

中文核心期刊  
中国科技核心期刊  
中国农林核心期刊  
RCCSE 中国权威学术期刊  
《中国科学引文数据库》C 库期刊  
《CAJ-CD 规范》执行优秀期刊  
中国科协精品科技期刊工程项目

**草地学报**  
**CAODI XUEBAO**  
**ACTA AGRESTIA SINICA**

第 05 期

第 31 卷

2023 年 5 月

1991 年创刊(月刊)

主管:中国科学技术协会

主办:中国草学会

主 编:王 翘

编 辑 部 主 任:邵新庆

责 任 编 辑:闵芝智,刘婷婷,  
彭露茜

英 文 编 辑:刘克思,张万军,  
王克华

编 务:葛慧荣

编辑出版:《草地学报》编辑部

地址:北京海淀区圆明园西路 2 号

中国农业大学动科大楼 152 室

邮编:100193

电话/传真:(010)62733894

E-mail:cdxb@cau.edu.cn

网址:<http://www.cdxb.org>

印刷:北京科信印刷有限公司

国内总发行:北京报刊发行局

订阅:全国各地邮局(所)

国内邮发代号:80-135

国内每册定价:55.00 元

国外总发行:中国国际图书贸易  
总公司

国外发行代号:MO1949

中国标准连续出版物号:

ISSN 1007-0435

CN 11-3362/S

基本参数:

CN11-3362/S \* 1991 \* b \* A<sub>4</sub>

\* 326 \* zh \* P \* 55.00 \* 260

\* 35 \* 2023-05

# 目 次

## 专论与进展

碳达峰、碳中和目标下草原增汇路径的思考 ..... 赵金龙, 刘永杰, 韩丰泽(1273)

国内外草原调查监测历程与展望 ..... 常生华, 王蕾, 姜佳昌, 等(1281)

非生物胁迫下牧草抗逆性研究进展 ..... 黄小芳, 石培礼, 余成群, 等(1293)

## 研究论文

模拟增温和放牧对高寒草甸主要植物生态位及种间联结的影响 ..... 尹正辉, 陈新丰, 拉多(1302)

棘孢木霉 152-42 诱导多年生黑麦草抗褐斑病的机理初探 ..... 唐若怡, 王柏森, 董纯辛, 等(1314)

不同氮化合物添加对农牧交错带草地土壤净氮矿化速率的影响 ..... 张祚恩, 刁华杰, 郝杰, 等(1322)

紫花苜蓿 MsMYB33 基因克隆、亚细胞定位及转录自激活检测 ..... 王欣怡, 王晓倩, 刘亚玲, 等(1331)

土壤灭菌与水分处理下糙毛以礼草苗期根鞘和根系生长的关系分析 ..... 张雯露, 丁忠阳, 汪辉, 等(1338)

大叶落地生根 KdSRG1 基因的克隆、表达分析及自激活检测 ..... 荣雅琳, 潘佳妮, 王梦迪, 等(1349)

不同治沙措施对土壤细菌群落多样性及理化性质的影响 ..... 王安林, 马瑞, 马彦军, 等(1359)

干旱胁迫对草地早熟禾叶片显微结构和光合特征的影响 ..... 岑慧芳, 钱文武, 朱慧森, 等(1368)

毛乌素沙地西南缘柠条锦鸡儿叶解剖结构策略轴对年限的响应 ..... 马龙, 杨钧, 杨君珑, 等(1378)

细叶小檗生理、光合特性及叶表微形态对干旱胁迫的响应 ..... 黄荣雁, 孟维珊, 朱琨, 等(1386)

辉河湿地河岸带土壤微生物群落组成与土壤理化关系 ..... 刘晶晶, 李金花, 季燕, 等(1393)

若尔盖高寒补播草地燕麦根际促生菌的筛选及促生特性研究 ..... 王振龙, 杜江, 牛勇, 等(1406)

21 种热带园林植物废弃物饲用价值评定 ..... 陈婷, 刘悦, 孙蓉, 等(1414)

20 份紫花苜蓿种质对黄萎病的抗性评价 ..... 陈超超, 李贺洋, 闫雨欣, 等(1425)

