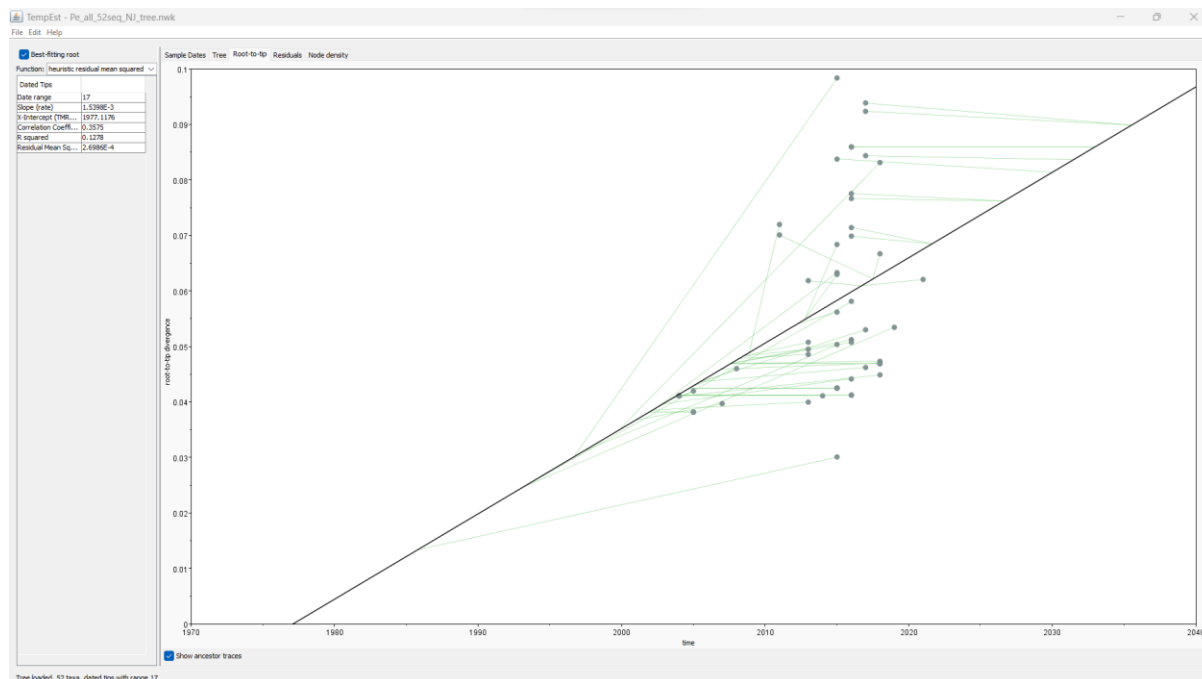
