



CORNELL UNIVERSITY

Quick Facts

Location (city, state): Ithaca, New York

Website: <https://www.cornell.edu>

Undergraduate student enrollment: 16,071

Public/Private: Private land-grant

Graduate student enrollment: 10,213

Type of Institution: Research University

Institutional Description (limit 250 words): In our case, the institution refers to the College of Agriculture and Life Sciences at Cornell University (Cornell CALS). Cornell CALS is one of Cornell University's 18 Colleges and Schools. Cornell CALS's long-standing research focus has been on purpose-driven science that advances understanding and improves life, manifested through high quality research publications and through partnerships that move research results into real-world application. CALS is fundamentally invested in improving the lives of people, their environments, and their communities both in New York state and around the world.

Partnership Information

Possible Academic Areas of Collaboration:

Cornell CALS has had a history of individual faculty relationships with Kazakhstan but has not to date developed holistic and sustained academic institutional partnerships. Cornell CALS is interested in learning more from Kazakhstan scientists and students, a country of incredibly robust and diverse fruit plantings and agricultural systems. Our college would be delighted to develop a longer lasting, enduring institutional partnership between CALS and relevant Kazakh, agriculturally focused academic institutions. Specifically, we would like to collaborate in joint research, student exchange, faculty exchange, distance learning in agriculture, various plant science disciplines, food security and STEM.

Institutional Strengths: Cornell CALS is home to Cornell University's second largest population of students, faculty, and staff. As a college, our institution is currently ranked as the third best institution for the study of animal and plant sciences by U.S. News and National Report, the fourth best institution for the study of agricultural sciences in the globe by QS analytics. We work across disciplines to tackle the challenges of our time through world-renowned research, education, and outreach. Cornell CALS spearheads the "solutions century" through purpose-driven agriculture and life sciences research. The questions we probe and the answers we seek focus on three overlapping concerns: natural and human systems; food, energy, and environmental resources; and social, physical and economic well-being. By bridging basic and applied perspectives across these areas, we address the complex problems facing our human and natural worlds. Those challenges threaten access to sustainable food, energy, and environmental resources. Cornell CALS's Research and Innovation Office strives to promote innovation, commercialization, industry partnerships, and start-up companies, by helping early career, mid-career and senior level faculty in pursuing large-scale training and center grants with multidisciplinary, multi-institutional teams. Cornell CALS has one of the oldest apple breeding programs at a public institution in the United States, and individual faculty members have collected and stewarded apple genetics from Kazakhstan apple varieties on our Geneva, NY campus, Cornell AgriTech, for at least 30 years. With over 20 faculty research programs dedicated to research and teaching in the fruit production supply chain, Cornell CALS has significant strengths to contribute to an institutional partnership program. The School of Integrative Plant Sciences is comprised of over 80 faculty engaged in research across the spectrum from fundamental discovery to translation and application, including work in plant biology, plant breeding, horticulture, soil and crop sciences, plant pathology and plant microbe-biology, and digital agriculture innovations.

Partnership Interests: *(e.g., faculty exchanges, student exchange, dual degrees, joint research, distance learning, etc.)*

Joint research, student exchange, faculty exchange, distance learning in agriculture, plant science, food security, and STEM

Interest in Partnership: Why are you interested in partnering with a U.S./Kazakh institution? What do you hope to gain from such a partnership?

Research, teaching and extension at Cornell CALS has strong focus on the priorities identified as critical for this Consortium Partnership Program (particularly agriculture, food security, and STEM). Cornell CALS has had a history of individual faculty relationships with Kazakhstan institutions but has not to date developed holistic and sustained academic institutional partnerships. Cornell CALS is interested to explore partnership with Kazakh institutions for joint research, student exchange, faculty exchange, distance learning in agriculture, food security, and STEM. We could initiate partnerships with Kazakh institute for research, education, and extension in horticulture crops, particularly apples.

Main Partnership Contact: (name, title, email):

Dr. Awais Khan (Associate Professor, Associate Director for Extension and Outreach, School of Integrative Plant Science, Cornell University; awais.khan@cornell.edu) will serve as the main partnership contact from Cornell CALS to this Consortium. Dr. Khan has initiated collaborations focused on apple genetic resources. Wild apples (*M. sieversii*), native to the Tian Shan Mountains in southern Kazakhstan, are the main progenitors of domesticated apples. These wild Kazakh apples provide novel genetics that can be utilized to develop improved apple cultivars resistant to diseases or abiotic stresses for more sustainable and resilient fruit production and to increase nutritional security. However, according to the International Union for Conservation of Nature, populations of *M. sieversii* are listed as "vulnerable" and are categorized as likely extinct unless conservation and reproductive strategies are initiated. The threats to the wild apple forests in Kazakhstan include human-associated factors, climate change, pests, and diseases resulting in habitat loss due to agrarian needs, harvesting of trees for firewood, over-foraging of fruit, and genetic erosion from hybridization with domesticated apples. Climate change is predicted to bring the possibility of increased frequency, duration, and intensity of abiotic stresses such as droughts and heat stress. Conserving wild *M. sieversii* is critical for the improvement of the apple industry globally and important to the Kazakh people.

Dr. Khan's research group is collaborating with Al-Farabi Kazakh National University in Almaty and Caspian University in Almaty to build capacity for genetics, genomics and plant pathology research and genetic conservation. They are collaboratively designing experiments to assess the extent of the threat to wild apple forests in Kazakhstan from the most devastating bacterial disease of apples, "fire blight." Dr. Khan is co-advising two PhD students from Kazakh National University with the aim of providing them with necessary knowledge and training in modern genetic research and the use of DNA markers for genetic diversity conservation research. Currently, they are also working together to write a review article to highlight the significance of Kazakh wild apples in apple breeding and strategies for their conservation.