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申请专业： (090705) 野生动植物
保护与利用

申请学院： (001) 林学院

考生类别： 应届毕业生

申请年度： 2025

4、 外语能力证书

全国大学英语六级考试
成绩报告单



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准考证号：530060211211315

考试时间：2021年6月

总分	听力 (35%)	阅读 (35%)	写作和翻译 (30%)
442	163	154	125

口 试

准考证号：--

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RESEARCH ARTICLE

Maternal Decision-Making in Non-Mother Caregiving Negotiation for Infants in Black-and-White Snub-Nosed Monkeys (*Rhinopithecus bieti*)

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Keywords: learning-to-mother hypothesis | maternal decision-making | maternal relief hypothesis | non-mother caregiving negotiation | *Rhinopithecus bieti*

ABSTRACT

Allomaternal care, or caregiving by non-maternal individuals, is prevalent in primates, yet few studies have explored the role of maternal consent and decision-making during this process. This study introduces the concept of “non-mother caregiving negotiation”, highlighting the mother’s primary role in deciding on non-maternal caregiving. This study focuses on a semi-provisioned breeding band of black-and-white snub-nosed monkeys (*Rhinopithecus bieti*) in the Xiangguqing area of the Baimaxueshan National Nature Reserve. We investigated how non-maternal females employ signaling behaviors to express their desire to care for infants and how maternal consent is achieved. Our study found that non-maternal females use specific behaviors, such as grooming the mother, gently touching, kissing, grooming the infant, or softly pulling the infant closer, to signal their interest. Mothers respond consistently to these signals, but their decisions to allow caregiving largely depend on the infant age and the caregiving experience of non-maternal females. As infants grow older, mothers become more likely to permit caregiving, particularly from females with prior caregiving or birthing experience. During each caregiving event, infants were often transferred among multiple caregivers, with infants being passed an average of 2.2 times by 2.5 caregivers within the same caregiving event. Additionally, when infants are under the care of non-maternal females, mothers rest less and spend more time on feed, social, move and other activities, thus reducing their own caregiving costs while enabling non-maternal females to gain caregiving involvement. Consequently, non-mother caregiving negotiation emerges as a behavior shaped by communicative interactions between mothers and non-maternal females, offering new insights into caregiving dynamics in primates and illuminating caregiving behaviors in both primate and human societies.

Abbreviations: GLM, generalized linear model, GLMM, generalized linear mixed model, NPB, non-provisioned wild breeding band, SPB, semi-provisioned breeding band.

Chun-Yan Cui and Jing Sun contributed equally to this work.

Preliminary study on mother-approved infant handling behavior of black-and-white snub-nosed monkeys (*Rhinopithecus bieti*)

† Folia Primatologica

著者: Chun-Yan Cui , Ying Geng, Ying Zhou, Bo-Yan Li, Jian-Dong Lai, Qing-Lei Sun, Sang Ge, Liang-Wei Cui , and Zhen-Hua Guan 

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Abstract

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Abstract

Mother-Approved Infant Handling (MAIH), a behaviour characterized by non-maternal individuals carrying a mother's offspring with her consent following a process of behavioural negotiation, is a well-documented phenomenon in colobine species. This study systematically documented MAIH within a semi-provisioned breeding band of black-and-white snub-nosed monkeys (*Rhinopithecus bieti*) in Xiangguqing, Yunnan, P.R. China. The research aimed to test the learning-to-mother hypothesis, which posits that inexperienced females engage in infant handling to acquire maternal skills. Over the study periods in 2019 and 2022, we observed MAIH events across multiple one-male units (OMUs). Our findings revealed that MAIH was predominantly initiated by juvenile and adult females, particularly within the first two months after an infant's birth. A generalized linear mixed model analysis revealed that both handler age and the number of offspring significantly influenced the occurrence of MAIH. These results support and enrich the learning-to-mother hypothesis, suggesting that MAIH provides an opportunity for inexperienced females to gain caregiving skills. While older females exhibited higher MAIH occurrences, the negative quadratic effect indicates that it declines after peaking at a certain age. This study advances our understanding of the adaptive significance of allomaternal care in primate societies and offers insights into the evolutionary origins of cooperative breeding in humans.



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4、 外语能力证书

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总分	听力 (35%)	阅读 (35%)	写作和翻译 (30%)
522	165	213	144

口试

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良好	能用英语就一般性话题阐述自己的观点，表明自己的态度；能开展较深入的讨论。语言表达准确连贯。
合格	能用英语就一般性话题进行交流；能参与讨论。语言表达基本准确。

莱州近岸海域春秋季节浮游动物优势种生态位及其与环境因子相关性研究

崔雯慧¹，蒋文良¹，张德普²，李生府¹，
董 斌³，吕振波¹，杨继松¹，任中华¹

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摘 要：为了解莱州近岸海域浮游动物群落结构及其与环境因子的关系，基于该海域 2020—2021 年的春、秋两季 24 站位浮游动物分析数据，使用优势度、生态位宽度(B_i)和重叠度指数(O_{ik})以及环境因子相关性分析等方法，研究浮游动物优势种组成及其生态位特征，并探讨造成优势种分化的环境因素。结果表明，两季共采集到浮游动物 42 种，其中春季优势种 10 种，秋季优势种 9 种，共同优势种为桡足类无节幼虫、小拟哲水蚤(*Paracalanus parvus*)、强壮滨箭虫(*Aidanosagitta crassa*)和双壳类壳顶幼虫，优势种季节更替率 73.3%。窄生态位种($B_i < 0.30$)和重叠度值较低的物种对($O_{ik} < 0.300$)在两季的优势种中占比较高，而春季优势种对之间的生态位重叠度值(0.256)高于秋季(0.193)。春季优势种丰度与水深、盐度和硝酸盐呈显著正相关，但与石油烃类和叶绿素 a 呈显著负相关；而秋季优势种丰度仅与总氮呈显著正相关；上述环境因子可能是造成本研究优势种生态位分化的重要环境因素，表明优势种生态位存在季节分化。研究结果有助于深入掌握莱州近岸海域生态系统结构和功能的变化规律。

