

**Part 1:** **TITLE, AUTHORS, APPROVALS, etc**

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| **Code assigned:** | **2020.009P** |  |
| **Short title:**  Create 61 species and abolish three species in the genus *Betasatellite* (*Tolecusatellitidae*) | | |
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**List the ICTV Study Group(s) that have seen this proposal**

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| *Geminiviridae* and *Tolecusatellitidae* Study Group |

**ICTV study group comments and response of proposer**

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**Authority to use the name of a living person**

|  |  |  |
| --- | --- | --- |
| **Taxon name** | **Person from whom the name is derived** | **Permission attached (Y/N)** |
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**Submission dates**

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| --- | --- |
| Date first submitted to SC Chair | July 31, 2020 |
| Date of this revision (if different to above) |  |

**ICTV-EC comments and response of the proposer**

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**Part 2:** **NON-TAXONOMIC PROPOSAL**

**Text of proposal**

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**Part 3:** **TAXONOMIC PROPOSAL**

**Name of accompanying Excel module**

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| 2020.009P.R.Betasatellite\_61nsp.xlsx |

**Abstract**

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| In this TP we propose to create 61 species and to abolish three species in the genus *Betasatellite*, family *Tolecusatellitidae*. This proposal has been prepared following the taxonomic criteria established for this genus. |

**Text of proposal**

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| |  | | --- | | Betasatellites are DNA satellites frequently associated with monopartite begomoviruses. Their genomes are approximately half the size of begomovirus DNA genome components and are essential for induction of typical disease symptoms.  In 2016, Briddon *et al*. established the current species demarcation criteria for the genus *Betasatellite* that is based on pairwise sequence comparison as the main criterion. Using these criteria, 61 new species are being proposed in the genus (see Table 1 and accompanying Excel module). Members of these 61 species have <91% nucleotide sequence identity for the complete genome with members of existing species, which is the cut off value established. The new betasatellite species have been isolated from cultivated and non-cultivated plants and all betasatellite isolates belonging to the new proposed species have been found in regions of the Old World (Asia and Africa). Also, phylogenetic analysis supports the proposal of all 61 species (Figure 1).  The only previous taxonomic proposal for species in the genus *Betasatellite* was that by Briddon et al. (2016).  Also following the species demarcation criteria in the genus *Betasatellite*, two species are being proposed to be abolished: *Tomato yellow leaf curl Rajasthan betasatellite*, *Ageratum yellow vein India betasatellite* (Table 2). Isolates of *Tomato yellow leaf curl Rajasthan betasatellite* and *Ageratum yellow vein India betasatellite* have >91% nt identity with isolates of *Chili leaf curl betasatellite* and *Ageratum yellow vein Sri Lanka betasatellite*, respectively. Thus, the mentioned species should be merged, maintaining the names *Chili leaf curl betasatellite* and *Ageratum yellow vein Sri Lanka betasatellite*. In addition, a careful sequence and phylogenetic analysis of the only *Malvastrum leaf curl Guangdong betasatellite* sequence, revealed that this is in fact a chimera involving a fragment of a betasatellite and a fragment of a DNA-A begomovirus component. Thus, this species is also being proposed to be abolished. | |

