

SABRAO JOURNAL OF BREEDING AND GENETICS

Volume 55 Number 3 | June 2023



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ISSN 1029-7073 | eISSN 2224-8978

Images on the front cover: According to the research activities for 2018-2020 under the grant of the Committee of Science of the Ministry of Education and Science of the Republic of Kazakhstan (No. BR05236500), certain work was carried out on the selection and study of drought-resistant samples of spring barley for fodder, using varieties from the gene pool of the international collection as germplasm in order to create cultivars adapted to the dry steppe zone conditions of the Central and Northern Kazakhstan. So, in Central and Northern Kazakhstan, 21 hybrid combinations were obtained in terms of resistance to early spring frosts, drought and productivity. Seven distinct hybrid lines were selected, namely Buloke × Karagandinckiy-6, Fathom × Donetskij-9, Onslow × Karabalykskiy-43, Onslow × (Karagandinckiy-5 × Arna), Bass × Karabalykskiy-150, Granal × SMB93H-805-F-1Y-1M-OY-17TRS-OAP, and Granal × CMB89A-380-1M-OGH-105GH-1B-1OY-OAP-19AP-OAP, which are undergoing competitive selection testing for cultivar transfer, may be introduced into production as zonal cultivars in the Northern and Central regions of Kazakhstan. Full details of the said research can be found in the article published by Kushanova *et al.* (2023) titled "Kushanova RZh, Baidyussen AA, Sereda GA, Jatayev SA, Sereda TG (2023). Spring barley hybrids assessment for biological and economic features under drought conditions of Northern and Central Kazakhstan. *SABRAO J. Breed. Genet.* 55(3): 850-863. <http://doi.org/10.54910/sabrao2023.55.3.20>". © SABRAO

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SABRAO JOURNAL of BREEDING and GENETICS

pISSN 1029-7073; eISSN 2224-8978

Volume 55 Number 3 JUNE 2023

<http://doi.org/10.54910/sabrao2023.55.3>

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- Kaleri MH, Jatoi WA, Baloch M, Mari SN, Memon S, Khanzada S, Rajput L, Lal K (2023). Heterotic effects in sunflower hybrids for earliness and yield traits under well-watered and stressed conditions. *SABRAO J. Breed. Genet.* 55(3): 609-622. <http://doi.org/10.54910/sabrao2023.55.3.2>.
- Samonte SOPB, Sanchez DL, Alpuerto JBB, Wilson LT, Yan Z, Thomson MJ (2023). Heterosis and heterotic grouping effects on grain yield, height, tiller density, and days to heading in hybrid rice (*Oryza sativa* L.). *SABRAO J. Breed. Genet.* 55(3): 623-639. <http://doi.org/10.54910/sabrao2023.55.3.3>.
- Chorshanbiev NE, Nabiev SM, Azimov AA, Shavkiev JSH, Pardaev EA, Quziboev AO (2023). Inheritance of morpho-economic traits and combining ability analysis in intraspecific hybrids of *Gossypium barbadense* L. *SABRAO J. Breed. Genet.* 55(3): 640-652. <http://doi.org/10.54910/sabrao2023.55.3.4>.
- Ammar A, Ali Z, Saddique MAB, Habib-Ur-Rahman M, Ali I (2023). Genetic analysis and expression profiling of *TaHSP90A* transcripts confer heat tolerance in wheat. *SABRAO J. Breed. Genet.* 55(3): 653-670. <http://doi.org/10.54910/sabrao2023.55.3.5>.
- Buronov A, Amanov B, Muminov Kh, Tursunova N, Umirova L (2023). Polymorphism and inheritance of gliadin proteins in wheat landraces of Uzbekistan. *SABRAO J. Breed. Genet.* 55(3): 671-680. <http://doi.org/10.54910/sabrao2023.55.3.6>.

