

Assembly and analysis of plastomes for 30 potato cultivars grown in Russia

Karetnikov D.I.^{1, 2*}, Salina E.A.^{1, 2}, Kochetov A.V.^{1, 2}, Afonnikov D.A.^{1, 2}

¹ Institute of Cytology and Genetics, SB RAS, Novosibirsk, Russia

² Kurchatov Genomic Center of the Institute of Cytology and Genetics, SB RAS, Novosibirsk, Russia

* karetnikovmit@bionet.nsc.ru

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Motivation and Aim: The chloroplast DNA of *Solanum tuberosum* L. is characterized by the isolation of different types of cytoplasmic DNA. There are five main types of potato chloroplast DNA: W, T, A, C, S. Each type is characterized by its mutation in the plastome. Thus, the T-type chloroplast DNA resulted from the deletion of 241 nucleotides in the primitive W-type chloroplast DNA. Determination of potato chloroplast DNA type is of interest in the study of cytoplasmic male sterility, as well as in the study of various agronomic traits. For example, hybrids with cytoplasmic DNA W/ γ and W/ α were found to have high starch content compared to other types. Previously, the plastomes of 15 potato cultivars of *S. tuberosum* grown in Russia were reconstructed and analyzed [1]. In this work, the sample of potato cultivars was expanded to 30.

Methods and Algorithms: Plastome reconstruction of an additional 15 potato cultivars of *S. tuberosum* based on short reads of Illumina sequencing technology was performed. Potato chloroplast DNA type was determined using *in silico* PCR and restriction endonuclease analysis. The reconstruction of potato phylogeny was performed in conjunction with previously collected plastomes as well as cultivars from other countries based on complete sequences of the plastomes [1].

Results: Genes encoding proteins, tRNAs and rRNAs were identified on the basis of *de novo* assembled plastomes. SNPs and InDels were identified in plastomes, microsatellites were quantitatively analyzed, and phylogeny was reconstructed. Potato chloroplast DNA types (W- and T-types) were identified based on *in silico* methods.

Conclusion: Our analysis provides the basis for further genetic studies of Russian potato cultivars, including the study of the plastome structure's relationship with the agronomic characteristics of plants.

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References

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