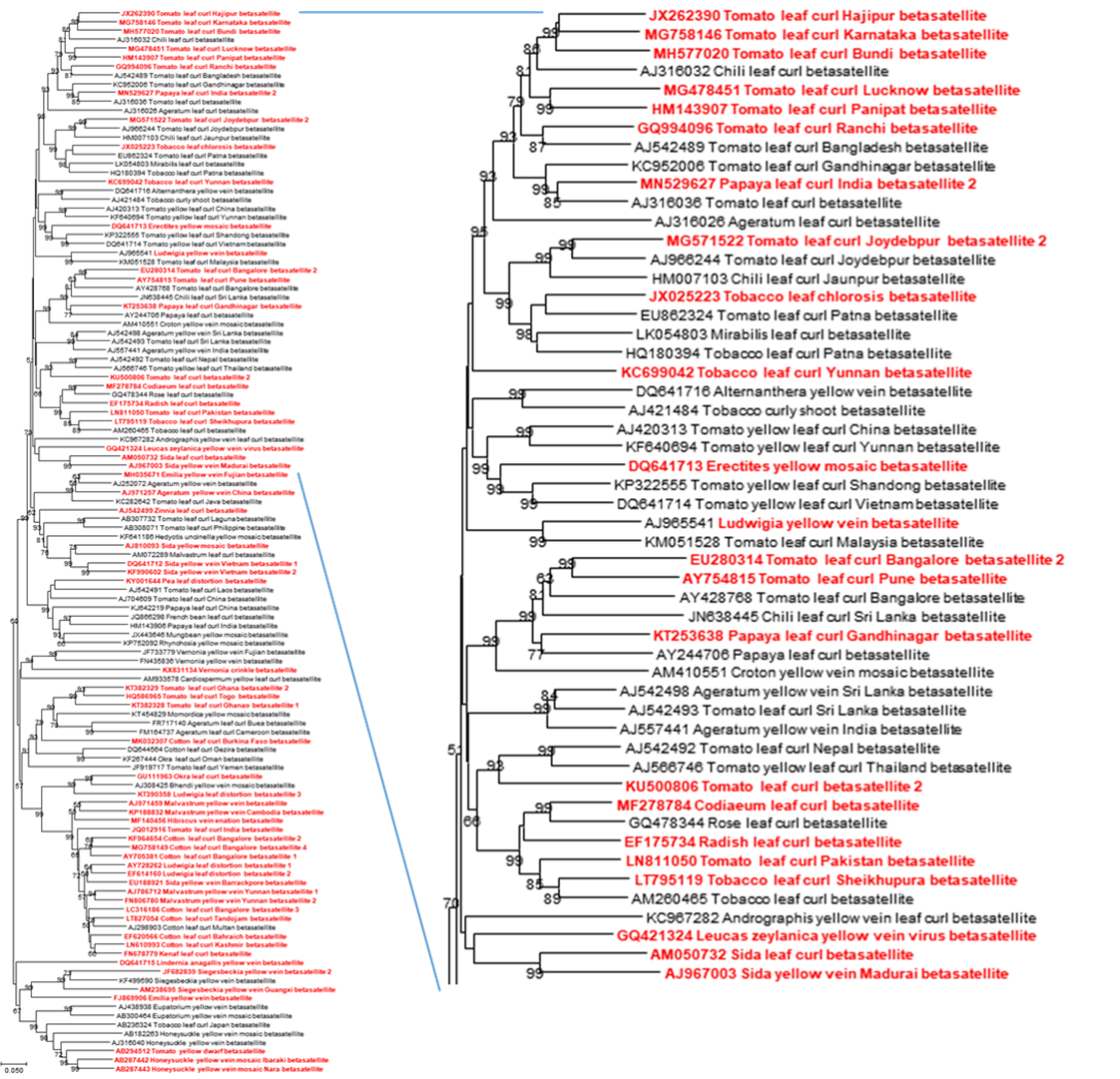
**Table 1.** Details of the 61 proposed betasatellite species.

