

Template for Taxonomic Proposal to the ICTV Executive Committee

Creating Species in an existing genus

Code[†] To designate the following as species in the genus:

belonging to the family[°] :

[†] Assigned by ICTV officers

[°] leave blank if inappropriate or in the case of an unassigned genus

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Old Taxonomic Order

Order

Family *Geminiviridae*

Genus *Begomovirus*

Type Species

Species in the Genus

Tentative Species in the Genus

Unassigned Species in the family

New Taxonomic Order

Order

Family *Geminiviridae*

Genus *Begomovirus*

Type Species

Species in the Genus

Tentative Species in the Genus

Unassigned Species in the family

ICTV-EC comments and response of the SG

Species demarcation criteria in the genus

The following criteria should be used as a guideline to establish taxonomic status:

- Number of genomic components. Presence or absence of a DNA B component
- Organization of the genome. Presence or absence of ORF AV2.
- Nucleotide sequence identity. Because of the growing number of recognized species, derivation of the complete nt sequence will be necessary to distinguish species. Nucleotide sequence identity <89% is generally indicative of a distinct species. However, decisions based on nt sequence comparisons, particularly when approaching this value, must also take into account the biological properties of the virus. The taxonomic status of a recombinant will depend on relatedness to the parental viruses, the frequency and extent of recombination events, and its biological properties compared with the parental viruses. Information concerning the diversity of related recombinants may be helpful to determine status.
- *Trans*-replication of genomic components. The inability of Rep protein to *trans*-replicate a genomic component suggests a distinct species. However, when considering this criterion, it should be kept in mind that small changes in the Rep binding site of otherwise identical viruses might prevent functional interaction and recombination involving a small part of the genome may confer replication competence on a distinct species.
- Production of viable pseudorecombinants. Account should be taken of the fitness of the pseudorecombinant in the natural host(s) of the parental viruses. It should be ensured that pseudorecombinant viability is not the result of inter-component recombination.
- Capsid protein characteristics. Amino acid sequence identity <90% and substantial serological differences may be indicative of a distinct species in the first instance, but derivation of the complete sequence will be necessary to confirm taxonomic status.

Natural host range and symptom phenotype. These characteristics may relate to a particular species but their commonest use will be to distinguish strains.

Argument to justify the designation of new species in the genus

Most of the proposed species show less than 89% nucleotide sequence identity with existing species in accordance with the accepted demarcation criteria:

Using NCBI PASC (Pairwise Sequence Comparison) analysis:

New species:	Most closely related species	.....% identity
Ageratum leaf curl virus	Ageratum yellow vein china virus	.....87.8
Corchorus yellow vein virus	Macroptilium mosaic Puerto Rico virus	.....68.4
Eupatorium yellow vein mosaic virus	Eupatorium yellow vein virus	.....89.2
Honeysuckle yellow vein Kagoshima virus	Honeysuckle yellow vein mosaic virus	.....90.3
Horsegram yellow mosaic virus	Mungbean yellow mosaic virus	.....85.0
Lindernia anagallis yellow vein virus	Ageratum yellow vein China virus	.....77.5
Malvastrum yellow vein Yunnan virus	Malvastrum yellow vein virus	.....86.3
Okra yellow mosaic Mexico virus	Chino del tomate virus	.....86.3
Pepper yellow vein virus	Tobacco leaf curl Zimbabwe virus	.....83.1
Senecio yellow mosaic virus	Ageratum leaf curl virus	.....77.9
Sida micrantha mosaic virus	Sida mottle virus	.....82.5
Sida yellow mosaic China virus	Stachytarpheta leaf curl virus	.....81.9
Tomato leaf curl Guandong virus	Ageratum leaf curl virus	.....83.0
Tomato leaf curl Iran virus	Tomato leaf curl Gujarat virus	.....88.2
Tomato leaf curl Java virus	Ageratum yellow vein virus	.....86.5
Tomato leaf curl Joydebpur virus	Chilli leaf curl virus	.....89.0
Tomato leaf curl Madagascar virus	Tomato leaf curl Mayotte virus	.....85.5
Tomato leaf curl Mali virus	Tomato leaf curl Madagascar virus	.....80.0
Tomato leaf curl Mayotte virus	Tomato leaf curl Madagascar virus	.....85.5
Tomato mild yellow leaf curl Aragua virus	Cucurbit leaf curl virus	.....81.9
Tomato mosaic leaf curl virus	Tomato yellow margin leaf curl virus	.....77.5
Tomato yellow leaf curl Axarquía virus	Tomato yellow leaf curl Sardinia virus	.....88.0
Tomato yellow leaf curl Guandong virus	Papaya leaf curl China virus	.....87.1
Tomato yellow leaf curl Mali virus	Tomato yellow leaf curl virus	.....89.2
Tomato yellow margin leaf curl virus	Potato yellow mosaic Trinidad virus	.....77.5

