NAME OF THE ORGANISM: Impatiens necrotic spot tospovirus (Impatiens necrotic spot virus) (INSV00)

GENERAL INFORMATION ON THE PEST

Name as submitted in the project specification (if different to the preferred name):

Pest category:

Viruses and viroids **1- Identity of the pest/Level of taxonomic listing:**
Is the organism clearly a single taxonomic entity and can it be adequately distinguished from other entities of the same rank?

Yes
Is the pest defined at the species level or lower?:

Yes
Can listing of the pest at a taxonomic level higher than species be supported by scientific reasons or can species be identified within the taxonomic rank which are the (main) pests of concern?

* Not relevant: Ornamental sector

Is it justified that the pest is listed at a taxonomic rank below species level?

Not relevant
Conclusion:

* Candidate: Ornamental sector

Justification (if necessary):

Impatiens necrotic spot tospovirus (INSV) is a single taxonomic entity (genus Tospovirus: family Bunyaviridae). In 2015 it was proposed to change the name of the virus from Impatiens necrotic spot virus to Impatiens necrotic spot tospovirus (ICTV, 2015; Van Regenmortel et al., 2015). It has been ratified in 2016 for all the family of the Bunyaviridae. **2 – Status in the EU:**

Is this pest already a quarantine pest for the whole EU?

No
Presence in the EU:

Yes
List of countries (EPPO Global Database):

Belgium (2014); Bulgaria (2011); Czech Republic (2011); Finland (2013); France (2011); Germany (2011); Hungary (2007); Italy (1999); Italy/Sicilia (1998); Netherlands (2015); Poland (1997); Portugal (2011); Slovenia (2011); Spain (2011); United Kingdom (2011); United Kingdom/England (1998)
Conclusion:

candidate
Justification (if necessary):

Data of the presence of this pest on the EU territory are available in EPPO Global Database (<https://gd.eppo.int/>).

HOST PLANT N°1: Begonia (Begonia x hiemalis) (BEGEH) for the Ornamental sector.

Origin of the listing:

Commission Directive 93/49/EEC
Plants for planting:

Plants intended for planting, other than seeds **3 - Is the pest already listed in a PM4 standard on the concerned host plant?**

Yes
Conclusion:

Qualified

Justification (if necessary):

The pest is listed in EPPO PM 4/19 Standard on Begonia. Because publications mainly refer to Begonia sp., experts agreed to refer to the host plant as Begonia rather than only Begonia x hiemalis. **CONCLUSION ON THE STATUS:**

Recommended for listing as an RNQP, based on EPPO PM 4/19 Standard. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

Yes
Proposed Tolerance levels:

Zero tolerance approach, based on visual examination and/or testing. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

Yes
Proposed Risk management measure:

(A) The site of production has been subjected to a monitoring regime and appropriate treatments to ensure effective suppression of populations of relevant thrips vectors (Frankliniella occidentalis);
AND
(B) (a) No symptoms of Impatiens necrotic spot tospovirus have been observed on plants at the site of production during the current growing period;
or
(b) Any plants at the production site showing symptoms of Impatiens necrotic spot tospovirus during the current growing period have been rogued out and a representative sample of the plants to be marketed has been tested and found free from Impatiens necrotic spot virus.
Justification (if necessary):

Experts considered that visual examination on the marketed material was not sufficient. **REFERENCES:**

