**Table S 4**.

Details of recombination between CLCuMuV and DNA satellites associated with hollyhock and other begomoviruses detected using RDP4.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA-A** | **Break point begin-end** a | **Parent-like sequences** | | **P-Values** | | | | | |
| **Major Parent** | **Minor parent** | **RDP** | **GENECOV** | **Max Chi** | **Chimera** | **Si Scan** | **3Seq** |
| **CLCuMuV-H1** | 132-482  547-745  1304-1733  2509-2753 | CLCuBaV-[IN:Ban:04].AY705380  CLCuMuV-Dar[IN:Sri:CLR07:10].JN678803  PaLCuV-Cro[IN:Cro].AJ507777  CLCuAlV-Al[PK:Ala804a:96].AJ002452 | BYVMV[Mad].AF241479  ToLCPuV-[IN:Pun:05].AY754814  ToLCBaV-C[IN:Ban4:97].AF165098  ToLCBV-[BD:BD2].AF188481 | 3.224X10-6  7.055X10-4  3.436X10-2  6.916X10-3 | 7.975X10-6  -  -  - | 2.533X10-6  -  8.31X10-1  - | 7.38X10-6  -  -  2.312X10-2 | -  1.973X10-2  2.481X10-6  - | 3.573X10-6  4.969X10-5  2.197X10-2  9.37X10-4 |
| **CLCuMuV-H2** | 235-482  1315-1468  1647-1673  2059-2156 | CLCuBaV-[IN:Ban:04].AY705380  CLCuMuV-H1  PaLCuV-Cro[IN:Cro].AJ507777  CLCuAlV-Al[PK:Ala804a:96].AJ002452 | BYVMV[Mad].AF241479  CLCuMuV-H2  ToLCBaV-C[IN:Ban4:97].AF165098  ToLCBV-[BD:BD2].AF188481 | 3.224X10-6  -  3.436X10-2  6.916X10-3 | 7.975X10-6  -  -  - | 2.533X10-6  1.829X10-5  8.31X10-1  - | 7.38X10-6  -  -  2.312X10-2 | -  3.808X10-4  2.481X10-6  - | 3.573X10-6  1.732X10-6  2.197X10-2  9.37X10-4 |
| **CLCuMuV-H3** | 121-482  1315-2737  1658-1835  2059-2156  2339-2826 | CLCuBaV-[IN:Ban:04].AY705380  CLCuMuV-H1  PaLCuV-Cro[IN:Cro].AJ507777  CLCuAlV-Al[PK:Ala804a:96].AJ002452  CLCuMuV-H2 | BYVMV[Mad].AF241479  CLCuMuV- [IN:Sri:CLR07:10].JN678803  ToLCBaV-C[IN:Ban4:97].AF165098  ToLCBV-[BD:BD2].AF188481  CLCuKoV-[IN:Bih:Tom:09].HM461862 | 3.224X10-6  1.406X10-4  3.436X10-2  6.916X10-3  5.38X10-15 | 7.975X10-6  1.938X10-2  -  -  3.104X10-4 | 2.533X10-6  1.242X10-22  8.31X10-1  -  3.395X10-10 | 7.38X10-6  1.479X10-26  -  2.312X10-2  - | -  2.336X10-10  2.481X10-6  -  - | 3.573X10-6  5.277X10-67  2.197X10-2  9.37X10-4  5.524X10-23 |
| **DNAD1(Alphasatellite)** | | | | | | | | | |
| **H1D1** | 132-326  419-792 | SLCuKaA-[IN:KTK:SnF:11].JX569789  AEA-[IN:Pat:rad:08].KF471054 | AYVIA-[IN:Luc:Par:12].JX570736  AEA-[PK:OK:13].HG518789 | 4.298X10-3  3.122X10-4 | 3.346X10-2  2.173X10-2 | 9.407X10-4  5.601X10-3 | 2.955X10-3  4.94X10-3 | 8.286X10-5  2.684X10-4 | 1.047X10-2  9.061X10-5 |
| **H1D2** | 133-326  418-830 | SLCuKaA-[IN:KTK:SnF:11].JX569789  AEA-[IN:Pat:rad:08].KF471054 | AYVIA-[IN:Luc:Par:12].JX570736  AEA-[PK:OK:13].HG518789 | 4.298X10-3  3.122X10-4 | 3.346X10-2  2.173X10-2 | 9.407X10-4  5.601X10-3 | 2.955X10-3  4.94X10-3 | 8.286X10-5  2.684X10-4 | 1.047X10-2  9.061X10-5 |
| **H1D3** | 128-321  856-39 | SLCuKaA-[IN:KTK:SnF:11].JX569789  AEA-[PK:OK:13].HG518792 | AYVIA-[IN:Luc:Par:12].JX570736  CLCuMuA-[IN::Pan:Cot:12].KF584012 | 4.298X10-3  6.894X10-10 | 3.346X10-2  6.298X10-5 | 9.407X10-4  5.741X10-5 | 2.955X10-3  5.653X10-6 | 8.286X10-5  7.936X10-6 | 1.047X10-2  2.54X10-6 |
| **DNAβ (Betasatellite)** | | | | | | | | | |
| **H1β** | 856-39 | H3β | H2β | 6.99X10-14 | 2.68X10-17 | 2.577X10-17 | 8.719X10-15 | 3.494X10-21 | 7.566X10-32 |
| **H2β (Non-recombinant)** | | | | | | | | | |
| **H3β** | 958-1138 | LuLDB-[IN:Lud:Okra:14].KJ614227 | LuLDB-[IN:hol:13].JQ408216 | 2.936X10-5 | 9.25X10-7 | 4.33X10-4 | 8.195X10-9 | 2.866X10-6 | 1.717X10-10 |

NS- Recombination Non-significance

Definition for acronyms in the supplementary Table 1

a The text in the parenthesis of this column indicates ORF’s in which break points are identified