# *Supplementary document: Molecular characterization of begomovirus–betasatellite–alphasatellite complex associated with okra enation leaf curl disease in Northern Sri Lanka*

Table S1: Details of begomovirus and satellites sequences retrieved from GenBank

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| --- | --- | --- | --- | --- |
|  | **Species name** | **Isolate name** | **Host Plant** | **GenBank Access #** |
| 1 | *Okra enation leaf curl virus*\* | OELCuV [Sri Lanka:DAVav02:2018] | Okra | MN389529 |
| 2 |  | OELCuV[India: Munthal: EL37: 2006] | Okra | GU111998 |
| 3 |  | OELCuV [India: SonEL10: Haryana: 2006]\*\* | Okra | GU111996 |
| 4 |  | OELCuV [Sri Lanka: DAJfn01:2018] | Okra | MN384976 |
| 5 |  | OELCuV[Iran: Papaya: 2010] | Papaya | KJ397527 |
| 6 |  | OELCuV [India: Uttar PradeshWOK8: 2014] | *Abelmoschus manihot* | KT390463 |
| 7 |  | OELCuV [Sri Lanka: Matara: 2015] | Okra | KX698092 |
| 8 |  | OELCuV [Sri Lanka: Tr02: 2015] | Okra | MH455207 |
| 9 |  | OELCuV [India: Sonipat: Haryana: EL14: 2006] | Okra | GU111997 |
| 10 |  | OELCuV[India: Munthal: EL38: 2006] | Okra | GU112002 |
| 11 | *Cotton leaf curl Gezira virus*\* | CLCuGeV[Egypt: Aswan:2001]\*\* | Hollyhock | AF155064 |
| 12 |  | CLCuGeV[Sudan: Okra: 2007] | Okra | FJ868828 |
| 13 | *Bhendi yellow vein mosaic virus*\* | BYVMV[India: Madurai:2000]\*\* | Okra | AF241479 |
| 14 |  | BYVMV[India: Maharashtra: NOL751:2008]\*\* | Okra | EU589392 |
| 15 |  | BYVMV[India: Thadagam: OY158: 2005]\*\* | Okra | FJ176235 |
| 16 |  | BYVMV[India: Coimbator: OYCO4:2004]\*\* | Okra | FJ179372 |
| 17 |  | BYVMV[India: Haryana: 2007] | Okra | FN645923 |
| 18 |  | BYVMV[Sri Lanka: Kandy: 2015] | Okra | KX698089 |
| 19 | *Tomato leaf curl Sri Lanka virus*\* | TLCuSLV[Sri Lanka:Bandarawela:1997]\*\* | Tomato | AF274349 |
| 20 | *Ageratum yellow vein Sri Lanka virus*\* | AYVSLV[Sri Lanka:1999]\*\* | Ageratum | AF314144 |
| 21 | *Sri Lankan cassava mosaic virus*\* | SLCMV[Sri Lanka:Columbo:SLCMV-Col:2001]\*\* | Cassava | AJ314737 |
| 22 |  | SLCMV[India: Attur 2: 2009] | Cassava | KP455484 |
| 23 | *Okra yellow mosaic Mexico virus*\* | OYMV[Mexico:Mazatepec3:2004]\*\* | Okra | DQ022611 |
| 24 |  | OYMV[USA: Texas: 2009] | Okra | HM035059 |
| 25 |  | OYMV[Mexico: Iguala-13-14:2007] | Okra | HQ020409 |
| 26 |  | OYMV[Mexico: Iguala-15-16:2007] | Okra | HQ116414 |
| 27 | *Okra yellow crinkle virus*\* | OYCrV[Cote d'Ivoire: CI061:2012] | Okra | KX100571 |
| 28 |  | OYCrV[Mali:Bamako2:2005]\*\* | Okra | DQ875879 |
| 29 |  | OYCrV[Cameroon: Njo5: 2007]\*\* | Okra | HE793424 |
| 30 |  | OYCrV[Mali: Bamako:2007] | Okra | EU024118 |
| 31 | *Okra mottle virus*\* | OMoV[Brazil: 6319:2008]\*\* | Okra | EU914817 |
| 32 |  | OMoV[Brazil: 6328:2008] | Okra | EU914819 |
| 33 | *Mesta yellow vein mosaic virus*\* | MeYVMV[India:Haringhata:2008] | *Hibiscus cannabinus* | FJ159263 |
