

SABRAO JOURNAL of BREEDING and GENETICS

Volume 51 No. 4 December 2019



SABRAO

**SOCIETY FOR THE ADVANCEMENT OF
BREEDING RESearch IN ASIa AND
OCEANIA**

<http://sabraojournal.org/>

ISSN 1029-7073; eISSN 2224-8978





SABRAO J. Breed. Genet. Editorial Board



EDITOR-IN-CHIEF

Prof. Dr. Naqib Ullah Khan

The University of Agriculture, Peshawar, PAKISTAN

DEPUTY EDITOR-IN-CHIEF

Dr. Sanun Jogloy

Khon Kaen University, THAILAND

ASSOCIATE EDITORS

Dr. CN Neeraja

Directorate of Rice Research, Hyderabad, INDIA

Dr. Sathiyamoorthy Meiyalaghan

Plant & Food Research, Christchurch, NEW ZEALAND

Dr. Ramakrishnan M. Nair

World Vegetable Center, Andhra Pradesh, INDIA

Dr. Arbind K. Choudhary

ICAR Research Complex for Eastern Region, Patna, INDIA

Dr. Sambasivam Periyannan

CSIRO, Canberra, AUSTRALIA

Prof. Dr. Sobir

Bogor Agricultural University, INDONESIA

Dr. Desta Wirnas

Bogor Agricultural University, INDONESIA

Dr. Akshaya K. Biswal

CIMMYT, Mexico

Dr. Samrin Gul

Lasbela University of Agriculture, Water and Marine Sciences, Uthal, PAKISTAN

Dr. Himmah Rustiami

Indonesian Institute of Sciences, Bogor, INDONESIA

Prof. Dr. Bambang Sapta Purwoko

Bogor Agricultural University, Bogor, INDONESIA

Prof. Dr. Kwon, Soon-Wook

Pusan National University, KOREA

SABRAO Publishing team

Dr. Bertrand (Bert) Collard

Senior Associate Editor/Publishing Editor, AUSTRALIA

ASSISTANT EDITORS

Mr. Joseph "Otep" Vicente & Mr. Joseph C. Beredo, PHILIPPINES

**New articles should be submitted directly to the Editor-in-Chief
(Prof. Dr. Naqib Khan) by email: nukmarwat@yahoo.com**

General enquiries: sabrao_journal_editor@hotmail.com

About the cover

Wheat breeding in Pakistan

Field visit at the Cereal Crops Research Institute (CCRI), Pirsabak - Nowshera, Khyber Pakhtunkhwa, Pakistan. Top left: crossing in the field. Top right: sowing activities. Main photo: Field visit by Dr. Hans Braun, Global Wheat Program Director, CIMMYT.

Photo contributed by Dr. Naqib Ullah Khan. © SABRAO



SABRAO JOURNAL of BREEDING and GENETICS

ISSN 1029-7073; eISSN 2224-8978

Volume 51 Number 4 DECEMBER 2019

CONTENTS

- Sitairesmi T, Suwarno WB, Gunarsih C, Nafisah, Nugraha Y, Sasmita P, Daradjat AA (2019). Comprehensive stability analysis of rice genotypes through multi-location yield trials using PBSTAT-GE. *SABRAO J Breed Genet* 51: 355-372.
- Songsri P, Nata J, Bootprom N, Jongrungklang N (2019). Evaluation of sugarcane elite clones through physiological responses and yield related traits under early rainfed drought stress conditions. *SABRAO J Breed Genet* 51: 373-389.
- Gunawan, Chikmawati T, Sobir, Sulistijorini (2019). Genetic diversity and population structure analyses in *Baccaurea angulata* accessions using ISSR primers. *SABRAO J Breed Genet* 51: 390-404.
- Alam T, Kurniasih B, Suryanto P, Basunanda P, Supriyanta, Ambarwati E, Widyawan MH, Handayani S, Taryono (2019). Stability analysis for soybean in agroforestry system with *kayu putih*. *SABRAO J Breed Genet* 51: 405-418.
- Fitriah N, Suharsono, Nugroho S, Suwarno, Miftahudin (2019). Introgression of resistance to blast disease from monogenic line IRBLta2-Re to Ciherang rice variety. *SABRAO J Breed Genet* 51: 419-429.
- Alsabah R, Purwoko BS, Dewi IS, Wahyu Y (2019). Selection index for selecting promising doubled haploid lines of black rice. *SABRAO J Breed Genet* 51: 430-441.
- Darmadi AAK, Suriani NL, Sudirga SK, Khalimi K (2019). First study on *Fusarium equiseti*: Causes *Fusarium wilt* in tomato crop in Bali, Indonesia. *SABRAO J Breed Genet* 51: 442-450.

