Water Absorption Characteristics of Substrate with Physical Properties of wick in Subirrigation System Using wick

심지형 저면관수시스템의 심지의 물리적 성질에 따른 수분흡수 특성

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Abstract

The objectives of this study were to investigate the effect of the physical properties of wick on the water absorption of substrate. Physical properties of wick in this study were cotton composition, width and length. The water infiltration rate through the wick was 0.24 cm/s at 90~95% cotton content, which was faster than at 80~85% (0.13 cm/s) and 70~75% (0.08 cm/s). As the cotton content increased, the water absorption of substrate became greater : the amount of absorbed water was about 5~7 g higher at 90~95% than at 80~85% and 70~75% at a wick width of 1 cm, the velocity of water absorption through the wick was fastest with 0.25 $cm \cdot s^{1}$. The amount of absorbed water was higher at 3 cm than at 1 and 2 cm. However, the water absorption rate through the cross - sectional area of wick (g H_2O /cm^2/hr) was higher at a wick width of 2 cm than at those of 1 and 3 cm. The amount of absorbed water in the substrate was higher at 2 : 1 than at 1 : 1 (length in substrate : length out of substrate). Absorbed water amount was larger at 30~40% initial moisture content than any other treatment.

Table and Figure

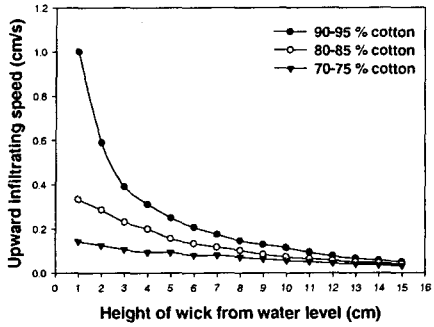

Fig. 1. Relation between the height of wick from water level and upward infiltrating speed for different ratios of cotton to wick compositions. Points represent the mean of 5 reZplications, respectivelv.

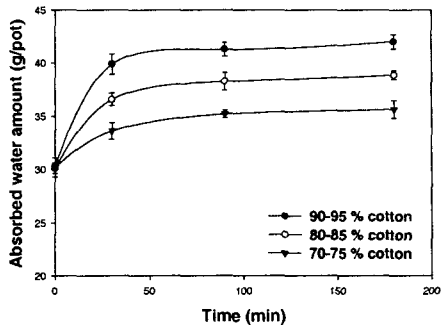

Fig. 2. Effect of cotton contents of wick on water absorption of substrate. Points represent the mean of 3 replications, respectively.

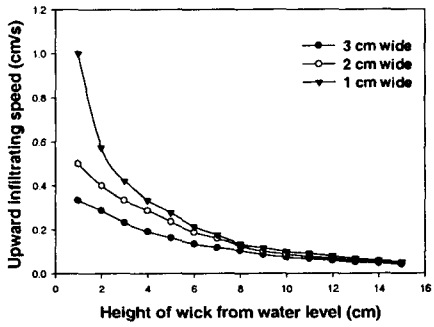

Fig. 3. Relation between the height of wick from water level and upward infiltrating speed for different widths of wick. Points represent mean of 5 replications, respectively.

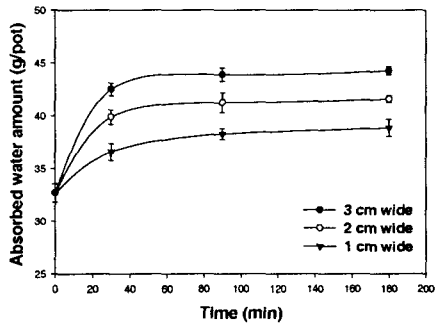

Fig. 4. Absorbed water amounts in substrate for different widths of wick. Points represent the mean of 3 replications, respectively.

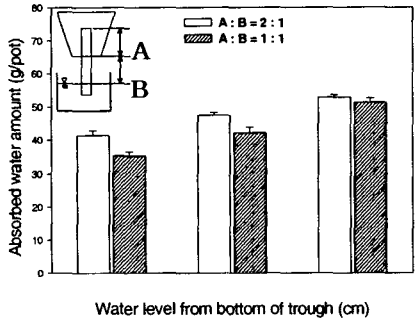

Fig. 5. Effects of wick length ratios (A:B) and wick length (WL) exposed to ambient air on water absorption of substrate. Vertical bars represent the mean of 3 replications, respectively.

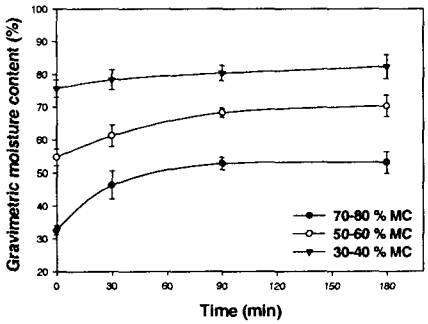

Fig. 6. Changes in gravimetric moisture content (MC) of substrate for different moisture contents. Points represent the mean of 3 replications, respectively.