

EFFECT OF DRIPPER DISCHARGE RATE AND SPACING ON WATER DISTRIBUTION, GROWTH, AND YIELD IN RADISH (*Raphanus sativus*) CULTIVATION

G.M.T.H. Bandaranayake¹, C.K. Wickramatunga² and K.G.S. Nirmanee¹

¹Department of Agricultural Engineering and Soil Science, Faculty of Agriculture, Rajarata University of Sri Lanka, Anuradhapura, Sri Lanka.

²Natural Resources Management Center, Peradeniya, Kandy, Sri Lanka.

This study explored the optimal dripper discharge rate and spacing to maximize yield in close-growing radish (*Raphanus sativus*) crops. The experiment employed a randomized complete block design (RCBD) with uniform plant spacing with varying dripper discharge rate and dripper spacing combinations. The key parameters tested were germination rate, and survival rate after thinning out and at the harvesting stage; total yield, plant count, fresh weight of the plant, leaf count per plant, and root:shoot ratio. Five distinct irrigation treatments tested were 4 L h⁻¹ in 25 cm (T1) and 50 cm (T2), 8 L h⁻¹ in 25 cm (T3) and 50 cm (T4), and manual watering (T5), each with four replicates. Irrigation was done daily based on evapotranspiration and rainfall data to ensure consistent water application. The collected data were analyzed for statistical significance using ANOVA in R software. The results indicated that the highest germination rates were observed in T3 and T5, while T2 had the lowest rate. No significant differences were found between T2, T1, and T4. The survival rates after thinning out, which reflected the number of plants at harvest, were highest in T3, T5, and T1 compared to T2 and T4. In terms of total yield, T5 (8.32 kg m⁻²), T1 (8.31 kg m⁻²) and T3 (8.2 kg m⁻²) performed the best while T4 (7.35 kg m⁻²) and T2 (7.28 kg m⁻²) showed significantly lower yields. However, there were no significant differences between treatments of other parameters. In conclusion, the optimal irrigation strategies for maximizing radish yield were found in T3 and T5, while demonstrating the highest yield, germination, and survival rates. Further studies combining fertigation with various soil types can enhance recommendations for broader applications. This approach supports drip irrigation adoption in water-scarce conditions, optimizing yield and water productivity.

Keywords: Drip irrigation, Radish, Water productivity, Water scarcity