

New Collaborative Genetics and Breeding Community in Kazakhstan as a Strategic Imperative for Scientific Excellence

An editorial perspective on building national research capacity and a professional platform for genetics and breeding in Kazakhstan.

Author	Affiliation	Dates	
Yerlan Turuspekov	Institute of Plant Biology and Biotechnology, Kazakhstan	Received: 2.01.2026 Accepted: 22.01.2026 Published: 22.01.2026	

DOI: 10.66273/3134-6359.2026.1.1.001

Graphical Abstract

See page 2 for the full Graphical Abstract illustrating the strategic framework for developing a collaborative genetics and breeding community in Kazakhstan.

Abstract

The Republican Public Association "Kazakh Society of Geneticists and Breeders" was established in July 2025 to provide a national platform for researchers and professionals working in genetics and breeding in Kazakhstan. The Society aims to support communication, cooperation, and professional development, and to promote research advancement in these fields. Genetics and breeding remain areas where many challenges in Kazakhstan's scientific system are clearly visible, including limited funding, uneven infrastructure, restricted access to modern technologies, and difficulties in retaining young specialists. These disciplines are directly linked to human genetics, agricultural productivity, food security, biodiversity preservation, and broader biological research. The Society is intended to strengthen coordination across institutions by encouraging joint projects, sharing resources, and reducing duplication of efforts. It may also support interaction with policymakers and funding agencies through a consolidated professional community. Further progress will depend on coordinated actions across research institutions and the policy environment, including sustained funding, infrastructure development, mechanisms for collaboration, and international integration.

Keywords: Kazakh Society of Geneticists and Breeders; scientific collaboration; genetics; breeding; Kazakhstan; research policy; scientific societies

Introduction

Kazakhstan's scientific landscape stands at a critical juncture, balancing notable progress with persistent structural challenges. While legislative reforms and increased publication output signal positive momentum, systemic constraints in funding, regional equity, and talent retention threaten to undermine long-term competitiveness. This analysis examines the multifaceted dimensions of Kazakhstan's research ecosystem, drawing on publication trends, comparative international benchmarks, and resource allocation patterns to inform evidence-based policy recommendations for sustained scientific advancement.

Kazakhstan has demonstrated substantial growth in scientific publication output over the past fifteen years, with refereed journal articles increasing from 494 in 2010 to 4,945 in 2025 (Fig. 1, InCites, Clarivate Analytics, accessed 17.12.2025), a tenfold expansion representing approximately 23% compound annual growth. This dramatic increase reflects the tangible impact of legislative frameworks designed to strengthen the research environment, particularly the Law on Science enacted in 2011 and the more comprehensive Law on Science and Technology Policy introduced in 2024. These policy instruments have established structural incentives for research productivity, including performance-based funding mechanisms, international collaboration requirements, and institutional accountability frameworks.

The sustained upward trajectory in publications suggests that Kazakhstan's scientific community has responded positively to these reforms, increasingly engaging with international peer-review standards and contributing to global knowledge production. This growth represents not merely quantitative expansion but qualitative integration into worldwide scientific discourse.

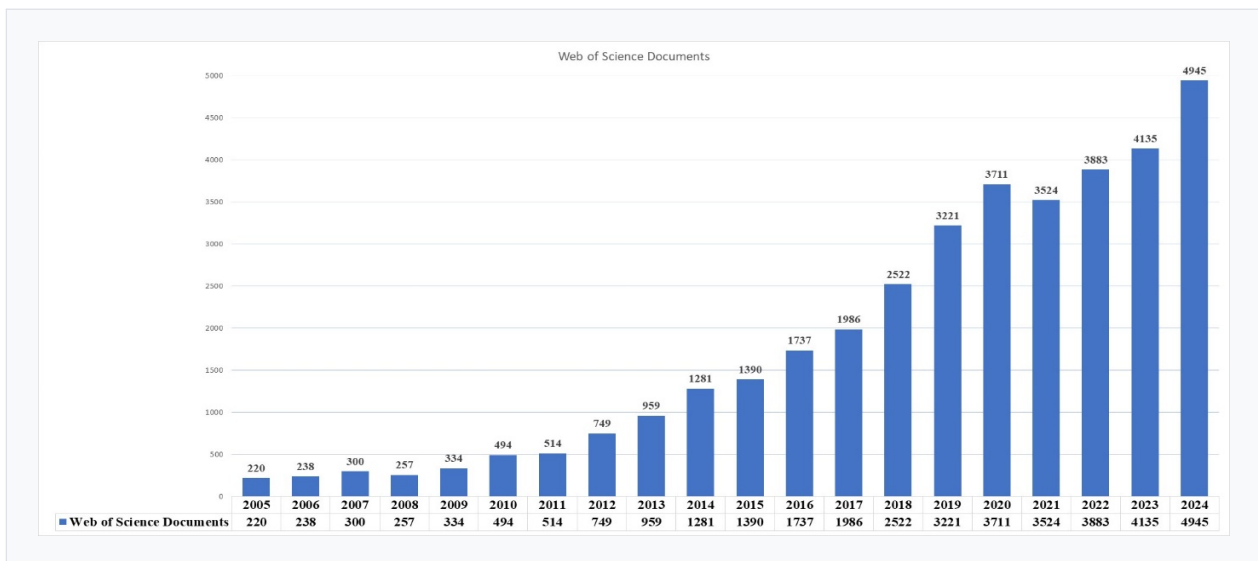


Figure 1. The growth of the number of research articles from a scientific community in Kazakhstan in refereed journals included in the Web of Sciences from 2005 to 2024 (InCites, Clarivate Analytics, accessed 17.12.2025).

