EUROPEAN AND MEDITERRANEAN PLANT PROTECTION ORGANIZATION
ORGANISATION EUROPEENNE ET MEDITERRANEENNE POUR LA PROTECTION DES PLANTES
Summary sheet of validation data for a diagnostic test

The EPPO Standard PM 7/98 *Specific requirements for laboratories preparing accreditation for a plant pest diagnostic activity* describes how validation should be conducted. It also includes definitions of performance criteria.

Laboratory contact details	Netherlands Institute for Vectors, Invasive plants and Plant health P.O. Box 9102, 6700 HC Wageningen, Netherlands
Short description of the test	This test can be used for the untargeted detection and identification of molecularly characterized ssRNA(+), ssRNA(-), dsRNA, cssRNA, dsDNA(-RT), ssDNA viruses and viroids in symptomatic plant samples.
Date, reference of the validation report	2020-07-13 - 2020.molbio.004 v1, 2021.molbio.009
Link to other validation data	- 2020.molbio.012 This validation data is for generic detection and identification of phytoplasmas. Phytoplasmas can be detected using conventional nested PCR. The conventional (nested) PCR product is purified and finally sequenced using HTS. For identification see validation sheet 571.
Validation process according to EPPO Standard PM7/98?	yes
Is the lab accredited for this test?	yes
Was the validated data generated in the framework of a project?	no
Description of the test	
Organism(s)	Cocadviroid cadangi (CCCVD0) Cowpea mild mottle virus / Carlavirus vignae (CPMMV0) Lettuce infectious yellows virus / Crinivirus lactucaflavi (LIYV00) Peach mosaic virus / Trichovirus persicae (PCMV00) Dichorhavirus orchidaceae (OFV000) Peach rosette mosaic virus / Nepovirus persicae (PRMV00) Potato black ringspot virus / Nepovirus solani (PBRSV0) Pepino mosaic virus / Potexvirus pepini (PEPMV0) Potato yellowing virus (PYV000) Ilarvirus SNSV (SNSV00) Physostegia chlorotic mottle virus / Alphanucleorhabdovirus physostegiae (PHCMOV) Potato virus X / Potexvirus ecspotati (PVX000) Potato virus Y / Potyvirus yituberosi (PVY000) Sri Lankan cassava mosaic virus / Begomovirus stanleyi (SLCMV0) Potato leafroll virus / Polerovirus PLRV (PLRV00)

	Potato virus A / Potyvirus atuberosi (PVA000) Emaravirus rosae (RRV000) Crinivirus ipomeae (SPCSV0) Carlavirus chisolani (PVH000) Potato virus T / Tepovirus tafsolani (PVT000) Tobacco ringspot virus / Nepovirus nicotianae (TRSV00) Potato virus M / Carlavirus misolani (PVM000) Potato virus S / Carlavirus sigmasolani (PVS000) Squash vein yellowing virus / Ipomovirus cucurbitavenaflavi (SQVYVX) Tomato brown rugose fruit virus / Tobamovirus fructirugosum (TOBRFV) Tomato leaf curl New Delhi virus / Begomovirus solanumdelhiense (TOLCND) Tomato yellow leaf curl Thailand virus / Begomovirus solanumflavusthailandense (TYLCTH) Viruses and viroids (1VIRUK) Potato yellow vein virus / Crinivirus flavisolani (PYVV00) Tomato golden mottle virus / Begomovirus solanumaureivariati (TOGMOV) Tomato mottle mosaic virus / Tobamovirus maculatessellati (TOMMV0) Tomato mild mottle virus / Ipomovirus lycopersici (TOMMOV) Tomato ringspot virus / Nepovirus lycopersici (TORSV0) African cassava mosaic virus / Begomovirus manihotis (ACMV00) Andean potato mild mosaic virus / Tymovirus mosandigenum (APMMV0) Alfamovirus AMV (AMV000) Andean potato mottle virus / Comovirus andesense (APMOV0) Arabis mosaic virus / Nepovirus arabis (ARMV00) Bean golden yellow mosaic virus / Begomovirus birdi (BGYMV0) Cucumber green mottle mosaic virus / Tobamovirus viridimaculae (CGMMV0) Cucurbit aphid-borne yellows virus / Polerovirus CABYV (CABYV0) Grablovirus vitis (GRBAV0) Andean potato latent virus / Tymovirus latandigenum (APLV00) Arracacha virus B / Cheravirus arracaciae (AVB000) Apple fruit crinkle viroid (AFCVD0) American plum line pattern virus / Ilarvirus APLPV (APLPV0) Beet curly top virus / Curtovirus betae (BCTV00) Beet necrotic yellow vein virus / Benyvirus necrobetae (BNYVV0) Blueberry leaf mottle virus / Nepovirus myrtilli (BLMOV0) Chayote yellow mosaic virus / Begomovirus chayotis (CHAYMV) Cherry rasp leaf virus / Cheravirus avii (CRLV00) Robigovirus robigomaculae (CRMAV0) Robigovirus tortifoliae (CTLAV0) Chilli leaf curl virus / Begomovirus chillicapsici