85 份不同类型籽粒苋种质资源表型多样性分析 ..... 郑春林, 喻望晨, 刘宁芳, 等(1435)

降水变化下红砂凋落物分解对干旱荒漠区土壤化学计量特征的影响 ..... 张亚强, 解婷婷, 梁冠军(1445)

返青期休牧对高寒草甸植物品质与碳氮磷化学计量比的影响 ..... 谢乐乐, 王晓丽, 马源, 等(1454)

外源油菜素内酯引发对劣变燕麦种子抗氧化特性的影响 ..... 王勃, 夏方山, 董秋丽, 等(1461)

青藏高原高寒地区无芒雀麦种质资源生产性能评价筛选 ..... 刘慢, 秦燕, 刘文辉, 等(1469)

温带草原围封对植物群落的影响 ..... 孙崇之, 唐士明, 王珍, 等(1481)

黄土丘陵区生物多样性与生态系统功能响应关系的分析 ..... 魏嘉琪, 郑诚, 崔梦莹, 等(1490)

180 份饲用燕麦种质资源表型遗传多样性研究 ..... 武敬也, 马琳, 吴欣明, 等(1501)

增温施氮对尕海湿地区沼泽草甸 N<sub>2</sub>O 排放的影响 ..... 许广帅, 马维伟, 常文华, 等(1511)

“碳中和”下光伏对西北荒漠生态因子与植被分布的影响 ..... 乔圣超, 喻朝庆, 黄逍, 等(1520)

祁连山国家公园不同退化高寒草甸植物与土壤特性研究 ..... 赵帅, 杨文权, 蔺宝珺, 等(1530)

基于外部性理论构建草地生态产品价值实现制度体系 ..... 丁玎, 任亮(1539)

## 技术研究

混播人工草地建植初期对黑土滩植被和土壤的恢复效果 ..... 常涛, 李珊, 李以康, 等(1546)

播种方式和密度对青海草地早熟禾建植初期植株的影响 ..... 景美玲, 李积雅, 杨增增, 等(1556)

复合发酵剂对葵花副产物发酵品质及瘤胃降解率的影响 ..... 李肖, 陈永成, 黄嵘峥, 等(1564)

华北平原区饲用小黑麦与褐色中脉高丹草复种模式研究 ..... 武瑞鑫, 石霞, 贾文娟, 等(1571)

生物炭和接种剂配施对紫花苜蓿生物量和土壤特征的影响 ..... 路文杰, 吴聪, 齐晋云, 等(1578)

植物生长调节剂对发草种子产量及产量构成因素的影响 ..... 何斌, 刘颖, 马玉寿(1588)

# 欢迎投稿 欢迎订阅

《草地学报》是中国科协主管、中国草学会主办、中国农业大学承办的学术刊物，是了解草地科学前沿科技、创新成果和草业发展的重要窗口。刊登国内外草地科学研究及相关领域的研究成果、新理论、新进展，以研究论文为主，兼发少量专稿、综述、简报和博士论文摘要，主要面向从事草地科学、草地生态、草地畜牧业和草坪业及相关领域的高校师生和科研院、所、站的科研人员。稿件要求详见本刊《投稿须知》。

《草地学报》被国内外多家重要检索机构收录，入编北京大学图书馆和北京高校图书馆期刊工作研究会主持完成的《中文核心期刊要目总览》(2020 年版)，2020 年复合影响因子为 2.238(据中信所 2021 版《中国科技期刊引证报告(核心版)》)。

本刊逢月末出版，国内外公开发行。国内邮发代号:80-135；国外代号:MO1949。每期定价 55 元，全年 660 元。若错过邮订时间，可直接向本刊编辑部订购(中国草学会会员订阅可优惠 30%)。

开户名:中国草学会 开户行:北京农商银行海淀新区支行农大分理处  
账号:0407030103000000056

No. 5, 2023

Vol. 31

Started in 1991 (Monthly)

**Administration Agency**China Association for Science  
and Technology**Sponsored by**Chinese Grassland Society  
China Agricultural University,  
Beijing 100193**Editor-in-Chief**

WANG Kun

**Responsible Editor**MIN Zhi-zhi, LIU Ting-ting,  
PENG Lu-xi**Edited by**

Editorial Board of A. A. S.