关键词：莱州；浮游动物；优势种；生态位宽度；生态位重叠度；环境因子相关性

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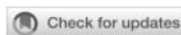
DOI:10.13233/j.cnki.mar.fish.20241108.001

浮游动物是海洋生态系统物质循环和能量流动的重要组成部分，一方面，浮游动物是海洋次级生产力的主要组成者，其通过上行效应影响渔业资源的变动，同时通过下行效应调控着海洋初级生产力^[1-2]；另一方面，浮游动物对海洋生态系统的结构和功能具有重要的调控作用，其动态变化反映着生态系统的健康状况，且浮游动物的群落结构时空分布变化与海洋环境的变化密切相关^[3-4]。浮游动物是水体中重要的生态环境指示类群，多数种类形态微小且缺乏游泳能力，具有随波逐流的特性，其分布易受环境变化的影

响^[5-6]。

莱州近岸海域属于暖温带半封闭性内海，其海水交换能力弱，特殊的地理位置使得其环境易受外界的影响，而浮游动物作为环境敏感类群具有指示水体环境的功能。研究表明，利用生态位理论可以探究浮游动物种群间关系与结构、时空动态演替以及生物多样性等方面^[7]。目前，国内学者针对莱州海域浮游动物群落结构及其环境因子相关性展开了大量的研究，例如，陈传曦等^[8]和姜会超等^[9]研究了莱州湾海域浮游动物群落结构特征及其与环境理化因子的关系。而

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Comparative study of the characteristics of the energy flow and food web structure in the Laizhou Bay ecosystem based on the Ecopath and LIM-MCMC models

Cui Wenhui¹, Xu Bingqing², Dong Xiuqiang³, Yang Jisong¹,
Li Min¹, Zhang Depu⁴, Li Shengfu¹, Lv Zhenbo¹,
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This study compared the characteristics of energy flow and food web structure in the Laizhou Bay ecosystem using the Ecopath model and linear inverse models enhanced by Monte Carlo methods coupled with a Markov Chain (LIM-MCMC), respectively, based on survey data collected in May, August, and November 2022. The ecosystem was divided into 22 functional groups with trophic levels ranging from 1.00 to 3.48 and a large proportion of predator groups. The Ecopath model estimated an overall energy transfer efficiency of 5.34%, with the detrital food chain exhibiting significantly higher energy transfer efficiency (6.73%) than the grazing food chain (5.31%). Energy flow paths in the LIM-MCMC model were classified into four primary routes, predominantly driven by respiration and the inflow of detritus at lower trophic levels, which accounted for 79.9% of the total energy flow in group a. The Ecopath model provided a connectance index of 0.30, a system omnivory index of 0.33, Finn's mean path length of 2.46, and Finn's cycle index of 8.18%, whereas the LIM-MCMC model produced an average path length of 2.78. Both models indicated a shorter food chain and low complexity of the food web. Total system throughput (TST) was estimated at 10,086.1 (Ecopath) and 10,968.0 t·km⁻²·a⁻¹ (LIM-MCMC), with total respiration and total flows into detritus accounting for 41.2% and 51.1% of TST, respectively. The total primary production to total respiration ratios were 1.40 (Ecopath) and 0.86 (LIM-MCMC). Despite consistent ecosystem parameters across both models—total consumption (4,407.7 t·km⁻²·a⁻¹), total primary production



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保护与利用

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4、 外语能力证书

全国大学英语四级考试
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准考证号: 530060182112430
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总分	听力 (35%)	阅读 (35%)	写作和翻译 (30%)
430	136	156	138

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5种北美栎树秋冬季叶色变化机理分析

代泽娅¹ 谭准¹ 孙海菁² 施翔² 王树凤² 胡冀珍¹

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摘要: 以栽植于苗圃的4年生水栎、纳塔栎、舒玛栎、沼生栎、柳叶栎为研究对象, 在秋冬转色期对其叶片的叶绿素、类胡萝卜素和花青素3种色素及可溶性糖含量进行定期测定, 同时记录转色期气温变化, 研究转色期叶片色素含量变化与环境影响因子的关系。结果表明: 随着气温的下降, 5种栎树叶片的叶绿素a和叶绿素b均呈先快后慢的下降趋势, 而花青素含量呈波动上升趋势。其中叶绿素a含量从大到小依次为沼生栎>水栎>舒玛栎>纳塔栎>柳叶栎; 10月12日至11月5日, 纳塔栎、舒玛栎和柳叶栎中的叶绿素b降幅最大。类胡萝卜素含量变化呈波动状态, 除柳叶栎在试验后期有较为明显的上升趋势外, 其他4种栎树在整个试验期变化不大。5个树种花青素含量与日平均湿度呈极显著负相关($P<0.01$), 水栎和柳叶栎中的花青素与可溶性糖含量呈显著正相关。由此得出, 秋冬季日平均气温的下降促进了5种栎树叶片花青素的积累, 直接影响了叶色的变化。

关键词: 水栎; 纳塔栎; 舒玛栎; 沼生栎; 柳叶栎; 叶片; 花青素; 湿度**中图分类号:** S792.18**文献标志码:** A**文章编号:** 2095-1914(2021)04-0056-07Leaf Color Transformation of 5 America Introduced
Quercus spp. in Autumn and WinterDai Zeya¹, Tan Zhun¹, Sun Haijing², Shi Xiang², Wang Shufeng², Hu Jizhen¹

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Abstract: Five introduced species of 4-year oak seedlings including *Quercus nigra*, *Q. nuttallii*, *Q. shumardii*, *Q. uercus palustris*, *Q. phellos* were used to measure the contents of chlorophyll, carotenoids, anthocyanin and soluble sugar in leaves. The air temperature and humidity changes during the experiment were recorded synchronously. The relationship between the change of pigment content in leaves and environmental factors was studied. The results showed that with the decreasing of air temperature, contents of chlorophyll a and b in leaves of 5 oak species decreased significantly first and then slowly, and the content of anthocyanin presented a trend of fluctuant rise. The chlorophyll a content in descending order was as follows: *Q. palustris* > *Q. nigra* > *Q. shumardii* > *Q. nuttallii* > *Q. phellos*. During the test period from October 12 to November 5, the chlorophyll b of *Q. nuttallii*, *Q. shumardii* and *Q. phellos* decreased the most. Variations of carotenoid contents exhibited significant increase in *Q. phellos*, while fluctuated in the other 4 species. The average temperature had a significantly negative correlation with anthocyanin in 5 oak species($P<0.01$), and there was a significant positive correlation

