Appendix. A Comprehensive information of naturally-occurring PSTVd variants.

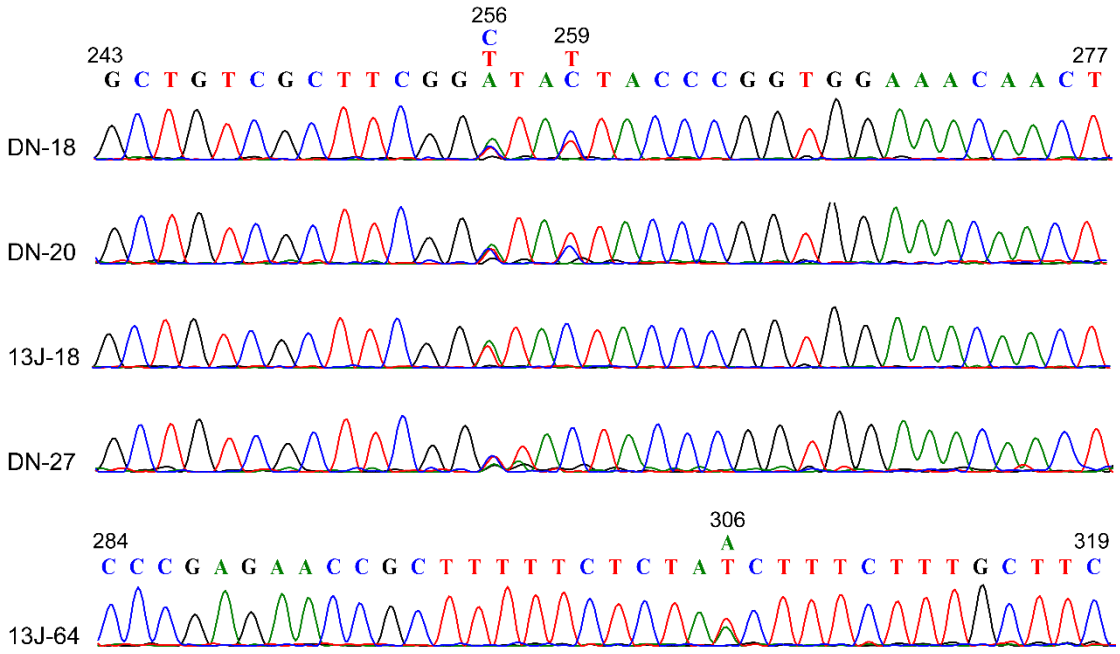
Genbank accession no.	Host	Country	Isolate	Length (nt)	phylogenetic Group
AB623143	Dahlia	Japan	dahlia	361	/
KJ857496	Tomato	Australia	CVN181	358	I
KJ857497	*Capsicum annuum*	Australia	CVN189	358	I
KJ857498	*Solanum nigrum*	Australia	CVN212	358	I
KF683200	Tomato	Dominica	DR13-01	358	I
KF049417	Tomato	Australia	BRIP54757	361	I
KF493732	Tomato	Netherlands	DCP_1124_2013	358	I
JX280944	Tomato	USA	NC12-01	360	I
JN559764	Cape gooseberry	Slovenia	Pp 413-Slo	358	I
FJ797614	Cape Gooseberry	New Zealand	92009595	359	I
EU862230	Cape Gooseberry	Turkey	3594502	357	I
EU862231	Cape Gooseberry	Germany	4099431	358	I
DQ308556	Potato	Iran	H08	357	I
AY962324	Tomato	Australia	Chittering	358	I
AY372397	Tomato	Netherlands	20011470	358	I
AY532801	*Capsicum annum*	New Zealand	Fiesta	359	I
AY532802	*Capsicum annum*	New Zealand	Spirit	359	I
AY532803	*Capsicum annum*	New Zealand		359	I
AY532804	*Capsicum annum*	New Zealand	Special	359	I
AJ583449	Tomato	UK	UK	358	I
AF369530	Tomato	New Zealand		358	I
U51895	Wild *Solanum* weed	Australia	Darwin	356	I
X17268	Tomato /Pepino	Netherlands	PSTVd-N	356	I
KF418767	*Solanum jasminoides*	Croatia	PSTVd_3	357	IIA
KF418768	*Solanum jasminoides*	Croatia	PSTVd_6	357	IIA
KF418769	*Lycianthes rantonnetii*	Croatia	PSTVd_11	357	IIA
KF418770	*Solanum jasminoides*	Croatia	PSTVd_20	357	IIA
KF418771	*Lycianthes rantonnetii*	Croatia	PSTVd_23	357	IIA
KF418772	*Solanum jasminoides*	Croatia	PSTVd_38	357	IIA
KF418773	*Solanum jasminoides*	Croatia	PSTVd_67	357	IIA
KF418774	*Solanum jasminoides*	Croatia	PSTVd_68	357	IIA
KC282384	*Solanum jasminoides*	Australia	Aus_S.jasminoides	357	IIA
KF419168	*Solanum jasminoides*	Hungary	EL134	357	IIA
KC810010	*Brugmansia*	Czech	jas2_brugmansia	357	IIA
JN559763	*Solanum jasminoides*	Slovenia	PSTVd Sj 403-Slo	357	IIA
FR851463	*Cestrum nocturnum*	Italy	Cen-1	361	IIA
HQ456944	*?*	Turkey	PSTVd-TR35	358	IIA
HQ452399	*Cestrum aurantiacum*	Italy	ca1a	359	IIA
HQ452400	*Cestrum aurantiacum*	Italy	ca1b	360	IIA
HQ452401	*Cestrum aurantiacum*	Italy	ca1c	360	IIA
HQ452402	*Cestrum aurantiacum*	Italy	ca2abc	361	IIA
HQ452403	*Cestrum ×cultum*	Italy	cc2ac	363	IIA
HQ452404	*Cestrum ×cultum*	Italy	cc2b	361	IIA
HQ452405	*Cestrum ×cultum*	Italy	cc3ac	360	IIA
HQ452406	*Cestrum ×cultum*	Italy	cc3b	362	IIA

