

Health Risk Assessment of Wastewater Irrigated Brinjal (*Solanum melongena*) Under Improved Land Water Management Practices

K G Rosin¹, R Kaur¹, K Lal¹, N Patel¹, A Suman², S Kumar³ and R Kumar¹

¹Water Technology Centre, ICAR- Indian Agricultural Research Institute, New Delhi-12, India

²Division of Microbiology, ICAR- Indian Agricultural Research Institute, New Delhi-12, India

³Soil Science and Agricultural Chemistry, ICAR- Indian Agricultural Research Institute, New Delhi-12, India

E-mail: rosin_wtc@iari.res.in

Abstract—Wastewater has been used for crop irrigation in the developing countries as well as in developed ones, is a less expensive and reliable water source. The reuse of wastewater for agricultural irrigation purposes offers increase in crop yield while various consequences on crop produce quality and population health are major concerns. To reduce the pollutant threat associated with wastewater irrigation, practicing better land and water management strategies can be a viable option for resource poor urban farmers. In this view an experiment was conducted at water technology centre, ICAR-IARI, in 2015-16 to compare the methods of irrigation (drip Vs flood) and land configuration (raised Vs flat bed), on pollutant and pathogen load and transport in brinjal irrigated with wastewater and groundwater. Results showed that the heavy metals like Zn and Pb were found to be significantly high in brinjal with wastewater applied through flood irrigation as compared to the wastewater applied through drip irrigation. Similarly the Pb content in soil was 23% higher when irrigated with wastewater using flood method of irrigation as compared to drip. As a result health risk index (HRI) of Pb ranged from 0.48 to 0.8 in case drip irrigation compared to 0.51 to 0.88 in surface irrigation and the HRI of Pb was 0.84 in wastewater irrigation compared to 0.51 in case of groundwater use. The pathogen load was also 10 times more in wastewater irrigated brinjal fruits as compared to groundwater irrigated fruits. The pathogen load in drip irrigated plots and ridge- furrow land configurations were 10- 100 times less compared to surface (flood) irrigation and basin land configuration. Compared to groundwater, application of wastewater significantly improved the overall microbial activity in terms of dehydrogenase activity, fluroscien diaceatae activity and microbial biomass carbon in 0-5 cm soil layer.

Keywords: sewage, microbial biomass carbon, drip irrigation, pathogen, contamination.