中国农业工程学会
Chinese Society of Agricultural Engineering

农业工程学报
Transactions of the Chinese Society of Agricultural Engineering

首页 中文首页 政策法规 学会概况 学会动态 学会出版物 学术交流 行业信息 科普之窗 表彰奖励 专家库 咨询服务 会议论坛

首页 | 简介 | 作者 | 编者 | 读者 | Ei(光盘版)收录本刊数据 | 网络预印版 | 点击排行前100篇

基于改进双链量子遗传算法的投影寻踪调亏灌溉综合评价

Comprehensive evaluation of regulated deficit irrigation using projection pursuit model based on improved double chains quantum genetic algorithm

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中文摘要：

　　针对调亏灌溉方案优选过程中存在单项指标的灌溉优劣评估结果单一和难以客观评价灌溉综合效益等问题，该文提出了基于双链量子遗传算法的投影寻踪综合评价模型。该模型利用双链量子遗传算法优化投影指标函数寻求最佳投影方向，同时通过矢量距浓度筛选进入搜索空间的量子染色体，以及在进化过程中逐步优化、压缩搜索空间对双链量子遗传算法进行改进。将改进双链量子遗传算法的投影寻踪模型对玉米各调亏灌溉方案进行综合评价，评价结果表明苗期水分亏缺程度为田间持水量50%～60%的处理是最佳调亏灌溉方案，产量与水分利用效率比正常灌溉处理分别提高了6.4%、10.8%。改进后的模型全局搜索能力与优化效率得到了显著提高。

英文摘要：

　　Due to the incompatibility of irrigation results for single evaluation index and difficulty in evaluating the comprehensive benefit objectively during the process of optimization choice of irrigation schemes, the project pursuit model based on improved double chains quantum genetic algorithm was proposed and applied to the comprehensive evaluation of regulated deficit irrigation. Double chains quantum genetic algorithm was introduced to optimize the projection index function and seek the optimum projection vector, and it was improved by selecting out quantum chromosomes in the search space through the vector distance concentration, gradually optimizing and compressing the search space during the process of evolution. The improved projection pursuit model was applied to comprehensively evaluate deficit irrigation schemes for maize. The results showed that maintaining the level of water deficit 50%-60% of the field capacity at the seedling stage of maize was the best irrigation scheme. Compared with the normal irrigation treatment, the yield was increased by 6.4% and the water use efficiency was increased by 10.8%. Both the global search capability and optimization efficiency of the improved projection pursuit model were significantly improved.

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