**Tel. / Fax:** 010-62733894**E-mail:** cdxb@cau.edu.cn**Website:** <http://www.cdxb.org>**Printed by**Beijing Kexin  
Printing Co., Ltd.**Distributed by**Beijing Bureau for Distribution  
of Newspapers and Journals**Domestic**All Local Post Offices in China  
(Periodical No. 80-135)**Foreign**China International Book Trading  
Corporation (P. O. Box 399, Beijing,  
China) (Code: MO1949)**CONTENTS**

- Considerations on the Carbon Sink Enhancement in Grasslands for the Carbon Peaking and Carbon Neutrality Targets ..... ZHAO Jin-long, LIU Yong-jie, HAN Feng-ze(1273)  
Developments Course and Prospect of Grassland Survey and Monitoring Domestic and Abroad ..... CHANG Sheng-hua, WANG Lei, JIANG Jia-chang, et al(1281)  
A Review of Abiotic Stress Resistance of Forages ..... HUANG Xiao-fang, SHI Pei-li, YU Cheng-qun, et al(1293)  
Analysis on the Niche and Interspecific Association of Dominant Plant Species in Alpine Meadow under Simulated Warming and Grazing ..... YIN Zheng-hui, CHEN Xin-feng, LHA Duo(1302)  
Preliminary Study on Resistance Mechanism of Perennial Ryegrass Induced by *Trichoderma asperellum* ..... TANG Ruo-yi, WANG Bai-sen, DONG Chun-xin, et al(1314)  
The Effects of Different Nitrogen Compounds Additions on Net Nitrogen Mineralization of Grassland in the Agro-pastoral Ecotone in Northern China ..... ZHANG Zuo-en, DIAO Hua-jie, HAO Jie, et al(1322)  
Cloning, Subcellular Localization and Autonomous Transcriptional Activation Testing of *MsMYB33* Gene from *Medicago sativa* ..... WANG Xin-yi, WANG Xiao-qian, LIU Ya-ling, et al(1331)  
Analysis of the Relationship between Rhizosheath and Root Growth of *Kengyilia hirsuta* Seedlings under Soil Sterilization and Moisture Treatments ..... ZHANG Wen-lu, DING Zhong-yan, WANG Hui, et al(1338)  
Cloning, Expression Analysis and Self-activation Detection of *KdSRG1* Gene from *Kalanchoe daigremontiana* ..... LUAN Ya-lin, PAN Jia-ni, WANG Meng-di, et al(1349)  
Effects of the Different Measures of Sandification Combating on the Diversity and Physicochemical Properties of Soil Bacterial Communities ..... WANG An-lin, MA Rui, MA Yan-jun, et al(1359)  
Effects of Drought Stress on Leaf Microstructure and Photosynthetic Characteristics of *Poa pratensis* ..... CEN Hui-fang, QIAN Wen-wu, ZHU Hui-sen, et al(1368)  
Response of Leaf Anatomical Structure Strategy Spectrum of *Caragana korshinskii* to the Planting Years in Southwestern Margin of Maowusu Sandy Land ..... MA Long, YANG Jun, YANG Jun-long, et al(1378)  
Responses of Physiological, Photosynthetic Characteristics and Leaf Surface Micromorphology of *Berberis poiretii* to Drought Stress ..... HUANG Rong-yan, MENG Wei-shan, ZHU Kun, et al(1386)  
Relationship between Soil Microbial Community Composition and Soil Physicochemical Properties in Riparian Zone of Huihe Wetland ..... LIU Jing-jing, LI Jin-hua, JI Yan, et al(1393)  
Screening and Growth-promoting characteristics of Plant Growth-Promoting Rhizobacteria of Oat Rhizosphere in Alpine Reseeding Grassland of Zoige ..... WANG Zhen-long, DU Jiang, NIU Yong, et al(1406)  
Assessment on the Feeding Value of Plant Waste of 21 Tropical Garden Species ..... CHEN Ting, LIU Yue, SUN Rong, et al(1414)  