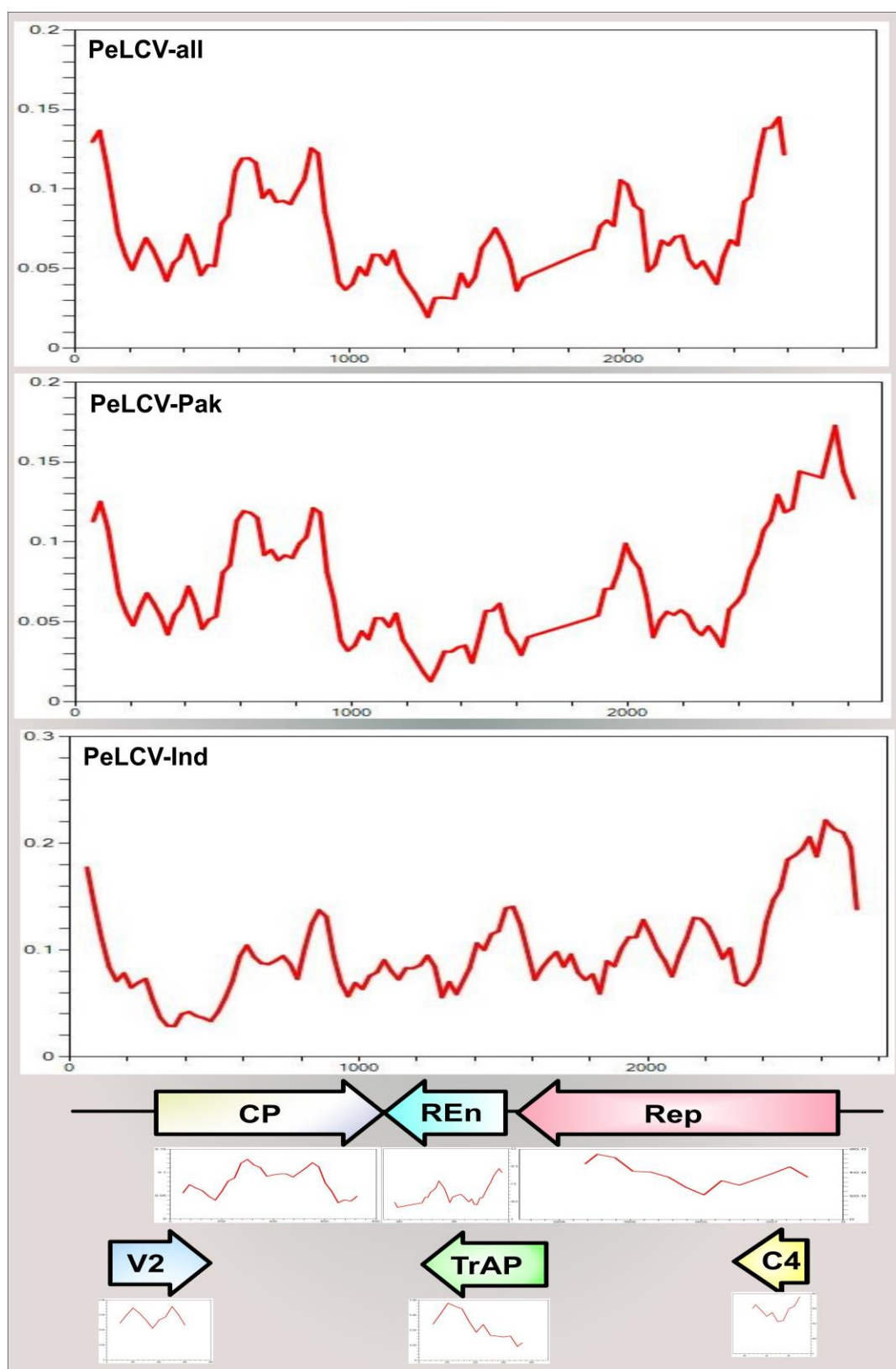


