

农业工程学报

TRANSACTIONS OF THE CHINESE SOCIETY OF AGRICULTURAL ENGINEERING

二〇二一年七月

第三十七卷

第十三期

中国农业工程学会

《中文核心期刊要目总览》收录
Ei Compendex(核心版)收录
百种中国杰出学术期刊
RCCSE中国权威学术期刊



ISSN 1002-6819
CN 11-2047/S
CODEN NGOXEO
www.tcsae.org

农业工程学报

NONGYE
GONGCHENG
XUEBAO

TRANSACTIONS OF THE CHINESE SOCIETY
OF AGRICULTURAL ENGINEERING

2021年 13
第37卷 VOL. 37

海洋渔业综合科学调查船



中国科学技术协会 主管

中国农业工程学会 主办

农业工程学报

2021年7月第13期 总第413期(第37卷)

目次

• 农业装备工程与机械化 •

- 基于离散元法的免耕深施肥分段式玉米播种开沟器研制
..... 赵淑红, 刘汉朋, 侯磊涛, 张鑫, 袁溢文, 杨悦乾 (1)
- 履带式坡地玉米收获机设计与试验
..... 耿端阳, 孙延成, 李华彪, 牟孝栋, 张国栋, 王宗源, 鹿秀凤 (11)
- 辣椒穴盘苗自动移栽机设计与试验
..... 韩长杰, 肖立强, 徐阳, 张静, 李洪雷 (20)
- 四轮独立电驱动高地隙喷雾机辅助转向系统设计与试验
..... 刘慧, 龙友能, 何思伟, 崔业民, 沈跃 (30)
- 油菜宽幅播种作业监测系统设计与试验
..... 丁幼春, 陈礼源, 董万静, 王万超, 刘晓东, 王凯阳, 刘伟鹏 (38)
- 罗非鱼初加工喂入量监测与运行参数在线控制
..... 张超, 黄剑彬, 成芳 (46)

• 农业水土工程 •

- 再生水灌溉对亚热带典型土壤干缩裂缝演变特征的影响
..... 王玮, 王辉, 陈潇岳, 谭帅, 胡传旺 (55)
- 干旱区引水灌区灌溉退水计算方法
..... 介飞龙, 费良军, 李山, 朱红艳, 郝琨, 刘利华 (66)
- 基于机器学习和全极化雷达数据的干旱区土壤湿度反演
..... 杨丽萍, 侯成磊, 苏志强, 白宇兴, 王彤, 冯瑞 (74)
- 黄淮海旱作区土壤压实度空间分布特征及其影响因素
..... 李勇, 赵云泽, 勾宇轩, 黄元仿 (83)
- 青海高寒区典型植被地表径流及氮磷流失特征
..... 黄薇, 王冬梅, 李平, 刘若莎 (92)
- 沙区光伏阵列对近地层风沙输移的干扰效应
..... 唐国栋, 蒙仲举, 高永, 党晓宏, 史芮嘉 (101)
- 基于 LMDI 方法的恩施州化肥施用驱动因素分析
..... 毛中明, 杨豪毅, 刘陈思雨, 马珠 (111)
- 受降雨影响的浅水泥沙颗粒起动规律
..... 肖克, 杨奉广, 聂锐华, 黄尔, 王协康, 刘兴年, 彭清娥 (121)

• 农业信息与电气技术 •

- 浙江省近海渔运船转载信息提取
..... 范秀梅, 张胜茂, 崔雪森, 杨胜龙 (128)
- 利用机器学习算法的海洋渔船捕捞能力影响因素权重分析
..... 吕超, 孙佳新, 刘爽 (135)
- 基于混合 3D-2D CNN 的多时相遥感农作物分类
..... 卢元兵, 李华朋, 张树清 (142)
- 基于机器学习的棉花叶面积指数监测
..... 马怡茹, 吕新, 易翔, 马露露, 祁亚琴, 侯彤瑜, 张泽 (152)
- 利用 Stacking 集成学习估算柑橘叶片氮含量
..... 吴彤, 李勇, 葛莹, 刘凌杰, 席顺忠, 任孟杰, 袁晓慧, 庄翠珍 (163)

