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China unveils â??Jingfan Chip 1.0â?? to cut tomato breedingâ??s dependence on imported gene chips

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arly 5,000-locus platform covers yield, quality, resistance and stress-tolerance traits, giving Chinese breeders a domestically controlled tool across the full breeding pipeline

China has unveiled its first high-precision solid-phase gene chip developed specifically for tomato breeding with fully independent intellectual property rights, marking a significant step toward reducing the seed industry's reliance on imported core breeding technologies. Named "Jingfan Chip 1.0," the technology was officially released in Beijing and is designed to support genetic analysis and molecular breeding across the tomato breeding pipeline. Its developers say the chip brings key hardware, reagents, software algorithms and related intellectual property under domestic control, creating what they describe as a new "China Chip" era for tomato breeding.

The development comes as seed companies increasingly turn to molecular tools to accelerate breeding, identify valuable genetic traits and improve the precision of variety development. By bringing these capabilities into a domestically controlled platform, Jingfan Chip 1.0 could give Chinese breeders greater control over costs, supply chains and technology upgrades.

The chip was jointly developed by Beijing Tongzhou International Seed Industry Technology Co., Ltd., the Vegetable Research Institute of the Beijing Academy of Agriculture and Forestry Sciences, the College of Life Sciences of Shandong Agricultural University, Suzhou Laso Biochip Technology Co., Ltd., and other institutions. Jingfan Chip 1.0 contains nearly 5,000 core genetic loci covering traits that are commercially important to tomato breeding, including yield, quality, pest and disease resistance, and tolerance to environmental stresses. The loci were selected from more than 1,100 tomato inbred lines, giving the platform a broad genetic base for breeding applications. The chip achieves a reported 99.12 per cent detection rate and 99.85 per cent detection repeatability, with both metrics described as reaching internationally advanced levels.

Beyond the genetic markers themselves, the technology's strategic significance lies in its attempt to establish an end-to-end domestic ecosystem. The developers say Jingfan Chip 1.0 has secured independent intellectual property rights across the full technology chain, including scanners, chips, reagents and software algorithms. A single experimental run can be completed within 72 hours, according to the developers, while the platform is designed to offer cost advantages and allow more flexible technology upgrades. That combination could matter as breeding moves toward increasingly data-driven models. Traditional breeding depends heavily on repeated field selection over multiple generations. Molecular marker technologies allow breeders to identify genetic characteristics earlier, potentially narrowing the number of plants that need to be carried forward and making breeding programs more targeted.

Jingfan Chip 1.0 is designed to operate across eight major application areas, positioning it as a platform rather than a single-purpose testing tool. These include precise identification of germplasm resources, genetic diversity analysis, molecular marker-assisted breeding, genomic selection breeding, variety identification and protection, detection of genetically modified components, identification of essentially derived varieties (EDV), and genome-wide association analysis and QTL mapping.

The breadth of these applications means the technology can potentially connect activities that have traditionally been handled through separate stages of a breeding program—from understanding genetic resources and identifying useful traits to selecting breeding materials and protecting commercial varieties.

Imported breeding technologies have played an important role in enabling molecular analysis, but dependence on overseas platforms can expose breeders to constraints involving supply, cost, technology access and future upgrades. A domestically developed system gives breeding organizations greater scope to adapt the platform to local germplasm, crop-specific requirements and evolving breeding strategies.

The launch also reflects a broader push across China's agricultural technology sector to build domestic capabilities in technologies that sit further upstream in the innovation chain. For the seed industry, that increasingly means controlling not only varieties and germplasm, but also the genomic tools used to discover and develop them.

If Jingfan Chip 1.0 achieves wider adoption, its impact could extend beyond faster genetic testing. A common domestic platform could help standardize molecular breeding workflows, generate larger datasets and strengthen the integration of genomic information into commercial breeding programs. The immediate focus is tomatoes, but the underlying business model points to a larger opportunity: building indigenous technology platforms around the genetic infrastructure of crop improvement.