



# 草地学报

ACTA AGRESTIA SINICA

草地学报



二〇二三年

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 1 期

第 30 卷

2022 年 1 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 堃

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>

\* 252 \* zh \* P \* 55.00 \* 320

\* 30 \* 2022-01

## 目 次

### 专论与进展

牧草干燥技术与装备研究进展 ..... 孙庆运,于启娜,贾振超,等(1)

### 研究论文

氮添加和刈割对内蒙古典型草原植被碳氮库的影响 ..... 秦加敏,王常慧,曹颖,等(12)

藏北高寒草地土壤真菌群落系统发育多样性对放牧的响应 ..... 张豪睿,付刚(21)

草地早熟禾 *Phosphate Starvation Response 2* 基因的克隆及表达分析 ..... 齐欣,李春月,刘本松,等(29)

杂交构树青贮饲料中优良乳酸菌的分离与鉴定 ..... 张玉琳,杨寒璐,李超程,等(38)

两种诱变处理下紫花苜蓿全基因组 DNA 甲基化图谱分析 ..... 申晓慧(46)

不同秋眠型苜蓿顶芽中特异表达蛋白筛选及其功能鉴定 ..... 杜红旗,姜治国,邹靖,等(55)

藜木取食对苜蓿氨基酸组成及含量的影响 ..... 武杰瑞,刘秉毅,特木尔布和,等(62)

KNO<sub>3</sub> 和抗坏血酸对老化草地早熟禾种子活力的影响 ..... 钱文武,黄志超,朱慧森,等(69)

不同根系交互强度下紫花苜蓿/甜高粱体内氮营养动态特征研究 ..... 汪雪,刘晓静,赵雅姣,等(76)

不同温度下 AOX 和 COX 途径对苜蓿种子萌发和幼根生长的影响 ..... 赵文静,张浩阳,徐燕妮,等(84)

舟叶橐吾浸提液对三种牧草种子萌发及幼苗生长的影响 ..... 王辉,马向丽,另如贵,等(93)

不同晒源及浓度对偏关苜蓿种子萌发及物质转化的影响 ..... 张士敏,朱慧森,赵娇阳,等(100)

柱花草低落粒种质筛选及农艺性状综合评价 ..... 张靖雪,盛伟,李欣勇,等(108)

外源 ABA 对锯肋迫下柳枝稷生理特性及锯吸收的影响 ..... 肖霄,方志刚,纪燕玲,等(118)

放牧强度对草甸草原植物群落主要功能群碳氮磷贮量的影响 ..... 王森,张宇,张楚,等(125)

短期封育对伊犁绢蒿荒漠草地土壤氮及其粒径组成的影响 ..... 哈里·阿力腾别克,崔雨萱,刘慧霞,等(134)

退化高寒草甸暖季休牧恢复过程中植被和土壤特性 ..... 张光茹,罗方林,张法伟,等(144)

内蒙古荒漠草原东部植被指标动态变化及其与气候变化的关系 ..... 焦越佳,张佳雨,黄馨慧,等(153)

热浪发生期提前对草甸草原碳吸收的影响 ..... 董校兵,程利,曲鲁平,等(161)

东祁连山高寒草甸植被特征和生物多样性对生境的响应 ..... 李强,何国兴,刘志刚,等(169)

毛乌素荒漠草原植被特征对降水变化的响应 ..... 黄绪梅,张翼,李建平(178)

近 16 年祁连山植被 NPP 时空格局及其对气候变化的响应 ..... 兰云飞,李传华(188)

锡林郭勒不同草原类型群落生物量及多样性研究 ..... 李想,于红博,刘月璇,等(196)

呼伦贝尔草原土壤呼吸作用空间异质性分析 ..... 范凯凯,李淑贞,陈金强,等(205)

### 技术研发

复合促生菌剂发酵条件优化及其对青稞促生效果评价 ..... 杨晓蕾,李建宏,姚拓,等(212)

切根与施有机肥对羊草草甸草原打草场地上生物量与土壤养分的影响 ..... 张楚,王森,张宇,等(220)

喷施敌草快对紫云英含水率、荚果性状的影响及其应用安全性评价 ..... 刘春增,张梦,史鹏飞,等(229)

海北州小黑麦与饲用型豌豆混播生产性能及营养品质分析 ..... 魏晓丽,徐成体,蒲小剑,等(236)

不同草地利用方式对河北坝上天然草地植物群落特征的影响 ..... 郭丽珠,吕进英,王堃(245)

## 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新成果、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、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,国内外公开发售。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

