

EPPO Datasheet: *Comovirus andesense*

Last updated: 2023-02-08

IDENTITY

Preferred name: *Comovirus andesense*

Taxonomic position: Viruses and viroids: Riboviria: Orthornavirae: Pisuviricota: Pisoniviricetes: Picornavirales: Secoviridae

Other scientific names: *APMoV*, *Andean potato mottle comovirus*, *Andean potato mottle virus*, *Potato Andean mottle comovirus*, *Potato Andean mottle virus*

Common names: Andean mottle of potato

[view more common names online...](#)

EPPO Categorization: A1 list

[view more categorizations online...](#)

EU Categorization: Quarantine pest ((EU) 2019/2072 Annex II A)

EPPO Code: APMOV0

Notes on taxonomy and nomenclature

Different strains of Andean potato mottle virus (APMoV) have been described infecting potato (*Solanum tuberosum*): Lm the type strain in Peru (Fribourg *et al.*, 1977; Adams *et al.*, 2019), strains C and H (Salazar & Harrison, 1978) and B in Brazil (Avila *et al.*, 1984). Strains Lm and C cannot be differentiated from each other using serological tests (Salazar & Harrison, 1978); Schroeder & Weidemann, 1990) but are serologically different to B and H. Strains B, C and H differ from the type strain in symptomatology and host range. New APMoV variants, as yet uncharacterized but possibly representing new strains, have been detected in Peru using high throughput sequencing (Fuentes *et al.*, 2019; Kreuze *et al.*, 2019).

Although a virus isolated from tabasco pepper (*Capsicum frutescens*) from Honduras and Nicaragua was reported as a new serotype of APMoV 'the pepper strain of APMoV' (Valverde *et al.*, 1995), sequence analyses of the protein domains, proteinase and RNA polymerase (Pro-Pol) of RNA1 and coat protein (CP) of RNA2 suggested that this was a new virus species since amino acid (aa) percentage identity was below 73% in the combined CP region and below 80% in the Pro-Pol region, which are assumed to be the species threshold for comoviruses (Alcalá-Briseño *et al.*, 2019). The name, pepper mild mosaic virus was proposed. Although this new virus species has not yet been approved by the International Committee on the Taxonomy of Viruses (ICTV, 2022a) it is not considered in this datasheet as strain of APMoV. Additionally, Adams *et al.* (2019) has indicated that APMoV strain B (Krengiel *et al.*, 1993; Shindo *et al.*, 1993) may be a new virus species because of only 68% aa identity for the combined coat protein (partial sequence) between this strain and the type strain, but further studies were required because the 94% aa identity in the Pro-Pol region (partial sequence) did not meet the criteria for a new species. Analysis of recently published full sequence data for RNA2 and RNA1 of the Brazilian strain (GenBank accession numbers QYA72454 and QYA72453) shows similar results to those of Adams *et al.* (2019) with 74% and 93% aa identity to the Lm strain. Because of the need for further investigations, including the sequencing of more strain isolates, this datasheet includes the Brazilian strain B as a strain of APMoV.

HOSTS

APMoV has a narrow host range. The major host of APMoV is potato (*Solanum tuberosum*) and other tuber forming *Solanum* species such as *S. chaucha* and *S. stenotomum*. In Argentina, it was detected in native *S. tuberosum* subsp. *andigenum* potato cultivars (Azul, Blanca redonda, Collareja and Ojosa) and *S. curtilobum* (cv. Luqui) (Clausen *et al.*, 2005). It has also been recorded in Brazil, infecting *Solanum aethiopicum* (Ethiopian or scarlet eggplant) (Kitajima *et al.*, 1984) and *Solanum sisymbriifolium* (Souza-Dias *et al.*, 1994) although this isolate of APMoV was unable to infect *Datura stramonium* and local cultivars of potato following mechanical inoculation. An APMoV strain similar to strain C has also been isolated from aubergine (*S. melongena*) (Brioso *et al.*, 1993).

Other *Solanum* (Fribourg *et al.*, 1977) and solanaceous species have been infected under experimental conditions. Some strains can also be transmitted to *Gomphrena globosa* (Amaranthaceae) and *Tetragonia tetragonioides* (Aizoaceae) (Salazar & Harrison, 1978).