## Supplementary data



**Figure S1.** TempEST analysis of PeLCV-all to assess potential evolutionary time of the most recent common ancestor (MRCA)



**Figure S2:** Total nucleotide diversity across all the nucleotide of all the PeLCV datasets. Along y-axis nucleotide diversity ( $\pi$ ) and along x-axis nucleotide position is mentioned. A linear genome organization is mentioned to map the  $\pi$  value at each ORF.

**Table S1.** Recombination events detected in the entire PeLCV-all population

PeLCV accession #	Number of recombination events	Recombination breakpoint*	Major parent	Minor parent	RDP methods	Highest P values detected by the underline method <sup>‡</sup>
AM712436	2	2738-16	JN807764	NC008299	R,G,B,M, <u>C</u> ,3S	80.4E-07
		2576-2625	NV008299	MN566097	R, <u>G</u> ,M,C,3S	6.42E-04
AM948961	1	1967-2402	HF568781	KY937947	R, <u>M</u> ,C,3S	1.67E-04
DQ116884	2	1138-1661	Unknown	MN885483	R,B,M,C,S, <u>3S</u>	1.82E-05
		1746-2559	Unknown	AM848961	R,G,B, <u>M</u> ,C,S,3S	6.50E-11
JN807764	3	730-1924	JQ012790	MN910265	B, <u>M</u> ,C,3S	1.71E-17
		1956-2476	KY937947	MN885482	R,M,C, <u>3S</u>	2.93E-08
		2600-2625	NC008299	MN566097	R, <u>G</u> ,M,C,3S	6.42E-04
JQ12790	2	1166-2404	KY937947	MH550115	R,G,B,M,S, <u>3S</u>	8.66E-13
		2600-2625	NC008299	MN566097	R, <u>G</u> ,M,C,3S	6.42E-04
KX168427	2	2746-364	JN807764	NC008299	R,G,B,M, <u>C</u> ,3S	8.04E-07
		2576-2625	NC008299	MN566097	R, <u>G</u> ,M,C,3S	6.42E-04
KX671561	1	1972-2747	MG764705	MN566097	G,B,M, <u>S</u> , <u>3S</u>	2.37E-08
KX671562	1	1740-2658	MG764705	MN566097	G,B,M, <u>S</u> ,3S	2.37E-08
KX671563	2	1679-2437	LN713272	Unknown	R,G,M,C,S, <u>3S</u>	4.56E-18
		1865-1963	KX671562	Unknown	G,M, <u>S</u> ,3S	6.01E-13
KX710160	2	834-1075	MN885483	Unknown	<u>R</u> ,G,B,M,C,S,3S	1.55E-09
		2559-648	LN713272	KX168427	R,G, <u>M</u> ,C,3S	1.26E-09
KX711622	1	1731-2664	MG764705	MN566097	G,B,M, <u>S</u> ,3S	2.37E-09
KY937947	2	2576-2625	NC008299	MN566097	R, <u>G</u> ,M,C, <u>3S</u>	6.42E-04
		2738-438	JN807764	NC008299	R,G,B,M, <u>C</u> ,3S	8.04E-07
KY978406	2	2576-2625	NC008299	MN566097	R, <u>G</u> ,M,C, <u>3S</u>	6.42E-04
		2738-438	JN807764	NC008299	R,G,B,M, <u>C</u> ,3S	8.04E-07
LN678638; LN713272; LN713273	1	1965-2427	HF568781	KY937947	R,M, <u>C</u> ,3S	1.07E-04
LT600729	3	45-1041	HF568781	Unknown	R,G,B,M,C, <u>3S</u>	1.58E-21
		1964-2385	MG764705	Unknown	R,M,C, <u>S</u> ,3S	7.56E-15
		2608-1272	HF568781	Unknown	G,B,M,C,S, <u>3S</u>	2.15E-60
LT795117	2	1956-2385	MG764705	Unknown	R,M,C, <u>S</u> ,3S	7.56E-15
		2505-1280	HF568781	Unknown	G,B,M,C,S, <u>3S</u>	2.15E-60
LT795118	3	45-1148	HF568781	Unknown	R,G,B,M,C,S, <u>3S</u>	1.58E-21
		1956-2385	MG764705	Unknown	R,M,C, <u>S</u> ,3S	7.56E-15
		2505-1280	HF568780	Unknown	G,B,M,C,S, <u>3S</u>	2.15E-60