Discussion

Despite impressive domestic growth rates, Kazakhstan's position within the global scientific community remains concerning when evaluated through comparative international metrics. Among the 156 countries that published at least 100 scientific articles in 2024, Kazakhstan ranks 149th — a positioning

that reveals the substantial gap between absolute growth and relative competitiveness. This ranking places Kazakhstan in the bottom quintile of scientifically active nations, significantly behind regional peers and aspirational benchmark countries.

This international comparison underscores that while Kazakhstan has made meaningful strides in absolute terms, the pace of improvement remains insufficient to close the competitiveness gap with established scientific economies. The disparity between domestic progress and international standing suggests that Kazakhstan's scientific development is occurring within a relatively isolated ecosystem, lacking the collaborative projects and knowledge exchange mechanisms that characterize high-performing research systems.

The modest international ranking necessitates a comprehensive strategic response addressing multiple dimensions of the research ecosystem simultaneously. The following four interconnected imperatives are particularly critical for accelerating Kazakhstan's scientific development:

- 1. Financial Support Infrastructure.** Substantially increase and stabilize research funding through multi-year commitments, diversified sources, and performance-based allocation mechanisms that reward excellence while supporting foundational capacity building.
- 2. Business-Oriented Research Projects.** Strengthen linkages between academic research and commercial application through innovation partnerships, technology transfer offices, and incentive structures that reward applied research with market potential.
- 3. Interdisciplinary Research Programs.** Foster collaborative research across traditional disciplinary boundaries by creating funding mechanisms, physical spaces, and institutional incentives that encourage integrated approaches to complex problems.
- 4. Regional Science Development.** Address geographic concentration of resources by investing in regional research centers, distributed excellence programs, and connectivity infrastructure linking provincial institutions to national and international networks.

Kazakhstan's research ecosystem exhibits extreme geographic concentration, with approximately 70% of allocated scientific funding in 2024 directed to just two cities: Astana and Almaty. This bipolar distribution creates significant structural inefficiencies and equity concerns that undermine national scientific potential. Regional universities and research centers lack the resources to retain talented researchers, upgrade facilities, or participate meaningfully in competitive grant programs.

Science funding as a percentage of GDP has risen from 0.12% in 2022 to 0.16% in 2025, but this level is dramatically below international norms and insufficient to support competitive research infrastructure. Developed nations typically invest 3% or more of GDP in research and development. Countries that have successfully transitioned to knowledge-based economies, including Japan, South Korea, and Singapore, achieved this transformation by sustaining research investments at or above 3% of GDP over extended periods.

Chronic underfunding produces cascading effects throughout Kazakhstan's scientific workforce, most critically in the recruitment and retention of young researchers. Science is increasingly perceived as an economically unattractive career path. The annual report of the National Academy of Sciences of the Republic of Kazakhstan indicates that in 2024, the number of graduates from universities reached 147,000 — 104 times the number of PhD students and 218 times the number of PhD holders, while the same proportions for the USA, Great Britain, and Germany are 35:1, 12:1, and 9:1 respectively.

Infrastructure obsolescence and technological lag present a second serious challenge. Kazakhstan's chronically low research investment has resulted in widespread obsolescence, with laboratory equipment aging beyond its useful service life, computational facilities falling short of international standards, and specialized research platforms remaining inaccessible due to cost constraints. Researchers cannot pursue questions that require advanced instrumentation, limiting them to methodologically simpler projects.

Limited research funding also creates hyper-competitive environments where scientists vie for scarce grants in zero-sum competitions that produce irrational incentives and counterproductive behaviors. This competitive dysfunction runs counter to global scientific trends emphasizing collaboration, interdisciplinary integration, and ambitious problem-solving. Worldwide, the most impactful research increasingly emerges from large collaborative teams working over multi-year timeframes and practicing open science.

The challenges facing Kazakhstan's broader scientific community are particularly acute in the fields of genetics and breeding — disciplines essential to human genetics, agricultural development, food security, ecology preservation, and biological research. Genetics and breeding research, by its very nature, requires long-term commitment, stable funding, and collaborative networks. Breeding programs may take years or decades to yield results, requiring sustained support and knowledge transfer across generations of researchers. The current funding model, dominated by short-term competitive grants, is fundamentally incompatible with the timescales and collaborative needs of effective genetics and breeding research.