HQ452407	*Cestrum endlicheri*	Italy	ce2bc	363	IIA
HQ452408	*Cestrum endlicheri*	Italy	ce3bc	363	IIA
HQ452409	*Cestrum nocturnum*	Italy	cn2b	361	IIA
HQ452410	*Cestrum nocturnum*	Italy	cn2c	361	IIA
HQ452411	*Cestrum nocturnum*	Italy	cn3ab	362	IIA
HQ452412	*Cestrum nocturnum*	Italy	cn3c	362	IIA
HQ452413	*Cestrum elegans*	Italy	cr1ac	362	IIA
HQ452414	*Cestrum elegans*	Italy	cr1b	362	IIA
HQ452415	*Cestrum elegans*	Italy	cr2a	363	IIA
HQ452416	*Cestrum elegans*	Italy	cr2c	363	IIA
GU481091	*Solanum jasminoides*	Greece	KalV66	357	IIA
FJ872823	Tomato	Italy	ToIt	357	IIA
FM998542	*Solanum jasminoides*	Belgium ?	6094505	357	IIA
FM998550	*Solanum jasminoides*	Belgium ?	7052000	357	IIA
FM998551	*Solanum jasminoides*	Belgium ?	7105700	357	IIA
FM998552	*Solanum jasminoides*	Belgium ?	8025001	357	IIA
EF580923	*Streptosolen jamesonii*	Netherlands	3497501-9B	357	IIA
EF459697	*Solanum jasminoides*	Italy	PS-Sj-5f	357	IIA
EF459698	*Solanum jasminoides*	Italy	PS-Sj-T	357	IIA
EF459699	*Solanum jasminoides*	Italy	PS-Sj-T	357	IIA
EF459700	*Solanum rantonnetii*	Italy	PS-Sr	357	IIA
EF459701	*Solanum rantonnetii*	Italy	PS-Sr2	357	IIA
EF192393	*Solanum jasminoides*	Netherlands	3373056	357	IIA
AY372398	Tomato	Netherlands	21008470	358	IIA
EU879919	Potato	Russia	VIZR-06/6L-07	356	IIA
DQ308555	Potato	Iran	Ar21	364	IIA
DQ308557	Potato	Iran	H31	359	IIA
AY372394	Tomato	Netherlands	94005977	364	IIA
AY372400	Tomato	Netherlands	H	359	IIA
KC810006	*Solanum sp.*	Czech	diascia2	360	IIA
JQ889842	Potato	Russia	Gracie -97	358	IIA
JQ889847	Potato	Russia	VIZR-06-6L_09	358	IIA
JQ889848	Potato	Russia	WS_Bor-10-232m	358	IIA
JQ889849	Potato	Russia	WS_Sedov-10-233m	358	IIA
JQ889850	Potato	Russia	WS_Zhukovskiy-10-235m	358	IIA
JQ889851	Potato	Russia	Agata-09-184m	360	IIA
JQ889852	Potato	Russia	WS_Udacha-10-228m	360	IIA
EU879920	Potato	Russia	VNIIF-07/K	359	IIA
EU879921	Potato	Russia	VNIIKH-07/42M	359	IIA
EU879923	Potato	Russia	Tver'-96	358	IIA
DQ308561	Potato	Iran	Es148	359	IIA
EF044305	Potato	Russia	Samara-97-3	359	IIA
X76844		Poland	Mild	359	IIA
KF021223	*Solanum seaforthianum*	Italy	oI33_2356	360	IIB
KC810007	*Solanum sp.*	Czech	diascia3	360	IIB
KC810008	*Datura sp.*	Czech	datura1	361	IIB
KC810009	*Datura sp.*	Czech	datura2	361	IIB
JQ889839	Tomato	Russia	Armenia-83	361	IIB

