

30  
years *IPBB*



Proceedings of  
**THE INTERNATIONAL  
CONFERENCE ON PLANT BIOLOGY  
AND BIOTECHNOLOGY  
(ICPBB 2024)**

Best Western Plus Atakent Park Hotel  
June 3-6, 2024  
Almaty, Kazakhstan



ҚАЗАҚСТАН РЕСПУБЛИКАСЫ ҒЫЛЫМ ЖӘНЕ ЖОҒАРЫ БІЛІМ МИНИСТРЛІГІ  
ҒЫЛЫМ КОМИТЕТІ  
БИОЛОГИЯ ЖӘНЕ ӨСІМДІКТЕР BIOTECHНОЛОГИЯСЫ ИНСТИТУТЫ

МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РЕСПУБЛИКИ КАЗАХСТАН  
КОМИТЕТ НАУКИ  
ИНСТИТУТ БИОЛОГИИ И BIOTECHНОЛОГИИ РАСТЕНИЙ

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF  
KAZAKHSTAN  
SCIENCE COMMITTEE  
INSTITUTE OF PLANT BIOLOGY AND BIOTECHNOLOGY

**«INTERNATIONAL CONFERENCE ON PLANT BIOLOGY AND BIOTECHNOLOGY  
(ICPBB 2024)»**

Халықаралық конференцияның материалдары  
3-6 маусым 2024 ж.

**«INTERNATIONAL CONFERENCE ON PLANT BIOLOGY AND BIOTECHNOLOGY  
(ICPBB 2024)»**

Материалы международной конференции  
3-6 июня 2024 г.

**«INTERNATIONAL CONFERENCE ON PLANT BIOLOGY AND BIOTECHNOLOGY  
(ICPBB 2024)»**

Materials of the international conference  
June 3-6, 2024

АЛМАТЫ 2024

**УДК 581; 574; 575; 631.52**

**ББК 28.5**

**P71**

**Редакционная коллегия:** д.б.н., проф. Абугалиева С.И., д.б.н., проф. Кохметова А.М., к.б.н., проф. Турусбеков Е.К., к.б.н., проф. Кушнарченко С.В., PhD Гриценко Д.А., PhD Альмерева Ш.С., PhD Энуарбек Ш.Н., PhD Сапахова З., PhD Затыбеков А.К.

«International Conference on Plant Biology and Biotechnology (ICPBB 2024)»: Материалы международной конференции / под общей редакцией Е.К. Турусбекова, С.И. Абугалиевой. – Алматы: ИББР, 2024 – 247 с.

**ISBN 978-601-08-4104-8**

В сборнике представлены материалы международной конференции «International Conference on Plant Biology and Biotechnology (ICPBB 2024)», проведенной в г. Алматы 3 – 6 июня 2024 г. В публикациях изложены результаты оригинальных исследований в области изучения, сохранения и использования генетических ресурсов, генетики, селекции, биоинформатики и биотехнологии растений.

Сборник рассчитан на биологов, генетиков, биотехнологов, селекционеров, специалистов, занимающихся генетическими ресурсами растений, и студентов биологического и сельскохозяйственного профилей.

Тезисы докладов представлены в авторской редакции.

Ответственность за текстовое содержание каждого тезиса несут соответствующие авторы.

Рекомендовано к изданию Ученым советом РГП на ПХВ «Институт биологии и биотехнологии растений» Комитета науки Министерства науки и высшего образования Республики Казахстан (Протокол №3 от 25.04.2024 г.)

**Proceedings of the «INTERNATIONAL CONFERENCE ON PLANT BIOLOGY AND BIOTECHNOLOGY (ICPBB 2024) »**

*June 3-6, 2024 - Almaty, Kazakhstan*

**Editors**

Yerlan Turuspekov, Saule Abugalieva

**Editorial Board:** Doctor of Biological Sciences, Prof. Abugalieva S.I.; Doctor of Biological Sciences, Prof. Kokhmetova A.M.; Candidate Biological Sciences, Prof. Turuspekov Y.K.; Candidate Biological Sciences, Prof. Kushnarenko S.V.; PhD Gritsenko D.A.; PhD Almerkova S.S.; PhD Anuarbek S.N.; PhD Sapakhova Z.; PhD Zatybekov A.K.

