

PHYTOPATHOGENIC VIRUSES AND THEIR IMPORTANCE IN THE NATIONAL ECONOMY

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Annotation: phytopathogenic viruses are one of the main disease triggers in plants, dramatically reducing the yield and product quality of agricultural crops. Worldwide, these viruses cause us \$ 30 billion in annual damage. Their distribution occurs through vectors (aphids, oozes), mechanical pathway, seed, and soil.

In Uzbekistan, it is common in important crops such as potatoes, tomatoes, Acorns, onions and cucumbers, among others, leading to a loss of up to 30-100% of the crop. The paper covers the structure, classification, mechanisms of transmission, symptoms, economic harm, and modern control methods of viruses extensively scientifically. As a result, it has been argued that harm can be prevented in the national economy through integrated protective measures. It is possible to ensure food safety by enhancing research and quarantine measures.

Keywords: phytopathogenic viruses, viral diseases, agricultural damage, vector transmission, productivity losses, resistant varieties, CRISPR/Cas9, integrated control, Agriculture of Uzbekistan.

Introduction viruses have a special place in biology: they are cell-free and multiply only in living cells. Phytopathogenic viruses were discovered as a plant-infecting group by Dmitry Ivanovsky in 1892 and Martin Beijerinck in 1898 using the example of tobacco mosaic virus (TMV). Currently, more than 1,000 phytovirus species have been identified, damaging more than 400 plant families.

Plant viruses disrupt photosynthesis, nutrient metabolism, and growth processes, causing the plant to become stunted, leaf deformation, and reduced yield quality.

Viral diseases are a major economic problem in the national economy, in particular in the Agriculture of Uzbekistan (potatoes, tomatoes, Acorns, wheat, onions and fruit crops. While global annual losses are \$ 30 billion, the rate is even higher in developing countries, including Central Asia. This article is devoted to the extensive coverage of the scientific basis of phytopathogenic viruses and their place in the national economy.

Main part. The structure and classification of phytopathogenic viruses consists of nucleic acid (often RNA, in some DNA) surrounded by phytopathogenic virus protein

shells (capsid). The size is 17-730 nm, the shape is rod – shaped (TMV-300×15 nm), thread-shaped or multifaceted. The classification is divided into 20 groups according to the Gibbs and Harrison (1978) system: depending on the type of nucleic acid, the spreading insect and the host of the plant.

The main families are Potyviridae (PVY), Geminiviridae (TYLCV), Closteroviridae (Citrus tristeza virus), etc.

Species such as TMV, PVY, Potato leafroll virus (PLRV) are common in Uzbekistan.

Ways of spreading viruses spread in the following ways:

By Vector: aphids (nonpersistent-PVY, persistent-PLRV), oqqanot (*Bemisia tabaci-tylcv*), trips (Tomato spotted wilt virus).

Mechanical: by Tools, hands, welding (TMV).

By seed and dust: in 20% of cases (some mosaic viruses).

Soil and nematodes: nematodes (*Xiphinema* spp.) through.

Vegetative propagation: through potato nodules. In the conditions of Uzbekistan, vectors (aphids) play a key role in the greenhouse and open fields.

Symptoms of the disease viral infection cause the following symptoms: mosaic (yellow-green spots on the leaves – TMV, PVY), chlorosis and yellowing, leaf twisting and grinding, necrosis and spotting, stunting of the plant, fruit deformation and reduced yield. For example, in potatoes, PVY causes nodule necrosis (PTNRD); in tomatoes, TYLCV causes leaf twisting and 100% loss of yield. In greenhouse conditions (32-35°C), symptoms increase. The importance of phytopathogenic viruses in the national economy is directly (crop loss) and indirectly (decreased quality, rot in storage) harmful to agriculture. Worldwide, annual damage is estimated at \$ 30 billion .

In Uzbekistan, potato viruses (PVY, PLRV, PVC) reduce yield by 30-59%; in tomatoes and acorns, tylcv and Mosaic viruses cause significant damage.

This affects food security, exports and farmer income. Climate change and new strains (recombination) are leading to increased damage.

Since control and prevention methods are impossible to treat, prevention is the main: Exclusion and quarantine: healthy seeds and seedlings, quarantine measures.

Thawing and Prevention: eradication of infected plants (roguing), weed control.

Vector control: insecticides, biological agents, reflexive mulch.

Thawing and Prevention: eradication of infected plants (roguing), weed control.

Genetic resistance: resistant varieties (eIF4E genes), CRISPR/Cas9 and RNAi technologies (dsRNA spray – GMO-free method).

Diagnostics: NGS (next-generation sequencing) and ELISA. In Uzbekistan, agrotechnics (sowing dates, fertilizers), thermotherapy and antibiotics (imantin) are effective. Integrated pest management (IPM) gives the best results.

Conclusion: Phytopathogenic viruses are a major threat to the national economy, causing significant economic damage on a global and national scale. Viruses significantly reduce yields in Uzbek agriculture, particularly in potato, vegetable, and cotton crops. Modern technologies (CRISPR, RNAi) and integrated control can prevent damage. Future research into diagnostics, development of resistant varieties, and adaptation to climate change will be essential. These measures will ensure food security and strengthen the national economy.

Foydalanilgan adabiyotlar:

1. Tatineni S. et al. (2023). Plant Viruses of Agricultural Importance: Current and Future Perspectives of Virus Disease Management Strategies. *Phytopathology*, 113(3): 1–20.
2. Umumiy va qishloq xo‘jaligi fitopatologiyasi (darslik). NamDU, 2024..
3. Jumamurodova G.B. (2023). Kartoshkaning viruslari va ulardan himoyalaniş choralari. CyberLeninka.
4. Sheraliev A.SH. Umumiy va qishloq xo‘jaligi fitopatologiyasi. Toshkent davlat agrar universiteti.
5. Hull R. (2014). *Plant Virology*. Academic Press.
6. Mumford R. et al. (2016). Economic losses due to plant viruses. *Plant Virus Disease Control*.
7. FAO. (2024). Plant disease threats to global food security.
8. Khasanov B.A. et al. (2023). Crop Diseases in Uzbekistan Caused by the Species of *Fusarium* (virus bilan bog‘liq kontekstda). IntechOpen.
9. Anikina I. et al. (2023). Plant protection from virus: a review. PMC.
10. O‘zbekiston Respublikasi qishloq xo‘jaligi vazirligi ma’lumotlari (2020–2024 yillar statistikasi asosida).