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作者: Guo, Q(Guo, Qiang)Lu, X(Lu, Xi)Xie, CX(Xie, Chongxin)Zhang, JS(Zhang, Jiansong)Xu, XY(Xu, Xianyin)Qian, YH(Qian, Yuhang)Luo, X(Luo, Xu)Duan, YB(Duan, Yubao)
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Article

Trophic Niche Differentiation in Two Sympatric Nuthatch Species (*Sitta yunnanensis* and *Sitta nagaensis*)

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Simple Summary: Trophic niches, as one of the important dimensions of niche theory, show the nutritional requirements of species; they can reflect their position in the ecosystem trophic level, and functional status, as well as the nutritional relationships between species. Similarities in body structure and ecological needs may lead to interspecific nutritional competition, and species may undergo niche differentiation through different foraging strategies. The body tissues of consumers contain stable isotope signatures that reflect their dietary information, and stable isotope analysis has been widely used in animal diet research. In this study, stable isotope techniques were used to assess the dietary information and nutritional niches of *Sitta yunnanensis* and *Sitta nagaensis* coexisting in Yunnan Province. *S. yunnanensis* and *S. nagaensis* mainly preyed on six orders, including Orthoptera, with overlapping food resources but different dietary ratios. Their two niches were differentiated, with *S. yunnanensis* having wider trophic niches. This study provides new insights into the food resources and trophic niches of *S. yunnanensis* and *S. nagaensis*, and the mechanisms behind their coexistence were consistent with the niche hypothesis.

Abstract: Sympatric closely related species may experience interspecific trophic competition due to ecological similarity; they may isolate in terms of diet or habitat use as a strategy to avoid competition. The body tissues of consumers contain stable isotope signatures information that can be applied to infer their dietary information. In this study, $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ stable isotopes were analyzed to determine the dietary information and trophic niches of sympatric coexisting *Sitta yunnanensis* and *Sitta nagaensis*. The results showed that the food sources of *S. yunnanensis* and *S. nagaensis* were from six orders, including Orthoptera, and the cumulative contribution rate was 99.97%, with the two species eating similar diets but at different rates. The larger $\delta^{13}\text{C}$ of *S. yunnanensis* indicates that it had a wider range of habitats for feeding, while the difference in $\delta^{15}\text{N}$ values was not significant ($p > 0.05$), indicating that both species feed on similar nutrient levels. As determined by Bayesian ellipses, the isotopic niches of *S. yunnanensis* and *S. nagaensis* were differentiated; the isotopic niche width of *S. yunnanensis* is 2.69‰^2 , which was larger than that of *S. nagaensis* (0.73‰^2), indicates that differentiation between the two species in diet or habitat use reduced competition. Trophic niche differentiation and differences in foraging proportions may be the principal resource allocation mechanisms behind *S. yunnanensis* and *S. nagaensis* coexistence.

Keywords: niche differentiation hypothesis; stable isotope; *Sitta nagaensis*; sympatric species; *Sitta yunnanensis*; trophic niche



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animals



Article

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Keywords: niche differentiation hypothesis; stable isotope; *Sitta nagaensis*; sympatric species; *Sitta yunnanensis*; trophic niche

Article

Comparative Analysis of Gut Microbiome Community Structures in Different Populations of Asian Elephants in China and Their Correlation with Diet

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Abstract: Background: The interaction and co-evolution between the gut microbiome and the host play important roles in the host's physiology, nutrition, and health. Diet is considered an important driver of differences in the gut microbiota; however, research on the relationship between the gut microbiota and diet in Asian elephants remains limited. Methods: In this study, we explored the gut microbiota structure and its relationship with diet in different populations of Asian elephants through metagenomic sequencing, combined with previously published dietary data. Results: This study found that the dominant gut microbiota of Asian elephants includes the phyla Bacillota (29.85% in BP, 22.79% in RC, 21.89% in SM, 31.67% in ML, and 33.00% in NGH), Bacteroidota (25.25% in BP, 31.44% in RC, 16.44% in SM, 25.73% in ML, and 23.74% in NGH), and Spirochaetota (3.49% in BP, 6.18% in RC, 1.71% in SM, 2.69% in ML, and 3.52% in NGH), with significant differences in the gut microbiota among different populations. Correlation analysis between the gut microbiota and diet revealed that dietary diversity did not directly affect the alpha diversity of the gut microbiota. However, specific food types might play a key role in shaping the gut microbiota structure by regulating the abundance of certain microbiota. Conclusions: This study reveals significant differences in the gut microbiota structure among different populations of Asian elephants and explores the impact of diet on the structure. The results provide foundational data for a deeper understanding of the gut microbiota structure of Asian elephants and offer important references for the scientific conservation and precise management strategies of this species.

Keywords: Asian elephant; gut microbiome; metagenomic sequencing; microbial diversity; diet–gut microbiome interaction



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Elucidating the molecular mechanisms of exogenous melatonin for improving heat tolerance in *Solanum tuberosum* L. seedlings

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Key words:

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ABSTRACT

In the era of climate change, the rise in temperature can adversely impact the potato growth, yield and even threaten food security. Temperature both as high and long-term have always retarded growth and development of potatoes. Based on this, overall study provides experimental proof of potato (*Solanum tuberosum* L.) heat tolerance mechanisms. Plant hormone melatonin (MT) elicits and improves potato tolerance against high temperature, but scarce information is present about detailed mechanisms. Therefore, introduction of exogenous MT in potato seedlings (Lishu 6) together with high-temperature stress was investigated to find the physiological and molecular mechanisms. Temperature stress results in wilting of basal leaves and inhibits photosynthesis in potato seedlings. Interestingly, we found distinct effects of introduced MT with increase in the actual photosynthetic quantum yield (ΦPSII), apparent photosynthetic electron transport rate (ETR), chlorophyll content, intercellular CO₂ concentration (Ci), net photosynthetic rate (Pn), photochemical quenching (qP), and transpiration rate (Tr). Further, hydrogen peroxide (H₂O₂) content and activities of antioxidant enzymes in potato seedling leaves reduced after introduction of exogenous MT. Through transcriptome analysis, we found that during temperature stress, MT significantly upregulated the expression of genes involved in photosynthesis and antioxidant enzymes, and plant hormone signal transduction. Importantly, it also augmented antioxidant capacity in potato seedlings and alleviated the damage at high temperature. In summary, we provide evidence that identifying factors could modulate the potential interaction of temperature stress with introduced MT to improve the heat tolerance of potato seedlings for maximum function.