JQ889843	Potato	Russia	VIZR_06-6L_10	358	IIB
JQ889854	Tomato	Russia	Armenia-87	364	IIB
JQ806338	Tomato	USA	CAHN8	359	IIB
HM753555	Tomato	USA	CA1	358	IIB
GU481090	*Brugmansia*	Greece	KorV25	360	IIB
GU481092	*Solanum jasminoides*	Greece	ChalkV74	360	IIB
GQ396665	*Brugmansia candida*	Netherlands	B34	361	IIB
FM998543	*Brugmansia sp*	Belgium ?	6093301	361	IIB
FM998544	*Brugmansia sp*	Belgium ?	6094900	361	IIB
FM998545	*Brugmansia sp*	Belgium ?	6097102	360	IIB
FM998546	*Brugmansia sp*	Belgium ?	6097105	360	IIB
FM998547	*Brugmansia sp*	Belgium ?	7043800	360	IIB
FM998548	*Brugmansia sp*	Belgium ?	7087900	360	IIB
FM998549	*Brugmansia sp*	Belgium ?	7050702	360	IIB
EU879914	Potato	Russia	VIR-06/5L-07	359	IIB
EU879924	Potato	Russia	VIZR-06/4L	359	IIB
EU879925	Potato	Russia	VIR-06/7L	359	IIB
EU879926	Potato	Russia	VIR-06/10L	361	IIB
EF192394	*Brugmansia suaveolens*	Netherlands	3077740	360	IIB
DQ308558	Potato	Iran	H112	359	IIB
DQ308559	Potato	Iran	Es122	359	IIB
DQ308560	Potato	Iran	Ar74	361	IIB
EF044303	Potato	Russia	Bugry-97	358	IIB
DQ315388	Potato	China	Hebei	360	IIB
AY673974	Rutgers tomato	Germany	AS3	360	IIB
AJ634596	*Nicotiana tabacum*	Germany	Nb	359	IIB
AY518939	Rutgers Tomato	Germany	AS1, severe	359	IIB
AY518940	Rutgers Tomato	Germany	AS2, severe	358	IIB
AY360446	Potato	China	BJ0205	360	IIB
U23058	Rutgers tomato	France	RG1/more lethal	359	IIB
U23059	Rutgers tomato	France	QF A/intermediate	361	IIB
U23060	Rutgers tomato	France	QF B /intermediate	361	IIB
X76845		Poland	S27	359	IIB
X76846		Poland	S23	359	IIB
X76847		Poland	I-818/I3	359	IIB
X76848		Poland	I-818/I4	358	IIB
X52039	Potato	Canada	variant S	360	IIB
X52040	Potato	Canada	variant S88	358	IIB
M88678			Burdock	361	IIB
X58388	Potato	Germany	KF440-2/Lethal	359	IIB
M38345					IIB
M36163				359	IIB
M16826				359	IIB
V01465	Potato	Germany		359	IIB
KC810005	*Solanum sp*.	Czech	diascia1	359	IIB
JQ889845	Potato	Russia	VNIIKH-94-2_08_09	358	IIB
JQ889846	Potato	Russia	VNIIKH-08-94B	359	IIB
JQ889853	Potato	Russia	YuAL-79_10	358	IIB

