

Chloroplast genomes for crop evolution: Chlorodiv

Chloroplast genomes as a tool for population genetics, phylogeography and phylogeny in agrobiodiversity

ABSTRACT

Biodiversity, phylogeography and population genetic studies will be revolutionized by access to large data sets thanks to next-generation sequencing methods. In this study, we develop an easy and cost-effective protocol for in solution enrichment hybridization capture of complete chloroplast genomes applicable at deep-multiplexed levels. The protocol uses cheap in-house species-specific probes developed via long-range PCR of the entire chloroplast. Barcoded libraries are constructed, and in-solution enrichment of the chloroplasts is carried out using the probes. This protocol was tested and validated on six economically important West African crop species, namely African rice, pearl millet, three African yam species and fonio. For pearl millet, we also demonstrate the effectiveness of this protocol to retrieve 95% of the sequence of the whole chloroplast on 95 multiplexed individuals in a single MiSeq run at a success rate of 95%. This new protocol allows whole chloroplast genomes to be retrieved at a modest cost and will allow unprecedented resolution for closely related species in phylogeography studies using plastomes.

Keywords : Agrobiodiversity, Adaptation, Operation, Genomics, Microscopic (Gene/cell), Evolution, Domestication, Method, Tool, Technic, Phylogeography, Corn, Palm tree, Mil, Igmam, Fonio

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