



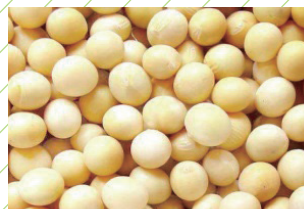
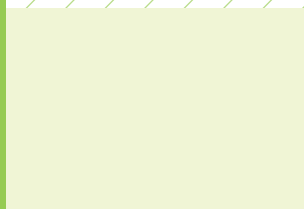
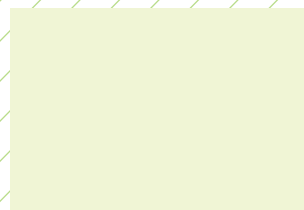
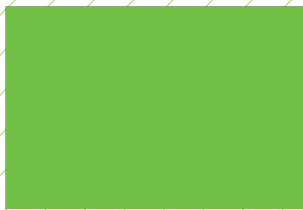
ISSN 0496-3490

CN 11-1809/S

# 作物学报

## ACTA AGRONOMICA SINICA

第49卷 第1期 Vol.49 No. 1



中国作物学会 中国农业科学院作物科学研究所 主办  
Sponsored by Crop Science Society of China and  
Institute of Crop Sciences, CAAS

科学出版社 出版  
Published by Science Press

1  
2023

# 作物学报

(ZUOWU XUEBAO)

第 49 卷 第 1 期 2023 年 1 月

## 目次

### 综述

- 1 营养导向型作物新品种选育与审定现状、问题与展望 朱大洲 武 宁 张 勇 孙君茂 陈萌山
- 12 弱光胁迫影响玉米产量形成的生理机制及调控效应 孙智超 张吉旺

### 作物遗传育种·种质资源·分子遗传学

- 24 大豆 *GmPIN2* 家族基因调控根系发育功能初探 梁 政 柯美玉 陈志威 陈 栩 高 震
- 36 马铃薯 *StMAPKK4* 基因表达分析及互作蛋白筛选与鉴定 濮 雪 王凯彤 张 宁 司怀军
- 46 甘蔗割手密种 *NAC* 转录因子 *ATAF* 亚家族鉴定及栽培品种 *ScNAC2* 基因的功能分析 王恒波 张 畅 吴明星 李 湘 蒋钟莉 林容潇 郭晋隆 阙友雄
- 62 大豆生长节间响应温度和外源 GA 诱导的赤霉素途径关键基因分析 齐阳阳 窦汝娜 赵彩桐 张 帆 李文滨 姜振峰
- 73 向日葵 *DGATs* 基因家族的鉴定及表达分析 张 程 张 展 杨佳宝 孟晚秋 曾令露 孙 黎
- 86 基于 *NCH* 遗传交配设计的籼稻抽穗期全基因组关联分析 徐 凯 郑兴飞 张红燕 胡中立 宁子岚 李兰芝
- 97 甘蔗 *ScPRI0* 基因的克隆及其响应赤条病菌侵染的表达特征分析 李 娟 周敬如 储 娜 孙会东 黄美婷 傅华英 高三基
- 105 应用 *RNA* 重测序分析低硫条件下大豆基因表达谱 王 慧 吴志医 张玉娥 喻德跃
- 119 利用高密度 *Bin* 遗传图谱定位水稻抽穗期 *QTL* 赵 凌 梁文化 赵春芳 魏晓东 周丽慧 姚 姝 王才林 张亚东
- 129 甘薯糖转运蛋白 *IbSWEET15* 的功能研究 吴旭莉 吴正丹 晚传芳 杜 叶 高 艳 李贻萱 王志前 唐道彬 王季春 张 凯
- 140 玉米籽粒淀粉含量全基因组关联分析和候选基因预测 王锐璞 董振营 高悦欣 鲍建喜 殷芳冰 李金萍 龙 艳 万向元
- 153 冷胁迫下甘蓝型冬油菜表达蛋白及 *BnGSTs* 基因家族的鉴定与分析 马 骊 白 静 赵玉红 孙柏林 侯献飞 方 彦 王旺田 蒲媛媛 刘丽君 徐 佳 陶肖蕾 孙万仓 武军艳

### 耕作栽培·生理生化

- 167 气候变化背景下中国不同区域玉米生育期高温胁迫时空变化特征 商蒙非 石晓宇 赵炯超 李 硕 褚庆全
- 177 1991—2019 年美国大豆区试品种(系)农艺和品质性状时空变化特征 白智媛 陈向阳 郑阿香 张 力 邹 军 张大同 陈 阜 尹小刚
- 188 夏玉米根系构型与抗根倒性能间的关系 张 静 王洪章 任 昊 殷复伟 吴红燕 赵 斌 张吉旺 任佰朝 戴爱斌 刘 鹏

