

Soil Water Distribution and Water Consumption during Bell Pepper (*Capsicum annum L*) Cultivation under Subsurface Ring-shaped Emitter Irrigation

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Increasing water use efficiency (WUE) is important to save water in semiarid and arid regions where water scarcity occurs frequently. Subsurface irrigation technology has been developed and practiced to improve WUE. A simple-designed affordable emitter is vital for small-scale farmers. Subsurface irrigation with a ring-shaped emitter is one of the low-cost irrigation techniques that has been introduced and developed in Indonesia for horticulture crops. The original emitter was made from a standard rubber hose, which was bent into a ring-shape with 20 cm in diameter. After five small holes were drilled with almost equal intervals, the ring-shaped hose was covered entirely with a permeable textile to ensure uniform water distribution around the emitter. Our previous study investigated if the number of the holes and the covering method can be modified. As a result, the emitter partially covered by the permeable textile with a reduced number of holes was proposed.

A glass-house experiment was carried out during the 2017 summer season in order to assess the performance of the modified ring-shaped emitter for bell pepper (*Capsicum annum L*) cultivation. The modified ring-shaped emitter had 2 holes and was covered by the permeable textile only around the holes. Water was applied with 1-cm pressure head from a water reservoir connected to the emitter for a duration of 2 hours every day during the growing period. Changes in the moisture content were monitored using soil moisture sensors at different depths. Results indicated that the irrigation using the modified ring-shaped emitter was more efficient in enhancing root zone water distribution than the original emitter as WUE was 96.0% and 75.2 %, respectively. Although the original emitter resulted in higher yield production, the difference between the two emitter designs was not significant. This study demonstrated that the number of the holes can be reduced and the ring covering method for the subsurface ring-shaped emitter can be modified from the original design for better WUE and easier maintenance.

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