Host list: *Solanum aethiopicum*, *Solanum chaucha*, *Solanum curtilobum*, *Solanum melongena*, *Solanum sisymbriifolium*, *Solanum stenotomum*, *Solanum tuberosum* subsp. *andigenum*, *Solanum tuberosum*

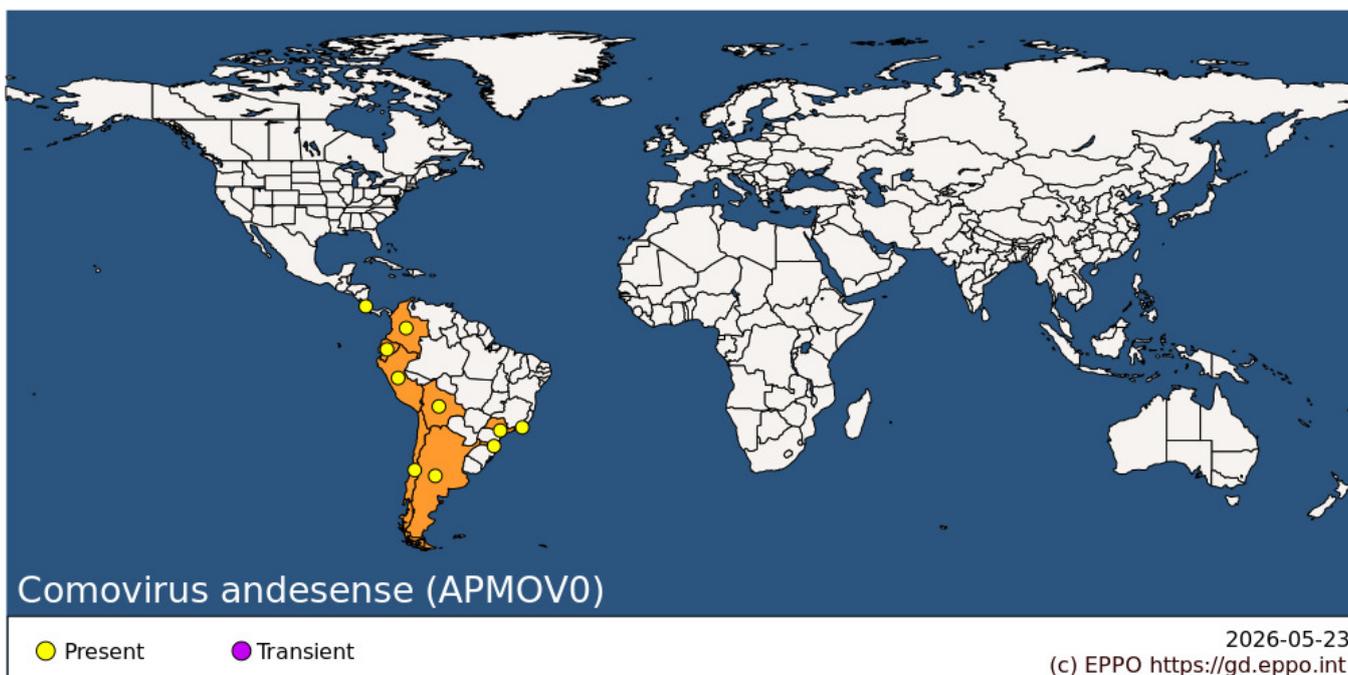
GEOGRAPHICAL DISTRIBUTION

APMoV is thought to occur throughout the Andean region at altitudes of 2000-4000 m (Fribourg & Jones, 1981), but it also occurs at altitudes less than 1800 m, as in Costa Rica (Vásquez *et al.*, 2006). Based on past ELISA survey results for the virus species *Andean potato latent virus* (APLV), APMoV, *Potato leafroll virus* (PLRV), *Potato virus S* (PVS), *Potato virus X* (PVX) and *Potato virus Y* (PVY), APMoV was found to be the 3rd most frequently detected virus, behind PVX (37-82%) and PVS (19-53%), in the period 1985-87, in the Peruvian highlands (>2900 m above sea level, masl). It was found at 3-13% incidence in leaf samples taken from farmer's fields, although the *S. tuberosum* hybrid cv. Yungay was found to be infected at incidences of 30% and 60% in the Valley del Mantara, and Cusco areas, respectively (Bertschinger *et al.*, 1990). Similar virus incidences since the 1980s were also reported by Kreuze *et al.* (2020) for PVX (30–82%), PVS (20–50%) and APMoV (4–15%). Now however, Peruvian potato growers no longer find APMoV to be a problem because routine inspection and testing has enabled its elimination from many potato fields (L Salazar, formerly CIP, Peru, personal communication, 2022). Indeed, in a recent survey using high throughput sequencing (HTS), mostly conducted in the Peruvian Andean region (2545-4268 masl) but also in the coastal departments of Ica and Lima (70 – 470 masl), which receive seed from the Andean regions, APMoV (including potentially new strains) was found to be the 7th most commonly found virus, at 8% incidence. More frequently found viruses (not including potentially new virus strain or species) were PVX (55%), PVY (34%), *Potato virus V* (19%), *Potato virus B* (18%), PVS (13%) and *Potato virus A* (12%) (Fuentes *et al.*, 2019; Kreuze *et al.*, 2019). Additionally, potentially new comoviruses were found in 8% of samples, indicating the wide range of virus diversity in the Andean region.