EU879922	Potato	Russia	VIZR-06/6L2-08	358	IIB
JQ889844	Potato	Russia	VNIIKH-09-205m	358	IIB
EU879913	Potato	Russia	VNIIF-07/D16	358	IIB
EU257478	Potato	Russia	2007	357	IIB
EF044302	Potato	Russia	Niva-95	359	IIB
EF044304	Potato	Russia	Onega-Premier-94	358	IIB
X52036	Potato	Canada	variant A	359	IIC
X52037	Potato	Canada	variant F	359	IIC
X52038	Potato	Canada	variant I	359	IIC
KM588065	Potato	China	Fujian	359	IIC
JQ889840	Potato	Russia	panda	359	IIC
JQ889841	Potato	Russia	Kinel-08-132B1	358	IIC
EU879915	Potato	Russia	VNIIF-93	359	IIC
EU879916	Potato	Russia	Povolzhye-77	359	IIC
EU879917	Potato	Russia	Samara-97/2-Res	359	IIC
EU879918	Potato	Russia	Kh-06/29B	359	IIC
AF483470		USA	KF5, M3	360	IIC
AF483471		USA	KF5, M4	360	IIC
AJ007489	Potato	USA	KF7	357	IIC
M93685		USA	KF5	360	IIC
M88681	*Solanum multiinterruptum*	India	mild	359	IIC
M88677	Potato	USA	Wisconsin B	359	IIC
M25199	*Solanum commersonii*	Netherlands	S.commersonii	358	IIC
M14814	Potato	Germany	Mild	359	IIC

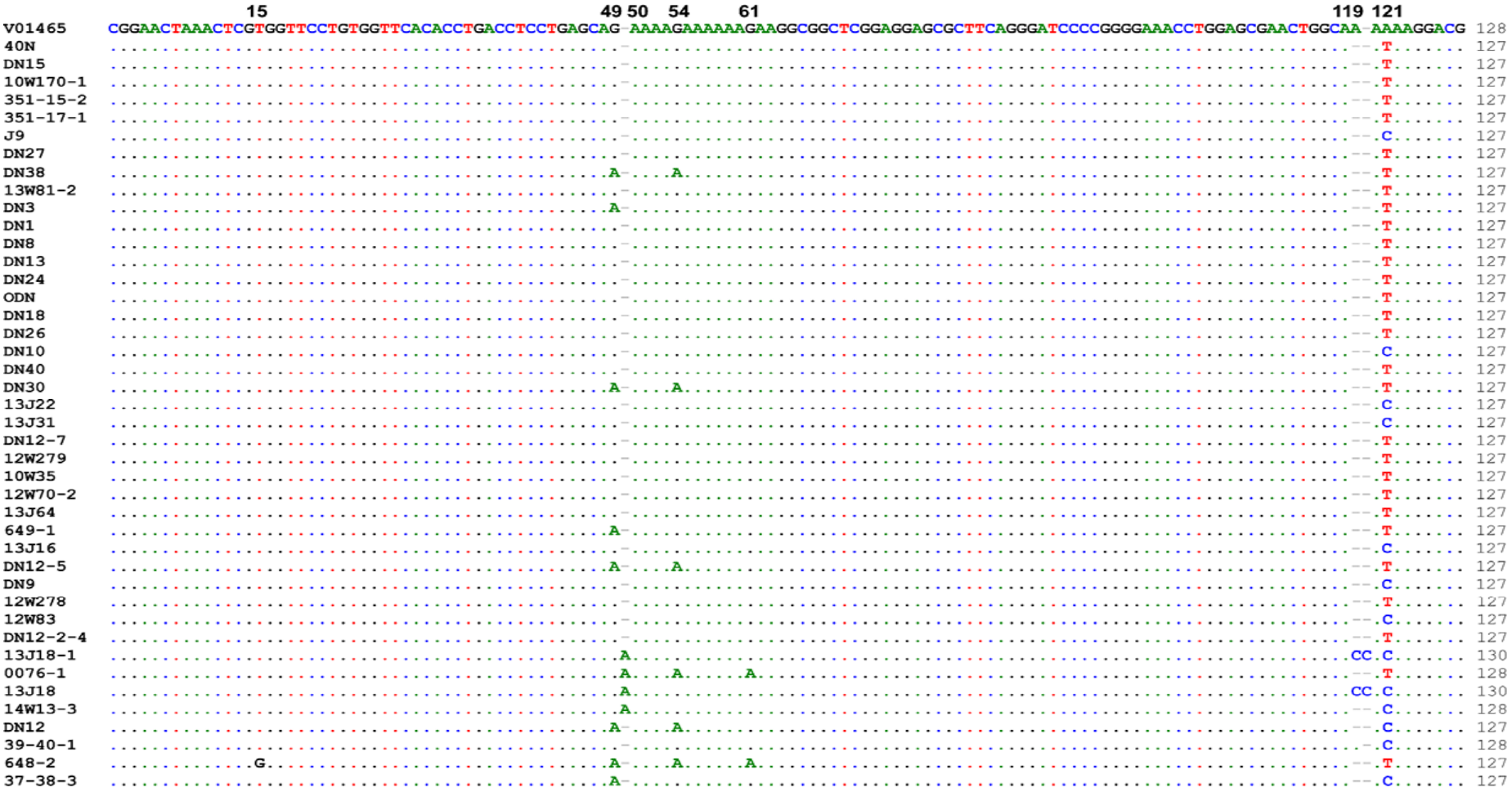
Appendix. B Base calling of five PSTVd variants. Overlapping peaks indicate the existence of more than one predominant sequence in each of the five PSTVd isolates