| 34 |  | MeYVMV[India: Bongaon: 2007] | *Hibiscus cannabinus* | FJ345400 |
| 35 |  | MeYVMV[India: Barackpore: 2006]\*\* | *Hibiscus cannabinus* | EF373060 |
| 36 |  | MeYVMV[India: Barackpore1: 2006] | *Hibiscus cannabinus* | EF428256 |
| 37 |  | MeYVMV [India:Barrackpore:Leaf Curl:2007] | *Hibiscus cannabinus* | FJ345398 |
| 38 | *Malvastrum yellow vein virus*\* | MaYVMV[Pakistan:Changa Manga: MV10:2009] | *Malvastrum* | FR715681 |
| 39 | *Bhendi yellow vein mosaic Delhi virus*\* | BYVMDV[India: OY131:2004]\*\* | Okra | FJ515747 |
| 40 | *Bhendi yellow vein Haryana virus*\* | BYVHV[India: Karnal: Haryana: 2003]\*\* | Okra | FJ561298 |
| 41 |  | BYVHV[India: Haryana: OY82:06] | Okra | KJ628309 |
| 42 | *Bhendi yellow vein Bhubhaneswar virus*\* | BYVBhV[India: Bhubhaneswar: Orissa: 2003]\*\* | Okra | FJ589571 |
| 43 | *Cotton leaf curl Allahabad virus* | CLCuAlV [India: Karnal: OY81B: 2005] | Okra | GU112004 |
| 44 |  | CLCuAlV [India: Karnal: OY77: 2005] | Okra | GU112081 |
| 45 |  | CLCuAlV[Pakistan: Multan: Punc-15A: 2006] | Cotton | EU384575 |
| 46 |  | CLCuAlV[Pakistan: Multan: Lob:06] | Cotton | FJ210467 |
| 47 | *Tomato leaf curl New Delhi virus*\* | ToLCNDV[India: Karnal: OY81A: 2004] | Okra | GU112082 |
| 48 |  | ToLCNDV[India: Guntur: OY136B:2006] | Okra | GU112086 |
| 49 |  | ToLCNDV[India: Bangalore: OY135: 2005] | Okra | GU112084 |
| 50 |  | ToLCNDV[India: Aurangabad: OY164A:2006] | Okra | GU112088 |
| 51 | *Okra leaf curl Oman virus*\* | OLCOV[Oman:Barka:OK-2:2012]\*\* | Okra | HE862273 |
| 52 |  | OLCOV[Oman: OK-3: 2012] | Okra | HF536716 |
| 53 | *Chilli leaf curl Sri Lanka virus*\* | ChiLCSLV[Sri Lanka: Nochchiyagama: CL-15:2009] | Chilli | JN555600 |
| 54 |  | ChiLCSLV [Sri Lanka: Nochchiyagama: CL-14:2009]\*\* | Chilli | JN555601 |
| 1 | *Bhendi yellow vein mosaic betasatellite*\* | BYVMB[India:Madurai:2000]\*\* | Okra | AJ308425 |
| 2 |  | BYVMB [Sri Lanka: Matara: 2015] | Okra | KX174321 |
| 3 |  | BYVMB[Sri Lanka: Kandy:2015] | Okra | KX174320 |
| 4 |  | BYVMB[India:Kolar:2006] | Okra | GU111973 |
| 5 |  | BYVMB[India: Coimbator: OYCo1:2005] | Okra | GU111975 |
| 6 |  | BYVMB[Sri Lanka:Jfn01:2018] | Okra | MN384974 |
| 7 |  | BYVMB[Sri Lanka:Vav02:2018] | Okra | MN384975 |
| 8 | *Bhendi yellow vein India betasatellite* | BYVIB[India: Pandarahalli: OY168:2006] | Okra | GU111990 |
| 9 |  | BYVIB[India: OK375:2014] | Okra | KT390385 |
| 10 | *Okra enation leaf curl betasatellite* | OELCuB[India:Jalgaon-4:okr:15] | Okra | KU296214 |
| 11 |  | OELCuB[India: Rajasthan: OK307: 2014] | Okra | KT390375 |
| 12 | *Okra leaf curl betasatellite* | OLCuB[India: EL32: 2006] | Okra | KJ437508 |
| 13 |  | OLCuB[India: EL14: 2006] | Okra | KJ437507 |
| 14 |  | OLCuB [India: Punjab: OK115:2014] | Okra | KT390362 |