In Argentina, in 2001, APMoV was detected in 4% of potato accessions (comprising *Solanum curtilobum* and *S. tuberosum* subsp. *andigenum* cultivars) on farms located 3600-4000 masl in the Andean Jujuy province, departments Humahuaca, Santa Catalina, Susques and Tumbaya.

In Bolivia, in 1992, APMoV was amongst the four most frequently detected viruses in *S. tuberosum* subsp. *andigenum* cv. Huaycha in the Cochabamba Andes region (2900–3380 masl) (reported in Coco Morante *et al.*, 2021). Since then, in Cochabamba, it has not been detected in the Aymara region and only at incidences of 4% in the Quechua region leading the authors to conclude that the virus might be losing its importance in the Andean region (Coco Morante *et al.*, 2021).

In Chile, although APMoV has been reported infecting potato (Contreras & Banse, 1982), it was not reported following testing of 98 samples collected from the Chiloé Archipelago using HTS (Pena Reyes, 2019).



Central America and Caribbean: Costa Rica

South America: Argentina, Bolivia, Brazil (Rio de Janeiro, Santa Catarina, Sao Paulo), Chile, Colombia, Ecuador, Peru

BIOLOGY

APMoV belongs to the genus *Comovirus*, members of which are typically beetle-transmitted, especially by members of the family Chrysomelidae. Transmission occurs immediately upon initiation of feeding, although higher frequencies of transmission occur with prolonged feeding and with beetles retaining their ability to transmit the virus from a few days to weeks (Gergerich & Scott, 1996; ICTV, 2012). The beetles normally have a very narrow host range (Fulton *et al.*, 1987). *Diabrotica* spp. (Coleoptera: Chrysomelidae) are prevalent in regions where the virus is found (Avila *et al.*, 1984) and APMoV has been reported by Abad and Salazar (unpublished) in Avila *et al.* (1984) to be transmitted by *Diabrotica viridula* and *Diabrotica* spp. in glasshouse experiments (Salazar, 1996). However, transmission of APMoV by an *Epitrix* sp. (Coleoptera: Chrysomelidae) was unsuccessful (Fribourg *et al.*, 1977). APMoV is also readily transmitted mechanically and by contact between plants. Although seed transmission has been reported for other comoviruses (ICTV, 2012), APMoV is not known to be transmitted by true seed (Fribourg *et al.*, 1979).

DETECTION AND IDENTIFICATION

Symptoms

At temperatures of 16-20°C, primary infection by APMoV in most Peruvian potato cultivars, induces a mild, patchy leaf mottle; but some sensitive cultivars may react with systemic top necrosis followed by strong mottle, leaf deformation and stunting of new growth. Secondary symptoms are strong mottle, leaf deformation and stunting. No tuber symptoms have been reported, but the virus may induce delayed emergence of sprouts (Fribourg *et al.*, 1977; Fribourg & Jones, 1981; Jones *et al.*, 1982). Under cool conditions, plants may develop yellow spotting, blotching or more generalized yellowing on leaves (Fribourg *et al.*, 1979).

The virus caused leaf mottle in *Solanum aethiopicum* (Kitajima *et al.*, 1984) and *S. melongena* (Brioso *et al.*, 1993) and in *Solanum sisymbriifolium* severe leaf mosaic (Souza-Dias *et al.*, 1994) and leaf distortion.

Morphology

APMoV virions are isometric, non-enveloped and of two types each of about 28 nm in diameter and exhibit icosahedral symmetry (T = 1, pseudo T = 3) (ICTV (2022b)). The genome is bipartite and consists of two positive-sense single stranded RNA molecules, designated RNA1 of 6038 – 6093 bases and RNA2 with 3439 – 3767 bases, separately encapsulated into isometric particles, composed of two coat proteins of 42 kDa and 22 kDa (Shindo *et al.*, 1992, ICTV 2022c). The complete coding sequence of the type strain Lm (Adams *et al.*, 2019) and other APMoV strains has been obtained (see <https://www.ncbi.nlm.nih.gov/nucleotide/?term=andean+potato+mottle+virus>).

