



*Journal of Zhejiang  
University-SCIENCE B*

**Editors-in-Chief**

Shumin DUAN  
Zhihong LIU

**Administrated by**

Ministry of Education, China

**Sponsored by**

Zhejiang University

**Published by**

Zhejiang University Press

**Edited by**

Editorial Office of *Journal of  
Zhejiang University-SCIENCE*

**Printed by**

Hangzhou Qianjiang Color  
Printing Co., Ltd.

**Publication Date**

1st Week per Month

**Subscription**

Tel: +86-571-87952783;  
E-mail: yangsq@zju.edu.cn;  
Postal distributing code: 32-323

**Contact**

Zhejiang University Press,  
148 Tianmushan Road,  
Hangzhou 310028, China;  
Tel: +86-571-88276199;  
E-mail: jzus\_b@zju.edu.cn

**Price**

100 CNY/Issue

**ISSN 1673-1581**

**CN 33-1356/Q**

# CONTENTS

## Special Issue on

### AI in Plant Phenotyping: From Cells to Fields

Guest Editors-in-Chief: Zhenhai LI, Kun WANG, Xuping FENG

## Editorial

- 431 Advancing multi-scale plant phenotyping for precision agriculture and sustainable crop production

Xuping FENG, Zhenhai LI, Kun WANG

## Research Articles

- 437 Optimized substrate selection for enhanced orchid growth based on high-throughput lysimetric arrays

Jia YAO, Xubo KE, Xinyue GU, Zhihan JIANG, Zhengzheng YING, Chenze LU, Chongbo SUN, Pei XU

- 450 Improved lightweight convolutional neural network models for the detection and evaluation of Fusarium head blight in wheat

Wang ZHANG, Yi REN, Zidi GUO, Han LI, Man ZHANG, Jie LIU, Ruicheng QIU

- 466 Embedding of ripening topology into one-stage detection for tomato cluster phenotyping

Bingquan CHU, Ruiyuan WU, Haijun ZHANG, Haochuan QIN, Zishun PENG, Fengle ZHU, Yong HE

- 482 Improving RGB image recognition in the YOLO11n algorithm for accurate detection of tea plant diseases

Jinxian TAO, Xiaoli LI, Jingfei ZHANG, Muhammad SHOAI B, Muhammad Adnan ISLAM, Ibrar AHMAD, Yong HE, Sitan YE, Yujie WANG, Binhui LIAO, Mostafa GOUDA

- 499 Enhancing rapeseed biomass and yield estimation with ensemble learning and synergistic multidimensional features

Yanni ZHANG, Xiaoyu CHAI, Jinpeng HU, Yaxiao NIU, Lizhang XU

- 517 RCTUnet: a deep learning model for crop-residue-soil image segmentation and crop residue cover extraction

Ting LI, Yang LIU, Haikuan FENG, Meiyuan SHU, Hao YANG, Yuanyuan FU, Xin XU, Yinghao LIN, Hongbo QIAO, Wei GUO, Xinming MA, Lei SHI, Jibo YUE

- 537 Deep learning-based phenology extraction and crop classification in arid oasis using Sentinel-2 time series

Chunli WANG, Jianan CHI, Xiao ZHANG, Nannan ZHANG

**English Consultants** Greg JERKOVICH (Hungary), Alan SEAL (NZ),  
Clarence SINGLETON (UK)

**Executive Editors** Qing YE, Hanfeng LIN