

Supplementary Information

**Figure S1.** RDP analysis of Cotton leaf curl Multan betasatellite sequences. Shown are linear representations of the sequences of selected CLCuMB isolates that are representative of the sub-groups discussed in the text. The origins of sequences (either from Cotton leaf curl Multan betasatellite strain Burewala (CLCuMB<sup>Mul</sup> or Tomato leaf curl betasatellite (ToLCB)) are shown as coloured boxes relative to the approximate positions of betasatellite features satellite conserved region (SCR),  $\beta$ C1 gene ( $\beta$ C1) and adenine-rich region (A-rich) shown at the top of the figure.



**Table S1.** Recombination analysis of selected Cotton leaf curl Multan betasatellite isolates using the RDP 3.0 program.

| Event no. | Breakpoint positions |      | Recombinant sequence *              | Minor parent *      | Major parent *                      | Detection methods ( <i>p</i> value) |                         |                         |                         |                         |        |
|-----------|----------------------|------|-------------------------------------|---------------------|-------------------------------------|-------------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------|
|           | Begin                | End  |                                     |                     |                                     | RDP                                 | GENECONV                | BootScan                | MaxChi                  | Chimera                 | Siscan |
| 1         | 1155                 | 1185 | CLCuMB <sup>Sha</sup><br>[HE601940] | ToLCB<br>[AJ542490] | CLCuMB <sup>Mul</sup><br>[AJ298903] | -                                   | $3.140 \times 10^{-05}$ | -                       | -                       | -                       | -      |
| 2         | 1128                 | 26   | CLCuMB <sup>Bur</sup><br>[HE601939] | ToLCB<br>[AJ542490] | CLCuMB <sup>Mul</sup><br>[AJ298903] | $8.288 \times 10^{-31}$             | $2.504 \times 10^{-34}$ | $4.171 \times 10^{-32}$ | $2.368 \times 10^{-11}$ | $5.777 \times 10^{-12}$ | -      |
| 3         | 1087                 | 20   | CLCuMB <sup>Bur</sup><br>[AY763123] | ToLCB<br>[AJ542490] | CLCuMB <sup>Mul</sup><br>AJ298903   | $6.083 \times 10^{-18}$             | $2.574 \times 10^{-13}$ | $2.069 \times 10^{-15}$ | $2.313 \times 10^{-04}$ | $1.845 \times 10^{-06}$ | -      |
| 4         | 1142                 | 1292 | CLCuMB <sup>Bur</sup><br>[AM084379] | ToLCB<br>[AJ542490] | CLCuMB <sup>Mul</sup><br>[AJ298903] | $2.917 \times 10^{-29}$             | $2.273 \times 10^{-22}$ | $4.080 \times 10^{-26}$ | $5.392 \times 10^{-10}$ | $3.753 \times 10^{-11}$ | -      |

\* The betasatellite species/strains are given as Tomato leaf curl betasatellite (ToLCB), Cotton leaf curl Multan betasatellite strains Multan (CLCuMB<sup>Mul</sup>), Burewala (CLCuMB<sup>Bur</sup>) and Shahdadpur (CLCuMB<sup>Sha</sup>). In each case the relevant database accession number is given.