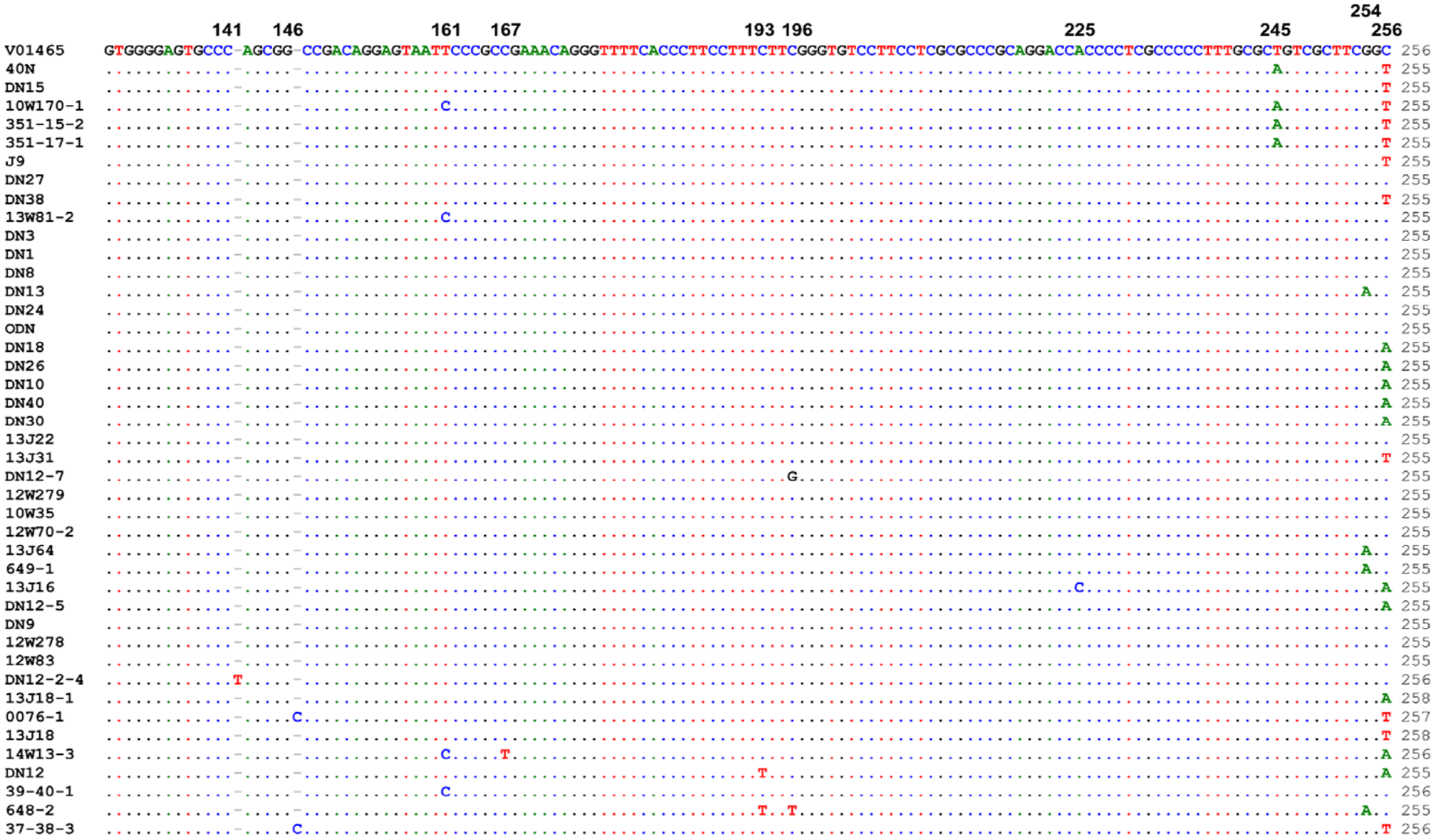


Appendix. C Population structure of PSTVd in different PSTVd isolates.

Isolates	No. of clones	Sequence types	No. of Variants
10-W-171	5	1=2=3=4=5	1
C-884	5	1=2=4=5=6	1
12-W-70	4	2=3=4=5	1
351-15	5	2=3=5; 1=4	2
39-40	5	1=2=3=4; 5	2
351-18	5	2=3=4=5; 1	2
K18-9-ZDX	5	1=2=3=5; 4	2
10-W-179	4	1=2=6; 4	2
BDH-45	5	1=3; 2=4; 5	3
351-17	5	1=3=5; 2, 6	3
355-11	5	1=4=5; 2, 3	3
355-13	5	2=3=4; 1, 5	3
K18-4-ZDX	5	2=3=5; 1,4	3
12-W-138	5	1=4=5; 3, 6	3
10-W-170	5	1=4=5; 2, 3	3
14-W-13	6	3=4=5; 1, 2, 6	4
14-W-15	6	3=5=6; 1, 2, 4	4
DN12-2	5	4=5; 1, 2, 3	4
12-W-13	5	2=8; 3, 5, 9	4
13-W-81	5	2=5; 1, 3,4	4
37-38	5	3=4; 1, 2 ,6	4
Total	105		58

Appendix. D Multiple sequences alignment of 42 different Chinese PSTVd variants and the reference sequence (accession no. V01465). Mutations are marked with numbers




141 146 161 167 193 196 225 245 254 256
V01465 GTGGGGAGTGCCC-AGCGG-CCGACAGGAGTAATTCCCGCCGAAACAGGGTTTTCACCCTTCCTTTCTTCGGGTGTCCTTCCTCGCGCCCGCAGGACCACCCCTCGCCCCCTTTGCGCTGTCGCTTCGGC 256