- Fendiyanto MH, Satrio RD, Suharsono S, Tjahjoleksono A, Hanarida I, Miftahudin M (2019). QTL for aluminum tolerance on rice chromosome 3 based on root length characters. *SABRAO J Breed Genet* 51: 451-469.
- Namwongsa J, Jongrunklang N, Songsri P (2019). Genotypic variation in root distribution and physiological responses of sugarcane induced by drought stress. *SABRAO J Breed Genet* 51: 470-493.

SABRAO
THE SOCIETY FOR THE ADVANCEMENT OF BREEDING
RESEARCH IN ASIA AND OCEANIA

Visit our new website at:

<http://sabraojournal.org/>

SABRAO JOURNAL OF BREEDING AND GENETICS

ISSN 1029-7073; eISSN 2224-8978

The *SABRAO Journal of Breeding and Genetics* is an international journal of plant breeding and genetics research, and is the official publication of the Society for the Advancement of Breeding Research in Asia and Oceania (SABRAO). The journal was first published in 1969. Its objective has been to promote the international exchange of research information on plant breeding and genetics, by describing new research findings or ideas of a basic or practical nature. It also provides a medium for the exchange of ideas and news regarding members of the Society.

Priority is given to articles that are of direct relevance to plant breeders with an emphasis on the Asian region. Research articles, short communications, methods, reviews, commentaries and opinion articles will be accepted or invited for publication. Scientific contributions will be refereed and edited to international standards.

The journal mainly publishes articles for SABRAO members and it is strongly preferred that at least one author should be a current member of the society. However non-members may also publish in the journal. In 2016, the journal became an electronic journal with open access. Although a publication fee is charged for all articles, the journal operates on a not-for-profit basis.

SABRAO WEBSITE

<http://sabraojournal.org/>

This website contains the most recent and past articles the *SABRAO Journal of Breeding and Genetics*, in addition to details of the Editorial Board and publishing team. The website also contains up-to-date information about the Society, information about current officers and regional secretaries, upcoming congresses, and general matters concerning the society.

SABRAO - Executive members 2019

Elected at the 2019 Korean Society of Breeding Science/14th International SABRAO Conference held in Korea (July 2-5, 2019)

President: Prof. Glenn B. Gregorio (SEARCA/UPLB, PHILIPPINES)
Email: gbg@searca.org

First Vice President: Prof. Chen Xin (Institute of Industrial Crops, Jiangsu Academy of Agricultural Sciences, CHINA)
Email: cx@jaas.ac.cn; jaascx@sohu.com

Second Vice President: Dr. Young-Chan Cho (KOREA)

Third Vice President: Dr. Malikarjuna Swamy (IRRI, PHILIPPINES)
Email: m.swamy@irri.org

Secretary General: Dr. Desta Wirnas (Bogor Agricultural University, INDONESIA)
Email: dwirnas@gmail.com

Treasurer: To be appointed

Editor-in-Chief: Prof. Naqib Ullah Khan (PAKISTAN)

Deputy Editor-in-Chief: Dr. Sanun Jogloy (THAILAND)

Ex-Officio Members:

Dr. Peerasak Srinives (THAILAND)
Dr. Sang-Nag Ahn (KOREA)

Member: Dr. B.C. Viraktamath (INDIA)

REGIONAL SECRETARIES

Regional Secretaries are elected by the members in each country. They play an indispensable role in the operations of the Society by:

- notifying members of Society announcements
- recruiting new members
- organizing other activities, such as local meetings
- keeping books of account and sending an audited statement to the Treasurer annually
- providing the Secretary-General with a list of financial members in their region each year

In 2019, the Regional Secretaries are as follows:

AUSTRALIA

Dr. Bertrand C.Y. Collard
Yanco Agricultural Institute
NSW Department of Primary Industries
Yanco 2703, Australia
Email: sabraojournal.editingteam@gmail.com

BANGLADESH

Dr. Abul Kashem Chowdhury
Professor
Department of Genetics and Plant Breeding
Patuakhali Science and Technology University
Patuakhali-8602, Bangladesh
Email: kashempstu@yahoo.com

CHINA (PEOPLES' REPUBLIC OF)

Prof. Cheng Xuzhen
Institute of Crop Sciences
Chinese Academy of Agricultural Sciences
30 Bai Shi Qiao Road, Beijing 100081, China
Email: chengxuzhen@caas.cn.

