```
TVCV OSU
                                                                                          Q88921
                MSIVSYEPKVSDFLNLSKKEEILPKALTRLKTVSISTKDIISVKESETLCDIDLLINVPLDKYRYVG
                                                                                      67
     NZ-587
                MSIVSYEPKVSDFLNLSKKEEILPKALTRLKTVSISTKDIISVKESETLCDIDLLINVPLDKYRYVG
                                                                                      67
                                                                                           I6NG32
     NZ-438
                                                                                           I6NHH2
                MSIVSYEPKVSDFLNLSKKEEILPKALTRLKTVSISTKDIISVKESETLCDIDLLINVPLDKYRYVG
     Pet-MS
                MSIVSYEPKVSDFLNLSKKEEILPKALTRLKTVSISTKDIISVKESETLCDIDLLINVPLDKYRYVG
                                                                                           B1A0S9
                                                                                      67
                                                                                          088605
     D/A
                MSTVSYEPKVSDFI.NI.SKKEETI.PKAI.TRI.KTVSTSTKDTTSVKESETI.CDTDI.I.TNVPI.DKYRYVG
                                                                                      67
YoMV (ORMV)
                ---MSYEPKVSDFLALTKKEEILPKALTRLKTVSISTKDVISVKESESLCDIDLLVNVPLDKYRYVG
                                                                                          Q66221
                                                                                      64
                ---MSYEPKVSDFLALTRKEEILPKALTRLKTVSISTKDVISVKESESLCDIDLLVNVPLDKYRYVG
     Shanxi
                                                                                           H6X0P4
     Br
                ---MSYEPKVSDFLALTKKEEILPKALTRLKTVSISTKDVISVKESESLCDIDLLVNVPLDKYRYVG
                                                                                      64
                                                                                          G9IAP7
     R/W
                ---MSYEPKVSDFLALTKKEETLPKALTRI.KTVSTSTKDVTSVKESESLCDTDLI.VNVPLDKYRYVG
                                                                                      64
                                                                                          Q7TD01
     Shanghai
                ---MSYEPKVSDFLALTKKEEILPKALTRLKTVSISTKDVISVKESESLCDIDLLVNVPLDKYRYVG
                                                                                      64
                                                                                          091PA6
     722
                ---MSYEPKVSDFLALTKKEEILPKALTRLKTVSISTKDVISVKDSESLCDIDLLVNVPLDKYRYVG
                                                                                          AOPA61
     Wh
                ---MSYEPKVSDFLALTKKEEILPKALTRLKTVSISTKDVISVKESESLCDIDLLVNVPLDKYRYVG
                                                                                      64
                                                                                          B2LS15
RMV (Zhu/Yu)
                ---MSYEPKVSDFLALTKKEEILPKALTRLKTVSISTKDVISVKESESLCDIDLLVNVPLDKYRYVG
                                                                                      64
                                                                                          Q9QDI8
     Kons.1105
                MSMVSYEPKVNDFLFLTNKEKILPKALTRLKTVSISTKDIISVKESETLCDIDLLIDVPLDKYRYVG
                                                                                          F8SRF8
     Act.-AC/AD
                MSMVSYEPKVNDFLFLTNKEKILPKALTRLKTVSISTKDIISVKESETLCDIDLLNDVPLDKYRYVG
                                                                                      67
                                                                                          EOWXS9
     FSHS
                MSMVSYEPKVNDFLFLTNKEKILPKALTRLKTVSISTKDVISVKESETLCDIDLLIDVPLDKYRYVG
                                                                                      67
                                                                                          17A7B2
     NZ-439
                MSMVSYEPKVNDFLFLTNKEKILPKALTRLKTVSISTKDIISVKESETLCDIDLLIDVPLDKYRYVG
                                                                                          F8SRF4
                                                                                      67
                    TVCV OSU
                {\tt ILGAVFTGEWLVPDFVKGGVTISVIDKRLVNSKECVIGTYRAAAKSKRFQFKLVPNYFVSTVDAKRK}
                                                                                     134
     NZ-587