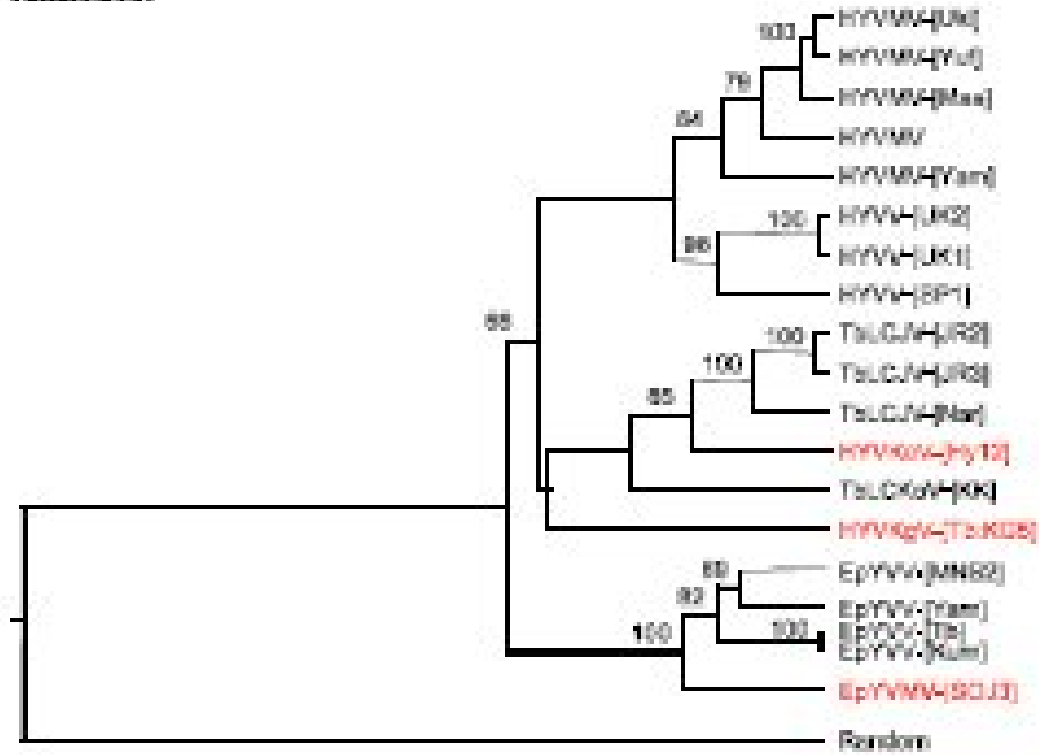
Although several of the proposed species slightly exceed the accepted cut-off value of 89% for designation of begomovirus species it is recognized that this is an empirical value derived from the analysis of all members of the genus. It is a guideline that may vary when considering particular groups of viruses that are host adapted or geographically isolated. Hence, for those viruses showing slightly greater than 89% identity with existing species:

- Eupatorium yellow vein mosaic virus and Honeysuckle yellow vein Kagoshima virus are proposed as new species to avoid the need to downgrade the established species *Honeysuckle yellow vein virus* to isolates of *Honeysuckle yellow vein mosaic virus* (phylogenetic tree, Annex I). *Honeysuckle yellow vein virus* and *Honeysuckle yellow vein mosaic virus* are considered to be distinct species on the basis of their sequence identity and the fact that they have distinct origins of replication.
- Tomato yellow leaf curl Mali virus is most closely related to *Tomato yellow leaf curl virus* but is a recombinant with a distinct origin of replication, for which reason it is considered to be a distinct species.

