



## Maintenance of drip irrigation system

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Uttar Pradesh occupies only 7.34 per cent geographical area of India and 82.1 per cent of land in Uttar Pradesh is under agriculture. The traditional cropping pattern *i.e.* alternation of wheat and paddy in the same field has resulted into manifold increase in irrigation water demand. In most part of state flood irrigation method is used which led to irrational pumping of fresh ground water used for irrigation purpose, wherein ground water resources have depleted to reach an alarming situation. In state of Uttar Pradesh some observations recorded at various regions showed that water table declined upto 1 to 2 centimetres per year.

In drip irrigation technique water flows through a filter into special drip laterals and distributed through the emitters directly into the soil near the roots of plants. Properly designed, installed and managed drip irrigation system reduces evaporative losses and facilitates water

conservation, deep drainage, less weed growth and reduce fertiliser loss as compared to conventional irrigation techniques. Drip irrigation also helps to eliminate many diseases that are spread through irrigation water in most types of the soils.

However, farmer finds it difficult to operate and manages the system due to lack of technical knowledge of the system. To help the farmers regarding technical knowledge of system, some installations and maintenance techniques of drip irrigation are discussed below.

**Installation of drip irrigation:** Installation of drip can be divided into three stages *viz.*, fitting of filter station, connecting the main to sub mains and laying of laterals with drippers. To avoid the damage during agricultural practices in the field main and sub main pipe line was installed at minimum depth of 1.5 feet. Install the drip system as shown Fig. 1. Filter was installed on the main

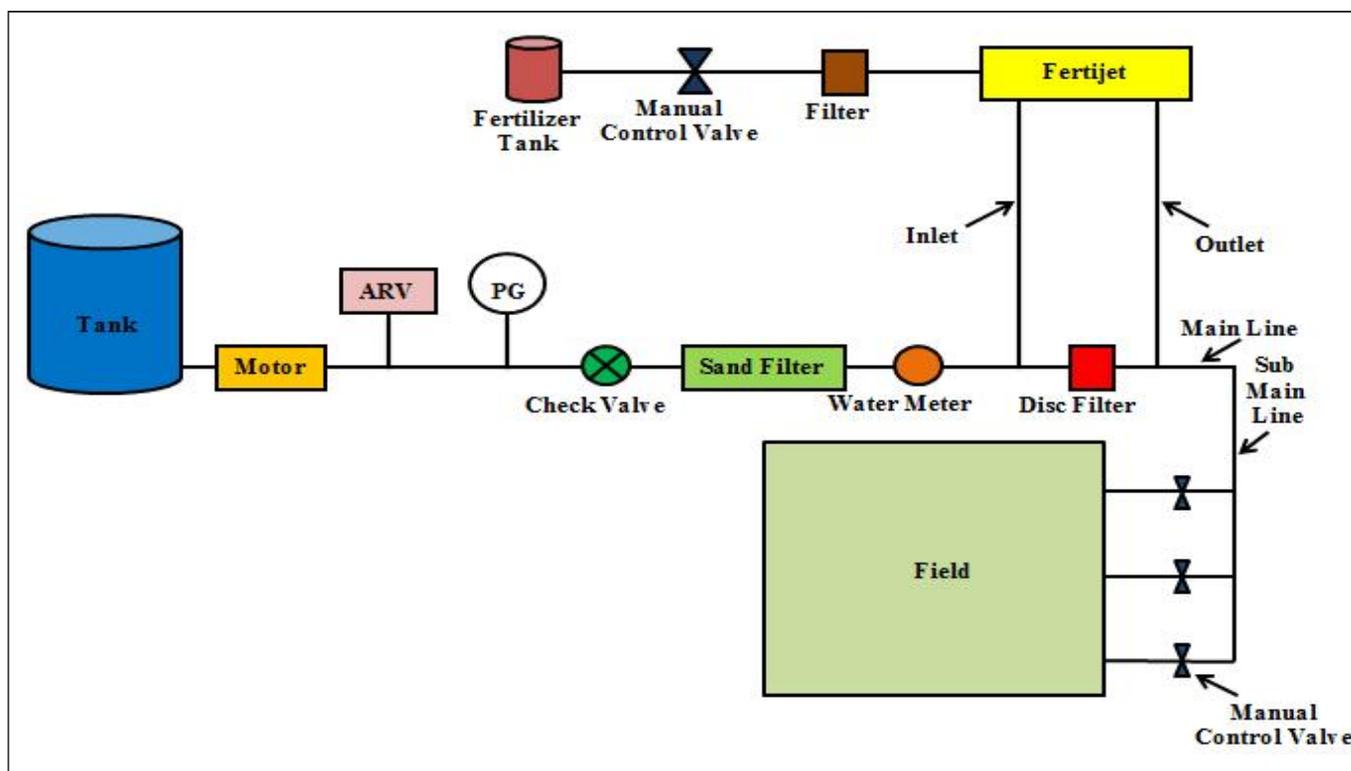


Fig. 1: A view of drip irrigation system

line before the fertigation unit. Fertigation unit was installed for the purpose to inject the water soluble chemical and fertilizer by the drip system directly to the root zone of the plant.

**Hints for successful working and maintenance of drip irrigation system:** For successful working of drip irrigation system the following hints are to be followed. To ensure the proper working of the system; daily, weekly and monthly basis maintenance are required.