Detection and inspection methods

Field inspection of potato plants and other host plants may enable detection of the virus (see section on Symptoms); EPPO Standard PM 3/71 General crop inspection procedure for potatoes (EPPO, 2007). APMoV is reliably detected in *in vitro* plants (4–6 weeks old and with stems of at least 5 cm) and plants grown from infected tubers using indicator plants and serological and molecular methods. The reliability of testing tubers has not been reported.

Indicator plants

Indicator plants for use in quarantine testing are listed in PM 3/21 *Post-entry quarantine for potato* (EPPO, 2019a). Recommended indicator plants are: *Nicotiana bigelovii* (symptoms of mosaic characterized by dark-green blotches and sometimes necrotic areas); *N. clevelandii* (similar symptoms but no necrosis) (Fribourg *et al.*, 1977); *N. occidentalis* P1 (local necrosis/wilting and necrotic lesions followed by systemic chlorosis and dwarfing) (Verhoeven & Roenhorst, 2000).

Serological detection methods

High-titre antisera can be prepared for use in ELISA and polyclonal antibodies are available commercially. ELISA variations, including dot-ELISA on nitrocellulose membranes, are also well suited especially for large-scale routine use (Dusi & Avila, 1988; CIP, 1989). Although the APMoV strains Lm and C are serologically different to B and H this is unlikely to affect detection, with polyclonal antibodies raised to each strain detecting all strains using double-antibody sandwich ELISA (Schroeder & Weidemann, 1990).

Molecular methods

One-step RT-PCR using the forward and reverse primers Como1F and Como1R for detection of comoviruses may be used followed by sequencing the PCR amplicon (~434 bp) for confirmation of virus identity. The primers were designed using an alignment of RNA-1 sequences from 10 comovirus species available in the GenBank database, including APMoV (Perez-Egusquiza *et al.*, 2014). For specific identification without sequencing APMoV nested primer sets 20 and 37 (which produce 128 bp and 391 bp APMoV specific amplicons) (Lee & Rho, 2015) may also be suitable for use.

PATHWAYS FOR MOVEMENT

Plants for planting of Solanaceous hosts (including potato tubers) moved locally or internationally constitute the major pathway for movement of APMoV. Viruliferous vectors (*Diabrotica* spp.) hitchhiking on imported products such as aubergine may also constitute a pathway if they are able to retain and transmit the virus for several weeks and escape at import and establish in the field. Worldwide, increasing interest is being shown in Andean root crops and these are often grown in association with, or in the same area as potato. Although they have been shown to be infected with other Andean viruses, they have not yet been shown to be infected with APMoV.

PEST SIGNIFICANCE

Economic impact

APMoV usually causes symptoms in potato crops, which may be severe in sensitive potato cultivars. It is considered

to be widespread and economically damaging in areas where it occurs, although the direct effects on yield do not appear to have been studied. Furthermore EFSA (2020) considered that any foliar symptoms were likely to affect photosynthesis, and thus yield and/or quality of tubers, but were unable to quantify the magnitude of the effect under conditions in the EPPO region. Similarly, the effect of APMoV on the yield and therefore economic impact on other hosts such as *Solanum aethiopicum* and *Solanum melongena* is unknown. In the EPPO region, the only place where *S. aethiopicum* appears to be grown to a significant extent is South Italy (Anon, 2022). *Solanum melongena* is widely grown (FAO, 2022).

Additionally, if APMoV were to be introduced into a country and then established, export of potatoes to countries where it was regulated as a quarantine pest would be affected resulting in further economic loss.

Control

For potato, control depends on the production of high-quality planting material from virus-free nuclear stock and production of certified potatoes in a pest free area or a pest-free production system according to PM 3/61 *Pest-free areas and pest-free production and distribution systems for quarantine pests of potato* (EPPO, 2019b) with appropriate measures to minimize mechanical transmission. Although the wild stolon forming but non-potato tuber forming species *Solanum palustre* (formerly *S. brevidens*) and *S. etuberosum* have been reported as resistant to APMoV, opening the possibility for resistance breeding (Valkonen *et al.*, 1992) there are obstacles in incorporating this resistance into conventional potato breeding programmes. This is because these *Solanum* species are difficult to cross sexually with cultivated potato. Instead, protoplast fusion with tetraploid potatoes is required in order to create a hexaploid, which can then be used in breeding programmes.