MF135486	1	52-1956	MF135486	AM948961	G,M,C, <u>3S</u>	3.03E-09
MF278788;	2	2576-2625	NC008299	MN566097	R, <u>G</u> ,M,C,S,3S	6.42E-04
MF278789		2738-438	JN807764	NV008299	R,G,B,M, <u>C</u> ,3S	8.04E-07
MG764701; MG764702; MG764703:M G764705	1	1869-2289	HF568781	KY937947	R, <u>M</u> ,C,3S	1.67E-04
MH550115	4	638-1145	Unknown	LN678638	R,G,M,C, <u>S</u>	6.63E-18
		1202-1598	OM993557	KX671562	R,M,C, <u>S</u> ,3S	2.06E-12
		1519-2017	HF568781	KY937947	<u>R</u> ,G,M,C,3S	3.39E-05
		2753-273	MK158208	KX671562	<u>R</u> ,G,B,M,C,S,3S	9.64E-12
MH643736	2	1201-2398	KY937947	MH550115	R,G,B,M,C, <u>3S</u>	8.66E-13
		2600-2625	NC008299	MN566097	R, <u>G</u> ,M,C,3S	6.42E-07
MH765695	3	116-570	MF278789	Unknown	R,G,M,C,S, <u>3S</u>	1.30E-08
		2577-2625	NC008299	MN566097	R, <u>G</u> ,M,C,3S	6.42E-04
		2741-600	JN807764	NC008299	R,G,B,M, <u>C</u> ,3S	8.04E-07
MH973686	2	1956-2385	MG764705	Unknown	R,M,C, <u>S</u> ,3S	7.56E-15
		2505-1280	HF568781	Unknown	G,B,M,C,S, <u>3S</u>	2.15E-60
MH973687	3	1745-1984	KX710160	Unknown	G,M,C, <u>S</u> ,3S	1.59E-09
		1985-2707	Unknown	MF135486	R,M,C,S, <u>3S</u>	5.73E-10
		2724-1103	HF568781	Unknown	R,G,B,M,C,S, <u>3S</u>	1.58E-21
MH973688	3	1743-1985	KX710160	Unknown	G,M,C, <u>S</u> ,3S	1.59E-09
		1994-2678	Unknown	MF165486	R,M,C,S, <u>3S</u>	5.73E-11
		2750-1168	HF568781	Unknown	R,G,B,M,C,S, <u>3S</u>	1.58E-21
MK158207; MK158208	3	639-1140	Unknown	LN678638	R,G,M,C,S, <u>3S</u>	6.63E-18
		1141-1659	OM993557	LN713272	<u>R</u> ,G,B,M,C,S,3S	1.01E-09
		1705-2416	HF568781	KY937947	R,G,B,M,C,S,3S	1.01E-09
MK158209	3	384-2147	OM993555	Unknown	R,G,B,M,C,S, <u>3S</u>	2.76E-16
		1484-1974	OM993555	Unknown	R,G,M,C,S, <u>3S</u>	2.54E-11
		2393-2696	MH550115	MH973687	G,B,M,C,S,3S	6.48E-28
MN566097; MN566098	2	381-511	LN313272	KY937947	<u>R</u> ,G,M,C,S,3S	8.61E-12
		1968-2389	MN566097	Unknown	R,M,C, <u>S</u> ,3S	7.56E-15
MN885484	2	415-1678	KX671562	MH973687	R,G,B,M,C,S, <u>3S</u>	4.31E-43
		415-1152	LN713272	OM993557	M,C,S, <u>3S</u>	1.02E-14
MN885485	2	423-1694	KX671562	MH973687	R,G,B,M,C,S, <u>3S</u>	4.31E-43
MN910265	4	272-812	MF278789	Unknown	R,G,B,M,C,S, <u>3S</u>	7.93E-13
		2120-2443	KY937947	Unknown	<u>R</u> ,G,B,M,C,S,3S	4.63E-11
		2576-2625	NC008299	MN566097	R, <u>G</u> ,M,C,3S	6.49E-04
		2738-271	JN807764	NC008299	R,G,B,M, <u>C</u> ,3S	8.05E-07
NC008299	2	1138-1661	Unknown	MN885483	R,B,M,C, <u>S</u>	9.12E-08
		1662-2564	Unknown	AM948961	R,G,B, <u>M</u> ,C,S	6.95E-11

NC012118	1	2762-438	JN807764	NC008299	R,G,B,M, <u>C</u> ,3S	8.04E-07
OM144969	1	1277-2467	HF568781	Unknown	G,B,M,C, <u>3S</u>	1.34E-45
OM993555	3	926-1472	OM993557	MK158209	R,G,B,M,C,S, <u>3S</u>	1.04E-09
		1512-2009	HF568781	KY937947	<u>R</u> ,G,M,C,S,3S	3.39E-06
		2328-254	MK158208	MF278789	B,M,C,S, <u>3S</u>	2.38E-12
OM993556	5	636-1143	Unknown	LN678638	R,G,M,C, <u>S</u>	6.63E-18
		1376-1598	OM993557	KX671562	R,M,C, <u>S</u> ,3S	2.06E-12
		1535-2405	HF568781	KY937947	<u>R</u> ,G,M,C,S,3S	3.39E-06
		2512-2784	Unknown	MK158208	R,G,B,M,C,S, <u>3S</u>	1.86E-25
		2785-304	MK158208	KX671562	<u>R</u> ,G,B,M,C,S,3S	9.63E-12
OM993557	3	636-1144	Unknown	LN678638	R,G,M,C, <u>S</u>	6.63E-18
		1376-1598	OM993557	KX671562	R,M,C, <u>S</u> ,3S	3.39E-08
		2754-272	MK158208	KX671562	<u>R</u> ,G,B,M,C,S,3S	9.63E-12
ON054966	1	1497-2655	KX671562	Unknown	B,M,C, <u>S</u>	6.06E-16