|     |                                  |     |     |     |     |     |     |
|-----|----------------------------------|-----|-----|-----|-----|-----|-----|
| 200 | 氮素穗肥对粳米淀粉特性和结构的影响及其与食用特征的关系      | 蒋 岩 | 赵 灿 | 陈 越 | 刘光明 | 赵凌天 | 廖平强 |
|     |                                  | 王维领 | 许 轲 | 李国辉 | 吴文革 | 霍中洋 |     |
| 211 | 施氮量对滴灌春小麦叶片光合生理性状的影响             | 王海琪 | 王荣荣 | 蒋桂英 | 尹豪杰 | 晏世杰 | 车子强 |
| 225 | 氮素缓解花生干旱胁迫的生理和转录调控机制             | 丁 红 | 张智猛 | 徐 扬 | 张冠初 | 郭 庆 | 秦斐斐 |
|     |                                  | 戴良香 |     |     |     |     |     |
| 239 | 施钙量对不同花生荚果发育时期光合碳在植株-土壤系统分配的影响   | 邹晓霞 | 蔺益民 | 赵亚飞 | 刘 燕 | 刘 娟 | 王月福 |
|     |                                  | 王维华 |     |     |     |     |     |
| 249 | 不同形态氮肥下丛枝菌根真菌对玉米灌浆期生理特性及产量和品质的影响 | 陈冰洁 | 张富粮 | 杨 硕 | 李晓立 | 何堂庆 | 张晨曦 |
|     |                                  | 田明慧 | 吴 梅 | 郝晓峰 | 张学林 |     |     |
| 262 | 马铃薯块茎末端糖化适应性、稳定性及薯条加工型品种(系)筛选    | 段惠敏 | 王 郁 | 程李香 | 撒 刚 | 夏露露 | 张 峰 |

研究简报

|     |                                   |     |     |     |     |     |     |
|-----|-----------------------------------|-----|-----|-----|-----|-----|-----|
| 277 | 花后叶面喷施尿素对冬小麦氮素吸收利用和产量的影响          | 陈嘉军 | 林 祥 | 谷淑波 | 王威雁 | 张保军 | 朱俊科 |
|     |                                   | 王 东 |     |     |     |     |     |
| 286 | 不同小麦品种旗叶叶绿素含量、叶片显微结构及产量对花后遮光的响应机制 | 李 秀 | 李刘龙 | 李慕嵘 | 尹立俊 | 王小燕 |     |

# ACTA AGRONOMICA SINICA

Vol. 49 No. 1 January 2023

## CONTENTS

### REVIEWS

- |    |                                                                                                                |                                                                   |
|----|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1  | Current situation, issues, and prospects of breeding and approval of new varieties of nutrition-oriented crops | ZHU Da-Zhou, WU Ning, ZHANG Yong, SUN Jun-Mao, and CHEN Meng-Shan |
| 12 | Physiological mechanism and regulation effect of low light on maize yield formation                            | SUN Zhi-Chao and ZHANG Ji-Wang                                    |

### CROP GENETICS & BREEDING • GERMPLASM RESOURCES • MOLECULAR GENETICS

- |     |                                                                                                                                                                                          |                                                                                                                                                                 |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 24  | Function of GmPIN2 family gene in regulating root development in soybean                                                                                                                 | LIANG Zheng, KE Mei-Yu, CHEN Zhi-Wei, CHEN Xu, and GAO Zhen                                                                                                     |
| 36  | Relative expression analysis of <i>StMAPKK4</i> gene and screening and identification of its interacting proteins in potato ( <i>Solanum tuberosum</i> L.)                               | PU Xue, WANG Kai-Tong, ZHANG Ning, and SI Huai-Jun                                                                                                              |
| 46  | Genome-wide identification of NAC transcription factors ATAF subfamily in <i>Saccharum spontaneum</i> and functional analysis of its homologous gene <i>ScNAC2</i> in sugarcane cultivar | WANG Heng-Bo, ZHANG Chang, WU Ming-Xing, LI Xiang, JIANG Zhong-Li, LIN Rong-Xiao, GUO Jin-Long, and QUE You-Xiong                                               |
| 62  | Analysis of key genes involved in GA pathway responding to temperature and exogenous GA related to internode development in soybean                                                      | QI Yang-Yang, DOU Ru-Na, ZHAO Cai-Tong, ZHANG Zhi, LI Wen-Bin, and JIANG Zhen-Feng                                                                              |
| 73  | Genome-wide identification and relative expression analysis of DGATs gene family in sunflower                                                                                            | ZHANG Cheng, ZHANG Zhan, YANG Jia-Bao, MENG Wan-Qiu, ZENG Ling-Lu, and SUN Li                                                                                   |
| 86  | Genome-wide association analysis of <i>indica</i> -rice heading date based on NCII genetic mating design                                                                                 | XU Kai, ZHENG Xing-Fei, ZHANG Hong-Yan, HU Zhong-Li, NING Zi-Lan, and LI Lan-Zhi                                                                                |
| 97  | Gene cloning and expression analysis of <i>ScPR10</i> in sugarcane under <i>Acidovorax avenae</i> subsp. <i>avenae</i> infection                                                         | LI Juan, ZHOU Jing-Ru, CHU Na, SUN Hui-Dong, HUANG Mei-Ting, FU Hua-Ying, and GAO San-Ji                                                                        |
| 105 | Transcriptional expression profiling of soybean genes under sulfur-starved conditions by RNA-seq                                                                                         | WANG Hui, WU Zhi-Yi, ZHANG Yu-E, and YU De-Yue                                                                                                                  |
| 119 | Mapping of QTLs for heading date of rice with high-density bin genetic map                                                                                                               | ZHAO Ling, LIANG Wen-Hua, ZHAO Chun-Fang, WEI Xiao-Dong, ZHOU Li-Hui, YAO Shu, WANG Cai-Lin, and ZHANG Ya-Dong                                                  |
| 129 | Functional identification of sucrose transporter protein IbSWEET15 in sweet potato                                                                                                       | WU Xu-Li, WU Zheng-Dan, WAN Chuan-Fang, DU Ye, GAO Yan, LI Ze-Xuan, WANG Zhi-Qian, TANG Dao-Bin, WANG Ji-Chun, and ZHANG Kai                                    |
| 140 | Genome-wide association study and candidate gene prediction of kernel starch content in maize                                                                                            | WANG Rui-Pu, DONG Zhen-Ying, GAO Yue-Xin, BAO Jian-Xi, YIN Fang-Bing, LI Jin-Ping, LONG Yan, and WAN Xiang-Yuan                                                 |
| 153 | Protein and physiological differences under cold stress, and identification and analysis of <i>BnGSTs</i> in <i>Brassica napus</i> L.                                                    | MA Li, BAI Jing, ZHAO Yu-Hong, SUN Bo-Lin, HOU Xian-Fei, FANG Yan, WANG Wang-Tian, PU Yuan-Yuan, LIU Li-Jun, XU Jia, TAO Xiao-Lei, SUN Wan-Cang, and WU Jun-Yan |