                ILGAVFTGEWLVPDFVKGGVTISVIDKRLVNSKECVIGTYRAAAKSKRFOFKLVPNYFVSTADAKRK
                                                                                     134
     NZ-438
                                                                                     134
                ILGAVFTGEWLVPDFVKGGVTISVIDKRLVNSKECVIGTYRAAAKSKRFQFKLVPNYFVSTADAKRK
     Pet-MS
                {\tt ILGAVFTGEWLVPDFVKGGVTISVIDKRLVNSKECVIGTYRAAAKSKRFQFKLIPNYFVSTVDAKRK}
     D/A
                ILGAVFTGEWLVPDFVKGGVTISVIDKRLANSKECVIGTYRAAAKSKRFQFKLVPNYFVSTVDAKRK
                                                                                     134
YoMV (ORMV)
                VI.GVVFTGEWI.VPDFVKGGVTVSVIDKRI.ENSKECIIGTYRAAAKDRRFOFKI.VPNYFVSVADAKRK
                                                                                     131
     Shanxi
                VLGVVFTGEWLVPDFVKGGVTVSVIDKRLENSKECIIGTYRAAAKDRRFQFKLVPNYFVSVADAKRK
                                                                                     131
     Br
                VLGVVFTGEWLVPDFVKGGVTVSVIDKRLENSRECIIGTYRAAAKDRRFOFKLVPNYFVSVADAKRK
     R/W
                VLGVVFTGEWLVPDFVKGGVTVSVIDKRLENSRECIIGTYRAAAKDRRFQFKLVPNYFVSTADAKRK
                                                                                     131
     Shanghai
                VLGVAFTGEWLVPDFVKGGVTVSVIDKRLENSRESMIGTYRAAAKDRRFOFKLVPNYFVSTADAKRK
                                                                                     131
     722
                VLGVVFTGEWLVPDFVKGGVTVSVIDKRLENSKECIIGTYRAAAKDKRFQFKLVPNYFVSVADAKRK
     Wh
                VLGVVFTGEWLVPDFVKGGVTVSVIDKRLENSKECIIGTYRAAAKDRRFQFKLVPNYFVSVADAKRK
                                                                                     131
RMV (Zhu/Yu)
                VLGVAFTGEWLVPDFVKGGVTVSVIDKRLENSRESMIGTYRAAAKDRRFOFKLVPNYFVSTADAKRK
                                                                                     131
     Kons.1105
                ILGAVFTGEWLVPDFVKGGVTISVIDKRLVNSKECVIGTYRAAAKSKRFOFKLVPNYFVSTADAKRK
                                                                                     134
     Act.-AC/AD
                {\tt ILGAVFTGEWLVPDFVKGGVTISVIDKRLVNSKECVIGTYRAAAKSKRFQFKLVPNYFVSTADAKRK}
     FSHS
                {\tt ILGAVFTGEWLVPDFVKGGVTISVIDKRLVNSKECVIGTYRAAAKSKRFQFKLVPNYFVSTADAKRK}
                                                                                     134
     NZ-439
                ILGAVFTGEWLVPDFVKGGVTISVIDKRLVNSKECVIGTYRAAAKSKRFOFKLVPNYFVSTADAKRK
                                                                                     134
                TVCV OSU
                {\tt PWQVHVRIQDLKIEAGWQPLALEVVSVAMVTNNVVMKGLREKVVAINDPDVEGFEGVVDEFVDSVAA}
                                                                                     201
     NZ-587
                PWOVHVRIODLKIEAGWOPLALEVVSVAMVTNNVVMKGLREKVVAINDPDVEGFEGVVDEFVDSVAA
                                                                                     201
     NZ-438
                PWOVHVRIODLKIEAGWOPLALEVVSVAMVTNNVVMKGLREKVVAINDPDVEGFEGVVDEFVDSVAA
                                                                                     201
     Pet-MS
                PWQVHVRIQDLKIEAGWQPLALEVVSVAMVTNNVVMKGLREKVVAINDPDVEGFEGVVDEFVDSVAA
                                                                                     201
     D/A
                {\tt PWQVHVRIQDLKIEAGWQPLALEVVSVAMVTNNVVMKGLREKVVAINDPDVEGFEGVVDEFVDSVAA}
                                                                                     201
YoMV (ORMV)
                PWOVHVRIONLKIEAGWOPLALEVVSVAMVTNNVVVKGLREKVIAVNDPNVEGFEGVVDDFVDSVAA
                                                                                     198
     Shanxi
                PWQVHVRIQNLKIEAGWQPLALEVVSVAMVTNNVVVKGLREKVIAVNDPNVEGFEGVVDDFVDSVAA
                                                                                     198
                PWQVHVRIQNLKIEAGWQPLALEVVSVAMVTNNVVVKGLREKVIAVNDPNVEGFEGVVDDFVDSVAA
     Br
     R/W
                PWQVHVRIQNLKIEAGWQPLALEVVSVAMVTNNVVVKGLREKVIAVNDPNVEGFEGVVDDFVDSVAA
                                                                                     198
     Shanghai
                PWOVHVRIONLKIEAGWOPLALEVVSVAMVTNNVVVKGLREKVIAVNDPNVEGFEGVVDDFVDSVAA
                                                                                     198
                                                                                     198
     722
                {\tt PWQVHVRIQNLRIEAGWQPLALEVVSVAMVTNNVVVKGLREKVIAVNDPNVEGFEGVVDDFVDSVAA}
     Wh
                PWOVHVRIONLKIEAGWOPLALEVVSVAMVTNNVVVKGLREKVIAVNDPNVEGFEGVVDDFVDSVAA
                                                                                     198