| 15 |  | OLCuB[India:Munthal:EL41:2006] | Okra | GU111965 |
| 16 |  | OLCuB[Mali:Bamako:2007] | Okra | EU024121 |
| 17 | *Okra leaf curl Oman betasatellite*\* | OLCuOMB[Oman: Barka:2012]\*\* | Okra | KF267444 |
| 18 | *Cotton leaf curl Gezira betasatellite*\* | CLCuGeB[Sudan: Cotton: CLC46C:2004 | Cotton | AY669328 |
| 19 |  | CLCuGeB[Sudan:2006]\*\* | Cotton | DQ644564 |
| 20 |  | CLCuGeB[Niger: Okra:2007] | Okra | EU727088 |
| 21 |  | CLCuGeB[Burkina Faso:Okra:2008] | Okra | FN554574 |
| 22 | *Tomato leaf curl Sri Lanka betasatellite*\* | ToLCSLB[Sri Lanka:2003)\*\* | Tomato | AJ542493 |
| 23 | *Ageratum yellow vein Sri Lanka betasatellite*\* | AYVSLB[Sri Lanka: Ageratum conyzoides:2003]\*\* | Ageratum | AJ542498 |
| 24 | *Leucas zeylanica yellow vein betasatellite* | LZYVB[Sri Lanka: Leucas zeylanica:2006] | Leucas | GQ421324 |
| 25 | *Croton yellow vein mosaic betasatellite*\* | CrYVMB[India: Bhubaneswar: OYBHU:2006] | Okra | GU111995 |
| 26 | *Chili leaf curl betasatellite*\* | ChLCuB[Pakistan:MC:1997]\*\* | Chili | AJ316032 |
| 27 | *Papaya leaf curl betasatellite*\* | PaLCuB[India: New Delhi: 2003]\*\* | Papaya | AY244706 |
| 28 | *Chili leaf curl Sri Lanka betasatellite*\* | ChLCuSLB[Sri Lanka: Mihiripura: 2009]\*\* | Chili | JN638445 |
| 29 |  | ChLCuSLB[Sri Lanka: CL14: 2009] | Chili | JN638446 |
| 1 | *Bhendi yellow vein mosaic alphasatellite* | BhYVMA[Sri Lanka:AlJfn01:2018] | Okra | MN384972 |
| 2 |  | BhYVMA[India:Haryana:2007] | Okra | NC039083 |
| 3 |  | BhYVMA[India:Haryana:2007]\*\* | Okra | FN658716 |
| 4 | *Okra leaf curl alphasatellite* | OLCuA[Sri Lanka: AlVav02:2018] | Okra | MN384973 |
| 5 |  | OLCuA[Pakistan: Janiwala: H11A3: 2013] | Cotton | HG934825 |
| 6 |  | OLCuA[India: New Delhi:2008] | Okra | KF471055 |
| 7 |  | OLCuA[India:C31:2015] | Cotton | MF929022 |
| 8 | *Cotton leaf curl Multan alphasatellite*\* | CLCuMuA[Pakistan:Fai01:1998]\*\* | Cotton | AJ132344 |
| 9 |  | CLCuMuA[Pakistan:Punjab: Multan: 2015] | Cotton | LN870405 |
| 10 | *Ageratum yellow vein alphasatellite*\* | AYVA[Singapore:1998]\*\* | Ageratum | AJ238493 |
| 11 | *Ageratum yellow vein Singapore alphasatellite*\* | AYVSGA[Singapore:1998]\*\* | Ageratum | AJ416153 |
| 12 | *Cotton leaf curl Egypt alphasatellite*\* | CLCuEA[Egypt:SB45:1995]\*\* | Cotton | AJ512960 |
| 13 | *Tomato yellow leaf curl Thailand alphasatellite*\* | TYLCTHA[Thailand:Y70:2003]\*\* | Tomato | AJ579359 |
| 14 | *Malvastrum yellow mosaic alphasatellite*\* | MaYA[China:Hn39:2006]\*\* | Malvastrum | AM236765 |
| 15 | *Sida yellow vein Vietnam alphasatellite*\* | SiYVVA[Vietnam: Hanoi:2005]\*\* | Sida | DQ641718 |
| 16 | *Gossypium mustilinum symptomless alphasatellite\** | GMusSLA[Pakistan: Multan:2:2006]\*\* | Gossypium mustilinum | EU384656 |
| 17 | *Cotton leaf curl Gezira alphasatellite*\* | CLCuGeA-[ Mali:Bamako:okra:2006]\*\* | Okra | EU589450 |
