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Nozzles Clogging as Limiting Factor in Pressurize Irrigation Systems

Abubaker B Ali[1]*, Wu Yan You[1], Xing Dek[1] and Nazar A Elshaikh[2]

[1]*Institute of Agricultural Equipment Engineering, Jiangsu University, China*

[2]*College of Agricultural Engineering, Hohai University, China*

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***Corresponding author:** Abubaker B Ali, Jiangsu University, Institute of Agricultural Equipment Engineering, Zhenjiang, 212013, China

Opinion

Modern irrigation systems have gained globally popularity, used widely in agriculture and landscape throughout the world, since it has more advantages in terms of the water use efficiency. However, these irrigation systems affect by water quality which leads to very serious problems of nozzle's clogging's. The nozzles are the main component of pressurized irrigation systems, however, these parts always subject to the clogging by undissolved chemical granular fertilizers and sediments, such as suspended clay particulates. As a result, biofilms develop inside the drip lines due to accumulation of suspended matters which leads to orifices clogging (Figure 1). Clogging has been a serious problem for inline drippers since these types of emitter are build-in the drip line, therefore, it is difficult to replace or cleanup. Nevertheless, the low water quality irrigation water contributes for far extent in emitters clogging. Nakayama et al. [1] reported that the clogging in pressurized irrigation systems is associated with concentrations of physical (inorganic particles suspended), chemical (dissolved solids) and organic (organic matter) contaminants.

Figure 1: Clogging status in different pressurized irrigation systems.

The clogging's whether partially or fully occurs due to precipitation or accumulation of salts around the nozzles or emitters. Consequently, these results in low distribution of water and farther more affect the productivity of the plants. There're, a lot of studies have been carried out to mitigate the problem of clogging's [2,3]. These trials have taken different ways, such as, rational filtration equipment, periodic treatment through acidification and chlorination, and optimization of emitters design. These method of fixing clogging emitters are time consumer and costly. Most of these investigations were focused on physical and chemicals means such as filtering and flushing the irrigation water before converting to the main irrigation lines or adding chemicals in water supply to avoids accumulation of solid particles. Therefore, there is urgent needs for efficient approach that environmentally friendly, quick, and sustainable. Kotan and Şahin [4] reported that, some of the microorganisms have been shown positive effects on controlling of pathogenic microorganisms in crop production. Thus, they might be beneficial for development of an alternative method of controlling biological clogging pressurized irrigation systems. Hence, this viewpoint highlights the significance of utilizing this friendly environmental method in addressing the nozzles clogging problems.

The effective micro-organism (EM) is a mixed culture of beneficial micro-organisms (primarily photothenthic eclectic acid bacteria yeasts, actenomycides fermenting fungi), main species involved in EM include: Lactic acid bacteria - *Lactobacillus plantarum, L. casei, Streptococcus lactic*; Photosynthetic bacteria - *Rhodopseudo monaspalustrus, Rhodobacter spaeroides*; Yeasts- *Saccharomyces cerevisiae*, Candida utilize; Actinomycetes- *Streptomyces albus, S. griseus*; Fermenting fungi – *Aspergillus oryzae*, Mucorhiemalis. The EM of selected concentrations should be injected at points located after the connection of the laterals to the sub main lines. EM concentration should be taken into consideration to avoid the viscosity and to ensure the flow rate through the pipes. The EM are expected to have high potential ability in reducing clogging in nozzles, due to its content of photothenthic eclectic acid. The effective micro-organism can cause to reduced emitters clogging percentage by 80% and the reduction percentage increases with increasing of eclectic acid concentration level. Moreover, EM could serve as fertilizer due to its ability to increase the soils microbial community this leads to improve the both soil and crop quality.

This view attempt to present a solution through the impact of EM on mitigating clogging problems normally associated with modern irrigation systems. The using of EM is expected to achieve great reduction in emitters clogging and prevention nozzles. Also, EM will have positive fertility effect for plant growth. Therefore, we suggested that, EM has potential capability to diminishing emitter clogging or event alleviate it. Hence, it can be key solution that should be considered when dealing with modern pressurized irrigation systems.

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