|  |  |  |  |
| --- | --- | --- | --- |
| **Species name** | **Virus acronym** | **Exemplar isolate** | **Acc. No.** |
| *Ageratum yellow vein China betasatellite* | AYVCNB | CN-G66-05 | AJ971257 |
| *Codiaeum leaf curl betasatellite* | CoLCuB | PK-AA2-16 | MF278784 |
| *Cotton leaf curl Bahraich betasatellite* | CLCBahB | IN-Hib-03 | EF620566 |
| *Cotton leaf curl Bangalore betasatellite 1* | CLCuBaB1 | IN-05 | AY705381 |
| *Cotton leaf curl Bangalore betasatellite 2* | CLCuBaB2 | IN-Tom-Ban5-01 | KF964654 |
| *Cotton leaf curl Bangalore betasatellite 3* | CLCuBaB3 | IN-Mal-15 | LC316186 |
| *Cotton leaf curl Bangalore betasatellite 4* | CLCuBaB4 | IN-Hol-CH50-17 | MG758149 |
| *Cotton leaf curl Burkina Faso betasatellite* | CLCuBFB | BF-Sid28BB-14 | MK032307 |
| *Cotton leaf curl Kashmir betasatellite* | CLCuKaB | IN-Cap-Kas1-14 | LN610993 |
| *Cotton leaf curl Tandojam betasatellite* | CLCuTaB | PK-Cap-IS\_6-16 | LT827054 |
| *Emilia yellow vein betasatellite* | EmYVB | CN-Fz1-06 | FJ869906 |
| *Emilia yellow vein Fujian betasatellite* | EmYVFuB | CN-Zz01-17 | MH035671 |
| *Erectites yellow mosaic betasatellite* | ErYMB | VN-Hoa-04 | DQ641713 |
| *Hibiscus vein enation betasatellite* | HVEB | TW-Cha-13 | MF140456 |
| *Honeysuckle yellow vein mosaic Ibaraki betasatellite* | HYVMIbB | JP-pBSHGVIB-5-01 | AB287442 |
| *Honeysuckle yellow vein mosaic Nara betasatellite* | HYVMNaB | JP-pBSHGVNR-1-95 | AB287443 |
| *Kenaf leaf curl betasatellite* | KeLCuB | PK-Alc-07 | FN678779 |
| *Leucas zeylanica yellow vein betasatellite* | LzYVB | LK-06 | GQ421324 |
| *Lindernia anagallis yellow vein betasatellite* | LaYVB | VN-Han-04 | DQ641715 |
| *Ludwigia leaf distortion betasatellite 1* | LuLDB1 | IN-Luf-04 | AY728262 |
| *Ludwigia leaf distortion betasatellite 2* | LuLDB2 | IN-Bah-Hib-06 | EF614160 |
| *Ludwigia leaf distortion betasatellite 3* | LuLDB3 | IN-Okr-OK100-14 | KT390358 |
| *Ludwigia yellow vein betasatellite* | LuYMB | CN-G37-06 | AJ965541 |
| *Malvastrum yellow vein betasatellite* | MaYVB | CN-Y189-03 | AJ971459 |
| *Malvastrum yellow vein Cambodia betasatellite* | MaYVKHB | KH-08-14 | KP188832 |
| *Malvastrum yellow vein Yunnan betasatellite 1* | MaYVYnB1 | CN-Y160-03 | AJ786712 |
| *Malvastrum yellow vein Yunnan betasatellite 2* | MaYVYnB1 | CN-Sid-Y340-08 | FN806780 |
| *Okra leaf curl betasatellite* | OLCuB | IN-EL38-06 | GU111963 |
| *Papaya leaf curl Gandhinagar betasatellite* | PaLCGB | IN-pCbGnb9-15 | KT253638 |
| *Papaya leaf curl India betasatellite 2* | PaLCINB2 | IN-MM1B-19 | MN529627 |
| *Pea leaf distortion betasatellite* | PeLDB | NP-N36-54-10 | KY001644 |
| *Radish leaf curl betasatellite* | RaLCuB | IN-Var-06 | EF175734 |
| *Sida leaf curl betasatellite* | SiLCuB | CN-Hn57-06 | AM050732 |
| *Sida yellow mosaic betasatellite* | SiYMB | CN-Hn8-03 | AJ810093 |
| *Sida yellow vein Barrackpore betasatellite* | SiYVBaB | IN-Si\_beta\_01-07 | EU188921 |
| *Sida yellow vein Madurai betasatellite* | SiYVMaB | IN-Mad-05 | AJ967003 |
| *Sida yellow vein Vietnam betasatellite 1* | SiYVVNB1 | VN-Han-00 | DQ641712 |
| *Sida yellow vein Vietnam betasatellite 2* | SiYVVNB2 | CN-GD-11 | KF990602 |
| *Siegesbeckia yellow vein betasatellite 2* | SiYVB2 | CN-08 | JF682839 |
| *Siegesbeckia yellow vein Guangxi betasatellite* | SiYVGxB | CN-Gx111-05 | AM238695 |
| *Tobacco leaf chlorosis betasatellite* | TobLCB | IN-01-10 | JX025223 |
| *Tobacco leaf curl Sheikhupura betasatellite* | TobLCuShB | PK-Bra- pSP2B-11 | LT795119 |
| *Tobacco leaf curl Yunnan betasatellite* | TobLCuYnB | CN-YN2013-2010 | KC699042 |
| *Tomato leaf curl Bangalore betasatellite 2* | ToLCuBaB2 | IN-Ban5-07 | EU280314 |
| *Tomato leaf curl betasatellite 2* | ToLCuB2 | IN-CN4B-15 | KU500806 |
| *Tomato leaf curl Bundi betasatellite* | ToLCuBuB | IN-16 | MH577020 |
| *Tomato leaf curl Ghana betasatellite 1* | ToLCuGHB1 | GH-Ago3-12 | KT382328 |
| *Tomato leaf curl Ghana betasatellite 2* | ToLCuGHB2 | GH-Ago1-12 | KT382329 |
| *Tomato leaf curl Hajipur betasatellite* | ToLCuHaB | IN-HJP09-10 | JX262390 |
| *Tomato leaf curl India betasatellite* | ToLCuINB | IN-AC1S1-11 | JQ012916 |
| *Tomato leaf curl Joydebpur betasatellite 2* | ToLCuJoB2 | IN-Mom-15 | MG571522 |
| *Tomato leaf curl Karnataka betasatellite* | ToLCuKaB | IN-Chr-17 | MG758146 |
| *Tomato leaf curl Lucknow betasatellite* | ToLCuLuB | IN-Pap-14 | MG478451 |
| *Tomato leaf curl Pakistan betasatellite* | ToLCuPKB | PK-HZ3-15 | LN811050 |
| *Tomato leaf curl Panipat betasatellite* | ToLCuPaB | IN-Pap-08 | HM143907 |
| *Tomato leaf curl Pune betasatellite* | ToLCuPuB | IN-04 | AY754815 |
| *Tomato leaf curl Ranchi betasatellite* | ToLCuRaB | IN-07 | GQ994096 |
| *Tomato leaf curl Togo betasatellite* | ToLCuTGB | TG-06 | HQ586965 |
| *Tomato yellow dwarf betasatellite* | ToYDB | JP-pTKbeta-1-00 | AB294512 |
| *Vernonia crinkle betasatellite* | VeCrB | UG-UG7-15 | KX831134 |
| *Zinnia leaf curl betasatellite* | ZiLCuB | TH-02 | AJ542499 |

