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滴灌模式和NaCl处理对苹果幼树水流阻力与水分利用的影响

Effects of drip irrigation mode and NaCl concentration on hydraulic resistance and water use of young apple tree

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中文关键词: [灌溉](#),[温室](#),[水分](#),[滴灌模式](#),[NaCl处理](#),[苹果幼树](#),[水流阻力](#)

英文关键词: [irrigation](#) [greenhouse](#) [moisture](#) [drip irrigation mode](#) [NaCl concentration](#) [young apple tree](#) [hydraulic resistance](#)

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作者 单位

[杨启良](#) 1. 昆明理工大学现代农业工程学院, 昆明 650500; 2. 西北农林科技大学旱区农业水土工程教育部重点实验室, 杨凌 712100

[张富仓](#) 2. 西北农林科技大学旱区农业水土工程教育部重点实验室, 杨凌 712100

[刘小刚](#) 1. 昆明理工大学现代农业工程学院, 昆明 650500; 2. 西北农林科技大学旱区农业水土工程教育部重点实验室, 杨凌 712100

[戈振扬](#) 1. 昆明理工大学现代农业工程学院, 昆明 650500

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中文摘要:

为了探讨滴灌模式和NaCl处理对苹果幼树水流阻力与水分利用的影响,该文采用了3种滴灌模式(交替滴灌ADI、固定滴灌FDI和常规滴灌CDI)和4个NaCl浓度梯度(0(CK)、0.2%(S1)、0.3%(S2)、0.4%(S3))。结果表明:叶水流阻力(RI+p)与叶水分利用效率(WUEI)、总水流阻力(Rt)与灌溉水利用效率(WUEi)间均呈对数相关关系。在相同的盐分处理下,与CDI处理相比,ADI处理节水达50%,平均根系干物质质量和根水流阻力(Rr)仅分别下降了8.7%和0.53%,而WUEI、WUEi、RI+p、冠层水流阻力和Rt分别提高了7.6%、16.96%、74.85%、35.33%和15.22%;在高盐分S2和S3处理下,ADI处理的RI+p和WUEi分别提高了50.5%和78.07%、14.99%和23.65%,但ADI处理的Rr反而降低了1.34%和9.96%。可见,采用ADI处理进行灌溉具有促进根系生长和提高RI+p及降低Rr的作用,是引起水分利用效率提高的重要原因,不仅提高了调控植物体内水分平衡的能力,而且也增强了抗盐胁迫能力。

英文摘要:

This research investigated the effect of four NaCl levels (0% (CK), 0.2% (S1), 0.3% (S2) and 0.4% (S3)) and three drip irrigation modes[alternate partial rootzone drip irrigation(ADI: alternate watering on both sides of the root-zone), fixed partial rootzone watering (FDI: fixed watering on one side of the root-zone) and conventional watering(CDI: Simultaneous watering on both sides of the root-zone)] on the physiological characteristic, hydraulic resistance and water use of young apple tree (*Malus pumila*) under greenhouse condition. The results show that the relationship between leaves hydraulic resistance (RI+p) and leaf water use efficiency (WUEI), the total hydraulic resistance (Rt) and irrigation water use efficiency (WUEi) were described as a logarithmic correlation. Compared with the CDI, water-saving up to 50 percent for ADI, but the average root dry matter and root hydraulic resistance (Rr) only decreased by 8.7% and 0.53%, respectively, and WUEI, WUEi, RI+p, shoot hydraulic resistance (Rsh) and Rt were increased by 7.6%, 16.96%, 74.85%, 35.33% and 15.22% under the same NaCl concentration. and the RI+p and WUEi increased by 50.5% and 78.07% for ADI, respectively, but the Rr decrease by 1.34% and 9.96% under the higher NaCl concentration as S2 and S3 treatment. This shows ADI treatment has an obvious promoting effect on the root growth of young apple tree, meanwhile, increased RI+p and decreased Rr, so these are some important reasons for improving water use efficiency of ADI treatment, and not only to improve the control and regulation plant water ability, but also to be strengthened resistance stability to salt-stress.

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