**Daily maintenance:** Daily maintenance is necessary for the successful operation of drip irrigation system. After starting the pump let the pressure is stabilized in the system. Check the pipe line pressure through the pressure gauge in the system. If the pressure gauge shows the pressure in pipe line, less than 1.5 kg/cm<sup>2</sup> then regulate it through by-pass valve. Examine the drip line and ensure that water is reaching all the corners of the field. If water is not reaching to the last dripper, flush the drip line properly. Inspect the drip line regularly for any cut and puncher and change the drip line immediately, if found. At the end of irrigation inspect the field and check uniform wetting pattern in the near of root zone. If dry patches are found near the plant root zone increase duration of operation of the irrigation system.

Examine all over the field to detect precipitation, scaling, if clogging is found of the drippers correct it immediately. If precipitation is found in the system take remedial actions and monitor the mechanical damages by rodents, farm operations by labour, animal or machinery, causing leakage, correct it immediately by using proper joiners. Flush all the laterals by opening end plug in a series then close them in the same sequence allowing flushing until clean water starts flowing. Flush each sub-main pipe line by the flush valve at the end of every section till dirt free clear water starts flowing through the flush valve. Check inlet and outlet filter pressures. Remove slurry from hydro cyclone, back flush sand filter at every 5 hours, flush screen or disc filter at the end of day's operation. Daily backwash of sand filter is necessary. In backwash process water flow is reversed in sand filter and inside of filter sand bed is lifted and expanded and it allowing to release the collect dirt. The dirt is flush out through backwashing valve.

If drip line is directly fitted to sub main pipe line some drippers remain inside the trench and once the system is shut off, the soil may enter into the emitters by negative pressure which may cause clogging of drippers. In order to rectify the problem, system should be operated on daily basis to flush out the dissolved salts. However, blocked

dripper should not be cleaned by hammering or by using sharp objects like nail, pin etc.

**Fortnightly maintenance:** In fortnightly maintenance, disc filter need to be clean properly. To clean the sand filter, open the lid of sand filter manhole, allow the water to come out through manhole, stir the sand thoroughly by moving the hand in between filter mushrooms (candles) without disturbing their position for thoroughly separating accumulated foreign material with media and recharging its filtering capacity.

**Chemical treatment:** Even after daily, fortnightly maintenance, sometimes, drip irrigation needs to be treated chemically for increasing their efficiency and proper working. These are described below:

**Acid treatment:** Use goggles and rubber hand gloves and never pour water in acid but always add acid in to water as safety precaution before handling acid. Use only recommended acid viz., hydrochloric acid, nitric acid and sulphuric acid. Select the most suitable and easily available acid in local market. Flush and clean filters, main pipe line, sub main pipe line through the flush valve and open lateral ends. Do not spill the acid or chlorine on the fertilizer tank. In case of fertilizer tank create appropriate pressure differential between inlet and outlet by throttle valve. After the injection of acid, allow acidified water to react with precipitated salts for about minimum 4 - 6 hours. Then open the ends of laterals and sub main pipe flush valve. Start the pump and allow all the water to flow out. Measure the discharges of marked drippers. Flush main pipe line, sub main pipe line and laterals. If there is no significant improvement repeat the treatment as above for all the sections. At the end of acid treatment wash the equipment and vessels with clean water, whip and dry eliminating residue of acid.

**Chlorination treatment:** If clogging is observed due to algae carry out chlorination treatment. Run the drip system for half an hour more than normal irrigation schedule so that additional amount of acid will be taken out of root zone. Chlorine injection reduces clogging and it helps keeping the irrigation lines clean. It is recommended as an intermittent treatment in drip system use water that contains a high concentration of organic materials. The most commonly used material for treatment of drip system is sodium hypochlorite 10-12 per cent.

**Precautions to be followed during chemical treatment:**

- Use goggles and rubber hand gloves because it is dangerous of human skin and health.
- Avoid accident by reaction, vessels for the solution

should be thoroughly washed.

– Never use fertigation of nitrogenous fertilizer during chlorination to avoid formation of sublime compound like ammonium chloride etc.

– Do not mix acids in chlorine solution, use another device of injection for acid prior to chlorine.

– Always keep acid in plastic container to avoid its reaction with metallic containers.

**Maintenance and cleaning of drip irrigation systems at the end of season :** After the harvesting of crop, cleaning of the drip irrigation systems is necessary.

**Advantages of maintenance of drip irrigation system:** Regular maintenance of drip irrigation system is most important to avoid blockage and increase the life of the

system. Chemical treatment helps in preventing the clogging of dripper and removes the heavy weight of algae and bacteria in sand, screen and disc filter for block up screen. Maintenance of the system minimizes the nutrient loss due to blockage of the dripper and uniformity of irrigation and fertigation was maintained.

**Conclusion:** To achieve higher crop yield and increase the life time of the drip irrigation system always drip system operate optimum pressure of 1.5 to 2.0 kg/cm<sup>2</sup> and always follow chemical treatment/daily, fortnightly, monthly schedules of maintenance activity of the drip irrigation system.

Received : 04.02.2020

Revised : 03.04.2020

Accepted : 04.05.2020

RNI : UPENG/2011/37228 Accredited by NAAS: NAAS Score: 3.84 ISSN : 0976-5638

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R.N.I. : UPENG/2010/32276  
ISSN : 0976-1284

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