

POTATO VIRUS X (Potato Mild Mosaic Virus)

Importance

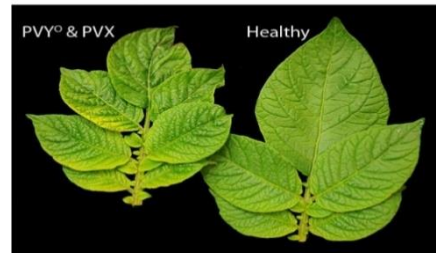
Affects Solanaceae, Amaranthaceae and Chenopodiaceae family

The incidence of PVX on potatoes is usually low as PVX infection causes mild mosaic symptoms and yield losses are limited between 10 and 15%. However, in the case of co-infection with other viruses, the effects of PVX are much more severe with PVY.

Symptoms

Mild mosaic on potato
Intervenial mosaic
Mottling of leaves with stunting
Crinkling
PVX+PVY: Necrosis

Potato virus X



Transmission: Mechanical

Virus classification

Group: Group IV ((+)ssRNA)
Order: Tymovirales
Family: Alphaflexiviridae
Genus: Potexvirus
Species: Potato virus X

Structure

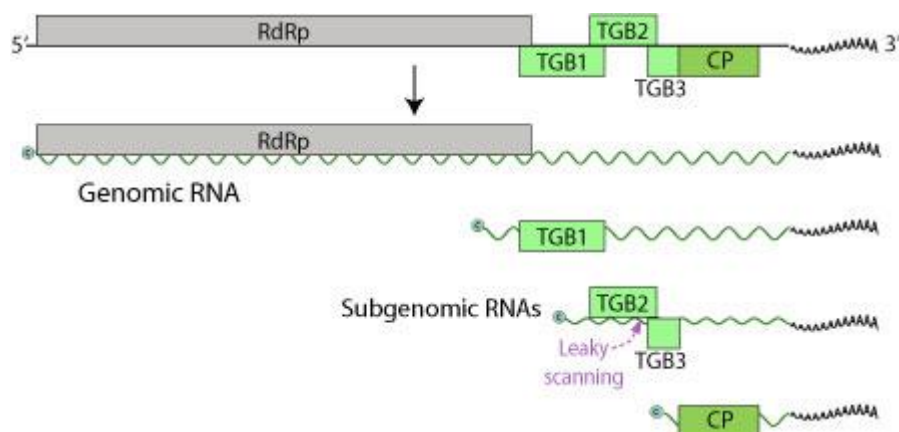
The virion has helical symmetry and a deeply grooved, highly hydrated surface and is made of a single-stranded positive-sense RNA genome of approximately 6.4 kb.

1300 units of a single coat protein (CP) type, with 8.9 CP units per helix turn.

The genome is capped at the 5'-end and poly-adenylated at the 3'-terminus.

It contains five open reading frames (ORFs) encoding five proteins:

- RNA-dependent RNA Polymerase (RdRP),
- Movement proteins encoded by three overlapping ORFs that form the Triple Gene Block (TGBp1, TGBp2, and TGBp3),
- CP (coat protein).



GENE EXPRESSION

The virion RNA is infectious and serves as both the genome and viral messenger RNA. RNA-dependent RNA polymerase (RdRp) is translated directly from the genomic RNA. The other ORFs are transcribed presumably as monocistronic subgenomic mRNAs (sgRNAs). TGB3 is expressed by leaky scanning of the TGB2 subgenomic mRNA.

REPLICATION

CYTOPLASMIC

1. Virus penetrates into the host cell.
2. Uncoating, and release of the viral genomic RNA into the cytoplasm.
3. The viral RNA is translated as a monocistronic mRNA to produce the RdRp (encoded by the 5'-proximal ORF).
4. Replication occurs in viral factories recruited by TGB1. A dsRNA genome is synthesized from the genomic ssRNA(+).
5. The dsRNA genome is transcribed/replicated thereby providing viral mRNAs/new ssRNA(+) genomes.
6. Internal subgenomic promoters are used to transcribe the sgRNAs. Translation of these sgRNAs yields the capsid and movement proteins.
7. Assembly of new virus particles.
8. Triple gene block proteins (TGBp) allow cell-to-cell and long-distance movement.

Diagnosis

Clinical Symptoms

RT PCR

Electron Microscopy

DAS ELISA

Control

Virus free Tubers

Sanitization

References

https://viralzone.expasy.org/272?outline=all_by_species

<http://ephytia.inra.fr/en/C/21025/Potato-Potato-virus-X-PVX>

https://en.wikipedia.org/wiki/Potato_virus_X