List of created species in the genus

<i>Ageratum leaf curl virus</i>		
Ageratum leaf curl virus – [G52]	AJ851005	(ALCuV-[G52])
<i>Corchorus yellow vein virus</i>		
Corchorus yellow vein virus – [Hoa]	AY727903-4	CYVV-[Hoa]
<i>Eupatorium yellow vein mosaic virus</i>		
Eupatorium yellow vein mosaic virus - [SOJ3]	AJ438937	(EpYVMV-[SOJ3])
<i>Honeysuckle yellow vein Kagoshima virus</i>		
Honeysuckle yellow vein Kagoshima virus – [Tobacco]	AB178949	(HYVKgV-[Tb:KG5])
<i>Horsegram yellow mosaic virus</i>		
Horsegram yellow mosaic virus – [Coimbatore]	AJ627904-5	HgYMV-[Coi]
<i>Lindernia anagallis yellow vein virus</i>		
Lindernia anagallis yellow vein virus – [China]	AY795900	(LAYVV-[CN])
<i>Malvastrum yellow vein Yunnan virus</i>		
Malvastrum yellow vein Yunnan virus - [Y160]	AJ786711	(MYVYV-[Y160])
<i>Okra yellow mosaic Mexico virus</i>		
Okra yellow mosaic virus - [Mazatepec-3]	DQ022611	(OYMV-[Maz3])
<i>Pepper yellow vein Mali virus</i>		
Pepper yellow vein Mali virus	AY502935	(PepYVMLV)
<i>Senecio yellow mosaic virus</i>		
Senecio yellow mosaic virus – [G4]	AJ876550	(SeYMV-[G4])
<i>Sida micrantha mosaic virus</i>		
Sida micrantha mosaic virus - [A2B2]	AJ557451, AJ557453	(SiMMV-[A2B2])
Sida micrantha mosaic virus - [B1]	AJ557452	(SiMMV-[B1])
<i>Sida yellow mosaic China virus</i>		
Sida yellow mosaic China virus - [Hn8]	AJ810096	(SiYMCNV-[Hn8])
<i>Tomato leaf curl Guangdong virus</i>		
Tomato leaf curl Guangdong virus - [G2]	AY602165	(ToLCGuV-[G2])
<i>Tomato leaf curl Iran virus</i>		
Tomato leaf curl Iran virus	AY297924	(ToLCIRV)
<i>Tomato leaf curl Java virus</i>		
Tomato leaf curl Java virus	AB100304	(ToLCJV)
<i>Tomato leaf curl Joydebpur virus</i>		
Tomato leaf curl Joydebpur virus – [Bangladesh]		(ToLCJoV-[BD])
<i>Tomato leaf curl Madagascar virus</i>		
Tomato leaf curl Madagascar virus – [Morondova]	AJ865338	(ToLCMGV-[Mor])
Tomato leaf curl Madagascar virus – [Toliary]	AJ865339	(ToLCMGV-[Tol])
<i>Tomato leaf curl Mali virus</i>		
Tomato leaf curl Mali virus	AY502936	(ToLCMLV)
<i>Tomato leaf curl Mayotte virus</i>		
Tomato leaf curl Mayotte virus – [Dembeni]	AJ865341	(ToLCYTV-[Dem])
Tomato leaf curl Mayotte virus – [Kahani]	AJ865340	(ToLCYTV-[Kah])
<i>Tomato mild yellow leaf curl Aragua virus</i>		
Tomato mild yellow leaf curl Aragua virus - [Venezuela]	AY927277	(ToMYLCAV-[VE])
<i>Tomato mosaic leaf curl virus</i>		
Tomato mosaic leaf curl virus - [Puerto Rico]	AF068636	(ToMLCV-[PR])
Tomato mosaic leaf curl virus - [Venezuela]	AY508991-2	(ToMLCV-[VE])
<i>Tomato yellow leaf curl Axarquia virus</i>		
Tomato yellow leaf curl Axarquia virus – [Algarrobo]	AY227892	(TYLCAxV-[Alg])
<i>Tomato yellow leaf curl Guangdong virus</i>		
Tomato yellow leaf curl Guangdong virus - [G3]	AY602166	(TYLCGuV-[G3])
<i>Tomato yellow leaf curl Mali virus</i>		
Tomato yellow leaf curl Mali virus	AY502934	(TYLCMLV)
<i>Tomato yellow margin leaf curl virus</i>		
Tomato yellow margin leaf curl virus	AY508993-4	(TYMLCV)

Annexes:



Legume
Begomoviruses

