

SABRAO JOURNAL OF BREEDING AND GENETICS

Volume 55 Number 2 | April 2023



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ISSN 1029-7073 | eISSN 2224-8978

Images on the front cover: Breeders at the “LLP - Agricultural Experimental Station of Cotton and Melon Growing, Atakent, Republic of Kazakhstan” have created 13 cultivars of medium-fiber cotton (*Gossypium hirsutum* L.) i.e., PA-3044, PA-3031, Bereke-07, Maktaaral-4003, Maktaaral-4005, Maktaaral-4007, Maktaaral-4011, Myrzashol-80, Atakent-2010, BTM-4047, Memory of Yeraliev, Maktaaral-4017, and Maktaaral-5027 over the past decades. In Kazakhstan and the world, cotton breeders are always trying to develop cotton cultivars with enhanced boll weight, seed cotton yield, desirable fiber quality traits, early maturity, tolerance to salinization, and pests and diseases. In 2019-2021, Breeders also selected the five high-yielding cotton genotypes viz., M-4001, M4003, M-4017, M-4018, and M-4019 with desirable fiber quality traits. These precocious cotton strains can be rightfully introduced into production in the Turkestan region, Kazakhstan. In addition, these promising cotton genotypes can be used as parental forms during hybridization to develop more productive cultivars. Full details of the said research can be found in the article published by Makhmadjanov *et al.* (2023) titled “Makhmadjanov SP, Tokhetova LA, Daurenbek NM, Tagaev AM, Kostakov AK (2023). Cotton advanced lines assessment in the Southern Region of Kazakhstan. *SABRAO J. Breed. Genet.* 55(2): 279-290. <http://doi.org/10.54910/sabrao2023.55.2.1>. © SABRAO

New articles should be submitted directly to the Editor-in-Chief (Prof. Dr. Naqib Ullah Khan) by email: nukmarwat@yahoo.com, nukmarwat@gmail.com, nukmarwat@aup.edu.pk



SABRAO JOURNAL of BREEDING and GENETICS

pISSN 1029-7073; eISSN 2224-8978

Volume 55 Number 2 APRIL 2023

<http://doi.org/10.54910/sabrao2023.55.2>

CONTENTS

- Makhmadjanov SP, Tokhetova LA, Daurenbek NM, Tagaev AM, Kostakov AK (2023). Cotton advanced lines assessment in the Southern Region of Kazakhstan. *SABRAO J. Breed. Genet.* 55(2): 279-290. <http://doi.org/10.54910/sabrao2023.55.2.1>.
- Khanishova MA, Azizov IV (2023). Evaluation of interspecific wheat hybrids (*T. Durum* × *T. Aestivum*) for spike-related traits. *SABRAO J. Breed. Genet.* 55(2): 291-297. <http://doi.org/10.54910/sabrao2023.55.2.2>.
- Ahmad J, Rehman A, Ahmad N, Anwar J, Nadeem M, Owais M, Abdullah M, Gulnaz S, Ramzan Y, Shair H, Saleem M, Shahzad R (2023). Dilkash-20: A newly approved wheat variety recommended for Punjab, Pakistan, with supreme yielding potential and disease resistance. *SABRAO J. Breed. Genet.* 55(2): 298-308. <http://doi.org/10.54910/sabrao2023.55.2.3>.
- Amas ANK, Musa Y, Farid M, Anshori MF (2023). Genetic characteristics of F₂ populations obtained through double and three-way crosses in cayenne peppers. *SABRAO J. Breed. Genet.* 55(2): 309-318. <http://doi.org/10.54910/sabrao2023.55.2.4>.
- Nadeem T, Khalil IH, Jadoon SA (2023). Combining ability analysis for maturity and yield attributes in sweet corn across environments. *SABRAO J. Breed. Genet.* 55(2): 319-328. <http://doi.org/10.54910/sabrao2023.55.2.5>.
- Saif R, Iqbal A, Bibi A, Ahmad N (2023). Genetic analysis of earliness, yield, oil quality-related traits, and DNA-based hybrid authentication in sunflower. *SABRAO J. Breed. Genet.* 55(2): 329-343. <http://doi.org/10.54910/sabrao2023.55.2.6>.