One of the most efficient strategies for strengthening integration within a fragmented scientific community is to build reliable platforms that facilitate collaboration, knowledge sharing, and collective priority-setting. Professional scientific societies have historically played this platform role across many scientific disciplines and countries. They create structures that outlast individual grants or projects, providing continuity and institutional memory. They offer neutral ground where researchers from competing institutions can meet and collaborate.

Recognizing the urgent need for such a platform, the Republican Public Association 'Kazakh Society of Geneticists and Breeders' was established in July 2025. This establishment marks a pivotal moment in the country's scientific development — the creation of a formal organization dedicated to consolidating intellectual potential, supporting professional growth, and actively shaping the future of genetics and breeding research in Kazakhstan. The Society was officially registered with the Ministry of Justice in July 2025, establishing its legal status and governance framework. Registration of regional branches across regions is currently underway.

The Society's strategic focus rests on three pillars: (1) **Consolidating Intellectual Potential** — bringing together geneticists and breeders from across Kazakhstan to pool knowledge, share resources, and speak with a collective voice; (2) **Supporting Professional Growth** — providing platforms for continuing education, mentorship programs, conference attendance, and professional recognition; and (3) **Shaping the Future Scientific Community** — participating in policy discussions, setting research priorities, establishing quality standards, and ensuring the next generation of researchers is prepared to lead.

Even with limited resources, a well-organized, collaborative community can achieve more than isolated researchers working in competition. Collaboration multiplies the impact of available resources by enabling resource sharing, reducing duplication of effort, facilitating larger-scale projects, enabling knowledge exchange, and building collective advocacy power. The Society also recognizes that the country's scientific community cannot thrive in isolation. Integration with global science through international partnerships, participation in global research networks, adoption of international standards, and the exchange of researchers is essential for maintaining competitiveness.

Policy Recommendations

- 1. Increase Research Investment to 1% GDP** — Establish a multi-year commitment to raise science funding from 0.16% to at least 1% of GDP within five years.
- 2. Implement Regional Distribution Targets** — Mandate that at least 40% of research funding supports institutions outside Astana and Almaty through distributed excellence programs.
- 3. Create Multi-Year Grant Programs** — Establish longer-term funding mechanisms of 5–6 years to support ambitious projects and reduce hyper-competitive dysfunction.
- 4. Develop Competitive Researcher Compensation** — Reform academic salary structures to offer compensation competitive with business sector alternatives.
- 5. Invest in Shared Research Infrastructure** — Establish national and regional core facilities providing access to advanced equipment through shared platforms.
- 6. Incentivize Interdisciplinary Collaboration** — Create funding programs explicitly supporting cross-disciplinary teams and evaluate grants on collaborative potential.
- 7. Build Bridges in Science** — Develop reliable platforms, including professional research societies, that facilitate collaboration, knowledge sharing, and collective priority-setting.

Stakeholder Roles

Policymakers can increase science funding toward international benchmarks, prioritize long-term grants compatible with breeding research timescales, and recognize the Society as a key stakeholder in science policy.

Research Administrators may facilitate institutional membership in the Society, enable researcher participation in Society activities, and integrate Society priorities into institutional strategic planning.

Researchers may join the Society and participate actively, mentor early-career colleagues, and engage in collaborative projects across institutions.

Universities can build partnerships with the Society to improve educational quality and integrate Society resources into curricula.

Funding Agencies can consult with the Society on funding priorities, create grant programs that encourage collaboration, and experiment with longer-term funding mechanisms.

Conclusions

Kazakhstan stands at a crossroads in its scientific development. The challenges are real and significant: funding levels far below international norms, young talent leaving for opportunities elsewhere, declining

educational quality, aging equipment, and researchers isolated in competitive environments. These problems are particularly acute in genetics and breeding — fields essential for the country's medicine, agricultural development, and food security.

The establishment of the Kazakh Society of Geneticists and Breeders represents a robust response to these challenges. By consolidating intellectual potential, supporting professional growth, and actively shaping the future scientific community, the Society provides a platform for collective action that can amplify the impact of limited resources and advocate effectively for systemic change.

Success will require commitment and collaboration from all stakeholders: policymakers must increase funding and create supportive policies; research administrators must facilitate participation and collaboration; researchers must engage actively and mentor the next generation; universities must partner to improve education; and funding agencies must experiment with new models that support long-term, collaborative research. The future of Kazakhstan's scientific community is being built today. The Kazakh Society of Geneticists and Breeders invites all stakeholders to join in creating that future together.

Citation: Yerlan Turuspekov (2026) New Collaborative Genetics and Breeding Community in Kazakhstan as a Strategic Imperative for Scientific Excellence. *Contig*. 1:202601. DOI: 10.66273/3134-6359.2026.1.1.001

Reviewed by: Ruslan Kalendar · **Keywords:** Kazakh Society of Geneticists and Breeders; scientific collaboration; genetics; breeding; Kazakhstan; research policy

Copyright © 2026 Yerlan Turuspekov. Open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0).