**Table S2.** Recombination events detected in PeLCV-Pak

PeLCV accession #	Number of recombination events	Recombination breakpoint*	Major parent	Minor parent	RDP methods	Highest P values detected by the underline method*
AM948961	1	1990-2574	MN566098	Unknown	R,G,M,C,S, <u>3S</u>	1.85E-11
DQ116884	2	978-2561	KY937947	LN678638	R, <u>M</u> ,C,S,3S	5.86E-08
		2577-2622	KY937947	Unknown	R,G,M, <u>C</u>	1.31E-04
HF568781	1	1169-2751	OM993557	LT600729	R,G,B,M,S, <u>3S</u>	2.43E-36
KX671561	1	1169-2751	OM993557	LT600729	R,G,B,M,S, <u>3S</u>	2.43E-36
KX671562	1	1169-2751	OM993557	LT600729	R,G,B,M,S, <u>3S</u>	2.43E-36
KX671563	2	1171-1966	MN885484	Unknown	R,G,M,C, <u>3S</u>	7.01E-18
		1194-1830	Unknown	KX671562	R,B,M, <u>3S</u>	2.13E-07
KX710160	3	834-1075	MN885483	Unknown	<u>R</u> ,G,B,M,C,S,3S	8.79E-10
		1921-2210	LT795118	MF278789	G,M, <u>C</u> ,S,3S	2.06E-04
		2559-648	LN713272	KY937947	R,G, <u>M</u> ,C,S,3S	3.10E-09
KX711622	1	1162-2750	OM993557	LT600729	R,G,B,M,S, <u>3S</u>	2.43E-36
LN678638	1	1952-2400	LT795118	KY937947	R,M, <u>S</u> ,3S	1.27E-26
LN713272	1	1924-2572	MN885484	Unknown	R,B,M, <u>S</u>	1.01E-08
LN713273	1	1952-2400	LT795118	KY937947	R,M, <u>S</u> ,3S	1.27E-26
LT600729	1	2739-978	KX671563	Unknown	R,G,B,M, <u>S</u> ,3S	3.24E-14
LT795117	1	2729-1142	KX671563	Unknown	R,G,B,M, <u>S</u> ,3S	3.24E-14
LT795118	1	2729-1142	KX671563	Unknown	R,G,B,M, <u>S</u> ,3S	3.24E-14