1. Introduction

Increasing global warming results in high temperature, which have become one of the main abiotic stresses affecting crop growth (Kumar et al., 2011). It ultimately affects the different stages of plant growth and development, germinating seeds (Alsamir et al., 2021; Bassirirad, 2000), flowering and pollen development, and finally reduces the quantity and quality of seeds (Camejo et al., 2005; Raja et al., 2019). Negative outcomes emerge in the form of crop yield and quality due to these devastating losses (Fahad et al., 2017; Goraya et al., 2017; Grover et al., 2013). Moreover, heat stress has negative effects on the morphological structure, physiological and biochemical metabolism, and crops

alleviate their damage by initiating a series of stress-resistant mechanisms. On the other hand, the plant could die within a short time under high-temperature conditions (Abdelrahman et al., 2017; Li et al., 2018; Suzuki et al., 2014). The crop morphology and structure are equally affected during heat, which mainly includes changes (withered, yellow and curling) in leaves, stems, and flowers (Costa et al., 2013).

The changes associated with the physiological and biochemical metabolism of crops include oxidative damage to cell structure and intracellular substances such as cell membrane and proteins through reactive oxygen species (ROS) (Choudhury et al., 2017; Mignolet-Spruyt et al., 2016). At this time, plants can scavenge ROS and maintain low level of free radicals through enzymatic and non-enzymatic reactions

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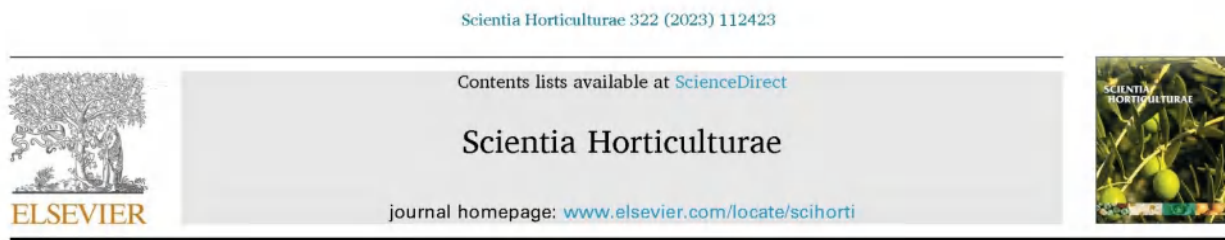
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外源褪黑素对低温胁迫下马铃薯 幼苗抗氧化系统的影响

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摘要: 为了探究不同浓度外源褪黑素对冷驯化后低温胁迫下马铃薯幼苗生长的影响, 以云南主栽马铃薯品种合作 88 为材料, 采用人工模拟低温胁迫(4 ℃ 14 d, -2 ℃ 12 h) 的方法, 研究了不同外源褪黑素浓度(50, 100, 150 μmol/L) 对低温胁迫下马铃薯幼苗生长及活性氧代谢系统的影响, 以探讨外源 MT 缓解低温胁迫对马铃薯幼苗伤害的可行性。结果表明, 与低温胁迫的马铃薯幼苗相比: 50 μmol/L MT 处理的幼苗的存活率提高了 38.89 百分点, 株高和茎粗分别提高了 2.92%, 1.86%, SS、SP 和 Pro 的含量分别增加了 12.66%, 13.80%, 1.96%, POD 和 CAT 的活性分别提高了 29.24%, 351.62%; 100 μmol/L MT 处理的幼苗的株高和茎粗分别提高了 16.97%, 2.82%, MDA 和 H₂O₂ 的含量分别降低了 19.35%, 0.48%, POD 和 CAT 的活性分别提高了 55.44%, 213.56%, GSH 的含量提高了 13.61%; 150 μmol/L MT 处理的幼苗的存活率提高了 27.78 百分点, 株高和茎粗分别提高了 5.62%, 13.20%, MDA 的含量降低了 9.45%, Pro 的含量增加了 38.70%, SOD、POD 和 CAT 的活性分别提高了 52.61%, 25.25%, 300.94%, AsA 和 GSH 的含量分别提高了 3.48%, 3.97%。表明施加外源 MT 后可以不同程度的通过促进幼苗的生长、降低叶片的 MDA 和 H₂O₂ 含量、促进 SS、SP、Pro 的积累、提高 SOD、POD、CAT 的活性、增加 AsA 和 GSH 的含量, 从而缓解低温胁迫对马铃薯幼苗的伤害, 进而提高马铃薯幼苗的抗低温胁迫的能力。综上, 50 μmol/L MT 处理可较优得提高马铃薯幼苗在低温胁迫下的抗逆性。

关键词: 马铃薯; 低温胁迫; 外源褪黑素; 抗氧化系统

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Effects of Exogenous Melatonin on Antioxidant System of Potato Seedlings under Low Temperature Stress

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Abstract: In order to explore the effects of different concentrations of exogenous melatonin on the growth of potato seedlings under low temperature stress after cold acclimation, using Yunnan main potato variety Hezuo 88 as material, the effects of different concentrations of exogenous melatonin(50, 100, 150 μmol/L) on the growth and active oxygen metabolism system of potato seedlings under low temperature stress(4 ℃ 14 d, -2 ℃ 12 h) were studied. The purpose of this study was to explore the feasibility of exogenous MT in alleviating the injury of potato seedlings caused by low temperature stress. The results showed that compared with potato seedlings under low temperature stress, the survival rate of seedlings treated with 50 μmol/L MT increased by 38.89 percentage point, and the plant height and stem diameter increased by 2.92% and 1.86%, the contents of SS, SP and Pro increased by 12.66%, 13.80% and 1.96%, the activities of POD and CAT increased by 29.24% and 351.62%. The plant height and stem diameter of seedlings treated with 100 μmol/L MT increased by 16.97% and 2.82%, the contents

