ICGN International Coffee Genome Network

SEQUENCING THE COFFEE GENOME

ICGN Concept Note

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The ICGN (http://www.coffeegenome.org/) is a worldwide network of scientists from universities, research institutes and industry within the coffee producing and consuming countries. It includes more than 50 individual and Institutional members networking scientific groups around the world in Africa, America, Europe, & Asia. Our collaborative network is focused on building the foundation for advancing agricultural research for sustainable coffee production worldwide by developing genomic tools and resources to further our understanding of the coffee genome at the molecular, biochemical, and physiological levels. ICGN membership is opened to any individual, laboratory, or institution that can contribute to this effort in genomics resource development, sequencing and genome assembly, annotation, biological scientific expertise, or funding.

Despite its economic and social importance for numerous countries around the world, coffee has received very little attention with respect to molecular genetics and genomics research. ICGN has developed a coordinated and cost efficient strategy to sequence the coffee genome using new generation sequencing technologies. ICGN is interested on securing international funding for this important effort on behalf of the coffee scientific community worldwide. Support from ICO and the private sector is needed to ensure a broad international participation and a broad funding base.

Sequencing the coffee genome will help decipher the genetic and molecular bases of important biological traits in coffee that are relevant to growers, processors, and consumers. This knowledge is fundamental to allow efficient use and preservation of coffee genetic resources for the development of improved cultivars in terms of enhanced quality, yield, and resistance with reduced economic and environmental costs. Although considerable diversity exists in diploid *Coffea* species, its use in conventional coffee breeding programs has been very limited. *Coffea arabica* is characterized by a very low genetic diversity, which is attributable to its allotetraploid origin, reproductive biology, and evolution. The narrow genetic base of cultivated *C. arabica* has created a bottleneck for coffee breeding and limits cultivar improvement. Similarly, the considerable genetic diversity observed in *C. canephora* is still largely unexploited in the cultivated varieties. In the future, the ability to capture and manipulate genetic diversity and effectively utilize germplasm in traditional coffee breeding programs will be vital for sustainable coffee production.

Significant advances in our understanding of the coffee genome and its biology must be achieved in the next decades to increase quality, yield and protect the crop from major losses caused by insect pests, diseases and abiotic stress related to climatic changes. Unravelling the coffee genome will contribute significantly to the characterization and utilization of germplasm needed for future coffee improvement. Development of genomic tools for coffee can help breeders identify, characterize, and utilize diversity.