利用 FL-DGCNN 模型估测绿萝叶片外部表型参数

..... 陈 玲, 王浩云, 肖海鸿, 马仕航, 杨 瑶, 徐焕良 (172)

• 农业生物环境与能源工程 •

复合纳米材料修饰丝网印刷电极检测土壤中铅和镉

..... 刘 宁, 赵 国, 王旭明, 刘 刚 (180)

考虑薄膜积灰的日光温室前屋面采光效率模型构建及应用

..... 张 锐, 刘一川, 朱德兰, 葛茂生 (190)

利用 Elman 神经网络的华北棚型日光温室室内环境要素模拟

..... 程 陈, 冯利平, 董朝阳, 宫志宏, 刘 涛, 黎贞发 (200)

猪场沼液 UF-MBR+RO 处理工艺浓缩液回流的盐积累模型

..... 蒋小妹, 李 俊, 王炯科, 伍佩珂, 邓良伟, 王文国 (209)

基于玉米秸秆滤料的养禽冲洗废水过滤技术

..... 关正军, 尹 恒, 韩 威, 章恬恬, 吴应涛, 陈科昭 (216)

Fe₂O₃-TiO₂/UV/O₃+PSAF 协同处理猪场废水效果及其除碳脱氮机制

..... 肖艳春, 陈 彪, 黄 婧, 刘瑞来 (224)

• 土地保障与生态安全 •

治理视角下村镇建设资源环境承载力综合评估

..... 黄 安, 田 莉, 于江浩, 高 原, 李永浮, 李 晴, 熊彬宇 (232)

基于特征优选决策树模型的河套灌区土地利用分类

..... 孙亚楠, 李仙岳, 史海滨, 崔佳琪, 马红雨, 王维刚 (242)

基于 PSR 模型的中国人地关系协调发展时空格局及其影响因素

..... 张博胜, 杨子生 (252)

• 农产品加工工程 •

超声预处理对猕猴桃水分状态及热风干燥特性的影响

..... 苑丽婧, 何 秀, 林 蓉, 程沙沙 (263)

采后褪黑素处理对鲜切花椰菜保鲜品质及货架期的影响 (英文)

..... 薛建新, 王 凯, 李泽珍, 张淑娟, 穆炳宇, 李紫辉, 黄 亮, 赵华民, 孙海霞 (273)

秸秆-薯渣混合物料应力松弛分数阶模型的建立及参数分析

..... 郭文斌, 王志鹏, 候智博, 胡 凡, 王春光, 齐文静 (284)

油脂预乳化提高大豆拉丝蛋白素食香肠品质

..... 陈 林, 陈 维, Rammile Ettelaie, 吴进莲 (291)

茶叶添加方式对酿造啤酒理化特性及感官品质的影响

..... 倪敬田, 夏 鹏, 代浩东, 王少震, 朱辰文, 蒋 军, 陈 琪, 高学玲 (299)

高压均质-冷冻干燥技术制备大豆分离蛋白微粒及其功能特性

..... 肖志刚, 王依凡, 王可心, 段庆松, 朱昱鹏, 霍金杰, 江睿生, 李 航, 何 东, 高育哲 (306)

• 专题论坛 •

“绿色”引领下东北地区秸秆产业发展长效机制解析

..... 丛宏斌, 孟海波, 于佳动, 叶炳南, 姚宗路, 冯 晶, 于炳驰, 秦 超,
霍丽丽, 袁艳文, 代敏怡, 李丽洁, 沈玉君, 赵立欣 (314)

全国县域乡村产业发展状况及其就业带动潜力评价

..... 杨亚东, 程长林, 杜娅婷, 巨章宏, 张 晴 (322)

致谢: 感谢中国水产科学研究院东海水产研究所提供的封面图片“海洋渔业综合科学调查船”。

Transactions
of the Chinese Society of Agricultural Engineering
Vol.37 No.13 (Total No.413) July 2021
CONTENTS

