

Impact of shallow barrier isolation layer and vertical salinity difference on tomato water and salinity production function

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Soil salinity is often heterogeneous, but plant response to uneven salt distributions in the vertical direction (USDVD) of the root-zone under buried straw layer is seldom studied in tomato (*Solanum lycopersicum* L.var. Yazhoufenwang). Our objective in this study was to evaluate the effects of USDVD under a buried straw layer on tomato yield and production function. The treatments, T1:1, T1:5, T2:4 and T3:3, were established by setting the upper soil layer with EC1:5. Under Blank model, Singh model, Jensen model and Rao model, the water distribution factors in different growth stages of tomato were introduced to establish the production function of potted tomato. The correlation analysis between the simulated yield and the measured yield of the test group was carried out by using the function. The results showed that when the water consumption of upper and lower layers of tomato was taken as the influencing factor, the Jensen model was used. The correlation coefficient R^2 between simulated and measured yields is 0.9211. The AE, RMSE and Cv are the lowest, which are 0.008, 0.083 and 11.341% respectively. While for salt production function. The correlation coefficient R^2 , AE, RMSE and Cv were calculated on the basis of predicting yield and measured yield. Results showed that when the Jensen model was established by using vertical salinity difference factor, the function had the best predictive effect on tomato yield, with R^2 , AE, RMSE and Cv values of 0.8758, 0.005, 0.082 and 11.250%, respectively. Combined water and salt production function based on Jensen model, The predicted tomato yield is fitted with the measured yield by using the function. The evaluation indexes R^2 and AE, RMSE and Cv are 0.9507, 0.0007, 0.0495 and 6.8%, respectively. The simulation effect is further improved on the basis of the separate water or salt production function.

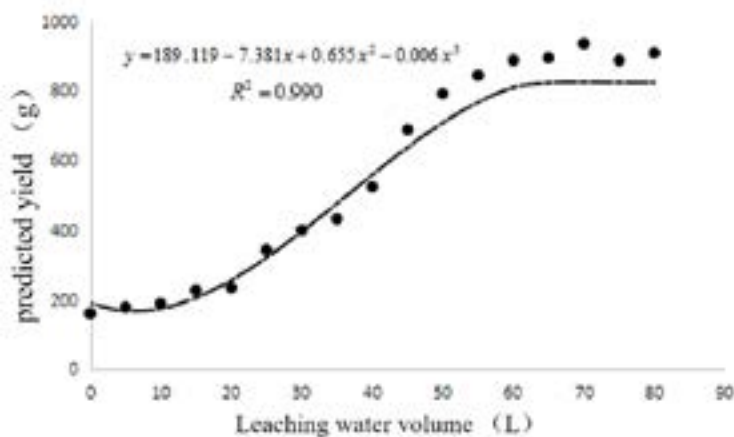


Figure 1. Predicted yield of Tomato under leaching water

Recent Publications

1. Sheng Chen, Zhanyu Zhang, Zhenchang Wang, Xiangping Guo, Minhao Liu, Yousef Alhaj Hamoud, Jiechen Zheng, Rangjian Qiu. Effects of uneven vertical distribution of soil salinity under a buried straw layer on the growth, fruit yield, and fruit quality of tomato[J]. *Scientia Horticulturae*, 2016, 203: 131-142.
2. Sheng Chen, Zhenchang Wang, Zhanyu Zhang, Xiangping Guo, Mengyang Wu, Ghulam Rasool. Effects of Uneven Vertical Distribution of Soil Salinity on Blossom-end Rot of Tomato Fruit[J]. *Hortscience*, 2017, 52(7): 958-964.
3. Sheng Chen, Zhenchang Wang, Xiangping Guo, Ghulam Rasool, Jian Zhang, Yi Xie, Yousef Alhaj Hamoud, Guangcheng Shao. Effects of vertically heterogeneous soil salinity on tomato photosynthesis and related physiological parameters[J]. *Scientia Horticulturae*, 2019, 249: 120-130.
4. Yousef Alhaj Hamoud, Xiangping Guo, Zhenchang Wang, Hiba Shaghaleh, Sheng Chen, Alfadil Hassan, Ahmad Bakour. Effects of irrigation regime and soil clay content and their interaction on the biological yield, nitrogen uptake and nitrogen-use efficiency of rice grown in southern China[J]. *Agricultural Water Management*, 2018, 213: 934-946.
5. Yousef Alhaj Hamoud, Zhenchang Wang, Xiangping Guo, Hiba Shaghaleh, Mohamed Sheteiwy, Sheng Chen, Rangjian Qiu and Mohammed M. A. Elbashier[J]. *Agronomy*, 2019, 9, 100.

Biography

Sheng Chen in 2013 to 2017 had studied for PhD degree in Agricultural and Hydraulic Engineering of Hohai University. Since 2018, postdoctoral has been carried out in the College of Water Conservancy and Hydropower, Hohai University. The response mechanism of vertical non-uniform distribution of salt to soil water and salt transport and crop under isolation zone was studied and 5 SCI papers were published during the last 5 years.

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