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

Research Progress of Forage Drying Technology and Equipment ..... SUN Qing-yun ,YU Qi-na ,JIA Zhen-chao ,et al(1)  
Effects of Nitrogen Addition and Mowing on Plant Carbon and Nitrogen Pools in Typical Grassland of Inner Mongolia ..... QIN Jia-min ,WANG Chang-hui ,CAO Ying ,et al(12)  
Responses of Phylogenetic Diversity of Soil Fungal Community to Grazing in Alpine Grasslands of the Northern Tibet ..... ZHANG Hao-ruì ,FU Gang(21)  
Cloning and Expression Analysis of *Phosphate Starvation Response 2* Gene in *Poa pratensis* L . ..... QI Xin ,LI Chun-yue ,LIU Ben-song ,et al(29)  
Isolation and Identification of Lactic Acid Bacterium Strain from *Broussonetia Papyrifera* Silage ..... ZHANG Yu-lin ,YANG Han-jun ,LI Chao-cheng ,et al(38)  
Analysis of DNA Methylation Map of Alfalfa Whole Genome under Two Kinds of Mutagenesis Treatments ..... SHEN Xiao-hui(46)  
Screening and Functional Identification of Proteins Specifically Expressed in Terminal Buds of Different Fall Dormancy Alfalfa ..... DU Hong-qi ,LOU Zhi-guo ,ZOU Jing ,et al(55)  
Effects of Thrips Infesting on Amino Acid Composition and Content of Alfalfa ..... WU Jie-rui ,LIU Bing-yi ,TE Muerbuhe ,et al(62)  
Effects of KNO<sub>3</sub> and Ascorbic Acid Priming on the Vigor of Aged *Poa pratensis* Seeds ..... QIAN Wen-wu ,HUANG Zhi-chao ,ZHU Hui-sen ,et al(69)  
Dynamic Characteristics of Nitrogen Nutrition in Alfalfa /Sweet Sorghum Intercropping Under Different Root Interaction Intensities ..... WANG Xue ,LIU Xiao-jing ,ZHAO Ya-jiao ,et al(76)  
Effects of the Alternative Oxidase and Cytochrome Oxidase Pathways on the Germination of Seeds and Growth of Roots of Alfalfa Seedlings under Different Temperatures ..... ZHAO Wen-jing ,ZHANG Hao-yang ,XU Yan-ni ,et al(84)  
Allelopathic Effects of *Ligularia Cymbulifera* Extracts on Seed Germination and Seedling Growth of Three Forages ..... WANG Hui ,MA Xiang-li ,LING Ru-gui ,et al(93)  
Effects of Different Selenium Sources and Concentrations on Seed Germination and Material Transformation of *Medicago sativa* ‘Pianguan’ ..... ZHANG Shi-min ,ZHU Hui-sen ,ZHAO Jiao-yang ,et al(100)  
Selection of Germplasm With Low Seed Shattering Rate and Evaluation of Agronomic Traits of *Stylosanthes* ..... ZHANG Jing-xue ,SHENG Wei ,LI Xin-yong ,et al(108)  
Effects of Exogenous ABA on Physiological Characteristics and Cadmium Uptake of Switchgrass under Cadmium Stress ..... XIAO Xiao ,FANG Zhi-gang ,JI Yan-ling ,et al(118)  
Effects of Grazing Intensity on the Carbon ,Nitrogen and Phosphorus Storage of the Main Functional Groups of Meadow Steppe Plant Community ..... WANG Miao ,ZHANG Yu ,ZHANG Chu ,et al(125)  
Effects of Short-term Grazing Exclusion on Soil Nitrogen and Particle Size Composition of *Seriphidium transiliense* Desert Grassland ..... HALI-Alitengbieke ,CUI Yu-xuan ,LIU Hui-xia ,et al(134)  
Vegetation and Soil Characteristics During Restoration of Grazing Rest in Warm Season of Degraded Alpine Meadows ..... ZHANG Guang-ru ,LUO Fang-lin ,ZHANG Fa-wei ,et al(144)  
Dynamic Changes of Vegetation Indexes and Their Relations with Climate Changes in the Eastern Desert Steppe of Inner Mongolia ..... JIAO Yue-jia ,ZHANG Jia-yu ,HUANG Xin-hui ,et al(153)  
The Early Occurrence of Heat Wave on Carbon Sequestration in Meadow Steppe ..... DONG Xiao-bing ,CHENG Li ,QU Lu-ping ,et al(161)  
Responses of Vegetation Characteristics and Biodiversity to habitat in Alpine Meadows in Eastern Qilian Mountains ..... LI Qiang ,HE Guo-xing ,LIU Zhi-gang ,et al(169)  
Responses of Vegetation Characteristics of Mu Us Desert Steppe to Changes in Precipitation ..... HUANG Xu-mei ,ZHANG Yi ,LI Jian-ping(178)  
Spatiotemporal Pattern of Vegetation Net Primary Productivity (NPP) and Its Response to Climate Change in Qilian Mountains during the past 16 Years ..... LAN Yun-fei ,LI Chuan-hua(188)  
Study on Community Biomass and Diversity of Different Grassland Types in Xilingol ..... LI Xiang ,YU Hong-bo ,LIU Yue-xuan ,et al(196)  
Spatial Heterogeneity Analysis of Soil Respiration in Hulunbuir Grassland ..... FAN Kai-kai ,LI Shu-zhen ,CHEN Jin-qiang ,et al(205)  
Optimization of Fermentation Conditions of Three Growth Promoting Strains and Evaluation of Effects on Highland Barley ..... YANG Xiao-lei ,LI Jian-hong ,YAO Tuo ,et al(212)  
Effects of Root Cutting and Organic Fertilizer Application on Aboveground Biomass and Soil Nutrients in the Mowing Grassland of *Leymus chinensis* Meadow ..... ZHANG Chu ,WANG Miao ,ZHANG Yu ,et al(220)  
Effects of Diquat on Moisture Content and Pod Traits of *Astragalus sinicus* and Evaluation on Application Safety ..... LIU Chun-zeng ,ZHANG Meng ,SHI Peng-fei ,et al(229)  
Analysis of Production Performance and Nutritional Quality of Mixed Seeding of Triticale and Forage Peas in Haibei Prefecture ..... WEI Xiao-li ,XU Cheng-ti ,PU Xiao-jian ,et al(236)  
Effects of Different Grassland Using Modes on Plant Community Characteristics on Bashang Natural Grassland ,Hebei Province ..... GUO Li-zhu ,LYU Jin-ying ,WANG Kun(245)