Phytosanitary risk

Climatic conditions will not impair the ability of APMoV to establish in the EPPO region. Potato is widely grown and is the main crop at risk along with *Solanum melongena*. Although EFSA (2020) concluded that APMoV met the criteria to qualify as an EU quarantine pest, the magnitude of potential impact in the EU was unclear.

PHYTOSANITARY MEASURES

EPPO recommends its member countries to prohibit the import of all breeding material of potato, of whatever origin, except under a special permit, subject to post-entry quarantine (EPPO, 2017; 2019a; 2022). Once tested and found to be free from pests it may be released from quarantine and moved within the EPPO region.

Certified seed potatoes (micropropagative material and minitubers) may be traded if they meet the requirements of EPPO Standards PM 3/62 *Production of pathogen-free microplants of potato* (EPPO, 2019c) and PM 3/63 *Production of pathogen-free minitubers of potato* (EPPO 2019d) respectively. For import of seed potatoes and ware potatoes, EPPO recommends that trade should be subject to transitional arrangements described in PM 8/1 *Commodity-specific phytosanitary measures for potato* (EPPO, 2017), which requires for countries where APMoV occurs, import from a pest-free area and from a pest-free potato production and distribution system, according to EPPO Standard PM 3/61 *Pest-free areas and pest-free production and distribution systems for quarantine pests of potato* (EPPO, 2019b). Additionally, for countries in Central and South America where APMoV does not occur, recommendations are confirmation by detection survey that APMoV does not occur and inspection or testing of tubers on import.

Additionally import of potato is regulated/prohibited in many EPPO countries. In the EU, the import of seed potatoes and plants for planting of stolon-or tuber-forming species of *Solanum* or their hybrids is prohibited from third countries, other than Switzerland, by Annex VI of Commission Implementing Regulation (EU) 2019/2072 (EU 2022). Entry of ware potatoes is also regulated, and import is only permitted from specified countries, which currently does not include countries in Central and South America where APMoV is known to be present. However as long as ware potatoes are not planted and only used for consumption or processing, the ability of APMoV to establish is likely very low (EFSA, 2020).

Also, it should be noted that import of plants for planting of other potential Solanaceae hosts of APMoV, such as *Solanum aethiopicum*

and *S. melongena* other than seeds (APMoV is not known to be seed transmitted), are prohibited in many EPPO countries, as is the case in the EU (EU, 2022).

The pathway of viruliferous vectors (*Diabrotica* spp.) hitchhiking on imported products such as aubergine is possibly open and the existence of possible vectors in the EU is unknown (EFSA, 2020).

REFERENCES

Adams IP, Fribourg C, Fox A, Boonham N & Jones RAC (2019) Complete coding sequence of Andean potato mottle virus from a 40-year-old sample from Peru. *Microbiology Resource Announcements* **40**, 9-10.

Alcalá-Briseño RI, Lotrakul P & Valverde RA (2019) Genome sequence and phylogenetic analysis of a novel comovirus from tabasco pepper (*Capsicum frutescens*). *Virus Genes* **55**, 854–858.

Anon (2022) *Solanum aethiopicum*. Available at https://en.wikipedia.org/wiki/Solanum_aethiopicum [accessed on 16 October 2022]

Avila AC, Salazar LF, Ortega M & Daniels J (1984) A new strain of Andean potato mottle virus from Brazil. *Plant Disease* **68**, 997-998.

Bertschinger L, Scheidegger UC, Luther K, Pinillos O & Hidalgo A (1990) La incidencia de virus de papa en cultivares nativos y mejorados en la sierra peruana [The incidence of potato virus in native and improved cultivars in the Peruvian highlands]. *Revista Latinoamericana de la Papa* **3**, 62–79.

Brioso PST, Pimentel JP, Louro RP, Kitajima EW & Oliveira DE (1993) 'Andean potato mottle virus': Caracterização de uma estirpe infetando naturalmente berinjela (*Solanum melongena*) [Andean potato mottle virus -characterization of a strain naturally infecting eggplant (*Solanum melongena*)]. *Fitopatologia Brasileira* **18**, 526-533.

CIP (1989) *Annual Report, International Potato Center (CIP), Lima, Peru*, p. 59. Available at <https://cgspace.cgiar.org/handle/10568/109437> [accessed on 12 December 2022]

Clausen AM, Colavita M, Butzonitch I & Valeria Carranza A (2005) A potato collecting expedition in the province of Jujuy, Argentina and disease indexing of virus and fungus pathogens in Andean cultivars. *Genetic Resources and Crop Evolution* **52**, 1099-1109.