- Yasin M, Ali GM, Riaz M, Ali S, Rahman HU, Iqbal A, Khan SU, Shakeel M, Munir M, Mohibullah M, Khan MR (2023). Genome-wide analyses of core regulatory module shattering cascade genes in canola (*Brassica napus* L.). *SABRAO J. Breed. Genet.* 55(3): 681-694. <http://doi.org/10.54910/sabrao2023.55.3.7>.
- Tabu I, Lubobo K, Mbuya K, Kimuni N (2023). Heterosis and line-by-tester combining ability analysis for grain yield and provitamin A in maize. *SABRAO J. Breed. Genet.* 55(3): 697-707. <http://doi.org/10.54910/sabrao2023.55.3.8>.
- Hamid BA, Al-Rufaye ZTA, Khaleel HA, Abidukadhim AR (2023). Phylogenetic analysis of some species of *Cyperaceae* based on dna internal transcribed spacers (ITS) in Iraq. *SABRAO J. Breed. Genet.* 55(3): 708-716. <http://doi.org/10.54910/sabrao2023.55.3.9>.
- Putri RK, Purwoko BS, Dewi IS, Lubis I, Yuriyah S (2023). Resistance of doubled haploid rice lines to bacterial leaf blight (*Xanthomonas oryzae* pv. *oryzae*). *SABRAO J. Breed. Genet.* 55(3): 717-728. <http://doi.org/10.54910/sabrao2023.55.3.10>.
- Nama LA, Altameme HJM (2023). Genetic relationship among some genera of the family Cactaceae. *SABRAO J. Breed. Genet.* 55(3): 729-738. <http://doi.org/10.54910/sabrao2023.55.3.11>.
- Mukhlif FH, Ramadan ASA, Hammody DT, Mousa MO, Shahatha SS (2023). Molecular assessment of genetic divergence among maize genotypes. *SABRAO J. Breed. Genet.* 55(3): 739-748. <http://doi.org/10.54910/sabrao2023.55.3.12>.
- Ahmad J, Zulkiffal M, Anwar J, Ahsan A, Tanveer MH, Ajmal S, Sarwar M, Shair H, Javaid MM, Makhdoom M, Saleem M, Nadeem M, Shahzad R (2023). 'MH-21,' a novel high-yielding and rusts resistant bread wheat variety for irrigated areas of Punjab, Pakistan. *SABRAO J. Breed. Genet.* 55(3): 749-759. <http://doi.org/10.54910/sabrao2023.55.3.13>.
- Kurbanbaev I, Abdushukirova S, Toshmatov Z, Amanov A, Azimov A, Shavkiev J (2023). Assessment of botanical and genetic collection of soybean for morphological and yield attributes and their impact on nodule-associated bacteria and soil fertility. *SABRAO J. Breed. Genet.* 55(3): 760-777. <http://doi.org/10.54910/sabrao2023.55.3.14>.
- Shaimerdenova A, Agapitova LG, Bobrova AV, Akhmetov Y, Sinyukov VA, Sharonin PN, Dobrovolsky AG, Ryakhovskiy DI, Krasnovskiy EE, Ten AD (2023). Development of optimal crop production model considering existing natural-climatic risks increasing crop yields. *SABRAO J. Breed. Genet.* 55(3): 778-795. <http://doi.org/10.54910/sabrao2023.55.3.15>.
- Thakur NK, Singh KP, Singh B, Shukla R, Khemraj, Haldar P (2023). Genetic diversity of different radish (*Raphanus sativus* L.) cultivars under the Bastar plateau of Chhattisgarh, India. *SABRAO J. Breed. Genet.* 55(3): 796-809. <http://doi.org/10.54910/sabrao2023.55.3.16>.