40N 255
DN15 255
10W170-1 255
351-15-2 255
351-17-1 255
J9 255
DN27 255
DN38 255
13W81-2 255
DN3 255
DN1 255
DN8 255
DN13 255
DN24 255
ODN 255
DN18 255
DN26 255
DN10 255
DN40 255
DN30 255
13J22 255
13J31 255
DN12-7 255
12W279 255
10W35 255
12W70-2 255
13J64 255
649-1 255
13J16 255
DN12-5 255
DN9 255
12W278 255
12W83 255
DN12-2-4 256
13J18-1 258
0076-1 257
13J18 258
14W13-3 256
DN12 255
39-40-1 256
648-2 255
37-38-3 256


259
318
257
306 310-312 316
V01465 TACTACCCGGTGGAAACAACTGAAGCTCCCGAGAACCGCTTTTTCTCTATCTTAC-TTGCTTC-GGGGCGAGGGTGTTTAGCCCTTGGAACCGCAGTTGGTTCCT 359
40N 359
DN15 359
10W170-1 359
351-15-2 359
351-17-1 358
J9 359
DN27 359
DN38 359
13W81-2 359
DN3 359
DN1 359
DN8 359
DN13 359
DN24 359
ODN 358
DN18 359
DN26 359
DN10 359
DN40 358
DN30 359
13J22 359
13J31 358
DN12-7 358
12W279 358
10W35 358
12W70-2 358
13J64 359
649-1 359
13J16 359
DN12-5 358
DN9 358
12W278 358
12W83 358
DN12-2-4 359
13J18-1 361
0076-1 360
13J18 361
14W13-3 359
DN12 359
39-40-1 359
648-2 359
37-38-3 359