MF135486	1	1135-2729	OM993557	LT600729	R,G,B,M,S, <u>3S</u>	2.43E-36
MG764701	1	1924-2127	KY671562	KY937947	R,B,M, <u>S</u> ,3S	1.19E-23
MG764702	1	1924-2127	KY671562	KY937947	R,B,M, <u>S</u> ,3S	1.19E-23
MG764703	1	1924-2127	KY671562	KY937947	R,B,M, <u>S</u> ,3S	1.19E-23
MG764704	1	1298-2254	KY671562	KY937947	R,B,M, <u>S</u> ,3S	1.19E-23
MG764705	1	1924-2127	KY671562	KY937947	R,B,M, <u>S</u> ,3S	1.19E-23
MH550515	2	2515-272	MK158208	MN885482	G,B,M,S, <u>3S</u>	2.37E-09
		2514-2777	OM993556	MK158208	R,G,B,M,S, <u>3S</u>	3.52E-23
MH643736	2	1140-2480	MF278789	Unknown	R,M,S, <u>3S</u>	1.44E-12
		2745-352	MF278789	Unknown	R,M,S, <u>3S</u>	4.51E-15
MH973686	1	2-1037	KX671563	Unknown	R,G,B,M,S, <u>3S</u>	2.98E-14
MH973687	2	1661-1985	LT600729	Unknown	R,G,M,S, <u>3S</u>	1.41E-09
		2739-1139	KX671563	OM993556	R,G,B,M,S, <u>3S</u>	7.98E-29
MH973688	2	4-1161	KX671563	OM993556	R,G,B,M,S, <u>3S</u>	7.98E-29
		1746-1987	LT600729	Unknown	R,G,M,S, <u>3S</u>	1.41E-09
MK158207	2	1594-1946	MN885482	KY937947	R,G,B,M,C, <u>S</u> ,3S	2.21E-08
		25-267	MF135486	Unknown	M,C, <u>S</u> ,3S	7.33E-04
MK158208	1	1496-2401	MN885482	KY937947	R,G,B,M,C, <u>S</u> ,3S	2.21E-08
MK158209	3	384-2147	OM993555	Unknown	R,G,B,M,C,S, <u>3S</u>	21.57E-16
		1484-1974	OM993555	Unknown	R,G,M,C,S, <u>3S</u>	1.44E-11
		2393-2696	MH550115	MH973686	G,M,C,S, <u>3S</u>	7.46E-27
MN566097	2	381-511	LN713272	KY937947	<u>R</u> ,G,C,M,S, <u>3S</u>	2.57E-09
		1164-2753	OM993557	LT600729	R,G,M,S, <u>3S</u>	2.43E-36
MN566098	3	381-511	LN713272	KY937947	<u>R</u> ,G,C,M,S, <u>3S</u>	2.57E-09
		1164-2753	OM993557	LT600729	R,G,M,S, <u>3S</u>	2.43E-36
		1425-2525	Unknown	MN885484	B,M,S, <u>3S</u>	4.46E-07
MN885482	1	1952-2357	LT795118	KY937947	R,B,M, <u>S</u> ,3S	2.04E-29
MN885483	1	1914-2527	MN885484	Unknown	R,G,B,M,S, <u>3S</u>	9.86E-10
MN885484	2	37-381	LT600729	MF135486	R,G,B,C,M,S, <u>3S</u>	1.53E-25
		2725-1101	KX671563	Unknown	R,G,B,C,M, <u>S</u> ,3S	3.24E-14
MN885485	1	59-1101	KX671563	Unknown	R,G,B,C,M,S, <u>3S</u>	3.24E-14
MN910265	2	302-812	KY937947	Unknown	R,G,C,M,S, <u>3S</u>	1.35E-12
		2120-2443	KY937947	LN678638	R, <u>C</u> ,M,S,3S	2.16E-07
OM993555	3	1486-1972	MN885482	KY937947	R,G,B,C,M, <u>S</u>	2.21E-06
		2349-2724	MH550115	MH973687	G,C,M,S, <u>3S</u>	7.46E-28
		2349-253	MK158208	MF278789	R,G,B,C,M, <u>S</u> ,3S	1.12E-16
OM993556	3	615-1518	Unknown	LN713272	B,C,M, <u>S</u>	2.70E-14
		1535-2407	MN885482	KY937947	R,G,B,C,M, <u>S</u> ,3S	2.21E-08
		2731-271	MK158208	MN885482	G,B,C,M,S, <u>3S</u>	2.36E-09
OM993557	2	2513-2765	OM993556	MK158208	R,G,B,C,M,S, <u>3S</u>	3.52E-23
		2513-348	MK158208	MN885482	G,B,C,M,S, <u>3S</u>	2.36E-09

NC008299	2	1076-2576	KY937947	LN678638	R, <u>M</u> ,C,S,3S	5.86E-08
		2577-2642	KY937947	Unknown	R,G,M, <u>C</u>	1.74E-08

**Table S3.** Recombination events detected in PeLCV-Ind

PeLCV accession #	Number of recombination events	Recombination breakpoint*	Major parent	Minor parent	RDP methods	Highest P values detected by the underline method <sup>‡</sup>
JN807764	3	93-573	MH765695	OK236813	R,G,B,M, <u>C</u> ,S,3S	1.08E-08
		1074-1654	JQ012792	Unknown	R,G,B,M,C,S, <u>3S</u>	7.55E-13
		1734-2518	KX168427	OK236813	R,B,M,C, <u>S</u> ,3S	1.91E-15
JQ12790	3	93-573	MH765695	OK236813	R,G,B,M,S, <u>3S</u>	2.26E-10
		1076-1865	KX168427	OK236813	R,G,B,M,C,S, <u>3S</u>	9.01E-08
		1962-2563	KX168427	OK236813	R,B,M,C, <u>S</u> ,3S	2.48E-15
MH765695	1	1076-2548	JQ012790	Unknown	R,B,M,C, <u>S</u> ,3S	9.92E-25
OM144969	2	1261-2425	OK236813	Unknown	R,G,B,M,C,S, <u>3S</u>	4.44E-14
		2740-74	OK236813	KX168427	R,G,B, <u>M</u> ,C,S,3S	1.96E-07
KX168427	3	80-596	MH765695	OK236813	R,G,B,M,C,S, <u>3S</u>	2.26E-10
		1130-1324	MH765695	OK236813	G,M,C, <u>S</u> ,3S	3.87E-10
		1562-1879	MH765695	OM144969	R,M,C, <u>S</u>	5.97E-16