INDIA

Dr. Ramakrishnan M. Nair
Global Plant Breeder - Legumes
World Vegetable Center-South Asia/Central Asia
ICRISAT Campus, Patancheru 502 324
Hyderabad, Andhra Pradesh, India
Email: ramakrishnan.nair@worldveg.org

INDONESIA

Dr. Desta Wirnas
Plant Genetics and Breeding Division
Dept. Agronomy and Horticulture
Faculty of Agriculture, Bogor Agricultural University
Bogor, 16680, Indonesia
Email: dwirnas@gmail.com

KOREA

Dr. Joong-Hyoun Chin
Sejong University, South Korea
Email: Joonghyoun.chin@gmail.com

MALAYSIA

Dr. Abdul Rahim Bin Harun
Malaysian Nuclear Agency
Bangi 43000, Kajang, Selangor, Malaysia
Email: rahim6313@yahoo.com

PAKISTAN

Prof. Naqib Ullah Khan
Department of Plant Breeding and Genetics
The University of Agriculture, Peshawar 25130
Khyber Pakhtunkhwa, Pakistan
Email: nukmarwat@yahoo.com, nukmarwat@aup.edu.pk

PHILIPPINES

Prof. Teresita H. Borromeo
Crop Science Cluster
College of Agriculture
University of the Philippines Los Baños
College, Laguna, The Philippines
Email: thborromeo@yahoo.com

SRI LANKA

Prof. D.P.S.T.G. (Thilak) Attanayaka
Faculty of Agriculture and Plantation Management
Wayamba University of Sri Lanka
Makandura, Gonawila (NWP), Sri Lanka
Email: dpstga@yahoo.com

TAIWAN, REPUBLIC OF CHINA

Dr. Hsun Tu
Rural Development Foundation,
5F, 7, Section 1, 4 Roosevelt Road, Taipei 100, Taiwan
Email: rdf@ms4.hinet.net

THAILAND

Dr. Suchila Techawongstien
Section of Horticulture, Department of Plant Science and Agricultural Resources
Faculty of Agriculture, Khon Kaen University
KhonKaen, 40002 Thailand
Email: suctec.kku@gmail.com

USA/NORTH & SOUTH AMERICA (*new*)

Dr. Thomas H. Tai
USDA, UC Davis, USA
Email: Thomas.Tai@ars.usda.gov

SABRAO EDITORIAL BOARD

EDITOR-IN-CHIEF

Dr. Naqib Ullah Khan

Professor

Department of Plant Breeding and Genetics
The University of Agriculture, Peshawar 25130
PAKISTAN

Email: nukmarwat@yahoo.com, nukmarwat@aup.edu.pk

Area of expertise: Breeding Fiber and Cereal Crops, Quantitative Genetics

DEPUTY EDITOR-IN-CHIEF

Dr. Sanun Jogloy

Department of Plant Science and Agricultural Resources
Faculty of Agriculture, Khon Kaen University
Khon Kaen 40002
THAILAND

Email: sjogloy@gmail.com

Area of expertise: plant breeding, quantitative genetics, physiological traits

ASSOCIATE EDITORS

Dr. CN Neeraja

Principal Scientist, Biotechnology Unit
Crop Improvement Section
Directorate of Rice Research,
Rajendra Nagar, Hyderabad – 500030
INDIA

Email: cnneeraja@gmail.com

Area of expertise: Molecular breeding of rice

Dr. Sathiyamoorthy Meiyalaghan (Mei)

Scientist - New Cultivar Innovation Portfolio
Plant & Food Research
Private Bag 4704, Christchurch, 8140
NEW ZEALAND

Email: mei.meiyalaghan@plantandfood.co.nz

Area of expertise: genomics and molecular breeding

Dr. Ramakrishnan M. Nair

Vegetable Breeder - Legumes
AVRDC - The World Vegetable Center
ICRISAT Campus, Patancheru 502 324
Hyderabad, Andhra Pradesh
INDIA

Email: ramakrishnan.nair@worldveg.org

Area of expertise: plant breeding and genetics research in pulses and pasture legumes

Dr. Arbind K. Choudhary

Principal Scientist (Plant Breeding)
ICAR Research Complex for Eastern Region
Patna 800 014 (Bihar)
INDIA

Email: akicar1968@gmail.com; akiipr23@yahoo.com

Area of expertise: Genetics and breeding of legumes

Dr. Sambasivam (Sam) Periyannan

Research Scientist
Agriculture & Food
CSIRO, Canberra, ACT 2601
AUSTRALIA

Email: sambasivam.periyannan@csiro.au

Area of expertise: molecular markers, breeding, disease resistance, gene cloning, transgenics