• Agricultural Equipment Engineering and Mechanization •

- Development of deep fertilizing no-tillage segmented maize sowing opener using discrete element method
..... *Zhao Shuhong, Liu Hanpeng, Hou Leitao, Zhang Xin, Yuan Yiwen, Yang Yueqian* (1)
- Design and experiment of crawler corn harvester for sloping fields
..... *Geng Duanyang, Sun Yancheng, Li Huabiao, Mou Xiaodong, Zhang Guodong, Wang Zongyuan, Lu Xiufeng* (11)
- Design and experiment of the automatic transplanter for chili plug seedlings
..... *Han Changjie, Xiao Liqiang, Xu Yang, Zhang Jing, Li Honglei* (20)
- Design and experiment of the auxiliary steering system for a four-wheel independent electrically driven high clearance sprayer
..... *Liu Hui, Long Youneng, He Siwei, Cui Yemin, Shen Yue* (30)
- Design and experiment of the sowing monitoring system for a wide-width rapeseed planter
..... *Ding Youchun, Chen Liyuan, Dong Wanjing, Wang Wanchao, Liu Xiaodong, Wang Kaiyang, Liu Weipeng* (38)
- Monitoring of feeding rate and online control of parameters in primary processing of Tilapia
..... *Zhang Chao, Huang Jianbin, Cheng Fang* (46)

• Soil and Water Engineering •

- Effects of reclaimed water irrigation on the evolution characteristics of desiccation crack of typical subtropical zone soils
..... *Wang Wei, Wang Hui, Chen Xiaoyue, Tan Shuai, Hu Chuanwang* (55)
- Calculation method for irrigation return flow in a water diversion irrigation district of arid areas
..... *Jie Feilong, Fei Liangjun, Li Shan, Zhu Hongyan, Hao Kun, Liu Lihua* (66)
- Soil moisture inversion in arid areas by using machine learning and fully polarimetric SAR imagery
..... *Yang Liping, Hou Chenglei, Su Zhiqiang, Bai Yuxing, Wang Tong, Feng Rui* (74)
- Spatial distribution characteristics and influence factors of degree of compaction in dry-farming Huang-Huai-Hai Plain of China
..... *Li Yong, Zhao Yunze, Gou Yuxuan, Huang Yuanfang* (83)
- Characteristics of surface runoff and nitrogen and phosphorus loss for different vegetation covers in Qinghai alpine region of China
..... *Huang Wei, Wang Dongmei, Li Ping, Liu Ruosha* (92)

Interference effect of solar photovoltaic array on near surface aeolian sand transport in sandy areas
 *Tang Guodong, Meng Zhongju, Gao Yong, Dang Xiaohong, Shi Ruijia* (101)

Analysis of driving factors of chemical fertilizer application by LMDI method at Enshi of Hubei Province in China
 *Mao Zhongming, Yang Haoyi, Liu Chensiyu, Ma Zhu* (111)

Incipient law of sediment particles in shallow water affected by rainfall
 *Xiao Ke, Yang Fengguang, Nie Ruihua, Huang Er, Wang Xiekang, Liu Xingnian, Peng Qing'e* (121)

• Agricultural Information and Electrical Technologies •

Extraction of transshipment information of offshore fish carrier vessels in Zhejiang Province of China
 *Fan Xiumei, Zhang Shengmao, Cui Xuesen, Yang Shenglong* (128)

Weight analysis of influencing factors of fishing capacity of marine fishing vessels using machine learning algorithm
 *Lyu Chao, Sun Jiabin, Liu Shuang* (135)

Multi-temporal remote sensing based crop classification using a hybrid 3D-2D CNN model
 *Lu Yuanbing, Li Huapeng, Zhang Shuqing* (142)

Monitoring of cotton leaf area index using machine learning
 *Ma Yiru, Lyu Xin, Yi Xiang, Ma Lulu, Qi Yaqin, Hou Tongyu, Zhang Ze* (152)

Estimation of nitrogen contents in citrus leaves using Stacking ensemble learning
 *Wu Tong, Li Yong, Ge Ying, Liu Lingjie, Xi Shunzhong, Ren Mengjie, Yuan Xiaohui, Zhuang Cuizhen* (163)

Estimation of external phenotypic parameters of Bunting leaves using FL-DGCNN model
 *Chen Ling, Wang Haoyun, Xiao Haihong, Ma Shihang, Yang Yao, Xu Huanliang* (172)

