AgroSpectrum ASIA
Envisaging Future | Updating Present

Roche's AXELIOS 1 shows promise for high-speed agricultural genomics, says KeyGene

20 July 2026 | News

Evaluation highlights ultra-high-throughput performance for plant genomics, enabling faster breeding, trait discovery and single-cell crop research

Plant research company KeyGene has validated the performance of Roche's AXELIOS 1 sequencing platform, concluding that the next-generation technology could significantly accelerate crop genomics by enabling rapid, high-accuracy genome sequencing and single-nucleus transcriptomics at unprecedented scale.

The evaluation, conducted in collaboration with Roche, assessed the newly launched AXELIOS 1 platform across agricultural applications ranging from whole-genome resequencing to single-cell gene expression analysis. The findings suggest the system could substantially shorten breeding cycles while improving researchers' ability to identify valuable crop traits.

As plant breeding increasingly relies on large genomic datasets, the demand for sequencing technologies that combine speed, accuracy and scalability has intensified. KeyGene believes the new platform addresses many of these bottlenecks.

Designed for large-scale crop genomics

The AXELIOS 1 platform combines Roche's Sequencing-by-Expansion (SBX) chemistry with high-throughput sequencing capabilities, supporting both duplex sequencing for highly accurate genome analysis and simplex sequencing for transcriptomics. For plant breeders, this could translate into faster screening of breeding populations, improved identification of genetic variation and more efficient validation of gene-edited crops.

In its pilot evaluation, KeyGene benchmarked the platform against established reference genomes for tomato and lettuce, achieving near-complete genome alignment while maintaining high sequencing accuracy. According to the company, the duplex workflow generated more than 20 billion sequencing reads during a single run, providing sufficient output to sequence approximately 75 tomato genomes at 30× coverage within four hours.

"The SBX-D duplex workflow on AXELIOS 1 produced 30× concordant duplex coverage for approximately 75 tomato genomes in a single four-hour run, enabling rapid, cost-effective resequencing of crops such as tomato and lettuce," said Alexander Wittenberg, Genomics Scientist at KeyGene.

Deeper insights into plant biology

Beyond genome sequencing, KeyGene also evaluated the platform's performance in single-nucleus RNA sequencing, a rapidly growing technique that enables researchers to examine gene activity within individual plant cells. Using tomato roots exposed to drought-mimicking conditions, researchers generated billions of sequencing reads per sample and identified thousands of individual cell nuclei.

The higher sequencing depth enabled scientists to distinguish rare cell populations and refine the identification of specialised root tissues involved in drought response, capabilities that are expected to improve crop resilience research. "Using the SBX-S workflow on AXELIOS 1, we were able to resolve thousands of individual nuclei with unprecedented detail, confirming drought-response mechanisms while enabling deeper and broader plant single-nucleus studies," said Petra van Bergeijk, Single-Cell Transcriptomics Specialist at KeyGene.

Implications for agricultural innovation

As genomic technologies become central to modern crop improvement, sequencing speed is increasingly viewed as a competitive advantage rather than simply a laboratory metric. Researchers say platforms capable of processing dozens of crop genomes within hours could significantly accelerate breeding programmes, improve trait discovery and support the development of climate-resilient crop varieties.

The technology could prove particularly valuable for crops with large and complex genomes, where sequencing costs and turnaround times have traditionally limited the scale of research projects. For KeyGene, the evaluation reinforces the growing role of advanced genomics in agricultural innovation, where faster sequencing is expected to play an increasingly important role in delivering improved crop varieties to farmers.