Dr. Desta Wirnas

Department of Agronomy and Horticulture
Bogor Agricultural University
Bogor 16680
INDONESIA

Email: dwirnas@gmail.com; desta@ipb.ac.id

Area of expertise: Plant Breeding and Genetics and Quantitative Genetics
Crop expertise: Rice, Soybean, Sorghum

Prof. Dr. Sobir

Genetic and Plant Breeding Laboratory
Department of Agronomy and Horticulture
Faculty of Agriculture, Darmaga Campus
Bogor Agricultural University
INDONESIA

Email: rsobir@yahoo.com; sobir@ipb.ac.id

Area of Expertise: Molecular Genetics and Plant Breeding in Tropical Crops

Dr. Akshaya K. Biswal

Biotechnology for Agricultural Development Laboratory
International Maize and Wheat Improvement Center (CIMMYT)
Carretera México-Veracruz Km. 45, El Batán, Texcoco, C.P. 56237
MEXICO

Email: akbiswal@hotmail.com; a.k.biswal@cgiar.org

Area of expertise: plant molecular genetics and biology

Dr. Samrin Gul

Department of Plant Breeding and Genetics
Lasbela University of Agriculture, Water and Marine Sciences (LUAWMS)
Uthal, District Lasbela – Balochistan
PAKISTAN

E-mail: samringulpbg@gmail.com; samringul@yahoo.com

Area of Expertise: Breeding Oilseed Crops, Quantitative Genetics

Dr. Himmah Rustiami

Research Center for Biology, Indonesian Institute of Sciences,
Cibinong Science Center, Jln Raya Jakarta Bogor,
Cibinong, Bogor
INDONESIA

Email: [hrustiemi@gmail.com](mailto:hrustiami@gmail.com)

Area of Expertise: Plant Systematics, Ethno-Botany

Prof. Dr. Bambang Sapta Purwoko

Department of Agronomy and Horticulture, Faculty of Agriculture,
Bogor Agricultural University
INDONESIA

Email: bspurwoko@apps.ipb.ac.id

Area of Expertise: Breeding for abiotic stress, plant tissue culture

Prof. Dr. Kwon, Soon-Wook

Department of Plant Bioscience
College of Natural Resource and Life Sciences
Pusan National University
Miryang 50463
KOREA

Email: swkwon@pusan.ac.kr

Area of Expertise: rice genetics

SABRAO Publishing team

Dr. Bertrand (Bert) Collard

Senior Associate Editor/Publishing Editor
NSW Department of Primary Industries
AUSTRALIA

Email: sabraojournal.editingteam@gmail.com

Area of expertise: plant breeding and genetics, QTL analysis, molecular breeding

ASSISTANT EDITORS

Mr. Joseph "Otep" Vicente

Email: sabraojournal.editingteam2@gmail.com

Mr. Joseph C. Beredo

Email: sabraojournal.editingteam.ph@gmail.com

WEB MANAGER

Ms. Ella "Kaye" Domingo

Email: ekdd14@yahoo.com

PUBLICATION FEE STRUCTURE

Please note that there is a publication fee FOR ALL ARTICLES - including SABRAO members - which must be paid after publication of the article. This requirement is to cover journal processing costs and to maintain the website. Payment can be made to the Regional Secretary (details available above or on SABRAO website) in local currency equivalent, or by contacting the Editor-in-Chief.

In 2019, the fee structure is as follows:

Category	Developing country	Developed country
SABRAO member*	US\$ 100	US\$ 125
Non member	US\$ 150	US\$ 200

*At least 1 author should be a current SABRAO member

If the standard of English is not satisfactory, SABRAO will use its own editing service, but will charge a **MINIMUM MANDATORY FEE of US\$50 per article. For articles requiring extensive English editing, authors will be charged up to US\$100 per article.** This additional fee is required because manuscripts are sent to external English editing services.

Authors certainly have the right to choose their own English editing services. If the English requires improvement after review, evidence is required that the authors have used a professional English editing service.

The philosophy of the journal is that publication fees will be kept minimal in order to ensure publication is available to scientists in developing countries. Therefore journal publication fees are reviewed annually.

ACKNOWLEDGEMENTS

The Editor-in-Chief would sincerely like to thank the many reviewers for their time and effort. An updated list of reviewers is maintained on the website.

Thanks to the publishing team for their countless hours of work for this issue.