* Daughtrey ML, Jones RK, Moyer JW, Daub ME & Baker JR (1997) Tospoviruses strike the greenhouse industry—INSV has become a major pathogen on flower crops. Plant Disease 81, 1220–1230;
* EFSA Panel on Plant Health (PLH) (2012) Scientific Opinion on the pest categorisation of the tospoviruses. EFSA Journal 10, 2772. 4264 pp.;
* Elliott DR, Lebas BSM, Ochoa-Corona FM, Tang J & Alexander BJR (2009) Investigation of Impatiens necrotic spot virus outbreaks in New Zealand. Australasian Plant Pathology 38, 490–495;
* Hausbeck MK, Welliver RA, Derr MA & Gildow FE (1992) Tomato spotted wilt survey among greenhouse ornamentals in Pennsylvania. Plant Disease 76, 795–800;
* International Committee on Taxonomy of Viruses (ICTV) (2015) Implementation of non-Latinized binomial species names in the family Bunyaviridae.
* Tian X, Zheng Y, Chintaluri K & Meng B (2013) First report of Impatiens necrotic spot virus on Hiemalis begonia (Begonia × hiemalis) in Canada. Plant Disease 97, 291. Available at <https://doi.org/10.1094/PDIS-09-12-0868-PDN>;
* Trkulja V, Mihić, Salapura J, Ćurković B, Stanković I, Bulajić, A. Vučurović & B. Krstić (2013) First Report of Impatiens necrotic spot virus on Begonia in Bosnia and Herzegovina. Plant Diseases 97, 7, 1004. <https://doi.org/10.1094/PDIS-01-13-0088-PDN>;
* Van Regenmortel MH, Burke DS, Calisher CH, Dietzgen RG, Fauquet CM, Ghabrial SA, Jahrling PB, Johnson KM, Holbrook MR, Horzinek MC, Keil GM, Kuhn JH, Mahy BW, Martelli GP, Pringle C, Rybicki EP, Skern T, Tesh, RB, Wahl - Jensen V, Walker PJ & Weaver SC (2010) A proposal to change existing virus species names to non - Latinized binomials. Arch. Virol. 155, 1909 - 1919;
* Verhoeven TJ & Roenhorst JW (1998) Occurrence of tospoviruses in the Netherlands. Proceedings of the Fourth International Symposium on Tospoviruses and thrips in Floral and Vegetable Crops, Wageningen, Netherlands. 77-80;

HOST PLANT N°2: Dianthus caryophyllus (DINCA) for the Ornamental sector.

Origin of the listing:

Commission Directive 93/49/EEC
Plants for planting:

Plants intended for planting, other than seeds **3 - Is the pest already listed in a PM4 standard on the concerned host plant?**

No
Conclusion:

Evaluation continues **4 - Are the listed plants for planting the main\* pathway for the "pest/host/intended use" combination? (\*: significant compared to others):**

?
Conclusion:

Candidate

Justification:

INSV has a broad host range of more than 300 species, mostly ornamentals. INSV presents a serious problem to the ornamentals industry (Daughtrey et al., 1997; Elliott et al., 2009). Approximately 80 % of of greenhouse ornamentals tospovirus problems in USA have been identified as INSV; and less than 20% for TSWV (Daughtrey et al., 1997). Symptoms of tospoviruses vary significantly depending on local or systemic infections, on the host species, its development stage, the virus strain, and environmental (growth) factors (EFSA, 2012).
The pest was found in this host in Iran (Shahraeen et al., 2002). However Dianthus caryophyllus is not included in the plant species found infected with INSV in the Netherlands (Verhoeven and Roenhorst, 1998). **5 - Economic impact:**
Are there documented reports of any economic impact on the host?

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Justification:

In Iran, samples with small necrotic spots, leaf yellowing, ring spots, necrotic vein clearing, wilting, and dwarf symptoms from Dianthus caryophyllus were positive for INSV (Shahraeen et al., 2002).
What is the likely economic impact of the pest irrespective of its infestation source in the absence of phytosanitary measures? (= official measures)

Minor
Is the economic impact due to the presence of the pest on the named host plant for planting, acceptable to the propagation and end user sectors concerned?

Yes
Is there unacceptable economic impact caused to other hosts (or the same host with a different intended use) produced at the same place of production due to the transfer of the pest from the named host plant for planting?

No
Conclusion:

Not candidate
Justification:

 **CONCLUSION ON THE STATUS:**

Disqualified: Not recommended for RNQP status because of lack of evidence on economic impact and pathway importance on this host. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

No
Proposed Tolerance levels:

Delisting. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

No
Proposed Risk management measure:

Delisting. **REFERENCES:**

* Daughtrey ML, Jones RK, Moyer JW, Daub ME & Baker JR (1997) Tospoviruses strike the greenhouse industry—INSV has become a major pathogen on flower crops. Plant Disease 81, 1220–1230;
* EFSA Panel on Plant Health (PLH) (2012) Scientific Opinion on the pest categorisation of the tospoviruses. EFSA Journal 10, 2772. 4264 pp.;
* Elliott DR, Lebas BSM, Ochoa-Corona FM, Tang J & Alexander BJR (2009) Investigation of Impatiens necrotic spot virus outbreaks in New Zealand. Australasian Plant Pathology 38, 490–495;
* International Committee on Taxonomy of Viruses (ICTV) (2015) Implementation of non-Latinized binomial species names in the family Bunyaviridae.
* Shahraeen N, Ghotbi T & Mehraban AH (2002) Occurrence of Impatiens necrotic spot virus in ornamentals in Mahallat and Tehran provinces in Iran. Plant Disease 86, 694;
* Van Regenmortel MH, Burke DS, Calisher CH, Dietzgen RG, Fauquet CM, Ghabrial SA, Jahrling PB, Johnson KM, Holbrook MR, Horzinek MC, Keil GM, Kuhn JH, Mahy BW, Martelli GP, Pringle C, Rybicki EP, Skern T, Tesh, RB, Wahl - Jensen V, Walker PJ & Weaver SC (2010) A proposal to change existing virus species names to non - Latinized binomials. Arch. Virol. 155, 1909 - 1919;
* Verhoeven TJ & Roenhorst JW (1998) Occurrence of tospoviruses in the Netherlands. Proceedings of the Fourth International Symposium on Tospoviruses and thrips in Floral and Vegetable Crops, Wageningen, Netherlands. 77-80;

HOST PLANT N°3: Euphorbia pulcherrima (EPHPU) for the Ornamental sector.

Origin of the listing:

Commission Directive 93/49/EEC
Plants for planting:

Plants intended for planting, other than seeds **3 - Is the pest already listed in a PM4 standard on the concerned host plant?**

No
Conclusion:

Evaluation continues **4 - Are the listed plants for planting the main\* pathway for the "pest/host/intended use" combination? (\*: significant compared to others):**

No
Conclusion:

Not candidate

Justification:

INSV has a broad host range of more than 300 species, mostly ornamentals. INSV presents a serious problem to the ornamentals industry (Daughtrey et al., 1997; Elliott et al., 2009). Approximately 80 % of of greenhouse ornamentals tospovirus problems in USA have been identified as INSV; and less than 20% for TSWV (Daughtrey et al., 1997). Symptoms of tospoviruses vary significantly depending on local or systemic infections, on the host species, its development stage, the virus strain, and environmental (growth) factors (EFSA, 2012).
Roses (Rosa hybrids) and poinsettias (Euphorbia pulcherrima) are the only major flower crops not susceptible to INSV or TSWV (Daughtrey et al., 1997). Euphorbia pulcherrima is not included in the plant species found infected with INSV in the Netherlands (Verhoeven and Roenhorst, 1998). **CONCLUSION ON THE STATUS:**

Disqualified: Not recommended for RNQP status because of lack of evidence on economic impact and pathway importance on this host. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

No
Proposed Tolerance levels:

Delisting. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

No
Proposed Risk management measure:

Delisting. **REFERENCES:**

* Daughtrey ML, Jones RK, Moyer JW, Daub ME & Baker JR (1997) Tospoviruses strike the greenhouse industry—INSV has become a major pathogen on flower crops. Plant Disease 81, 1220–1230;
* EFSA Panel on Plant Health (PLH) (2012) Scientific Opinion on the pest categorisation of the tospoviruses. EFSA Journal 10, 2772. 4264 pp.;
* Elliott DR, Lebas BSM, Ochoa-Corona FM, Tang J & Alexander BJR (2009) Investigation of Impatiens necrotic spot virus outbreaks in New Zealand. Australasian Plant Pathology 38, 490–495;
* International Committee on Taxonomy of Viruses (ICTV) (2015) Implementation of non-Latinized binomial species names in the family Bunyaviridae.
* Van Regenmortel MH, Burke DS, Calisher CH, Dietzgen RG, Fauquet CM, Ghabrial SA, Jahrling PB, Johnson KM, Holbrook MR, Horzinek MC, Keil GM, Kuhn JH, Mahy BW, Martelli GP, Pringle C, Rybicki EP, Skern T, Tesh, RB, Wahl - Jensen V, Walker PJ & Weaver SC (2010) A proposal to change existing virus species names to non - Latinized binomials. Arch. Virol. 155, 1909 - 1919;
* Verhoeven TJ & Roenhorst JW (1998) Occurrence of tospoviruses in the Netherlands. Proceedings of the Fourth International Symposium on Tospoviruses and thrips in Floral and Vegetable Crops, Wageningen, Netherlands. 77-80;

HOST PLANT N°4: Gerbera (1GEBG) for the Ornamental sector.