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保护与利用

申请学院：（001）林学院

考生类别：应届毕业生

申请年度：2025

4、 外语能力证书

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考试时间: 2023年6月

总分	听力 (35%)	阅读 (35%)	写作和翻译 (30%)
478	146	211	121

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成绩报告单编号: 231253006001630

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报告编号：（2025）SWFU012999

论文收录 / 引用检索报告

项目名称：西南林业大学李春苹发表论文被 SCI 收录、期刊影响因子及中科院 JCR 分区情况

委 托 人：李春苹

委托日期：2025 年 04 月 21 日

完成日期：2025 年 04 月 21 日

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一、项目的技术要求

西南林业大学李春苹发表论文被 SCI 收录、期刊影响因子及中科院 JCR 分区情况。

标题: 略

二、情报检索情况

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三、检出文献情况(编号、名称、文献题目及出处)

(一) SCI-E 收录情况

1. 标题: **Influence of habitats on the physical and mechanical properties of Iron bamboo (*Ferrocalamus strictus*) and its optimal habitats**

作者: Li, CP(Li, Chunping)[1,2,3];Tian, K(Tian, Kun)[1,2];Li, Y(Li, Yuan)[2,4];Xu, R(Xu, Rui)[1,2,3];Zheng, XF(Zheng, Xiaofeng)[1,2,3];Zhan, H(Zhan, Hui)[1,2,3];Wang, CM(Wang, Changming)[1,2,3];Wan, H(Wan, Hui)[2,4];

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	2023 年	五年影响因子
INDUSTRIAL CROPS AND PRODUCTS	5.6	5.7

(三) 中国科学院 JCR 期刊分区(2025 年)

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Influence of habitats on the physical and mechanical properties of Iron bamboo (*Ferocalamus strictus*) and its optimal habitats

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Cluster analysis

ABSTRACT

The structures and the physical and mechanical properties of *Ferocalamus strictus* culms were differently affected by the environment in different habitats. Correlation analysis, random forest and cluster analysis were used to investigate the effects of environmental factors in five habitats on the structure and physical and mechanical properties of bamboo poles or stalks of *F. strictus*. The air-dry density of *F. strictus* stalks ranged from 0.66 to 0.91 g/cm³. Data showed that the average annual temperature, soil water content and available potassium content were important factors affecting air-dry density the bamboo stalks. The compressive strength of *F. strictus* stalks varied from 60.62 to 126.16 MPa and was positively correlated with mean annual sunshine hour. The modulus of rupture (MOR) ranged from 57.95 to 252.09 MPa and the soil available phosphorus content limited the MOR of *F. strictus*. The modulus of elasticity (MOE) ranged from 6.04 to 12.89 GPa. The outer hardness ranged from 66.75 to 94.83 HD (Shore D hardness) and the inner hardness ranged from 28.42 to 58.42 HD. Soil silicon content affected the structures and mechanical tissue strength of *F. strictus* culms. The principal component analysis indicated that the Yuanyang was the optimal habitat of *F. strictus* with highest composite scores of 14.07, the *F. strictus* of Yuanyang had the highest bending strength in the world, suggested that selecting a habitat site as breeding materials be reasonable. The regulation of hydrothermal conditions, i.e. soil pH, silicon (Si), phosphorus (P) and potassium (K) elements, was essential for the growth rate and physical and mechanical properties of *F. strictus* stalks. Further research will work on regulating the growth conditions of *F. strictus* at Yuanyang according to the information found from this paper and evaluating the impact of regulation.

1. Introduction

It is well known that the structures and physical and mechanical properties of bamboo directly determined the processing and utilization performance of bamboo products (Xu et al., 2003). While some factors such as genetic factors and environmental effects and the interactions between them affected the structure and the mechanical properties of bamboo culm (Zhang et al., 2019). Previous studies have mostly been limited to studying and analyzing bamboo structure from a single region across different ages, comparing the physical and mechanical properties

of different bamboo species (Hartono et al., 2022), and studying bamboo modification (Huang et al., 2018; Kadiyar et al., 2022; Li et al., 2023; Liu et al., 2022; Srivaro et al., 2018; Xie et al., 2016; Zhang et al., 2021). Comprehensive comparative analyses based on climatic conditions, soil, and other ecological parameters are rare, especially the lack of studies on the extent to which environmental factors affect the structural and mechanical properties of bamboo culm. Consequently, a study of the bamboo culm structures as well as physical and mechanical properties of *F. strictus* from diverse habitats should significantly benefit the research, processing and utilization of bamboo structure, particularly for the

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西南林业大学博士研究生招生 “申请-审核制”审核材料

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申请学院： (001) 林学院

考生类别： 往届毕业生

申请年度： 2025

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姓名：吴诺

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准考证号：530015202106715

考试时间：2020年12月

总分	听力 (35%)	阅读 (35%)	写作和翻译 (30%)
470	166	184	120

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◆ 濒危植物 ◆

无柄醉鱼草与大叶醉鱼草的遗传多样性解析^{*}

吴 诺^{1,2,3}, 陈 高^{1,3}, 申仕康^{2,4}, 葛 佳^{1,3**}

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摘要:无柄醉鱼草(*Buddleja sessilifolia*)是狭域分布的极小种群野生植物(Plant Species with Extremely Small Populations, PSESP),大叶醉鱼草(*B. davidii*)则是广布种,二者亲缘关系较近,且同为四倍体。通过比较濒危物种与近缘广布种的遗传多样性,可以了解濒危物种的演化历史,为制定保护策略提供理论依据。本研究通过简单重复序列(Simple Sequence Repeats, SSR)分子标记对无柄醉鱼草 5 个居群(126 个个体)和大叶醉鱼草 14 个居群(206 个个体)进行遗传多样性和遗传结构解析,并提出对无柄醉鱼草的保护建议。结果表明,无柄醉鱼草和大叶醉鱼草各居群的期望杂合度(H_e)平均值分别为 0.606、0.775,Shannon's 多样性指数(I)平均值分别为 1.162、1.729,两个物种均具有较高的遗传多样性,但广布种大叶醉鱼草遗传多样性水平高于狭域种无柄醉鱼草;无柄醉鱼草和大叶醉鱼草遗传分化系数(F_{ST})分别为 0.043 和 0.024,两个物种居群间遗传分化程度均较低。遗传结构分析结果表明,无柄醉鱼草 5 个居群可划分为 2 个集群,居群间地理距离与遗传距离不存在相关性;大叶醉鱼草 14 个居群可划分为 3 个集群,居群间地理距离与遗传距离相关。结合野外居群现状,建议对无柄醉鱼草划分保护单元,重点对丹珠居群和独龙江隧道口居群开展就地保护,同时采取种质资源收集、人工繁育等保护措施。