Coco Morante M, Salazar EC, Burgos Villegas J & Ponce NT (2021) Virus incidence associated with native potato yield in microcenters of potato genetic diversity of Bolivian. *American Journal of Potato Research* **98**, 384–394.

Contreras AM & Banse JH (1982) Determinación de virus en el germoplasma chileno de papas *Solanum* sp. [Determination of viruses in the Chilean germplasm of potatoes *Solanum* sp.] *Agro Sur* **10**, 84-89.

Dusi AN, Avila AC (1988) Purificação e sorologia do vírus do mosqueado andino da batata (APMV) por ELISA direto e indireto. [Purification and serology of Andean potato mottle virus (APMV) by direct and indirect ELISA]. *Fitopatologia Brasileira* **13**, 389-391.

EFSA PLH Panel (EFSA Panel on Plant Health), Bragard C, Dehnen-Schmutz K, Gonthier P, Jacques M-A, Jaques Miret JA, Justesen AF, MacLeod A, Magnusson CS, Milonas P, Navas-Cortes JA, Parnell S, Potting R, Reignault PL, Thulke H-H, van der Werf W, Vicent Civera A, Yuen J, Zappalà L, Candresse T, Lacomme C, Bottex B, Oplaat C, Roenhorst A, Schenk M & Di Serio F (2020) Scientific opinion on the pest categorisation of non-EU viruses and viroids of potato. *EFSA Journal* **18**, 5853, 134pp. Available at <https://doi.org/10.2903/j.efsa.2020.5853> [accessed on 18 October 2022]

EPPO (2007) EPPO Standard PM 3/71(1) General crop inspection procedure for potatoes. Phytosanitary procedures. *EPPO Bulletin* **37**, 592-597. Available at <https://gd.eppo.int/download/standard/76/pm3-071-1-en.pdf>. [accessed on 12 December 2022]

- EPPO (2017a) EPPO Standard PM 8/1(2) Potato. Commodity-specific phytosanitary measures. *EPPO Bulletin* **47**, 487-503. Available at <https://gd.eppo.int/download/standard/243/pm8-001-2-en.pdf> [accessed on 6 November 2022]
- EPPO (2019a) EPPO Standard PM 3/21(3) Post entry quarantine for potato. *EPPO Bulletin* **49**, 452–479. Available at <https://gd.eppo.int/download/standard/26/pm3-021-3-en.pdf> [accessed on 6 November 2022]
- EPPO (2019b) EPPO Standard PM 3/61(2) Pest-free areas and pest-free production and distribution systems for quarantine pests of potato. *EPPO Bulletin* **49**, 480–481. Available at <https://gd.eppo.int/download/standard/66/pm3-061-2-en.pdf> [accessed on 6 November 2022]
- EPPO (2019c) EPPO Standard PM 3/62 (3) Production of pathogen-free microplants of potato. *EPPO Bulletin* **49**, 482–483. Available at <https://gd.eppo.int/download/standard/67/pm3-062-3-en.pdf> [accessed on 6 November 2022]
- EPPO (2019d) EPPO Standard PM 3/63 (3) Production of pathogen-free minitubers of potato. *EPPO Bulletin* **49**, 484–485. Available at <https://gd.eppo.int/download/standard/68/pm3-063-3-en.pdf> [accessed on 6 November 2022]
- EPPO (2022) EPPO A1 List of pests recommended for regulation as quarantine pests version 2020-09. https://www.eppo.int/ACTIVITIES/plant_quarantine/A1_list [accessed on 16 October 2022]
- EU (2022) Consolidated text: Commission Implementing Regulation (EU) 2019/2072 of 28 November 2019 establishing uniform conditions for the implementation of Regulation (EU) 2016/2031 of the European Parliament and the Council, as regards protective measures against pests of plants, and repealing Commission Regulation (EC) No 690/2008 and amending Commission Implementing Regulation (EU) 2018/2019. Lastly revised in 2022. Available at https://eur-lex.europa.eu/eli/reg_impl/2019/2072#:~:text=Consolidated%20text%3A%20Commission%20Implementing%20Regulation%202019/2072,~:text=Consolidated%20text%3A%20Commission%20Implementing%20Regulation%202019/2072 [accessed on 6 November 2022]
- FAO (2022) FAOSTAT. Crop and livestock statistics. <https://www.fao.org/faostat/en/#data/QCL> [accessed on 6 November]
- Fribourg CE & Jones RAC (1981) Andean potato mottle virus. In *Compendium of Potato Diseases* (Ed. Hooker WJ), p 77. APS Press, St Paul, USA. Available at https://pdf.usaid.gov/pdf_docs/PNABD692.pdf [Accessed on 21 January 2023]
- Fribourg CE, Jones RAC & Koenig R (1977) Andean potato mottle, a new member of the Cowpea mosaic virus group. *Phytopathology* **67**, 969-974.
- Fuentes S, Perez A & Kreuze J (2019) Dataset for: The Peruvian potato virome, V1. International Potato Center. Available at <https://doi.org/10.21223/P3/YFHLQU> [accessed on 18 October 2022]
- Fulton JP, Gergerich RC & Scott HA (1987) Beetle transmission of plant viruses. *Annual Review of Phytopathology* **25**, 111-123.
- Gergerich RC & Scott HA (1996) Comoviruses: Transmission, Epidemiology, and Control. In: Harrison BD, Murant AF (eds) *The Plant Viruses*, 77–98. Springer New York, USA.
- ICTV (2012) Virus Taxonomy: Ninth Report of the International Committee on Taxonomy of Viruses. ICTV.
- ICTV (2022a) ICTV master species list 2021 v2. International Committee on Taxonomy of Viruses. <https://ictv.global/msl> [accessed on 17 October 2022]
- ICTV (2022b) The ICTV Report on Virus Classification and Taxon Nomenclature: *Secoviridae*. Available at <https://ictv.global/report/chapter/secoviridae/secoviridae> [accessed on 9 December 2022]
- ICTV (2022c) The ICTV Report on Virus Classification and Taxon Nomenclature: *Comovirus*. Available at <https://ictv.global/report/chapter/secoviridae/secoviridae/comovirus> [accessed on 9 December 2022]