- Mansour SR, Elhaloos BA, Abdel-Lateif KS (2023). Phenotypic and genetic diversity of native *Rhizobium* isolated from root nodules of leguminous plants grown in reclaimed soil, Egypt. *SABRAO J. Breed. Genet.* 55(2): 344-357. <http://doi.org/10.54910/sabrao2023.55.2.7>.
- Rauf A, Khan MA, Jan F, Gul S, Afridi K, Khan I, Bibi H, Khan RW, Khan W, Kumar T (2023). Genetic analysis for production traits in wheat using line x tester combining ability analysis. *SABRAO J. Breed. Genet.* 55(2): 358-366. <http://doi.org/10.54910/sabrao2023.55.2.8>.
- Saleem H, Sadaqat HA, Razzaq H, Chattha AA, Khan SH (2023). Heterotic grouping with combining ability and gene action in *Sesamum indicum* L. using line x tester analysis. *SABRAO J. Breed. Genet.* 55(2): 367-378. <http://doi.org/10.54910/sabrao2023.55.2.9>.
- Baran W, Khan MA, Habib U, Rana RM (2023). Genetic analysis and morphological profiling of ranunculus genotypes. *SABRAO J. Breed. Genet.* 55(2): 379-387. <http://doi.org/10.54910/sabrao2023.55.2.10>.
- Ahmad N, Rehman A, Gulnaz S, Javed A, Sultana R, Ajmal S, Ahsan A, Shamim S, Nadeem M, Shair H, Abdullah M, Ahmad J, Sarwar M (2023). Appraisal of bread wheat germplasm for quality attributes and their relationship with grain yield. *SABRAO J. Breed. Genet.* 55(2): 388-398. <http://doi.org/10.54910/sabrao2023.55.2.11>.
- Al-Haidari HAM, Al-Tamimi AJT (2023). Physical and chemical mutagenesis in *catharanthus roseus* plant using SCoT markers. *SABRAO J. Breed. Genet.* 55(2): 399-406. <http://doi.org/10.54910/sabrao2023.55.2.12>.
- Al-Musawi MDK, Al-Tamimi AJT (2023). Assessment of variations in *Catharanthus roseus* L. induced by gamma rays and sodium azide using RAPD markers. *SABRAO J. Breed. Genet.* 55(2): 407-416. <http://doi.org/10.54910/sabrao2023.55.2.13>.
- Barus WA, Sulistiani R, Utami S, Tarigan DM, Lestami A (2023). Black soybean response to antioxidant application for growth and yield under salinity stress conditions. *SABRAO J. Breed. Genet.* 55(2): 417-426. <http://doi.org/10.54910/sabrao2023.55.2.14>.
- Rizwan M, Ahmad K, Khan ZI, Ahmad I, Akhtar S (2023). Floristic composition of indigenous vegetation of Namal Valley, Mianwali - Punjab, Pakistan. *SABRAO J. Breed. Genet.* 55(2): 427-441. <http://doi.org/10.54910/sabrao2023.55.2.15>.
- Al-Mathidy A, Al-Doskey ZAS, Shehab MOM (2023). Numerical taxonomy of the genus *Rosa* L. (Rosaceae) grown in the Kurdistan Region of Iraq. *SABRAO J. Breed. Genet.* 55(2): 442-452. <http://doi.org/10.54910/sabrao2023.55.2.16>.
- Muminov K, Amanov B, Buronov A, Tursunova N, Umirova L (2023). Analysis of yield and fiber quality traits in intraspecific and interspecific hybrids of cotton. *SABRAO J. Breed. Genet.* 55(2): 453-462. <http://doi.org/10.54910/sabrao2023.55.2.17>.
- Khan S, Khan A, Nadeem T, Akbar H, Hussain Z (2023). Phenology, crop stand, and dry matter production of wheat in response to beneficial microbes and organic matter sources. *SABRAO J. Breed. Genet.* 55(2): 463-475.

<http://doi.org/10.54910/sabrao2023.55.2.18>.