• Agricultural Bioenvironmental and Energy Engineering •

Detection of lead and cadmium in soil using composite nanomaterials modified screen-printed electrode
 *Liu Ning, Zhao Guo, Wang Xuming, Liu Gang* (180)

Establishment and application of daylighting efficiency model for the front roof covered with dust film in solar greenhouses
 *Zhang Rui, Liu Yichuan, Zhu Delan, Ge Maosheng* (190)

Simulation of inside environmental factors in solar greenhouses using Elman neural network in North China
 *Cheng Chen, Feng Liping, Dong Chaoyang, Gong Zhihong, Liu Tao, Li Zhenfa* (200)

Salt accumulation model for the reflux of membrane concentrate from piggery liquid digestate UF-MBR+RO treatment process
 *Jiang Xiaomei, Li Jun, Wang Jiongke, Wu Peike, Deng Liangwei, Wang Wenguo* (209)

Filtration technology of poultry washing wastewater based on maize stover filter media

..... *Guan Zhengjun, Yin Heng, Han Wei, Zhang Tiantian, Wu Yingtao, Chen Kezhao* (216)

Effects and mechanism of carbon and nitrogen removal of wastewater using Fe₂O₃-TiO₂/UV/O₃+PSAF treatment on a swine farm

..... *Xiao Yanchun, Chen Biao, Huang Jing, Liu Ruilai* (224)

• Land Security and Ecological Safety •

Comprehensive assessment of resource and environmental carrying capacity of village and town from the perspective of governance *Huang An, Tian Li, Yu Jianghao, Gao Yuan, Li Yongfu, Li Qing, Xiong Binyu* (232)

Classification of land use in Hetao Irrigation District of Inner Mongolia using feature optimal decision trees

..... *Sun Yanan, Li Xianyue, Shi Haibin, Cui Jiaqi, Ma Hongyu, Wang Weigang* (242)

Spatio-temporal pattern and its influencing factors of coordinated development of man-land relationship in China using PSR model..... *Zhang Bosheng, Yang Zisheng* (252)

• Agricultural Produce Processing Engineering •

Effects of ultrasound pretreatment on water state and hot-air drying characteristics of kiwifruit

..... *Yuan Lijing, He Xiu, Lin Rong, Cheng Shasha* (263)

Influences of post-harvest melatonin treatment on preservation quality and shelf life of fresh-cut cauliflower

..... *Xue Jianxin, Wang Kai, Li Zezhen, Zhang Shujuan, Mu Bingyu, Li Zihui,*

Huang Liang, Zhao Huamin, Sun Haixia (273)

Parameter analysis and development of fractional calculus model for stress relaxation of cornstalk and potato residues

..... *Guo Wenbin, Wang Zhipeng, Hou Zhibo, Hu Fan, Wang Chunguang, Qi Wenjing* (284)

Improving the quality of vegetarian sausage prepared with textured fibril soy protein using oil pre-emulsification

..... *Chen Lin, Chen Wei, Rammile Ettelaie, Wu Jinlian* (291)

Effects of tea addition method on physicochemical characteristics and sensory quality of beer products

..... *Ni Jingtian, Xia Peng, Dai Haodong, Wang Shaozhen, Zhu Chenwen, Jiang Jun, Chen Qi, Gao Xueling* (299)

Preparation and functional properties of soy protein isolate particles by high pressure homogenization-freeze drying technology

..... *Xiao Zhigang, Wang Yifan, Wang Kexin, Duan Qingsong, Zhu Minpeng,*

Huo Jinjie, Jiang Ruisheng, Li Hang, He Dong, Gao Yuzhe (306)

• **Special Forum** •

Analysis of long-term mechanism for development of straw industry in northeast China under guidance of “Green-concept”

.....*Cong Hongbin, Meng Haibo, Yu Jiadong, Ye bingnan, Yao Zonglu, Feng Jing, Yu Bingchi, Qin Chao,*
Huo Lili, Yuan Yanwen, Dai Minyi, Li Lijie, Shen Yujun, Zhao Lixin (314)

Evaluation of national county-level rural industry development condition and its employment driving potential

.....*Yang Yadong, Cheng Changlin, Du Yating, Ju Zhanghong, Zhang Qing* (322)