RMV (Zhu/Yu)
                PWQVHVRIQNLKIEAGWQPLALEVVSVAMVTNNVVVKGLREKVIAVNDPNVEGFEGVVDDFVDSVAA
                                                                                     198
     Kons.1105
                PWOVHVRIODVKIEAGWOPLALEVVSVAMVANNVVMKGLREKIIAISDPDVEGFEGVVDDFVDSVEA
                                                                                     201
     Act.-AC/AD
                PWQVHVRIQDVKIEAGWQPLALEVVSVAMVANNVVMKGLREKIIAISDPDVEGFEGVVDEFVDSVEA
                                                                                     201
     FSHS
                PWQVHVRIQDVKIEAGWQPLALEVVSVAMVANNVVMKGLREKIIAISDPDGEGFEGVVDEFVDSVEA
                                                                                     201
     NZ-439
                PWQVHVRIQDVKIEAGWQPLALEVVSVAMVANNVVMKGLREKIIAISDPDVEGFEGVVDDFVDSVEA
                                                                                     201
                 ******
TVCV OSU
                                                                                     267
                FKAVDNFRKRKKVEERDVV-SKYKYRPEKYAGPDSFNLKEENVLQHYKPESVPVLRSGVGRAHTNA
     NZ-587
                FKAVDNFRKRKKKVEEKGVV-SKYKYRPEKYAGPNSFNFKEENVLQHYEPESVPVFRSGVGRAHTNA
     NZ-438
                FKAVDNFRKRKKVEEKGVV-RKYKYRPEKYAGPNSFNLKEENVLQDYEPESVPVFRSGVGRAHTNA
                                                                                     267
     Pet-MS
                FKAVDNFRKRKKKVEERDVV-SKYKYRPEKYAGPDSFNLKEENALQHYKPESVPVLRSGVGRAHTNA
                                                                                     267
    D/A
                FKAVDNFKRRKKKVEEKGVV-SKYKYRPEKYAGPDSFNLKEENVLQHYKPESVPVFRSGVGRAHSDA
                                                                                     267
YoMV (ORMV)
                FKAIDSFRKKKKRIGGRDVNSNKYRYRPERYAGPDSLQYKEENGLQHHELESVPVFRSDVGRAHSDA
                                                                                     265
     Shanxi
                SKAIDSFRKKKKRIGGKDVNNNKYRYRPERYAGPNSLOYKEGNDLOHHEPESVPVFRSDVGRAHGDA
                                                                                     265
     Br
                FKAIDSFRKKKKIGGKDVNNNKYRYRPERYAGPDSLOYKEENVLOHHELESVPVFRSDVGRAHSDA
                                                                                     265
     R/W
                FKAIDSFRKKKKKIGGRDVNNNKYRYRPERYAGPDSLQYKEENGLQHHELESVPVFRSDVGRAHSDA
     Shanghai
                FKAIDSFRKKKKKIGGRDVN-NKYRYRPERYAGPDSLQYKEENGLQHHELESVPVFRSDVGRAHSDA
                                                                                     264
     722
                FKAVDTFRKKKKKIGGKDVNNNKYRYRPERYAGODSLNYKEENVLOHHELESVPVFRSDVGRAHSDA
                                                                                     265
     Wh
                FKAIDSFRKKKKKIGGKDVSNNKYRYRPETYAGPDSLQYKEGNVLQHHELESVPVFRSNVGRAHSDA
                                                                                     265
RMV (Zhu/Yu)
                FKAIDSFRKKKKKIGGRDVNNNKYRYRPERYAGPDSLQYKEENGLQHHELESVPVFRSDVGRAHSDA
     Kons.1105
                FRAVDNFRKKKRKIGEKEAV-SRNKYRPEKHAGPNSLYIKEENVLQHHELESVPVLRSGVGRTHTNA
                                                                                     267
     Act.-AC/AD
                FKAVDNFRKKKRK1GGSEVV-SKNKYRPEKHAGPNSLY1KEENVLOHHELESVPVFRSGVGRAHTNA
                                                                                     267
     FSHS
                FKAVDNFRKKKRKIGEKEVV-SRNKYRPEKHAGPNSLYIKEENVLQHHELESVPVLRSGVGRTYTNA
     NZ-439
                FKAVDNFRKKKRKIGEKEVV-SRNKYRPEKHAGPNSLYIKEENVLQHHELESVPVLRSGVGRTHTNA
                :*:*.*:::
                                    : :*** :** :*: ** * **.:: :***:: :*
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Figure S1. Conservation of MP<sup>TVCV</sup> NLS among all subgroup 3 Tobamoviruses
Alignment of all sequenced MP proteins from the subgroup 3 Tobamoviruses (TVCV, YoMV and RMV). Conservation of monopartite NLS identified in TVCV in this study (TVCV OSU, top line) as predicted among all available subgroup 3 virus MP sequences is highlighted in yellow (basic residues) with additional residues predicted to be involved in importin- $\alpha$  interactions (<a href="http://nls-mapper.iab.keio.ac.jp/cgi-bin/NLS\_Mapper\_form.cgi//">http://nls-mapper.iab.keio.ac.jp/cgi-bin/NLS\_Mapper\_form.cgi//</a>) shaded in grey. Accession numbers for each MP sequence is shown at the right of the first line of sequence, as are the residue positions within each protein (every line). Sequence similarity indicated below the aligned sequences. See text for details.