- Smirnova I, Sadanov A, Baimakhanova G, Faizulina E, Tatarkina L (2023). Using salt-tolerant rhizobia to improve the soybean (*Glycine max*) Resilience to salinity. *SABRAO J. Breed. Genet.* 55(3): 810-824. <http://doi.org/10.54910/sabrao2023.55.3.17>.
- Baidalina S, Baidalin M, Khusainov A, Kazydub N, Baiken A (2023). Photosynthetic activity, productivity, and nutritional value of mowing and grazing phytocenoses depending on the species composition of grasses. *SABRAO J. Breed. Genet.* 55(3): 825-835. <http://doi.org/10.54910/sabrao2023.55.3.18>.
- Pratama SN, Sudarsono, Ardie SW, Sukma D (2023). Identification and characterization of cassava mutant genotypes with high leaf mineral content at the MV10 generation. *SABRAO J. Breed. Genet.* 55(3): 836-849. <http://doi.org/10.54910/sabrao2023.55.3.19>.
- Kushanova RZh, Baidyussen AA, Sereda GA, Jatayev SA, Sereda TG (2023). Spring barley hybrids assessment for biological and economic features under drought conditions of Northern and Central Kazakhstan. *SABRAO J. Breed. Genet.* 55(3): 850-863. <http://doi.org/10.54910/sabrao2023.55.3.20>.
- Bugubaeva A, Kuprijanov A, Chashkov V, Kuanyshbaev S, Valiev K, Mamikhin S, Shcheglov A, Nugmanov A, Bulaev A, Sultangazina G, Kunanbayev K, Chernyavskaya O, Baubekova G, Ruchkina G, Safronova O, Uxikbayeva M, Sokharev Y (2023). Productivity assessment of various plant communities at uranium mine sites in Central Kazakhstan. *SABRAO J. Breed. Genet.* 55(3): 864-876. <http://doi.org/10.54910/sabrao2023.55.3.21>.
- Ho VT, Nguyen TH, Nguyen LBN, Nguyen TTN, Nguyen MP (2023). Comparison of *rbcl* and *trnH-psbA* DNA barcodes in diverse *Camellia* species collection in Vietnam. *SABRAO J. Breed. Genet.* 55(3): 877-885. <http://doi.org/10.54910/sabrao2023.55.3.22>.
- Kenenbaev SB, Ramazanov SB, Gusev VN (2023). State and prospects of mineral fertilizers use in agriculture of Kazakhstan. *SABRAO J. Breed. Genet.* 55(3): 886-895. <http://doi.org/10.54910/sabrao2023.55.3.23>.
- Ismail EN, Majeed DM, Alagely HS, Abed AS, Hussien GA (2023). Qualitative characteristics and genomic analysis of wheat genotypes in Iraq. *SABRAO J. Breed. Genet.* 55(3): 896-906. <http://doi.org/10.54910/sabrao2023.55.3.24>.
- Asif M, Safdar ME, Akhtar N, Gul S, Javed MA, Raza N, Haq I, Saleem U, Aslam MN (2023). Sulfur application improves the yield and quality of sunflower (*Helianthus annuus* L.) hybrids. *SABRAO J. Breed. Genet.* 55(3): 907-916. <http://doi.org/10.54910/sabrao2023.55.3.25>.
- Rinaldi AZS, Nurainas, Syamsuardi (2023). Identification of *Pinus merkusii* landrace belonging to Kerinci - West Sumatra, Indonesia, using sequence-related amplified polymorphism (SRAP) technique. *SABRAO J. Breed. Genet.* 55(3): 917-926. <http://doi.org/10.54910/sabrao2023.55.3.26>.
- Fitmawati, Sartika, Juliantari E (2023). Diversity of pitcher plants (*Nepenthes* spp.) in Riau Archipelago Province, Indonesia. *SABRAO J. Breed. Genet.* 55(3): 927-939. <http://doi.org/10.54910/sabrao2023.55.3.27>.

- Hanafiah DS, Lubis K, Haryati, Setiado H, Damanik GM, Limbong MS, Silaen FR, Joshua, Lestami A (2023). Assembly of soybean genotypes developed through three-way cross. *SABRAO J. Breed. Genet.* 55(3): 940-950. <http://doi.org/10.54910/sabrao2023.55.3.28>.
- Rahayu T, Suparti, Asngad A, Widyayanti S, Kristamtini, Sidiq Y (2023). Endophytic bacteria from banana plant improves the growth and yield of black rice plant. *SABRAO J. Breed. Genet.* 55(3): 951-964. <http://doi.org/10.54910/sabrao2023.55.3.29>.
- Sattarov KK (2023). Hydrogenation technology and chemistry of cottonseed oil and fats. *SABRAO J. Breed. Genet.* 55(3): 965-971. <http://doi.org/10.54910/sabrao2023.55.3.30>.
- Makenova M, Nauanova A, Aidarkhanova G, Ospanova S, Bostubayeva M, Sultangazina G, Turgut B (2023). Organic and biofertilizers effects on the rhizosphere microbiome and spring barley productivity in northern Kazakhstan. *SABRAO J. Breed. Genet.* 55(3): 972-983. <http://doi.org/10.54910/sabrao2023.55.3.31>.
- Muslimah Y, Lizmah SF, Harahap EJ, Jasmi, Ralis (2023). Effect of drip irrigation and genotypes on the production traits of sweet corn (*Zea mays saccharata* Sturt). *SABRAO J. Breed. Genet.* 55(3): 984-991. <http://doi.org/10.54910/sabrao2023.55.3.32>.
- Hassan AY (2023). Goat pea (*Securigera securidaca* L.) Seed yield and phytochemicals improvement through crop management practices. *SABRAO J. Breed. Genet.* 55(3): 992-1002. <http://doi.org/10.54910/sabrao2023.55.3.33>.

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SABRAO JOURNAL OF BREEDING AND GENETICS

pISSN 1029-7073; eISSN 2224-8978

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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.