关键词:遗传多样性;遗传结构;极小种群野生植物;濒危物种;无柄醉鱼草;大叶醉鱼草;保护建议

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玄参科(Scrophulariaceae)醉鱼草属(*Buddleja*)植物多为灌木或小乔木,全球有 90 余种,分布于美洲、非洲和亚洲的热带至温带地区^[1]。本属植物醉鱼草(*B. lindleyana*)叶片中含有醉鱼草甙和醉鱼草酮甙,对鱼有麻醉作用,古时渔人将其叶片捣烂放入水中,鱼取食后如同醉酒般浮于水面,故而得名“醉鱼

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WU N, CHEN G, SHEN S K, et al. Analysis of Genetic Diversity of *Buddleja sessilifolia* and *B. davidii* [J]. Guangxi Sciences, 2024, 31(1): 126-138.



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考生类别： 往届毕业生

申请年度： 2025

4、 外语能力证书

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考试时间: 2012 年 6 月

总分: 476

听 力 (35%)	阅 读 (35%)	综 合 (10%)	写作和翻译 (20%)
163	189	46	78

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REGULAR ARTICLES



Effects of cassava root meal on the growth performance, apparent nutrient digestibility, organ and intestinal indices, and slaughter performance of yellow-feathered broiler chickens

Y. Yang¹ · F. Lei² · Z. Zhang² · L. Liu¹ · Q. Li¹ · A. Guo¹

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Abstract

With the global population growth and shortage of food, the competition between humans and animal for food will become increasingly fierce. Therefore, the development of unconventional energy feed cassava feed is of great significance. The objective of this study was to investigate the effects of cassava root meal (CRM) on the growth performance, apparent digestibility, and organ and intestinal indices of broiler chickens. A total of 140 one-day-old chicks were randomly assigned to four dietary treatment groups [control diet (CT), 15% CRM (CRM15), 30% CRM (CRM30), and 45% CRM (CRM45)] with five replicates of seven birds per replicate. The results showed that the body weight of broiler chickens fed diets containing CRM were significantly lower than that in the CT group at 21 and 42 days of age, the average daily gain and average daily feed intake in the CRM group were significantly lower than those in the CT group from 1 to 21 days of age. However, from days 22 to 42, there were no significant differences between CRM15 and CT birds regarding average daily gain and average daily feed intake, but there was no difference in feed conversion rate between the CRM15 and CT groups. At 42 days of age, there were no significant differences between CRM15 and CT birds in body measurements, the slaughter performance and the percentage of semi-eviscerated yield. The addition of CRM reduced the proportion of breast and thigh muscles during the feeding period, although we detected no significant difference between CRM15 and CT regarding the apparent digestibility of nutrients. Collectively, our findings indicate that 15% cassava was the optimal proportion for supplementing diets for broiler chicken production.

Keywords Cassava root meal · Growth performance · Apparent digestibility · Organ index · Broiler chickens

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Introduction

The global shortage of livestock feed resources is a common problem, with the animal feed industry being heavily reliant on corn, which provides 60% to 70% of animal energy requirements (Ahiwe et al. 2018). With the current expansion of the livestock sector and continual world population growth, competition for food between humans and livestock has become an increasingly prominent issue, particularly in developing countries. Consequently, it is important to assess alternative energy sources that could be used to replace corn. Cassava (*Manihot esculenta*) is a widely consumed staple food grown in tropical and subtropical regions. Notably, it can be cultivated without fertilizer in dry, poor, and acidic soils that are unsuitable for growing corn and other crops (Pradyawong et al. 2018). Sixty-one percent of the global cassava crop is produced in Africa, with smaller proportions of 29% and 9% being grown in Asia and South America,

家禽肠道健康的生物标志物研究进展

杨亚晋 郭爱伟* 韩明升 刘晓贺

(西南林业大学生命科学学院,昆明 650224)

摘要: 肠道不仅是家禽营养物质消化吸收的主要部位,也是动物体内重要的免疫器官,是机体防御体系的第1道屏障,维护和检测家禽肠道健康对保障家禽生产至关重要。肠道健康与宿主的健康、营养水平、环境、饲养管理和肠道中菌群组成情况密切相关。目前,可通过检测一些与家禽肠道相关的生物标志物来衡量肠道健康问题。本文归纳了近年来人类和动物肠道健康生物标志物的研究进展,从肠道健康生物标志物概述、损伤性取样、非损伤性取样的生物标志物以及其他一些潜在的生物标志物等方面进行了综述,试图确定目前和未来能用于评价家禽肠道健康的生物标志物,从而建立监测家禽肠道健康的有效策略。

关键词: 家禽;肠道健康;生物标志物;损伤性取样;非损伤取样

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动物的肠道除了维持营养物质的消化吸收功能,同时也是机体的一道重要的免疫防线^[1]。肠道内腔中黏膜组织形态结构的完整性及其上附着的微生物多样性是维持机体健康的有效屏障,能阻止肠道内细菌和毒素进入血液,家禽的肠道屏障主要包括机械屏障、化学屏障、微生物屏障和免疫屏障,各屏障之间相互作用,共同维护肠道健康(intestinal health)^[2]。公元前460—370年,西方医学之父 Hippocrates 曾提出“所有疾病始于肠道”的论述,表明肠道健康对机体的重要性。目前,已证实肠道功能出现紊乱与多种疾病的发生有关,如炎症性肠病(IBD)[包括溃疡性结肠炎(UC)和克罗恩病(CD)]、糖尿病(DM)、癌症、肥胖等,甚至与自闭症(AD)和抑郁症等精神类疾病有关^[3]。对于畜禽生产而言,健康的肠道对维持家禽的生长和可持续生产至关重要,健康的肠道可以提高养分消化率,减少营养物质的排泄,改善家禽的生产效率,减轻生产中有害气体对家禽和环境的影响。