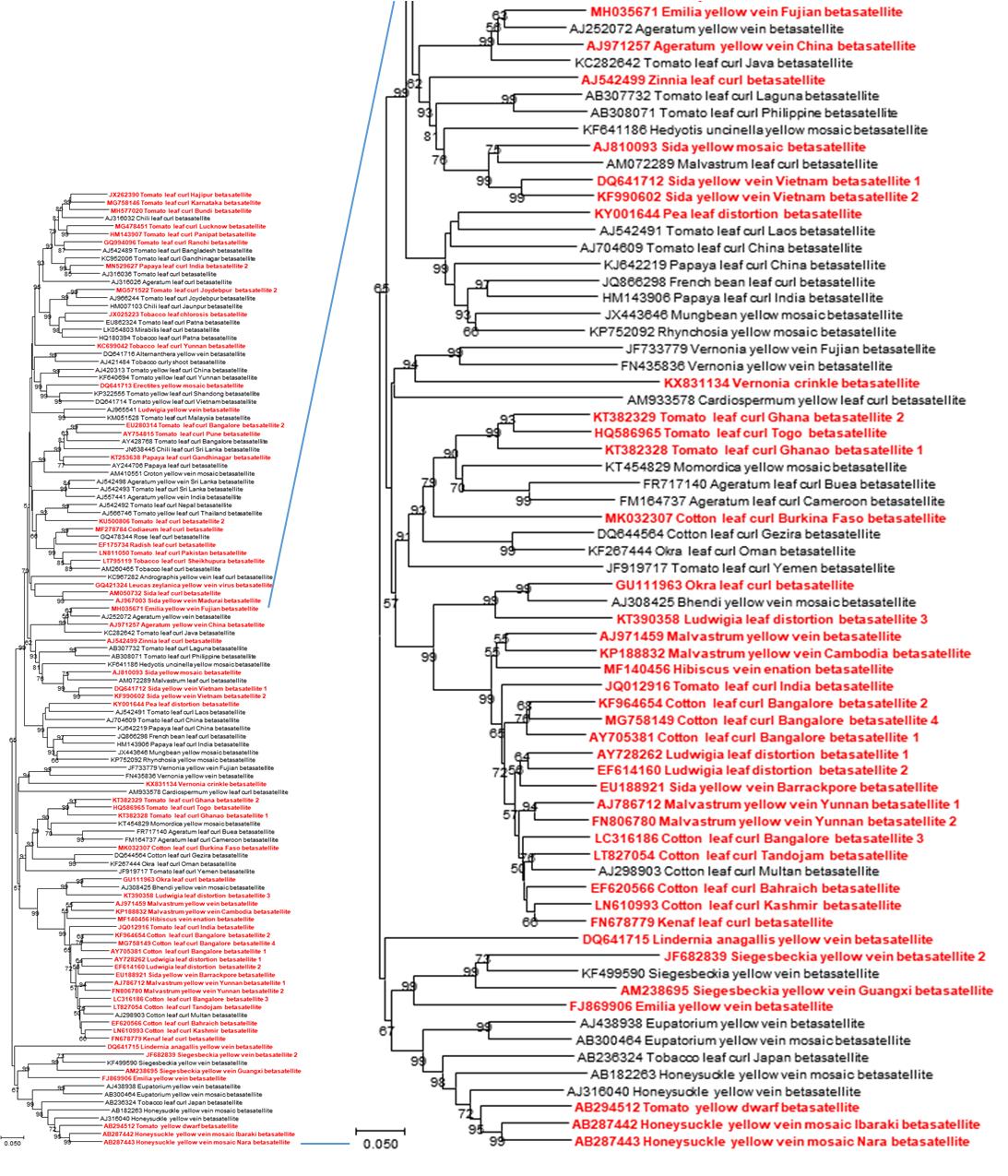
**Table 2.** Details of the betasatellite species to be abolished.