## TILLAGE & CULTIVATION • PHYSIOLOGY & BIOCHEMISTRY

- 167 **Spatiotemporal variation of high temperature stress in different regions of China under climate change** SHANG Meng-Fei, SHI Xiao-Yu, ZHAO Jiong-Chao, LI Shuo, and CHU Qing-Quan
- 177 **Spatial-temporal variations for agronomic and quality characters of soybeans varieties (strains) tested in America from 1991 to 2019** BAI Zhi-Yuan, CHEN Xiang-Yang, ZHENG A-Xiang, ZHANG Li, ZOU Jun, ZHANG Da-Tong, CHEN Fu, and YIN Xiao-Gang
- 188 **Relationship between root architecture and root pulling force of summer maize** ZHANG Jing, WANG Hong-Zhang, REN Hao, YIN Fu-Wei, WU Hong-Yan, ZHAO Bin, ZHANG Ji-Wang, REN Bai-Zhao, DAI Ai-Bin, and LIU Peng
- 200 **Effects of nitrogen panicle fertilizer application on physicochemical properties and fine structure of *japonica* rice starch and its relationship with eating quality** JIANG Yan, ZHAO Can, CHEN Yue, LIU Guang-Ming, ZHAO Ling-Tian, LIAO Ping-Qiang, WANG Wei-Ling, XU Ke, LI Guo-Hui, WU Wen-Ge, and HUO Zhong-Yang
- 211 **Effect of amount of nitrogen fertilizer applied on photosynthetic physiological characteristics of drip irrigated spring wheat leaves** WANG Hai-Qi, WANG Rong-Rong, JIANG Gui-Ying, YIN Hao-Jie, YAN Shi-Jie, and CHE Zi-Qiang
- 225 **Physiological and transcriptional regulation mechanisms of nitrogen alleviating drought stress in peanut** DING Hong, ZHANG Zhi-Meng, XU Yang, ZHANG Guan-Chu, GUO Qing, QIN Fei-Fei, and DAI Liang-Xiang
- 239 **Effects of calcium application on the distribution of photosynthetic carbon in plant-soil system at different peanut pod development stages** ZOU Xiao-Xia, LIN Yi-Min, ZHAO Ya-Fei, LIU Yan, LIU Juan, WANG Yue-Fu, and WANG Wei-Hua
- 249 **Effects of arbuscular mycorrhizae fungi on maize physiological characteristics during grain filling stage, yield, and grain quality under different nitrogen fertilizer forms** CHEN Bing-Jie, ZHANG Fu-Liang, YANG Shuo, LI Xiao-Li, HE Tang-Qing, ZHANG Chen-Xi, TIAN Ming-Hui, WU Mei, HAO Xiao-Feng, and ZHANG Xue-Lin
- 262 **Tuber sugar-end adaptability, stability, and screening of French fries processing varieties in potato** DUAN Hui-Min, WANG Yu, CHENG Li-Xiang, SA Gang, XIA Lu-Lu, and ZHANG Feng

## RESEARCH NOTES

- 277 **Effects of foliar spraying of urea post anthesis on nitrogen uptake and utilization and yield in winter wheat** CHEN Jia-Jun, LIN Xiang, GU Shu-Bo, WANG Wei-Yan, ZHANG Bao-Jun, ZHU Jun-Ke, and WANG Dong
- 286 **Effects of shading postanthesis on flag leaf chlorophyll content, leaf microstructure and yield of different wheat varieties** LI Xiu, LI Liu-Long, LI Mu-Rong, YIN Li-Jun, and WANG Xiao-Yan