TMGMV (TMV U2) U2	MAVSLRDTVKISEFINLSKQDEILPAFMTKVKSVRISTVDKIMAVKNDSLSDVDLLKGVKLVKNGYV MAVSLRDTVKISEFIDLSKODEILPAFMTKVKSVRISTVDKIMAVKNDSLSDVDLLKGVKLVKNGYV	67 67	P18338 A4LAL8
Japanese	MAVSLRDTVKISEFIDLSKODEILPAFMTKVKSVRISTVDKIMAVKNDSLSDVDLLKGVKLVKNGYV	67	Q8V701
HP	MAVSLRDTVKISEFIDLSKQDEILPAFMTKVKSVRISTVDKIMAVKNDSLSDVDLLKGVKLVKNGYV	67	A30VG8
	*******************		
THEOREM (THE LUC)		124	
TMGMV (TMV U2)	CLAGLVVSGEWNLPDNCRGGVSVCIVDKRMKRSNEATLGAYHAPACKKNFSFKLIPNYSITSEDAEK	134	
U2	CLAGLVVSGEWNLPDNCRGGVSVCIVDKRMKRSKEATLGAYHAPACKKNFSFKLIPNYSITSEDAEK	134	
Japanese	CLAGLVVSGEWNLPDNCRGGVSVCIVDKRMKRSKEATLGAYHAPACKKNFSFKLIPNYSITSEDAEK	134	
HP	CLAGLVVSGEWNLPDNCRGGVSVCIVDKRMKRSKEATLGAYHAPACKKNFSFKLIPNYSITSEDAEK	134	
	*******************		
TMGMV (TMV U2)	NPWQVLVNIKGVAMEEGYCPLSLEFVSICVVHKNNVKKGLRERILRVTDDSPIELTEKVVEEFVDEV	201	
U2	HPWQVLVNIKGVAMEEGYCPLSLEFVSICVVHKNNVRKGLRERILSVTDGSPIELTEKVVEEFVDEV	201	
Japanese	HPWOVLVNIKGVAMEEGYCPLSLEFVSICVVHKNNVRKGLRERILRVTDGLPIELTEKVVEEFVDEV	201	
HP	HPWOVLVNIKGVAMEEGYCPLSLEFVSICVVRKNNVRKGLRERILRVTDGLLIELTEKVVEEFVDEV	201	
nr	.*************************************	201	
TMGMV (TMV U2)	PMAVKLERFRKT <mark>KKG<mark>KKRKKEKKKR</mark>VVGNSVNNKKINNSGKKGLKVEEIEDNVSDDESIASSSTF</mark>	266	
U2	PMAVKLERFRKTKKKVVGNNVNNKKINNSGKKGFKIEEIEDNVSDDESIASSSTF	256	
Japanese	PMAVKLERFRKTKKRVVGNSVNNKKINNSGKKGLKVEEIEDSVSDDESIASSSTF	256	
HP	PMAVKLERFRKTKKRVVGNSVNNKKINNSGKKGLKVEEIEDSVSDDESIASSSTF	256	
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Figure S2. A putative basic monopartite NLS is not conserved among TMGMV isolates.

Alignment of MP protein sequences from the four sequenced isolates of *Tobacco mild green mosaic virus* (TMGMV). The monopartite NLS predicted to be present in one isolate, and to correspond in sequence and position to the MP<sup>TVCV</sup> NLS, is highlighted in yellow with additional residues predicted to be involved in importin- $\alpha$  interactions (<a href="http://nls-mapper.iab.keio.ac.jp/cgibin/NLS\_Mapper\_form.cgi/">http://nls-mapper.iab.keio.ac.jp/cgibin/NLS\_Mapper\_form.cgi//</a>) shaded in grey. Accession numbers for each MP sequence are shown at the right of the first line of sequence, as are the residue positions within each protein (every line). Sequence similarity indicated below the aligned sequences. See text for details.