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| **Abolished species** | **GenBank Acc. No. of a representative isolate** | **Reason for abolishing** |
| *Tomato yellow leaf curl Rajasthan betasatellite* | AY438558 | Merge with *Chili leaf curl betasatellite* (AJ316032) |
| *Ageratum yellow vein India betasatellite* | AJ557441 | Merge with *Ageratum yellow vein Sri Lanka betasatellite* (AJ542498) |
| *Malvastrum leaf curl Guangdong betasatellite* | KF912951 | The only available isolate is in fact a chimera involving a fragment of a betasatellite and a fragment of a DNA-A begomovirus component |

**Supporting evidence**



**Figure 1.** Neighbor-joining phylogenetic tree based on the complete nucleotide sequences of an isolate of each betasatellite species. Branch length is related to genetic distance (*p*-distance method by using MEGA7 [Kumar *et al*., 2016]). Numbers at the nodes indicate bootstrap values (1,000 replications) and only values ≥50% are shown. The new species listed in this proposal are in bold and highlighted in red.



**Figure 1 (cont.)**

**References**

1. Briddon RW, Navas-Castillo J, Fiallo-Olivé E (2016) ICTV taxonomic proposal 2016.021a-kP.A.v2.Tolecusatellitidae. Create the *Tolecusatellitidae*, a new family of single-stranded DNA satellites with two genera. Available at: http://www.ictv.global/proposals-16/2016.021a-kP.A.v2.Tolecusatellitidae.pdf.
2. Kumar S, Stecher G, Tamura K (2016) MEGA7: molecular evolutionary genetics analysis version 7.0 for bigger datasets. Mol Biol Evol 33:1870–1874. PMID: 27004904 DOI: 10.1093/molbev/msw054