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Onion Yield with Web-Based Irrigation Scheduling and Subsurface Drip Irrigation as Opposed to Trench Irrigation

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Abstract

Selecting the right irrigation method will be beneficial to manage limited water supplies and increase crop profitability. The overall objective of this study was to evaluate the effect of subsurface drip irrigation and trench irrigation on onion yield and irrigation water use efficiency. This study was performed as split plots for two sites with two SDI and trench irrigation treatments and three replicates for each treatment. The total onion yield obtained with the SDI system was 93% higher than that obtained with the trench irrigation system. Onion size was 181% larger in the SDI system than in the bed system at both sites. The productivity at the giant size is also higher. At one site, the yield of giant onion was 206% higher than that of rowed onions, while at another site the onion beds did not produce giant onions and SDI had some yield. It was concluded that drip irrigation systems more than doubled yield and increased onion size while using almost half the amount of water. This is because SDI allows for more frequent watering and smaller depth with higher irrigation efficiency than trench irrigation.

Keywords:

trench irrigation in the two locations. Onion yield was approximately 119% higher with the SDI system than with the row irrigation system in the commercial eld. A similar trend was observed at the Weslaco site where SDI yielded 95% higher onion yields than the bed system. Higher onion yields can be made possible by the higher irrigation frequency of SDI systems. Onion yields obtained by Hatterman-Valenti and Hendrickson for sprinkler-irrigated onions ranged from 51.9 to 56.9 Mg ha−1 and yields obtained by Shock ranged from 43.1 to 49, 8 Mg ha− 1 for onions irrigated with SDI. In this study, the average onion yield ranged from 20.2 to 62.9 Mg ha−1 [10]. When onion yields were sorted by size, irrigation systems did not have a signi cant impact on small and medium yields at the commercial site, but they did a ect the onion yield resources at the site. Weslaco. At the Weslaco site, the average onion yield of 24.4 Mg ha−1 for the SDI system was higher than that for the bed system and the yield for the small onion was statistically similar. Large and giant onions usually have a higher market value than small and medium onions. In both sites, the average yield of large and giant onions was higher for the SDI system than for the bed system.

ese di erences were most noticeable in the commercial eld, where the average size of large onions and giant onions from the SDI system was 206% and 168% larger than those from the row-irrigated system. At the Weslaco site, the average large onions were 182% larger for the SDI system than for the bed system. e average giant onion yield was 0.6 Mg ha−1 for the SDI system and zero for the trench irrigation system.

e SDI system was larger and more massive than the trench system at both sites possibly due to higher irrigation e ciency and higher frequency of irrigation.

Discussion

e e ciency of irrigation water use is calculated by dividing the total onion production by the amount of irrigation water. In the commercial eld for the 2012-2013 crop, irrigation water e ciency was 17.5 kg m−3 for the SDI system and 4.2 kg m−3 for the trench system. In Weslaco eld area, irrigation is programmed using water balance method and this may be the reason why higher irrigation e ciency is observed in Weslaco eld area compared to eld area commerce. Irrigation e ciency is higher for the SDI system with 25.2 kg m-3 and only 6.5 kg m-3 for the trench system. In previous studies, Enciso obtained the water use e ciency of drip-irrigated onions de ned as the relationship between total y5(d o)12(p b)-ce.

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