

Special Issue on

Genomic Strategies for Sustainable Agriculture: Balancing Yield and Environmental Impact

CALL FOR PAPERS

Ensuring sustainable agriculture has become a vital concern in the face of escalating challenges such as climate change and population growth. With the world population projected to reach approximately 10 billion by 2050, food demand will surge remarkably. Concurrently, the spectra of climate change impact agricultural productivity, presenting farmers with numerous challenges, including extreme temperatures, irregular rainfall, poor soil conditions, and water scarcity. Against this backdrop, achieving sustainable agriculture has never been more urgent. Genomic techniques have emerged as indispensable tools in the pursuit of sustainable agriculture, offering molecular insights into the intricate factors that govern plant growth, stress tolerance, and adaptation. Combining genomics into agricultural practices represents a paradigm shift in our approach to crop improvement and resource management. By deciphering molecular determinants, researchers can unlock avenues to develop resilient varieties capable of defying environmental stresses while maximizing yields and minimizing input.

The multifaceted challenge confronting modern agriculture is climate change, which alters the growing seasons, and exacerbates the frequency and intensity of extreme weather events. Heatwaves, droughts, floods, and saline soil conditions cause havoc on crops, leading to yield losses, reduced quality, and compromised food security. Furthermore, the impacts of climate change extend beyond the field, affecting the availability and accessibility of water resources, exacerbating soil erosion and degradation, and threatening biodiversity and ecosystem stability. The increase in population compounds the challenges posed by climate change, placing additional strain on already stressed agricultural systems. Meeting the dietary needs of a growing population requires significant increases in agricultural productivity. However, conventional agricultural practices are often unsustainable, relying heavily on chemical fertilizers, monocropping, and intensive land use practices that degrade soil health and deplete natural resources. In this context, achieving sustainable agriculture is an urgent need to ensure the world's food supply. However, the transition to sustainable agriculture requires a concerted effort to overcome entrenched barriers and embrace innovative strategies that prioritize sustainable agriculture. To tackle these challenges through genetic engineering, the investigation of molecular and genetic determination is a prerequisite.

The aim of this Special Issue is to explore cutting-edge genomic strategies that contribute to sustainable agriculture by balancing maximizing crop yields and minimizing environmental impact. This Special Issue welcomes original research and review articles that explore recent advancements in plant molecular biology, plant physiology, biochemistry, and related disciplines and seek to showcase innovative approaches, technologies, and insights that harness the potential of functional genomics to reform agricultural practices and crop improvement.

Potential topics include but are not limited to the following:

- ▶ Enhancing crop productivity through sustainable agriculture and plant breeding
- ▶ Genetic strategies for the enhancement of crop yields
- ▶ Exploring genetic and molecular mechanisms in crop plants for stress resilience
- ▶ Enhancing nitrogen use efficiency in crops for sustainable agricultural practices
- ▶ Leveraging multi-omics approaches in plant-microbe interactions to improve plant defense
- ▶ Examining the role of transcription factors during abiotic stresses in plants
- ▶ Potential role of phytohormones in effective crop production under challenging environmental conditions
- ▶ Unraveling molecular cascades of sugar signaling in plants to address stress responses
- ▶ Implementing omics approaches for holistic understanding and improvement
- ▶ Genome editing technology and its advances in precision genome editing for crop improvement.

Authors can submit their manuscripts through the Manuscript Tracking System at <https://review.wiley.com/submit?specialIssue=394677>.

Papers are published upon acceptance, regardless of the Special Issue publication date.

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Submission Deadline

Friday, 27 September 2024

Publication Date

November 2024