1、外语基础能力证明材料

成 绩 证 明

兹证明考生 关凌珊，

身份证件号码为 [redacted]，

于 2020 年 12月参加 全国大学英语四级

考试。成绩 信息如下：

笔试

总分	听力 (35%)	阅读 (35%)	写作和翻译 (30%)
450	155	172	123

口试

等级
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学校名称：内蒙古民族大学
准考证号：150131202116228
成绩单编号：202115013003846

教育部教育考试院
2024 年03 月25 日

No.C 2300093755

2、代表性论文

biology

MDPI

Article

Metabolome and Transcriptome Analyses Reveal Flower Color Differentiation Mechanisms in Various *Sophora japonica* L. Petal Types

Lingshan Guan [1], Jinshi Liu [1], Ruilong Wang [1,2], Yanjuan Mu [1], Tao Sun [1], Lili Wang [1], Yunchao Zhao [1], Nana Zhu [1,3], Xinyue Ji [1], Yizeng Lu [1,*] and Yan Wang [1,*]

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Simple Summary: Flower color is one of the most important ornamental characteristics of *Sophora japonica*. The most common *S. japonica* flower color is generally yellow and white, with no exceptional characteristics. The monotonous flower color seriously affects the ornamental value of this species. Therefore, the elucidation of the underlying biosynthetic mechanisms and the role of anthocyanins in the development and cultivation of new flower color varieties in *S. japonica* is of significant importance but has remained unclear to date. In this study, the *S. japonica* 'AM' mutant was investigated due to its flower color mutation. The key structural genes involved in the synthesis and accumulation of anthocyanins in *S. japonica* 'AM' were screened out using metabolomics and transcriptomics approaches. Bioinformatics analysis demonstrated that the primary key metabolites that affect the color variation in 'AM' petals are cyanidin-type anthocyanins. The late genes and the *bHLH* transcription factor are the key genes affecting the anthocyanin synthesis and responsible for color variation in *S. japonica* 'AM' petals. This study analyzed the variation patterns and the synthesis pathways of anthocyanin components in *S. japonica* petals. The major relevant regulatory genes were also explored to provide a theoretical basis for the innovative utilization of *S. japonica* flower color germplasm resources.

Abstract: *Sophora japonica* L. is an important landscaping and ornamental tree species throughout southern and northern parts of China. The most common color of *S. japonica* petals is yellow and white. In this study, *S. japonica* flower color mutants with yellow and white flag petals and light purple-red wing and keel petals were used for transcriptomics and metabolomics analyses. To investigate the underlying mechanisms of flower color variation in *S. japonica* 'AM' mutant, 36 anthocyanin metabolites were screened in the anthocyanin-targeting metabolome. The results demonstrated that cyanidins such as cyanidin-3-O-glucoside and cyanidin-3-O-rutinoside in the 'AM' mutant were the key metabolites responsible for the red color of the wing and keel petals. Transcriptome sequencing and differentially expressed gene (DEG) analysis identified the key structural genes and transcription factors related to anthocyanin biosynthesis. Among these, *F3′5′H*, *ANS*, *UFGT79B1*, *bHLH*, and *WRKY* expression was significantly correlated with the cyanidin-type anthocyanins (key regulatory factors affecting anthocyanin biosynthesis) in the flag, wing, and keel petals in *S. japonica* at various flower development stages.

Keywords: *Sophora japonica*; anthocyanin; metabolome; transcriptome

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Citation: Guan, L.; Liu, J.; Wang, R.; Mu, Y.; Sun, T.; Wang, L.; Zhao, Y.; Zhu, N.; Ji, X.; Lu, Y.; et al. Metabolome and Transcriptome Analyses Reveal Flower Color Differentiation Mechanisms in Various *Sophora japonica* L. Petal Types. *Biology* **2023**, *12*, 1466. https://doi.org/10.3390/biology12121466

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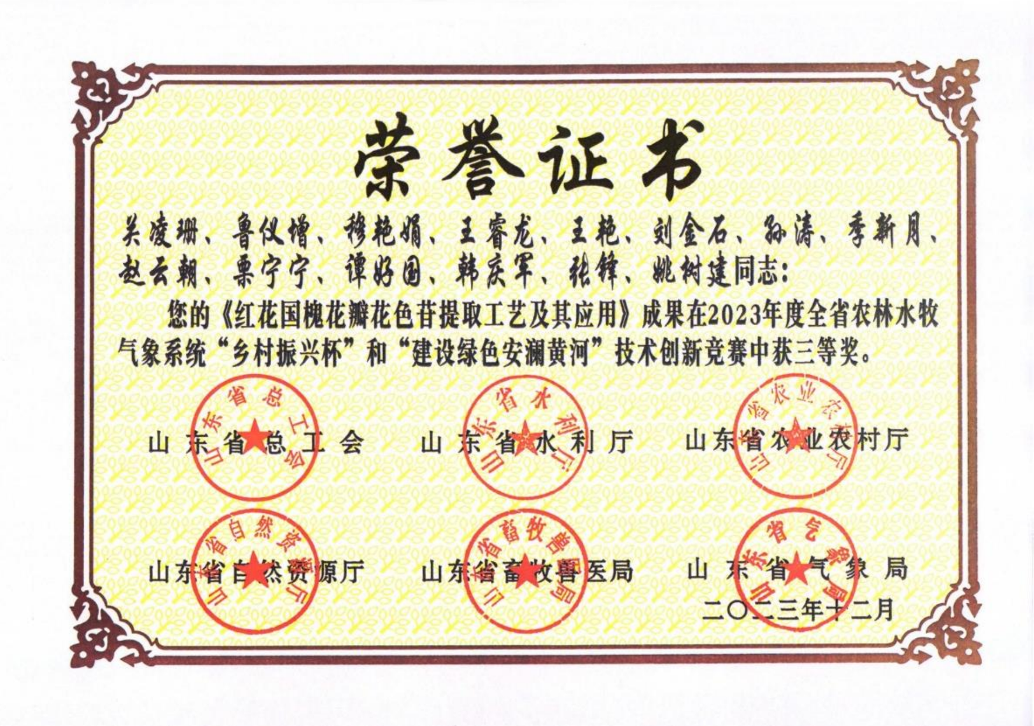
3、代表性成果



荣誉证书

关凌珊、鲁仪增、穆艳娟、王睿龙、王艳、刘金石、孙涛、季新月、赵云朝、栗宁宁、谭好国、韩庆军、张锋、姚树建同志：

您的《红花国槐花瓣花色苷提取工艺及其应用》成果在2023年度全省农林水牧气象系统“乡村振兴杯”和“建设绿色安澜黄河”技术创新竞赛中获三等奖。

山东省总工会　山东省水利厅　山东省农业农村厅

山东省自然资源厅　山东省畜牧兽医局　山东省气象局

二〇二三年十二月