Tomato Brown Rugose Fruit Virus in Albania: Detection and Characterization Using SANGER Sequencing and Nanopore Technology

Orges Cara[1,2,5]
Amani Ben Slimen [1]
Magdalena Cara[3,5]
Jordan Merkuri[4,5]
Enea Mitri[1,3]
Toufic Elbeaino[1,5]
[1]*Istituto Agronomico Mediterraneo di Bari (IAMB,Italy),* [2]*Università degli Studi di Bari (UNIBA, Italy),* [3]*Agricultural University of Tirana, Albania,* [4]*Scientific Research Centre Durres (Albania),* [5]*NanoALB.*
magdacara@ubt.edu.al

Abstract

Tomato (*Solanum lycopersicum L.*) is one of the most economically valuable fruit or vegetable crops worldwide, valued at 93.9 billion US dollars in 2018, with a yield estimated at 180.8 million tons in 2019 [1]. Tomato production is affected by numerous diseases and, among them, viruses are considered an important production-limiting factor. It has been estimated that nearly half of emerging crop diseases can be attributed to plant viruses [2], which could amount for about a quarter of overall achievable yields in major crops, including tomatoes [3]. Among many important tomato viruses, undoubtedly tomato brown rugose fruit virus (ToBRFV) is a new emerging viral pathogen that is spreading widely within greenhouses of tomato crops of several countries and recently it was found to be present on tomato plants from a commercial greenhouse in Albania [4].

Two ToBRFV isolates (Al-B and Al-F) were selected for Sanger-type sequencing and subsequent BlastN analysis of their partial nucleotide sequences (accession numbers OL763429 and OL763428) revealed more than 99% identity with homologs reported in the GenBank database.

To determine the incidence of ToBRFV in the country, 160 samples were collected from different tomato growing regions during 2022-2023. The preliminary results of qPCR applied on collected samples showed an infection rate of 18 %; whereas the Oxford Nanopore Technology (MinION) applied on the previously Sanger-sequenced samples confirmed the sequence variations found on the two Albanian isolates. Additional MinION sequencing is ongoing to determine the full genome sequence of several isolates showing severe symptoms. Gaining further molecular information on Albanian ToBRFV isolates would help to draw a precise scenario on the origin of the infection and help to prevent further spread in the country.

References

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Figure 1: Fruit symptoms of ToBRFV.

Figure 2: Oxford Nanopore (MinION).