- Jones RAC, Fribourg CE & Slack SA (1982) Set No 2, Potato Virus and Virus-Like Diseases, 5-6. In: Barnett OW, Tolin SA (eds) Plant Virus Slide Series. Clemson University, Clemson, South Carolina, USA: College of Agricultural Sciences.
- Kitajima EW, Ribeiro R de LD, Lin MT, Ribeiro MISD, Kimura O, Costa CL & Pimentel JP (1984) Lista comentada de vírus e organismos do tipo micoplasma em plantas cultivadas silvestres do Estado do Rio de Janeiro [Annotated list of viruses and mycoplasma-like organisms in wild cultivated plants of the State of Rio de Janeiro]. *Fitopatologia Brasileira* **9**, 607-625.
- Krengiel R, Vicente ACP, Weyne M, Shindo N, Brioso PST, Felix DB, Villaroel R, Oliveira DE de & Timmerman B (1993) Molecular cloning and sequence analysis of a segment from Andean potato mottle virus B RNA encoding the putative RNA polymerase. *Journal of General Virology* **74**, 315-318.
- Kreuze JF, Souza-Dias JAC, Jeevalatha A, Figueira AR, Valkonen JPT & Jones RAC (2020) Viral diseases in potato. In *The Potato Crop. Its Agricultural, Nutritional and Social Contribution to Humankind* (eds Campos H & Ortiz O), pp. 389-430. Springer, Cham (CH). Available at https://link.springer.com/content/pdf/10.1007%2F978-3-030-28683-5_11.pdf [accessed on 18 October 2022].
- Kreuze J, Fuentes S, Pérez A, Gutierrez D & Cadenas C (2019) Viroma de la papa en el Perú y fortalecimiento de capacidades INIA y UNALM en el diagnóstico de patógenos con técnicas de última generación para enfrentar al riesgo de enfermedades emergentes por el calentamiento global” Programa Nacional de Innovación Agraria : 029-2015-INIA-PNIA/UPMSI/IE [Potato viruses in Peru and strengthening of INIA and UNALM capacities in the diagnosis of pathogens with state-of-the-art techniques to face the risk of emerging diseases due to global warming” National Program for Agrarian Innovation: 029-2015-INIA-PNIA/ UPMSI/IE]. [http://potpathodiv.org/static/papers/2_Resultados_Viroma%20de%20la%20Papa_Marzo%202019_\(SFD\).pdf](http://potpathodiv.org/static/papers/2_Resultados_Viroma%20de%20la%20Papa_Marzo%202019_(SFD).pdf) [accessed on 18 October 2022]
- Lee S & Rho JY (2015) Development of a PCR diagnostic system for detecting *Andean potato mottle virus* associated with potato quarantine in Korea. *American Journal of Potato Research* **92**, 546–550.
- Pena Reyes EC (2019) Metagenomic approach to study viruses and virus-like pathogens in native potatoes from Chiloé archipelago. PhD thesis. Pontifical Catholic University of Chile. Available at <https://repositorio.uc.cl/handle/11534/23343> [accessed on 16 October 2022]
- Perez-Egusquiza Z, Tang JZ, Ward LI & Fletcher JD (2014) The truth about Pea mild mosaic virus. *Australasian Plant Pathology* **43**, 193–196.
- Salazar LF (1996) Potato Viruses and their Control. Lima, Peru: International Potato Center.
- Salazar LF & Harrison BD (1978) Particle properties and strains of Andean potato mottle virus. *Journal of General Virology* **39**, 171-178.
- Schroeder M & Weidemann HL (1990) Detection of quarantine viruses of potato by ELISA. *EPPO Bulletin* **20**, 581-590.
- Shindo N, Krengiel R, Brioso PST, Vicente ACP, Weyne M, Oliveira DE & Timmerman B (1992) Complete nucleotide sequence of the 22 kDa coat protein of Andean potato mottle virus. *Plant Molecular Biology* **19**, 505-507.
- Shindo N, Vicente ACP, Krengiel R & Oliveira DE (1993) Nucleotide sequence analysis of an Andean potato mottle virus middle component. *Intervirology* **36**, 169-180.
- Souza-Dias JAC, Scagliusi SM & Costa AS (1994) Isalado do Andean potato mottle virus (APMV) ocorrendo naturalmente em Joa’ na Estação Experimental de Itararé (EEI) não infectou variedades de batata do local. [An isolate of Andean potato mottle virus (APMV) occurring naturally in solanaceous weed at the Itarare Experimental Station (EEI) did not infect varieties of local growing potato varieties]. *Fitopatologia Brasileira* **19**, 322 (Abstract).
- Vásquez V, Montero-Astúa M & Rivera C (2006) Incidence and altitudinal distribution of 13 viruses in *Solanum tuberosum*