Evaluation on the Resistance of 20 Germplasms of *Medicago sativa* to Verticillium Wilt ..... CHEN Chao-chao, LI He-yang, YAN Yu-xin, et al(1425)  
Phenotypic Diversity Analysis of the Different Germplasmsof 85 Materials of the Grain Amaranth ..... ZHENG Chun-lin, YU Wang-chen, LIU Ning-fang, et al(1435)  
Effects of Precipitation Changes on Soil Stoichiometric Characteristics under *Reaumuria soongorica* Litter Decomposition ..... ZHANG Ya-qiang, XIE Ting-ting, LIANG Guan-jun(1445)  
Effect of the No-Grazing practice in Regreening Period on the Quality and Stoichiometric Ratio of C, N, P of Plant Community in Alpine Meadow ..... XIE Le-le, WANG Xiao-li, MA Yuan, et al(1454)  
Effect of Exogenous Brassinosteroids Priming on Antioxidant Characteristics of Deteriorated Oat Seeds ..... WANG Bo, XIA Fang-shan, DONG Qiu-li, et al(1461)  
Evaluation on and Screening of Production Performance of *Bromus inermis* Resources in Alpine Regions of Qinghai-Tibet Plateau ..... LIU Man, QIN Yan, LIU Wen-hui, et al(1469)  
Effects of the Enclosure on Plant Communities in Temperate Grassland ..... SUN Chong-zhi, TANG Shi-ming, WANG Zhen, et al(1481)  
Analysis on the Relationship between Biodiversity and Ecosystem Function in Loess Hilly Region ..... WEI Jia-qi, ZHENG Cheng, CUI Meng-ying, et al(1490)  
Study on Phenotypic Genetic Diversity of 180 Feed Oat Germplasms ..... WU Jing-ye, MA Lin, WU Xin-ming, et al(1501)  
Effects of Warming and Nitrogen Application on  $N_2O$  Emissionfrom Swamp Meadow in Gahai Wetland ..... XU Guang-shuai, MA Wei-wei, CHANG Wen-hua, et al(1511)  
The Impacts of Centralized Photovoltaic Power Plants on Ecological Driversand Vegetation Development in China's Northwestern Desert Regions underthe Carbon Neutrality Strategy ..... QIAO Sheng-chao, YU Chao-qing, HUANG Xiao, et al(1520)  
Plant and Soil Characteristics of Different Degraded Alpine Meadows in Qilian Mountain National Park ..... ZHAO Shuai, YANG Wen-quan, LIN Bao-jun, et al(1530)  
The Value Realization System of Grassland Ecological Products was Established Based on The Externality Theory ..... DING Ding, REN Liang(1539)  
Restoration Effects of Mixed Sowing Artificial Grassland on Vegetation and Soil of Black Soil Land at the Initial Planting Stage ..... CHANG Tao, LI Shan, LI Yi-kang, et al(1546)  
Response of Seeding Mode and Sowing Density to Plant Component Charactersin the Early Stage Establishment of *Poa pratensis* L. 'Qinghai' ..... JING Mei-ling, LI Ji-ya, YANG Zeng-zeng, et al(1556)  
Effects of Compound Starter on Silage Quality and Rumen Degradation Rate of Sunflower Byproduct ..... LI Xiao, CHEN Yong-cheng, HUANG Rong-zheng, et al(1564)  
Research on Double Cropping Pattern of the Forage Triticale and Brown Midrib *Sorghum bicolor* *x* *S. sudanense* in North China Plain ..... WU Rui-xin, SHI Xia, JIA Wen-juan, et al(1571)  
Effects of the Co-application of Biochar and Inoculants on the Alfalfa Biomass and Soil Characteristics ..... LU Wen-jie, WU Cong, QI Jin-yun, et al(1578)  
Effects of Plant Growth Regulators on Seed Yield and Yield Components of *Deschampsia cespitosa* ..... HE Bin, LIU Ying, MA Yu-shou(1588)