrigation system is considered as pressurized irrigation system. It requires pressure to push the water to each and every corner of the field through a piped distribution network which consists of drip tubing/inline, submain line and mainline. Accessories used in drip irrigation such as filter, fertilizer injectors, mainline, submain and drip tubing causes a pressure loss either due to friction or due to obstructions in filters and fittings. Hence the pump has to generate additional pressure to overcome these losses. Hence a pressurized pumping system is needed to operate the drip irrigation system efficiently. Energy saving is possible if required pressure to operate the drip irrigation is minimised.



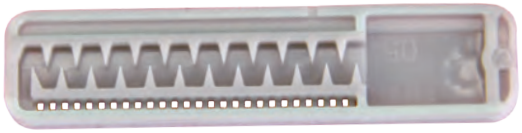
Jain® Drip
More Crop Per Drop®

Is it possible to operate a drip irrigation system at low pressure?

A conventional drip system requires higher operating pressure so that water under high pressure will avoid settlement of particles/debris/salt inside the zigzag labyrinth of the dripper.

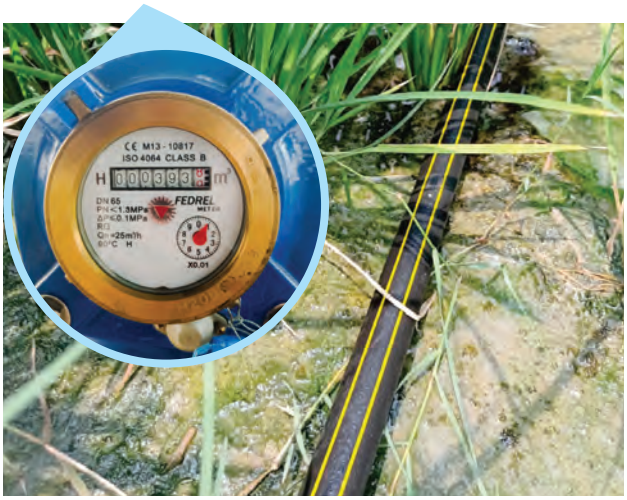
Thanks to Jain Irrigation's advanced and innovative flow path labyrinth called 'cascade labyrinth' can help to operate the system at much lower pressure. Drippers with Cascade Labyrinth are designed in such a way that small dirt particles entering into the drip system does not block or plug the flow movement and also slimy algae threads can easily pass through it.

Production technologies are also improved and advanced which can help to produce pipe and tubing with smooth surface finish which helps to reduce the frictional losses.

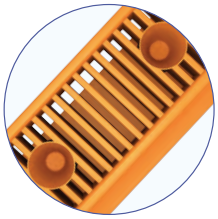


Can I operate the drip irrigation system at ultra low pressure of 0.1 kg/cm2 pressure?

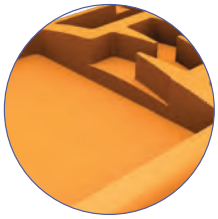
Yes, it is possible for drippers with Cascade Labyrinth and with implementation of proper design techniques. You can fill up the water tank which has an average height of 1 m to operate the drip system with the Jain Turbo Excel/ Jain TUrbo Slim Dripline.



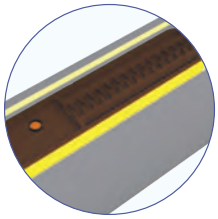
Cascade Labyrinth which creates a stagnant ara to settle any sand/ silt particles



3D filtration system which increases effective filtration area which allow the water entry inside the drip even if filters are plugged



Stepped outlet which prevents entrance of soil into the flow path



Thin drippers minimizes obstructions to the flow and thus reduces the pressure losses.

Advantages of Ultra Low Energy Drip (ULEP)

Advantages to the Farmers

- Low Capital requirement & Quicker return on investments.
- System operates on very low pressure, replacing high head pumping systems.
- Less dependent on conventional and erratic energy sources.
- Water can be stored in a simple holding tank with a height of 1 m.
- Fertilizers can be directly dissolved in the tank so the cost of separate fertilizer injectors is saved.
- Water to be pre filtered before pouring in the holding tank. It saves on high pressure filtration and also saves losses occurring during the filtration process.
- Maintenance is easy, acid/chlorine required to be injected as per the maintenance schedule by directly mixing in the holding tank.
- Low discharge drippers maintain better air-water balance resulting in uniform growth.
- The slow application of water over a longer period of time also gives a better soil-moisture leading to high growth rate and yield.
- Large sections operate at a time, providing operational flexibility and requires less manpower.
- Farmers, who are deprived of resources are unable to get the benefits of technological interventions, can now enjoy the advantages of Drip technology.
- Farmers from the Canal command areas can reap the benefits.
- Drip Systems can be efficiently operated using Solar Operated Pumps.

Advantages for Government:

- Lower energy requirement results in substantial reduction in agriculture power consumption leading to saving to the exchequer.
- Water saving.

If I have an existing pumping system, will using ULED still be advantageous to save energy?

- Pumps characteristic curves shows that when the dynamic pressure head of the pump is reduced, pump discharge increases.
- Hence, if we operate a pump at low head to fill up a water tank will deliver more discharge than a pump under pressure connected directly to a drip system.
- Drip line hydraulics proves that it is possible to operate the system at lower pressure heads.
- Alternatively, we can achieve low pressure operation by using a variable frequency drive for pumps (although expensive but energy efficient) Or by using a solar pump which either can directly be connected to the system or we can fill up a water tank placed at minimum height of 0.5m above ground and height of the tank 1m.
- Water tank can also be filled up by using any other means like paddle pump, siphoning from the canal etc. As the tank height is low, it is easy to pour the water in the holding tank.

Water Holding Tank at an Average Height of 1m

Uniform Distribution of water even at1 m pressure head.

Laying of Submain. L/L spacing 0.6m

Success Story of Ultra Low Pressure Drip Irrigation System

Name of the Farmer	**Sukhvinder Singh**
Address	Village Shahpur, District SAS nagar (Punjab)
Area	2 acre
Crop	DSR Paddy
Variety	PR 126
Drip System Details	
Tank Size	1000 ltr placed at 0.5 m height
Water Source to fill up tank	Tubewell
FIlter	40 mesh net
Name of dripline	Jain Turbo Slim
Size of the Dripline	22 mm ID x 200 micron thickness
Dripper Details	0.7 lph at 1 m head
Dripper Spacing	30 cm
Lateral to Lateral spacing	0.6 m
Yield	**29.35 Qtl/acre**
Water use / acre	**2225950 lit**

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TO WHOMSOEVER IT MAY CONCERN

I express my appreciation for another innovation - Ultra Low Energy Drip Irrigation System developed by Jain Irrigation Systems Limited, India. I have evaluated the Ultra-low Energy (Pressure) Drip irrigation system and have taken 2 crops (2 seasons) on this latest Low-pressure drip system at the farmers' field. It was observed that the system requires no pumping and works efficiently even at low pressure of 1 m. It has performed well and provided uniform irrigation and fertilization to the entire crop. This system has the advantage that fertilizers can be directly dissolved into the water tank.

I express my satisfaction and suggest that other farmers can take up this path-breaking Drip system. Farmers, who don't have power connections or limited power, can also take up the system and enjoy the benefits. Farmers from the canal command areas can also think of utilizing these techniques by using siphoning techniques to fill up the water tanks.

I believe the Ultra Low Energy Drip System developed and designed by Jain Irrigation is a boon for the farmers.

(Rakesh Sharda)