(Solanaceae) crops in Costa Rica. (Incidencia y distribución altitudinal de 13 virus en cultivos de *Solanum tuberosum* (Solanaceae) en Costa Rica). *Revista de Biología Tropical* **54**, 1135-1141.

Valkonen JPT, Brigneti G, Salazar LF, Pehu E & Gibson RW (1992) Interactions of the *Solanum* spp. of the *Etuberosa* group and nine potato-infecting viruses and a viroid. *Annals of Applied Biology* **120**, 301-313.

Valverde RA, Black LL & Dufresne DJ (1995) A comovirus affecting tabasco pepper in Central America. *Plant Disease* **79**, 421-423.

Verhoeven JThJ & Roenhorst JW (2000) Herbaceous test plants for the detection of quarantine viruses of potato. *EPPO Bulletin* **30**, 463-467.

Other resources used when preparing this datasheet

Fribourg CE, Jones RAC & Koenig R (1979) AAB description of plant viruses. Available at <https://www.dpvweb.net/dpv/showdpv/?dpvno=203> [accessed on 17 October 2022]

CABI Datasheet: <https://www.cabidigitallibrary.org/doi/full/10.1079/cabicompendium.42520> [accessed on 3 December 2022]

ACKNOWLEDGEMENTS

This datasheet was extensively revised in 2023 by C Jeffries (SASA, UK) with help from J Kreuze (CIP, Peru), L Salazar (formerly CIP, Peru) and J Souza-Dias (IAC, Brazil). Their valuable contribution is gratefully acknowledged.

How to cite this datasheet?

EPPO (2026) *Comovirus andesense*. EPPO datasheets on pests recommended for regulation. Available online. <https://gd.eppo.int>

Datasheet history

This datasheet was first published in the EPPO Bulletin in 1984 and revised in the two editions of 'Quarantine Pests for Europe' in 1992 and 1997, as well as in 2023. It is now maintained in an electronic format in the EPPO Global Database. The sections on 'Identity', 'Hosts', and 'Geographical distribution' are automatically updated from the database. For other sections, the date of last revision is indicated on the right.

CABI/EPPO (1992/1997) *Quarantine Pests for Europe (1st and 2nd edition)*. CABI, Wallingford (GB).

EPPO (1984) EPPO Data Sheet on Quarantine Organisms no 128: potato viruses (non-European). *EPPO Bulletin* **14** (1), 11-22. <https://doi.org/10.1111/j.1365-2338.1984.tb01975.x>



Co-funded by the
European Union