ICTV Virus Taxonomy Profile: **Benyviridae**

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**Abstract**

The *Benyviridae* is a family of multipartite plant viruses with rod-shaped virions. Genomes are segmented and comprised of single-stranded, positive-sense RNAs, each with a 5' m^7^G cap. Unlike rod-shaped viruses classified in the *Virgaviridae* family, the genome segments have a 3' polyA tract and there is post-translational cleavage of the viral replicase. The better-known members are transmitted by root-infecting vectors in the Plasmodiphorales family, once described as fungi but now classified as Cercozoa. The family has a single genus. This is a summary of the International Committee on Taxonomy of Viruses (ICTV) Report on the taxonomy of *Benyviridae*, which is available at [www.ictv.global/report/benyviridae](http://www.ictv.global/report/benyviridae).

**Table 1. Characteristics of the Benyviridae family**

<table>
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<th>Typical member: beet necrotic yellow vein virus isolate Japan S (RNA1: D84410; RNA2: D84411; RNA3: D84412; RNA4: D84413; RNA5: D63936), species Beet necrotic yellow vein virus, genus Benyvirus</th>
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**VIRION**

Non-enveloped, helically constructed rod-shaped particles, with an axial canal and up to five different lengths have been described (Table 1 and Fig. 1). In beet necrotic yellow vein virus, the predominant lengths are about 390, 265, 100, 85 and 65–80 nm and their diameter is about 20 nm. The right-handed helix with a pitch of 2.6 nm has an axial repeat of four turns, involving 49 coat protein subunits, each occupying four nucleotides [1].

**GENOME**

Beet necrotic yellow vein virus has four or five linear positive-sense ssRNAs of about 6.7, 4.6, 1.8, 1.4 and 1.3 kb, respectively [2, 3]. The viral RNAs are capped at the 5' end and 3'-polyadenylated, unlike the RNAs of all other rod-shaped plant viruses. Viral RNAs have a conserved 3' structure involved with RNA replication initiation. After mechanical transmission to laboratory test plants, RNA3, RNA4 and RNA5 may carry deletions or be lost entirely [4]. Isolates of the beet soil-borne mosaic virus have four RNAs [5], while rice stripe necrosis virus [6] and burdock mottle virus [7] apparently only contain two genomic RNAs.

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**Fig. 1.** Electron micrographs of beet necrotic yellow vein virus particles. (Left) Negative contrast-stained purified particles. (Right) From the left, (a) negative contrast electron micrograph and (b, c, d) computer-filtered micrographs (modified from [1], courtesy of A.C. Steven). The bar represents 100 nm.
necrotic yellow vein virus is able to replicate and encapsidate beet soil-borne mosaic virus RNA3 and RNA4. Genome RNA amplification occurs in the cytoplasm from complementary-strand intermediate(s).

**TAXONOMY**

There is a single genus, *Benyvirus*. Beet necrotic yellow vein virus causes the widespread (Europe, North America, Asia) and highly damaging soil-borne 'rhizomania' disease of sugar beet.

**RESOURCES**


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**Conflicts of interest**

The authors declare that there are no conflicts of interest.

**References**