李晓彬,汪有科,张 平.充分灌溉下梨枣树茎直径动态变化及MDS影响因子的通径分析[J].农业工程学报,2011,27(4):88-93

充分灌溉下梨枣树茎直径动态变化及MDS影响因子的通径分析

Dynamic changes of pear jujube stem diameter and path analysis of MDS influencing factors with full irrigation

投稿时间：6/5/2010 最后修改时间：4/1/2011

中文关键词: 灌溉 蒸发 温度 梨枣树 茎杆直径 MDS 气象因子 通径分析

英文关键词: irrigation evaporation temperature jujube stem diameter MDS meteorological factors path analysis

基金项目: 国家重大科技支撑项目“陕西半干旱区山地特色果品综合节水技术研究与示范”（2007BAD88B05）

作者	单位
李晓彬	1. 中国科学院教育部水土保持与生态环境研究中心，杨凌 712100；3. 中国科学院研究生院，北京 100049
汪有科	1. 中国科学院教育部水土保持与生态环境研究中心，杨凌 712100；2. 西北农林科技大学水土保持研究所，杨凌 712100
张 平	1. 中国科学院教育部水土保持与生态环境研究中心，杨凌 712100；3. 中国科学院研究生院，北京 100049

中文摘要:

为了揭示梨枣树生育期茎直径日最大收缩量MDS变化规律和生长发育的关系以及MDS主要气象影响因子，该文以三年生大田梨枣树为试材，研究了在充分灌溉条件下茎杆直径的动态变化过程，并对茎杆最大日收缩量（MDS）与参考作物蒸发蒸散量（ET0）、日平均温度（Tm）、日正午温度（Tmd）、水汽压亏缺日均值（VPDm）、正午水汽压亏缺值（VPDmd）、太阳辐射（Rs)等气象因子之间的通径系数进行了分析。目的是为实现以MDS模拟方程进行精确灌溉的现代节水灌溉技术提供参考依据。结果表明：梨枣树生命活动量与气象因素的波动性会影响到MDS的波动性，是茎直径变化的主要原因，在生产实践中，可以通过修剪消弱梨枣树生命活动量来减小梨枣树无效蒸腾，提高水分利用率。茎直径日最大值（MXTD）、茎直径日最小值（MNTD）随时间具有增大的趋势，MNTD呈现波折型动态变化，MXTD则呈现平缓型动态变化，MNTD的波动强度大于MXTD。Tm、VPDm、Rs对MDS的变化有正向的线性影响，为决策变量，而VPDm、Rs是影响MDS的主要决策变量。ET0、Tmd、VPDmd对MDS的影响是负向的，为限制变量，但作用不显著。从VPDm、Rs作为影响MDS变化的重要气象因子分析得出，可通过控温控光来影响梨枣树生长发育程度，并且在建立MDS模拟方程指导灌溉时需要重点考虑两因子的作用。试验中，还有一些未考虑进来的重要因素影响MDS值，这些因素可能主要包括未考虑在内的其他气象因子(如相对湿度和日温差等)、测量上的误差以及梨枣树生育期与物候期等，有待进一步研究。

英文摘要:

To reveal the relationship between the variation of the maximum daily shrinkage (MDS) and the growth and development characteristics of pear jujube trees, field experiments were conducted to study the dynamic characteristics of trunk diameter for 3-year-old pear jujube with full irrigation. The path coefficients between MDS and meteorological factors (reference evapotranspiration ET0, daily mean temperature Tm, temperature at midday Tmd, daily mean vapor press deficitVPDm, vapor press deficit at midday VPDmd and net radiatio Rs) were analyzed and the main infuencing factors for precise irrigation schedule using MDS simulation equation were suggested. The results showed that the main reasons for trunk diameter changes were jujube’s life activity and the volatility of the meteorological factors. In practice, the tree’s invalid transpiration amount could be reduced and water use efficiency could be increased by pruning. Minimum daily trunk diameter (MNTD) increased significantly with fluctuation while maximum daily trunk diameter (MXTD) increased gently with time. The fluctuation intensity of MNTD was bigger than that of MXTD. Tm, VPDm and Rs had linear and positive influences on MDS as decision variables, and VPDm and Rs were the principal decision variables. ET0, Tmd and VPDmd were the bound variables which had negative influences on MDS, but the effect was not significant. So pear jujube tree’s growth and development could be improved by controlling temperature and sunshine, and VPDm and Rs should be given more consideration when establishing MDS simulation equations for precise irrigation. Some important factors that influenced MDS were not considered and these factors might include the other meteorological factors (such as relative humidity and daily temperature difference), the error of measuring and the phonological period and growth period of jujube, which were worth of further attention in further experiments.

查看全文 下载PDF阅读器

关闭