Origin of the listing:

Commission Directive 93/49/EEC
Plants for planting:

Plants intended for planting, other than seeds **3 - Is the pest already listed in a PM4 standard on the concerned host plant?**

No
Conclusion:

Evaluation continues **4 - Are the listed plants for planting the main\* pathway for the "pest/host/intended use" combination? (\*: significant compared to others):**

?
Conclusion:

Candidate

Justification:

INSV has a broad host range of more than 300 species, mostly ornamentals. INSV presents a serious problem to the ornamentals industry (Daughtrey et al., 1997; Elliott et al., 2009). Approximately 80 % of of greenhouse ornamentals tospovirus problems in USA have been identified as INSV; and less than 20% for TSWV (Daughtrey et al., 1997). Symptoms of tospoviruses vary significantly depending on local or systemic infections, on the host species, its development stage, the virus strain, and environmental (growth) factors (EFSA, 2012).
One record is available on this host from New Zealand (Elliott et al., 2009) and Italy (Vicchi & Bellardi, 1996). However Gerbera is not included in the plant species found infected with INSV in the Netherlands (Verhoeven and Roenhorst, 1998) and in the USA (Daughtrey et al., 1997). **5 - Economic impact:**
Are there documented reports of any economic impact on the host?

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Justification:

No information on direct impacts on this host found in the references.
What is the likely economic impact of the pest irrespective of its infestation source in the absence of phytosanitary measures? (= official measures)

Minor
Is the economic impact due to the presence of the pest on the named host plant for planting, acceptable to the propagation and end user sectors concerned?

Yes
Is there unacceptable economic impact caused to other hosts (or the same host with a different intended use) produced at the same place of production due to the transfer of the pest from the named host plant for planting?

No
Conclusion:

Not candidate
Justification:

 **CONCLUSION ON THE STATUS:**

Disqualified: Not recommended for RNQP status because of lack of evidence on economic impact and pathway importance on this host. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

No
Proposed Tolerance levels:

Delisting. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

No
Proposed Risk management measure:

Delisting. **REFERENCES:**

* Daughtrey ML, Jones RK, Moyer JW, Daub ME & Baker JR (1997) Tospoviruses strike the greenhouse industry—INSV has become a major pathogen on flower crops. Plant Disease 81, 1220–1230;
* EFSA Panel on Plant Health (PLH) (2012) Scientific Opinion on the pest categorisation of the tospoviruses. EFSA Journal 10, 2772. 4264 pp.;
* Elliott DR, Lebas BSM, Ochoa-Corona FM, Tang J & Alexander BJR (2009) Investigation of Impatiens necrotic spot virus outbreaks in New Zealand. Australasian Plant Pathology 38, 490–495;
* International Committee on Taxonomy of Viruses (ICTV) (2015) Implementation of non-Latinized binomial species names in the family Bunyaviridae.
* Van Regenmortel MH, Burke DS, Calisher CH, Dietzgen RG, Fauquet CM, Ghabrial SA, Jahrling PB, Johnson KM, Holbrook MR, Horzinek MC, Keil GM, Kuhn JH, Mahy BW, Martelli GP, Pringle C, Rybicki EP, Skern T, Tesh, RB, Wahl - Jensen V, Walker PJ & Weaver SC (2010) A proposal to change existing virus species names to non - Latinized binomials. Arch. Virol. 155, 1909 - 1919;
* Verhoeven TJ & Roenhorst JW (1998) Occurrence of tospoviruses in the Netherlands. Proceedings of the Fourth International Symposium on Tospoviruses and thrips in Floral and Vegetable Crops, Wageningen, Netherlands. 77-80;
* Vicchi V & Bellardi MG (1996) Evaluation of the ELISA technique in the diagnosis of tospoviruses in ornamental plants. Informatore Fitopatologico 46, 60-63;

HOST PLANT N°5: Impatiens New Guinea hybrids (IPANG) for the Ornamental sector.

