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Strain Diversity as A Basis of Phytovirus Specification

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Abstract: Some groups of phytoviruses are known to demonstrate special variability of molecular and phenotypical characteristics – e.g. *Potyvirus* (*Potyviridae*), *Tobamovirus* (*Virgaviridae*), *Cucumovirus* (*Bromoviridae*), *Carlavirus* (*Tymovirales*, *Alphaflexiviridae*), *Potexvirus* (*Tymovirales*, *Alphaflexiviridae*), etc.. Comparing with other taxons implies that these genera of plant viruses are evolutionary. We have revealed wide intra-specie and strain diversity of viruses from the referred genera in the Russian Far East investigating 16 species (19 strains) of *Potyvirus*, 2 (43) of *Tobamovirus*, 2 (15) of *Cucumovirus*, 5 (5) of *Potexvirus*, and 5 (7) of *Carlavirus*. Strains demonstrated high level of both symptom and genetic divergence. The majority of strains are local.

Signs of infections provoked by of potato virus X (PVX) (*Potexvirus*) varied from “black skin” (strong necrotic strain) to symptomless (“vaccine” strain). Two strains of Plantago asiatica mosaic virus (PAMV) (*Potexvirus*) differed by symptoms, composition of capsid proteins, and geographical distribution.

The most numerous and variable *Potyvirus* genus is characterized in the Russian Far East by a large strain diversity of potato virus Y (PVY), soybean mosaic virus (SMV), bean common mosaic virus (BCMV), and bean yellow mosaic virus (BYMV). We carried out distinctions in phenotypes, antigenic characteristics as well as in the properties of capsid protein (molecular weight, sensitivity to proteolysis and temperature) of PVY strains. SMV variants were grouped into three groups: weak, moderate, and virulent with individual and group-specific epitopes. BYMV strains were revealed to have differences not only in biological properties, but also in the structure of capsid protein and antigenic characteristics.

Members of *Tobamovirus* were highly variable: just each Far Eastern plant species permitted to isolate one or several strains of TMV with own pathogenic, antigenic, and genetic peculiarities. Some strains are so distant that could be considered as a new species. For example, TMV strain from *Iris sibirica* was not able to infect solanaceous plants whereas serologically related with another TMV strains.

Comparative analysis of Far Eastern strains of phytoviruses together with related viruses from other geographical regions has uncovered the role of specific regional climate, soil, and ecosystem conditions in phytovirus specification. We consider that the appreciable differences in phenotypical, antigenic, and genetic properties of investigated strains could underlie virus speciation as well as form intra-genera structure.

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