	(CHILCU) Chrysanthemum stem necrosis virus / Orthotospovirus chrysanthinecrocaulis (CSNV00) Citrus tristeza virus / Closterovirus tristezae (CTV000) Cotton leaf curl Gezira virus / Begomovirus gossypigeziraense (CLCUGV) Cucumber mosaic virus / Cucumovirus CMV (CMV000) Honeysuckle yellow vein virus / Begomovirus macrotylomae (HYVV00) Papaya leaf curl Guandong virus / Begomovirus caricaguandongense (PALCGV) Pepper huasteco yellow vein virus / Begomovirus capsicumhuastecoense (PHYVV0) Potato aucuba mosaic virus / Potexvirus marmoraucuba (PAMV00) Potato spindle tuber viroid / Pospiviroid fusituberis (PSTVD0) Nepovirus betasolani (PVB000) Potato virus P / Carlavirus pisolani (PVP000) Potato virus V / Potyvirus vetuberosi (PVV000) potato yellow dwarf virus / Alphanucleorhabdovirus tuberosum (PYDV00) Satsuma dwarf virus / Sadwavirus citri (SDV000) Strawberry latent ringspot virus / Stralarivirus fragariae (SLRSV0) Ipomovirus lenisbatatae (SPMMV0) Tomato chocolàte virus (TOCHV0) Tomato leaf deformation virus / Begomovirus solanumdepravationis (TOLDEV) Tomato marchitez virus / Torradovirus marchitezum (TOANV0) Watermelon chlorotic stunt virus / Begomovirus citrulli (WMCSV0)
Detection / identification	detection and identification
Method(s)	Molecular HTS
Method: Molecular HTS	
Reference of the test description	
As or adapted from an EPPO diagnostic protocol	no
New test being considered for inclusion in the next version of the EPPO diagnostic protocol?	yes
As or adapted from an IPPC diagnostic protocol	no
Reference of the test	Roenhorst et al. (in preparation)
Is the test modified compared to the reference test	no
Other information	
Other details on the test	Included as VirDisc in EPPO PM7/151 - Appendix 1: Example of high throughput sequencing (HTS) tests

	for the detection and identification of viruses or viroids
Performance Criteria :	
Organism 1.:	**Cocadviroid cadangi(CCCVD0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 2.3x10^1. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 2.:	**Carlavirus vignae(CPMMV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 2.9x10^2 - 1.8x10^4. Based on 2 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	8
Specificity value	100
Organism 3.:	**Crinivirus lactucaflavi(LIYV00)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 6.8x10^1. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 4.:	**Trichovirus persicae(PCMV00)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 3.8x10^1 - 2.6x10^3. Based on 3 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	7
Specificity value	100
Organism 5.:	**Dichorhavirus orchidaceae(OFV000)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 2.1x10^3 - 2.3x10^3. Based on 2 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target	2

organisms tested	
Specificity value	100
Organism 6.:	**Nepovirus persicae(PRMV00)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 9.0x10^3. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 7.:	**Nepovirus solani(PBRSV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 1.9x10^3 - 1.1x10^4. Based on 4 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	4
Specificity value	100
Organism 8.:	**Potexvirus pepini(PEPMV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 1.5x10^3 - 6.8x10^3. Based on 3 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	>19 (see annex)
Specificity value	100
Organism 9.:	**Potato yellowing virus(PYV000)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 1.3x10^3 - 5.1x10^3. Based on 2 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	7
Specificity value	100
Organism 10.:	**Ilarvirus SNSV(SNSV00)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 2.1x10^3 - 4.2x10^3. Based on 4 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	4