**Publisher**

Institute of Plant Biology and Biotechnology

Responsibility for the text content of each abstract is with the respective authors.

**Venue:** Best Western Plus Atakent Park Hotel, 42 Timiryazev str., 050040  
Almaty, Kazakhstan

**Conference webpage:** <https://primerdigital.com/ICPBB2024/>

**Hosted by:** Institute of Plant Biology and Biotechnology, Almaty, Kazakhstan

*Correct citation:* Turuspekov Ye., Abugalieva S. (editors) (2024) Proceedings of the «International Conference on Plant Biology and Biotechnology» (ICPBB 2024), Almaty, Kazakhstan, June 3-6, 2024, IPBB, Almaty, Kazakhstan; ISBN

ISBN 978-601-08-4104-8

© IPBB, 2024

## **Session 1.**

# **Genetic Resources and Biodiversity**

## GENETIC ADAPTATION STRATEGIES OF RHODIOLA *LINEARIFOLIA* PLANTS FROM VARIOUS ECOLOGICAL AND GEOGRAPHICAL POPULATIONS

Terletskaya N.V., Khapilina O.N.<sup>2</sup>, Erbay M.<sup>1</sup>, Turzhanova A.S.<sup>2</sup>

<sup>1</sup> Institute of Genetics and Physiology, Almaty, Kazakhstan

<sup>2</sup> National Center for Biotechnology, Astana, Kazakhstan

E-mail: teni02@mail.ru

Representatives of the Crassulaceae family's genus *Rhodiola* are succulents and have a great capacity for adaptation to unfavorable environmental influences. We studied the individual specimens from from *R. linearifolia* Boriss. from three different natural populations of nature reserves in various mountainous regions of Kazakhstan.

One of the most significant tools for analyzing plant resources, including numerous genetic processes in wild populations, is the analysis of molecular genetic polymorphism. This work aimed to look at the polymorphisms of allelic variations of the superoxide dismutase (SOD) and auxin response factor (ARF) gene families, as well as the genetic diversity of from three different natural populations of *R. linearifolia*, using the retrotransposons-based fingerprinting approach. The multi-locus exon-primed intron-crossing (EPIC-PCR) profiling approach was used to examine allelic variations in the SOD and ARF gene families. We implemented the inter-primer binding site (iPBS) PCR amplification technique for genome profiling, which demonstrated a significant level of polymorphism in the *Rhodiola* samples studied. The results obtained in this study show a high level of molecular genetic polymorphism in the coding part of the genome in the studied samples.

Both SOD family genes and ARF genes had a great variety of EPIC-PCR amplicons in populations studied. Yes, the analyzed populations of *R. linearifolia*, respond mainly similarly to stress. But the results indicate the presence of genetic differences or structural features between these populations, which may be associated with adaptation to different environmental conditions or allelic drift.

The iPBS profiling analysis for the studied samples of analyzed populations also revealed the level of genetic differentiation of the studied populations and demonstrated Genetic profiles contained both common amplicons and unique one's characteristic of each specific population of *R. linearifolia*. Based on the results of genetic analysis of populations based on DNA profiling data, we can conclude that about 64% of genetic diversity is due to intrapopulation variability.

The variability in the regulatory regions of the ARFs and SOD genes may be associated with different plant responses to stress factors, while PBS polymorphism may be due to the geographic remoteness of populations and the influence of environmental conditions.

So, the genetic variety of wild populations of *R. linearifolia* leads to their improved tolerance of opposing environmental circumstances and evolutionary divergence.