- Javaid A, Razzaq H, Khan FA, Awan FS (2023). Evaluation of maize accessions for drought tolerance through principal component analysis. *SABRAO J. Breed. Genet.* 55(2): 476-484. <http://doi.org/10.54910/sabrao2023.55.2.19>.
- Fathurrahman F (2023). Growth and genetic characteristics of cucumber (*Cucumis sativus* L.) Cultivar mercy f₁ hybrid and mutant populations. *SABRAO J. Breed. Genet.* 55(2): 485-494. <http://doi.org/10.54910/sabrao2023.55.2.20>.
- Shakeel M, Hafeez FY, Malik IR, Farid A, Ullah H, Ahmed I, Gul H, Mohibullah M, Yasin M (2023). *Serratia marcescens* strain FA-4 enhances zinc content in rice grains by activating the zinc translocating enzymes. *SABRAO J. Breed. Genet.* 55(2): 495-507. <http://doi.org/10.54910/sabrao2023.55.2.21>.
- Fikri M, Farid M, Musa Y, Anshori MF, Nur A (2023). Selected agronomic traits and drone application in corn yield prediction. *SABRAO J. Breed. Genet.* 55(2): 508-515. <http://doi.org/10.54910/sabrao2023.55.2.22>.
- Alshugeairy ZK, Alogaidi FF, Hadi BH, Hassan WA (2023). Path coefficient analyses of introduced rice varieties under different planting distances. *SABRAO J. Breed. Genet.* 55(2): 516-524. <http://doi.org/10.54910/sabrao2023.55.2.23>.
- Ali WH, Alshugeairy ZK (2023). Study of the genetic diversity of some genotypes of maize under two levels of nitrogen fertilization. *SABRAO J. Breed. Genet.* 55(2): 525-532. <http://doi.org/10.54910/sabrao2023.55.2.24>.
- Dzhos EA, Pyshnaya ON, Mamedov MI, Baikov AA, Gins MS, Tukuser YP, Matykina AA, Shafigullin DR, Gins EM, Motyleva SM (2023). Biologically active compounds transform during the ripening stages in greenhouse tomatoes. *SABRAO J. Breed. Genet.* 55(2): 533-540. <http://doi.org/10.54910/sabrao2023.55.2.25>.
- Maharijaya A, Kurnianingtya D, Sobir, Wiyono S, Purwito A (2023). Possible morphological and chemical resistance mechanism of shallots (*Allium cepa* var *Ascalonicum*) to *Colletotrichum gloeosporioides* penz. *SABRAO J. Breed. Genet.* 55(2): 541-549. <http://doi.org/10.54910/sabrao2023.55.2.26>.
- Tarigan DM, Barus WA, Munar A, Lestami A (2023). Exploration and morphological characterization of phosphate-solubilizing and nitrogen-fixing bacteria in saline soil. *SABRAO J. Breed. Genet.* 55(2): 550-563. <http://doi.org/10.54910/sabrao2023.55.2.27>.
- Ahmed TS, Saeed AH, Zaidan GJ, Alqaisi MRM (2023). Effect of spent mushroom substrate and sulfur on growth and yield traits of broccoli in gypsiferous soil. *SABRAO J. Breed. Genet.* 55(2): 564-574. <http://doi.org/10.54910/sabrao2023.55.2.28>.
- Tahir MA, Sabah NU, Gul S, Javed MS, Aziz A, Javed MA, Aslam MU, Daud M, Ayesha (2023). Optimization of new generation potassium (NG-K) fertilizer for improvement in quantity and quality of citrus (*Citrus limon*). *SABRAO J. Breed. Genet.* 55(2): 575-586. <http://doi.org/10.54910/sabrao2023.55.2.29>.
- Merza NAR, Atab HA, Al-Fatlawi ZH, Alsharifi SKA (2023). Effect of irrigation systems on rice productivity. *SABRAO J. Breed. Genet.* 55(2): 587-597. <http://doi.org/10.54910/sabrao2023.55.2.30>.

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SABRAO JOURNAL OF BREEDING AND GENETICS

pISSN 1029-7073; eISSN 2224-8978

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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.

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ACKNOWLEDGEMENTS

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

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