目前,对于肠道健康还没有一个准确的定义,

肠道健康取决于宿主(免疫、黏膜屏障)、营养、微生物和环境因素。肠道健康的丧失与肠道微生物群组成的变化、黏膜屏障功能和肠道感染有关^[4]。尤其各国在养殖业中陆续禁抗后,如何维护肠道健康已经成为家禽营养研究的热点,特别是在集约化家禽养殖中。因此,需要对家禽肠道健康状况进行持续监测,尤其是高效的畜禽生产中肠道负荷经常被推到极限,肠道健康容易出现紊乱,继而引发一系列的炎症。本文对近年来人和畜禽肠道健康研究中相关的生物标志物(biomarkers)进行了综述,同时对不同肠道疾病模型相关标志物的来源和样本类型进行了分类总结,旨在此类生物标志物在目前和未来能用于畜禽的安全健康养殖,监测家禽肠道健康并做好有效的防控措施。

1 肠道健康的生物标志物概述

生物标志物被定义为肠道在健康或非健康状况下检测可变化的相关生物物质^[5],生物标志物应具有可靠性、特异性和敏感性,能够准确地反映肠道的健康状态,比较理想的生物标志物是稳定

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云南松苗木生长对 GA_3 和壳寡糖浸种及缓释肥的响应

张合瑶,李莲芳,刘 娴,李小军,顾 梦,周冬梅

(西南林业大学 林学院,云南 昆明 650224)

【摘要】【目的】了解赤霉素(gibberellin, GA_3)和壳寡糖(chitosan oligosaccharide, COS)溶液浸种结合基质施缓释肥的组合对云南松苗木生长及其针叶光合色素含量的影响,为短期内培育无蹲苗期壮苗提供科学依据。【方法】从 15 年生的 1.5 轮实生种子园采集云南松种子,采用 $L_9(3^4)$ 正交试验,开展不同质量浓度 GA_3 (0.1, 0.2 和 0.3 g/L)和 COS(1.3 和 5 g/L)溶液浸种结合基质施缓释肥(0.5, 1.0 和 1.5 kg/m³)的育苗试验,以不浸种和不施肥的处理作为对照。在苗龄 70, 110 和 140 d 时,测定苗木地径和苗高生长量,并于苗龄 140 d 时测定其针叶光合色素含量,筛选促进苗高生长的无蹲苗期壮苗培育的最优组合。【结果】苗龄 70, 110 和 140 d 时,各处理组合的苗木地径分别为 0.9~1.1, 1.1~1.5 和 1.9~2.3 mm,苗高分别为 3.5~5.0, 7.3~9.6 和 8.7~12.0 cm,对照地径分别为 1.0, 1.1 和 2.1 mm,苗高分别为 3.7, 7.0 和 9.2 cm;苗龄 140 d 时,各处理组合苗木针叶叶绿素 a、叶绿素 b、总叶绿素和类胡萝卜素含量分别为 0.43~0.67, 0.19~0.27, 0.62~0.94 和 0.08~0.13 mg/g,对照上述色素含量分别为 0.52, 0.20, 0.72 和 0.10 mg/g;各处理组合间以上指标均具有显著($P<0.05$)或极显著($P<0.01$)差异。除苗龄 140 d 时影响苗木地径生长的主导因子是 COS 外,其他苗龄阶段影响各指标的主导因子均为基质施缓释肥。【结论】外源激素和养分浸种结合基质施缓释肥可促进云南松苗木生长及其针叶光合色素的积累;无蹲苗期的云南松壮苗培育以促进苗高生长为主,0.2 g/L GA_3 和 1 g/L COS 浸种结合基质施 1.0 kg/m³ 缓释肥的组合,在 110 d 时即可培育出苗高达到出圃要求的无蹲苗期壮苗。

【关键词】 云南松;苗木培育;光合色素;赤霉素;壳寡糖;缓释肥

【中图分类号】 S791.257

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Responses of *Pinus yunnanensis* seedlings growth to GA_3 and chitosan oligosaccharide seed soaking and slow-released fertilizer application

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Abstract: 【Objective】 This study investigated the effects of soaking seeds with gibberellin (GA_3) and chitosan oligosaccharide (COS) solution combined with substrate application of slow-released fertilizer (SRF) on growth of *Pinus yunnanensis* seedlings and photosynthetic pigments contents of needles to provide basis and reference for cultivating robust seedlings without grass-stage in short time. 【Method】 *P. yunnanensis* seeds were collected from 1.5 cycle seedling-seed orchard of 15-year-old forests, and the $L_9(3^4)$ orthogonal design was employed to implement treatment combinations (TCs) with different mass concentrations of GA_3 (0.1, 0.2 and 0.3 g/L) and COS (1.3 and 5 g/L) combined with SRF (0.5, 1.0 and 1.5 kg/m³) in substrates. The treatment without seed soaking and fertilization served as the control (CK).