| 18 | *Cleome leaf crumple alphasatellite*\* | ClLCrA[Brazil:Mato Grosso do Sul:2007]\*\* | Cleome | FN436007 |
| 19 | *Euphorbia yellow mosaic alphasatellite*\* | EuYMA[Brazil:Mato Grosso do Sul:1:2007]\*\* | Cleome | FN436008 |
| 20 | *Croton yellow vein mosaic alphasatellite*\* | CrYVMA[India:Haryana:Acalypha:07]\*\* | Acalypha | FN658711 |
| 21 | *Okra yellow crinkle Cameroon alphasatellite*\* | OkYCCMA[Cameroon:Lys1sp3:2008]\*\* | Okra | FN675285 |
| 22 | *Tomato leaf curl Cameroon alphasatellite*\* | ToLCuCMA[Cameroon:Buea:OMHD3:2008]\*\* | Tomato | FN675296 |
| 23 | *Malvastrum yellow mosaic Cameroon alphasatellite*\* | MaYMCMA[Cameroon:Mundemba:UMU1D1:2008]\*\* | Malvastrum | FN675297 |
| 24 | *Tomato leaf curl Buea alphasatellite*\* | ToLCuBuA[Cameroon:Buea:TOS2D1:2007]\*\* | Tomato | FN675299 |
| 25 | *Sida leaf curl alphasatellite*\* | SiLCuA[Pakistan:Lahore:06]\*\* | Sida | FR772088 |
| 26 | *Cassava mosaic Madagascar alphasatellite*\* | CMMGA[Madagascar:Diana:635A1:2011]\*\* | Cassava | HE984148 |
| 27 | *Okra enation leaf curl alphasatellite*\* | OELCuA-[India:Surat:2011]\*\* | Okra | HF546575 |
| 28 | *Cotton leaf curl Saudi Arabia alphasatellite*\* | CLCuSAA[Saudi Arabia:Jazan:2013]\*\* | Okra | HG530543 |
| 29 | *Melon chlorotic mosaic alphasatellite*\* | MeCMA[Venezuela:2009-02-04-0:2009]\*\* | Watermelon | HM163578 |
| 30 | *Cotton leaf curl Lucknow alphasatellite*\* | CLCuLuA[India: Lucknow:2010]\*\* | Cotton | HQ343234 |
| 31 | *Tobacco curly shoot alphasatellite*\* | TbCSA[India:WSF1:Helianthus:2010]\*\* | sunflower | HQ407396 |
| 32 | *Mesta yellow vein mosaic alphasatellite*\* | MeYVMA[India:Ludhiana:Okra:2010]\*\* | Okra | JX183090 |
| 33 | *Tomato leaf curl alphasatellite* | ToLCA[India:Tomato:2011] | Tomato | JX569789 |
| 34 | *Ageratum yellow vein India alphasatellite*\* | AYVIA[India: Lucknow:Parthenium:2012]\*\* | Parthenium | JX570736 |
| 35 |  | AYVIA[Pakistan:Rajowal:C47A2:2013] | Radish | HG934821 |
| 36 | *Ageratum enation alphasatellite*\* | AEA[India:Jwala Ji: Himachal:2013] | Synedrella | LN558518 |
| 37 |  | AEA[India: Lucknow:2012]\*\* | Poppy | JX913532 |
| 38 | *Vernonia yellow vein Fujian alphasatellite*\* | VeYVFA[India:Vamban:blackgram:2012]\*\* | Blackgram | KC959931 |
| 39 | *Chilli leaf curl alphasatellite*\* | ChLCA-[India:273:2006]\*\* | Chilli | KF471043 |
| 40 | *Ageratum yellow vein China alphasatellite*\* | AYVCNA[Philippines:Davao:SN3:Synedrella nodiflora:2012]\*\* | *Synedrella nodiflora* | KF785752 |
| 41 | *Tomato yellow spot alphasatellite*\* | ToYSA[Brazil:Dou1095.1:2011]\*\* | *Leonurus sibiricus* | KX348228 |

(\*) The species are listed in ICTV 2018b Master Species List (MSL34) (Version 2, 31/May/2019). For more information see: <http://www.ictvonline.org/>.

(\*\*)Representative isolate: for each species.