Specificity value	100
Organism 11.:	**Alphanucleorhabdovirus physostegiae(PHCMOV)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 1.5x10^2 - 3.3x10^4. Based on 4 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	16
Specificity value	100
Organism 12.:	**Potexvirus ecspotati(PVX000)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 5.1x10^2. Based on 2 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	2
Specificity value	100
Organism 13.:	**Potyvirus yituberosi(PVY000)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 1.4x10^2 - 8.9x10^3. Based on 6 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	43
Specificity value	100
Organism 14.:	**Begomovirus stanleyi(SLCMV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 8.1x10^1. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 15.:	**Polerovirus PLRV(PLRV00)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 0.58 - 9.9x10^1. Based on 3 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	13

Specificity value	100
Organism 16.:	**Potyvirus atuberosi(PVA000)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 1.0x10^2 - 1.7x10^3. Based on 2 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	7
Specificity value	100
Organism 17.:	**Emaravirus rosae(RRV000)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 3.5x10^1 - 6.7x10^2. Based on 4 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	4
Specificity value	100
Organism 18.:	**Crinivirus ipomeae(SPCSV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 8.0x10^0. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	15
Specificity value	100
Organism 19.:	**Carlavirus chisolani(PVH000)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 1.1x10^4. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 20.:	**Tepovirus tafsolani(PVT000)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 7.0x10^1 - 5.1x10^2. Based on 2 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	3

Specificity value	100
Organism 21.:	**Nepovirus nicotianae(TRSV00)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 2.1x10^2 - 9.0x10^3. Based on 7 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	50
Specificity value	100
Organism 22.:	**Carlavirus misolani(PVM000)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 3.6x10^3. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	5
Specificity value	100
Organism 23.:	**Carlavirus sigmasolani(PVS000)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 2.7x10^3 - 1.5x10^4. Based on 2 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	8
Specificity value	100
Organism 24.:	**Ipomovirus cucurbitavenaflavi(SQVYVX)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 6.8x10^3. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 25.:	**Tobamovirus fructirugosum(TOBRFV)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 9.1x10^3 - 1.0x10^5. Based on 3 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	299

Specificity value	100
Organism 26.:	**Begomovirus solanumdelhiense(TOLCND)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 8.3x10^2 - 5.0x10^3. Based on 3 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	5
Specificity value	100
Organism 27.:	**Begomovirus solanumflavusthailandense(TYLCTH)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 4.0x10^0. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 28.:	**Viruses and viroids(1VIRUK)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	To determine the analytical sensitivity, a serial 10 times dilution (10^2 till 10^7) of infected S. lycopersicum homogenate in healthy S. lycopersicum homogenate was made in triplicate. HTS test results show that there is a correlation between the dilution and the sequence coverage, i.e. a 10 times dilution of the virus in the plant homogenate resulting in approx. 10 times less viral-sequence reads. As the threshold is set at 10 times read coverage to obtain consensus sequences, no coverage was obtained by de novo assembly at dilution 10^6 and 10^7. At a 10^4 dilution, (near) complete ToBRFV genomes were recovered and at 10^5 partial (fragmented) genomes were obtained. For subsequent virus species -host combinations, the LOD was calculated based on the hypothetical dilution at which (near) complete genomes could still be obtained .
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	The HTS test was successfully applied for the following virus/viroid host combinations, including but not limited to: 1. Citrus tristeza virus (Closterovirus) in Citrus confirmed with ELISA CTV + 2. Cotton leaf curl Gezira virus (Begomovirus) in Lavatera confirmed with RT-PCR-Sequencing generic Begomovirus + 3. Cucumber green mottle mosaic virus (Tobamovirus) in Cucumis sativus confirmed with ELISA CGMMV + 4. Cucumber mosaic virus (Cucumovirus) in Buddleja davidii

