A REVIEW International Journal of Agricultural Engineering | Volume 5 | Issue 2 | October, 2012 | 284–287

Effect of flushing frequency and filtration in emitters clogging

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Received : 17.04.2012; Revised : 06.07.2012; Accepted : 24.08.2012

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ABSTRACT : Clogging of emitters is one of the most important aspect that affects the performance of micro irrigation systems. Emitters clogging may be due to poor quality of water that is being used or may be due to inadequate pressure under which the system in operation or precipitates resulting during the fertigation process or improper functioning of filtration units that are installed in the system. Inorder to have emitters free from clogging frequent flushing of the entire micro irrigation systems is essential. Apart from this the back flushing or cleaning of different filtration units installed in the system by monitoring the pressure drop is also needs to be flowed. Studies also indicated that continuous monitoring of emitter flow and operation of the drip irrigation system at 100 kPa (1 kg/cm^2) pressure are essential for early detection of clogging problems and for identifying the flushing frequency. As the micro irrigation systems are gaining popularity in India a review of studies carried out on the flushing frequency of emitter and filtration units is presented in this paper.

KEY WORDS : Emitters, Flushing, Filtration, Frequency, Flow velocities

HOW TO CITE THIS PAPER : Ramana Rao, K.V., Agrawal, Vijay, Patel, G.P., Keshri, R. and Chourasia, L. (2012). Effect of flushing frequency and filtration in emitters clogging. *Internat. J. Agric. Engg.*, **5**(2) : 284-287.

Micro irrigation systems have many advantages over other conventional irrigation systems. One of the major challenges in these systems is to keep emitters free from clogging. The causative factors for emitter clogging could be due to physical particles, biological agents and chemical composition of water. The most common physical causes of clogging of drip emitters are sand particles, which are usually found in surface water (Fig. 1). Other suspended solids may be too large to pass through the emitter's opening and might clog it. Under certain conditions, silt-sized particles can form larger aggregates that may cause clogging. Drip irrigation systems provide a favorable environment for bacteria, fungi and algae that can cause slime accumulation. Bacterial slime can be a direct cause for clogging of drippers, but it can also induce mineral particles to stick together and form aggregates large enough to clog the emitter openings.

This phenomenon is specifically significant when manganese, sulphide and iron are present in the water. Water that contain high levels of these elements, and have a pH above 7.0, might potentially cause clogging of drip emitters. Presently, drip irrigation system is being used for application of fertilizers along with the irrigation also. Due to interaction of the fertilizers with the chemical compounds present in water, the solubility of the fertilizers are effected, resulting in clogging of emitters. Common guidelines used to assess the clogging potential of drip emitters are presented in Table 1.

Emitter clogging problems and frequency of flushing:

With the decreasing good quality water resources for irrigation, there is an increasing trend toward the use of marginal waters which are either stored from storm runoff, treated sewage effluents etc. Emitter clogging hazards are a major concern in selecting drip irrigation systems for use with marginal waters. Reservoir waters contain a variety of phytoplankton and zooplankton, that develop during storage according to the specific conditions prevailing in the reservoir. Suspended particles, which can agglomerate with filaments, slimy or otherwise sticky by-products of microbial activity, are also abundant, especially in earthen reservoirs (Adin, 1987; Ravina *et al.*, 1992). Most clogging factors can be found in the wastewater effluents if used in drip irrigation systems without from care in operation and maintenance of the system. There are also aquatic organisms that can grow and proliferate with in the pipe line system and, in certain circumstances, develop into a biomass that can clog almost any component of the drip irrigation system (Nakayama and Bucks, 1991). Such problems might be intensified by longer supply lines and slower stream velocities (Ravina *et al.*, 1992). Emitter