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柚木种子吸水及生活力对不同溶液浸种的响应

张合瑶, 朱存福*, 李莲芳*, 沈 松, 郑川玲, 顾 梦, 文国卫, 王 帅, 朱庆伟
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摘要:【目的】为了解清水(自来水)、不同浓度 NaOH 和 GA_3 溶液浸种组合,以及 GA_3 溶液于不同温度和时间浸种组合对柚木种实及种子吸水和生活力的影响,丰富柚木种实处理的资料,为进一步的试验研究和生产实践提供参考。【方法】采用单因素(清水-自来水浸种时间),以及 $L_8(2^7)$ (不同浓度 NaOH 和 GA_3 溶液浸种)和 $L_9(3^4)$ 正交(不同浓度 GA_3 溶液于不同温度和时间条件下浸种)设计开展柚木种实浸种和种子生活力测定的试验。【结果】清水浸种 2 h 的种实吸水率达 38.5%,之后吸水率极显著加速,18 h 后缓慢吸水,至 24 h 时,达饱和吸水量。NaOH 和 GA_3 浸种的种子吸水率和生活力分别为 20.9%~35.9%和 41.3%~65.3%,处理组间,此 2 指标呈现显著或极显著的差异影响($P<0.05$ 或 $P<0.01$);NaOH 溶液浓度及其与浸种时间的交互作用是影响种子吸水的主导因子,NaOH 溶液浓度是影响生活力的主导因子。 GA_3 溶液于不同温度和时间浸种的种实吸水率和种子生活力分别为 72.1%~108.3%和 1.0%~43.3%,处理组间,此两指标均呈现极显著的差异影响($P<0.01$); GA_3 溶液浓度及其与浸种时间的交互作用是影响种实吸水的主导因子,影响生活力的则是浸种温度。【结论】试验结果与普遍认为柚木种子吸水困难的结论相悖;NaOH 和 GA_3 浸种促进种子吸水,但相对高浓度 NaOH 溶液长时间浸种,降低种子生活力。0.1 g/L GA_3 于 35 ℃恒温下浸种 16 h 的生活力最高,35 ℃可作为柚木种子浸种的适宜温度。

关键词:柚木;正交试验;种实;种子;浸种;吸水;生活力

中图分类号:S796 **文献标志码:**A **文章编号:**1000-2650(2021)05-0596-08

Response of Water Absorption and Viability of Teak Seeds to Soaking with Water Involved NaOH and GA_3

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Abstract:【Objective】The purpose of the experiments is to understand effects of fruits soaked combinations (FSCs) consisted of water (tap water), different NaOH and GA_3 concentrations solution, involved the FSCs of GA_3 solution at different temperatures and time durations on water absorption and seed viability of teak (*Tectona grandis*) fruits and seeds, with to enrich the information of teak seed treatment, and provide references for further experimental research and production practice. 【Method】Single factor (clear water-soaking time durations in tap water), $L_8(2^7)$ (soaking fruits with different concentration solutions of the NaOH and GA_3) and $L_9(3^4)$ (soaking fruits with different GA_3 concentration solutions at different temperatures and time durations) orthogonal design were employed to implement experiments of teak fruit soaking and seed-vitality measurement. 【Result】The water absorption percent of fruits was 38.5% after 2 hours of soaking with clear water, and then the water absorption of the fruit was significantly accelerated. The water absorption was slowly down after 18 hours and reached the saturated water absorption

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作者： 周礼茂，吴海洋，田斌
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基于 MaxEnt 优化模型对不同时期金银忍冬潜在适生区动态模拟分析

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摘要: 使用优化的 MaxEnt 模型, 基于 58 个生态因子, 分析历史 (末次盛冰期、全新世中期)、当前和未来 2050 年与 2070 年气候背景下金银忍冬潜在适生区。结果表明: 在当前气候背景下 AUC 值大于 0.9, 连续博伊斯指数 (CBI) 的值是 0.998, 表明模拟结果可靠。影响金银忍冬分布的主要环境因子是最干季平均温度 (bio09)、土壤类型 (SU_CODE)、紫外线最强月份平均辐射量 (uvb3)。金银忍冬高适生区和最佳适生区面积是全国总面积的 4.43%, 主要分布在我国云南东北部、四川中部、湖北西部、重庆东部、甘肃东部、陕西、河南西部、山西南部。整体而言, 未来气候变化有利于金银忍冬适生区的扩张。从末次盛冰期到当前, 金银忍冬适生区向东北方向移动, 在未来, 金银忍冬的适生区有向北方迁移而在西南方向收缩的趋势, 并且最佳适生区严重丧失。建议加强最佳适生区保护, 在新增适生区, 可以考虑迁地保育方法, 进行合理的人工引种栽培。

关键词: 金银忍冬; 气候变化; MaxEnt; 适生区; 引种; 栽培

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Analysis of Potential Suitable Regions in the Different Periods for *Lonicera maackii* Using the MaxEnt Optimization Model

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Abstract: We use the optimized MaxEnt model to analyze the potential suitable regions of *Lonicera maackii* under historical (the Last Glacial Maximum, the Mid - Holocene), current and future climate conditions in 2050 and 2070 years based on 58 ecological factors. The model results show that: In the current climate background, the AUC value is greater than 0.9, and the continuous Boyce Index (CBI) value is 0.998, indicating that the simulation results are reliable. The main factors affecting the potential distribution of *Lonicera maackii* were Mean Temperature of Driest Quarter, soil classification and the Mean UV-B of Highest Month. The highly and optimal suitable regions for the present distribution covered Northeast Yunnan, central Sichuan, western Hubei, eastern Chongqing, eastern Gansu, Shaanxi, western Henan, southwest Shanxi, which accounted for 4.43% of national total area. Overall, future climate change will be conducive to the expansion of *Lonicera maackii* suitable regions. From the Last Glacial Maximum to the present, the suitable regions of *Lonicera maackii* move to the northeast, in the future, the suitable regions of *Lonicera maackii* tend to move to the north and shrink in the southwest, and the optimal suitable area is seriously lost. It is recommended to strengthen the protection of the optimal suitable regions, in the newly suitable regions, the relocation conservation method can be considered to carry out reasonable artificial introduction and cultivation.

Key words: *Lonicera maackii*; climate change; MaxEnt; suitable regions; introduction; cultivation

植物类群的分布格局取决于它们对环境的适应能力和扩散能力, 并受到生物和非生物环境因素的共同影响^[1-2]。一般说, 在大尺度的空间范围上, 非生物环境因子 (气候、地形、土壤等) 被认为是决定植物分布范围的主要因素^[3]。气候因素主要是温度和降雨等通过提供能源和水分来调控植物的各种生理过程。例如极端气候事件在塑造植物对环境的生理耐受性方面发挥重要作用, 植物物种在气候变化较大的环境中可能进化出更大的耐受性^[4-5]。地形通过诱导环境条件 (如微气候和土壤稳定性) 的变化以及通过在景观中形成植物扩散的地理

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