	confirmed with Bioassay P1++, bent-+, Wb+- 5. Cucumber mosaic virus (Cucumovirus) in Capsicum sp. confirmed with ELISA CMV + 6. Potato virus Y - O (Potyvirus) in Capsicum sp. confirmed with ELISA PVY + 7. Tomato chlorotic spot virus (Orthotospovirus) in Capsicum sp. confirmed with RT-PCR-Sequencing generic orthotospovirus TCSV+ 8. Strawberry latent ringspot virus (Stralarivirus) in Rubus idaeus confirmed with ELISA SLRSV + 9. Tobacco ringspot virus (Nepovirus) in Rosmarinus confirmed with ELISA TRSV + 10. Cherry leafroll virus (Nepovirus) in Sambucus nigra confirmed with ELISA CLRV + 11. Pepino mosaic virus (Potexvirus) in Solanum lycopersicum confirmed with ELISA PepMV + 12. Tomato brown rugose fruit virus (Tobamovirus) in Solanum lycopersicum confirmed with real-time RT-PCR specific ToBRFV + 13. Bean yellow mosaic virus (Potyvirus) in Vicia faba confirmed with RT-PCR-Sequencing generic potyvirus +
Specificity value	
Analytical specificity - exclusivity	
Number of non-target organisms tested	Not relevant for this test
Specificity value	
Reproducibility	
Provide the calculated % of agreement for a given level of the pest (see PM 7/98)	The repeatability and reproducibility of the test was investigated with biological material. From each dilution 10^2-10^5 three identical plant homogenate subsamples were made. RNA extraction of two of those subsamples was performed by one person at the same moment and the RNA was sequenced in the same batch (repeatability). The RNA of the third subsample was extracted by another person and sequenced at a different moment. The obtained sequence data was analysed by three qualified assessors independently. At low and medium dilutions (10^2-10^4) the ToBRFV genome was assembled in a single contiguous sequence representing the (near) complete genome with a sequence length between 6379-6353 nt and 100 % identical sequence.
Repeatability	
Provide the calculated % of agreement for a given level of the pest (see PM 7/98)	The repeatability and reproducibility of the test was investigated with biological material. From each dilution 10^2-10^5 three identical plant homogenate subsamples were made. RNA extraction of two of those subsamples was performed by one person at the same moment and the RNA was sequenced in the same batch (repeatability). The RNA of the third subsample was extracted by another person and sequenced at a different moment. The obtained sequence data was analysed by three qualified assessors independently. At low and medium dilutions

	(10^2-10^4) the ToBRFV genome was assembled in a single contiguous sequence representing the (near) complete genome with a sequence length between 6379-6353 nt and 100 % identical sequence.
Organism 29.:	**Crinivirus flavisolani(PYVV00)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 2.4x10^2. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	2
Specificity value	100
Organism 30.:	**Begomovirus solanumaureivariati(TOGMOV)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 1.3x10^2. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 31.:	**Tobamovirus maculatessellati(TOMMV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 1.3x10^1 - 2.5x10^4. Based on 4 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	14
Specificity value	100
Organism 32.:	**Ipomovirus lycopersici(TOMMOV)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 8.6x10^2. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	2
Specificity value	100
Organism 33.:	**Nepovirus lycopersici(TORSV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 3.3x10^2 - 7.0x10^3. Based on 2 isolates.
Analytical specificity - inclusivity	

Number of strains/populations of target organisms tested	8
Specificity value	100
Organism 34.:	**Begomovirus manihotis(ACMV00)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 3.5x10^2. Based on 1 isolate(s).
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 35.:	**Tymovirus mosandigenum(APMMV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 3.3x10^3. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 36.:	**Alfamovirus AMV(AMV000)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 6.2x10^3 - 4.5x10^4. Based on 3 isolate(s).
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	8
Specificity value	100
Organism 37.:	**Comovirus andesense(APMOV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 1.7x10^2. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 38.:	**Nepovirus arabis(ARMV00)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 1.3x10^2 - 2.7x10^3. Based on 4 isolates.
Analytical specificity - inclusivity	

Number of strains/populations of target organisms tested	7
Specificity value	100
Organism 39.:	**Begomovirus birdi(BGYMV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 3.1x10^0. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 40.:	**Tobamovirus viridimaculae(CGMMV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 1.6x10^4 - 2.3x10^4. Based on 2 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	25
Specificity value	100
Organism 41.:	**Polerovirus CABYV(CABYV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 5.8x10^0 - 9.9x10^2. Based on 2 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	34
Specificity value	100
Organism 42.:	**Grablovirus vitis(GRBAV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 6.4x10^1. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 43.:	**Tymovirus latandigenum(APLV00)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution rate: 1.0x10^3. Based on 1 isolate.
Analytical specificity - inclusivity	

Number of strains/populations of target organisms tested	2
Specificity value	100
Organism 44.:	**Cheravirus arracaciae(AVB000)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 3.8x10^3. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 45.:	**Apple fruit crinkle viroid(AFCVD0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 2.2x10^0. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 46.:	**Ilarvirus APLPV(APLPV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution rate range: 1.2x10^1 - 6.1x10^2. Based on 5 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	18
Specificity value	100
Organism 47.:	**Curtovirus betae(BCTV00)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 9.6x10^1. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 48.:	**Benyvirus necrobetae(BNYVV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 3.3x10^4. Based on 1 isolate.
Analytical specificity - inclusivity	

Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 49.:	**Nepovirus myrtilli(BLMOV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 2.5x10^1 - 1.0x10^2. Based on 2 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	2
Specificity value	100
Organism 50.:	**Begomovirus chayotis(CHAYMV)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 4.2x10^3. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 51.:	**Cheravirus avii(CRLV00)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 5.4x10^2 - 1.7x10^3. Based on 2 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	2
Specificity value	100
Organism 52.:	**Robigovirus robigomaculae(CRMAV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 1.5x10^3. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 53.:	**Robigovirus tortifoliae(CTLAV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 1.4x10^2. Based on 1 isolate.
Analytical specificity - inclusivity	

Number of strains/populations of target organisms tested	100
Specificity value	1
Organism 54.:	**Begomovirus chillicapsici(CHILCU)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 2.5x10^1 - 1.0x10^2. Based on 2 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	4
Specificity value	100
Organism 55.:	**Orthotospovirus chrysanthinecrocaulis(CSNV00)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 4.3x10^3. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 56.:	**Closterovirus tristezae(CTV000)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 9.4x10^0. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	10
Specificity value	100
Organism 57.:	**Begomovirus gossypigeziraense(CLCUGV)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 5.6x10^0 - 1.2x10^1. Based on 2 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	19
Specificity value	100
Organism 58.:	**Cucumovirus CMV(CMV000)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 1.1x10^2 - 3.1x10^4. Based on 5 isolates.
Analytical specificity - inclusivity	

Number of strains/populations of target organisms tested	41
Specificity value	100
Organism 59.:	**Begomovirus macrotylomae(HYVV00)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 0.91. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	3
Specificity value	100
Organism 60.:	**Begomovirus caricaguandongense(PALCGV)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 0.93. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	3
Specificity value	100
Organism 61.:	**Begomovirus capsicumhuastecoense(PHYVV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 4.0x10^0. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 62.:	**Potexvirus marmoraucuba(PAMV00)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 9.8x10^2. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	2
Specificity value	100
Organism 63.:	**Pospiviroid fusituberis(PSTVD0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 1.8x10^1. Based on 1 isolate.
Analytical specificity - inclusivity	

Number of strains/populations of target organisms tested	13
Specificity value	100
Organism 64.:	**Nepovirus betasolani(PVB000)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 6.8x10^1. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	6
Specificity value	100
Organism 65.:	**Carlavirus pisolani(PVP000)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 6.5x10^3. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 66.:	**Potyvirus vetuberosi(PVV000)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 2.3x10^2 - 2.3x10^3. Based on 2 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	8
Specificity value	100
Organism 67.:	**Alphanucleorhabdovirus tuberosum(PYDV00)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 3.4x10^3. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 68.:	**Sadwavirus citri(SDV000)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 6.9x10^1. Based on 1 isolate.
Analytical specificity - inclusivity	

Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 69.:	**Stralarivirus fragariae(SLRSV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution range: 1.6x10^1 - 2.1x10^2. Based on 3 isolates.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	14
Specificity value	100
Organism 70.:	**Ipomovirus lenisbatatae(SPMMV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 6.9x10^2. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 71.:	**Tomato chocolàte virus(TOCHV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 2.3x10^3. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 72.:	**Begomovirus solanumdepravationis(TOLDEV)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 2.0x10^0. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 73.:	**Torradovirus marchitezum(TOANV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 2.4x10^2. Based on 1 isolate.
Analytical specificity - inclusivity	

Number of strains/populations of target organisms tested	1
Specificity value	100
Organism 74.:	**Begomovirus citrulli(WMCSV0)**
Analytical sensitivity	
What is smallest amount of target that can be detected reliably?	Relative dilution: 2.6x10^3. Based on 1 isolate.
Analytical specificity - inclusivity	
Number of strains/populations of target organisms tested	1
Specificity value	100
Test performance study	
Test performance study?	no
The following complementary files are available online:	• Validation report VirDisc • Validation report VirDisc - Appendices • Additional analyses Analytical Specificity • Additional analyses Analytical Sensitivity • Additional analyses Analytical Sensitivity and Specificity - Appendices

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