Origin of the listing:

Ornamental SEWG
Plants for planting:

Plants intended for planting, other than seeds **3 - Is the pest already listed in a PM4 standard on the concerned host plant?**

Yes
Conclusion:

Qualified

Justification (if necessary):

The pest is listed in EPPO PM 4/20 Standard for New Guinea hybrids of impatiens. **CONCLUSION ON THE STATUS:**

Recommended for listing as an RNQP, based on EPPO PM 4/20 Standard. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

Yes
Proposed Tolerance levels:

Zero tolerance approach, based on visual examination and/or testing. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

Yes
Proposed Risk management measure:

(A) The site of production has been subjected to a monitoring regime and appropriate treatments to ensure effective suppression of populations of relevant thrips vectors (Frankliniella occidentalis);
AND
(B) (a) No symptoms of Impatiens necrotic spot tospovirus have been observed on plants at the site of production during the current growing period;
or
(b) Any plants at the production site showing symptoms of Impatiens necrotic spot tospovirus during the current growing period have been rogued out and a representative sample of the plants to be marketed has been tested and found free from Impatiens necrotic spot virus.
Justification (if necessary):

Experts considered that visual examination on the marketed material was not sufficient. **REFERENCES:**

* Daughtrey ML, Jones RK, Moyer JW, Daub ME & Baker JR (1997) Tospoviruses strike the greenhouse industry—INSV has become a major pathogen on flower crops. Plant Disease 81, 1220–1230;
* EFSA Panel on Plant Health (PLH) (2012) Scientific Opinion on the pest categorisation of the tospoviruses. EFSA Journal 10, 2772. 4264 pp.;
* Elliott DR, Lebas BSM, Ochoa-Corona FM, Tang J & Alexander BJR (2009) Investigation of Impatiens necrotic spot virus outbreaks in New Zealand. Australasian Plant Pathology 38, 490–495;
* Hausbeck MK, Welliver RA, Derr MA & Gildow FE (1992) Tomato spotted wilt survey among greenhouse ornamentals in Pennsylvania. Plant Disease 76, 795–800;
* Lebas BSM, Ochoa-Corona FM, 2007. Impatiens necrotic spot virus. In: Characterization, diagnosis and management of plant viruses. v 4, Grain crops & Ornamentals, Eds:RaoGP, Bragard C and Lebas BSM.Studium Press, LLC Texas, USA, 221-243;
* ICTV 2015: Implementation of non-Latinized binomial species names in the family Bunyaviridae;
* International Committee on Taxonomy of Viruses (ICTV) (2015) Implementation of non-Latinized binomial species names in the family Bunyaviridae.
* Van Regenmortel MH, Burke DS, Calisher CH, Dietzgen RG, Fauquet CM, Ghabrial SA, Jahrling PB, Johnson KM, Holbrook MR, Horzinek MC, Keil GM, Kuhn JH,
* Verhoeven TJ & Roenhorst JW (1998) Occurrence of tospoviruses in the Netherlands. Proceedings of the Fourth International Symposium on Tospoviruses and thrips in Floral and Vegetable Crops, Wageningen, Netherlands. 77-80;

HOST PLANT N°6: Pelargonium (1PELG) for the Ornamental sector.

Origin of the listing:

Commission Directive 93/49/EEC
Plants for planting:

Plants intended for planting, other than seeds **3 - Is the pest already listed in a PM4 standard on the concerned host plant?**

Yes
Conclusion:

Evaluation continues

Justification (if necessary):

The pest is listed in EPPO certification scheme PM 4/3 for Pelargonium. However experts decided to continue the evaluation because of uncertainties concerning the unacceptable economic impact on this host plant. **4 - Are the listed plants for planting the main\* pathway for the "pest/host/intended use" combination? (\*: significant compared to others):**

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Conclusion:

Candidate

Justification:

INSV has a broad host range of more than 300 species, mostly ornamentals. INSV presents a serious problem to the ornamentals industry (Daughtrey et al., 1997; Elliott et al., 2009). Approximately 80 % of of greenhouse ornamentals tospovirus problems in USA have been identified as INSV; and less than 20% for TSWV (Daughtrey et al., 1997). Symptoms of tospoviruses vary significantly depending on local or systemic infections, on the host species, its development stage, the virus strain, and environmental (growth) factors (EFSA, 2012).
The pest was found in this host in Iran (Shahraeen et al., 2002). However Pelargonium sp. has not been listed in the host plant of INSV in Verhoeven and Roenhorst, (1998), Lebas and Ochoa-Corona (2007) and Elliott et al., (2009). **5 - Economic impact:**
Are there documented reports of any economic impact on the host?

No
Justification:

In Iran, samples with small necrotic spots, leaf yellowing, ring spots, necrotic vein clearing, wilting, and dwarf symptoms from Pelargonium roseum were positive for INSV (Shahraeen et al., 2002). No significant crop losses in Pelargonium spp. from tospoviruses were reported even though INSV and TSWV have occasionally been detected in Pelargonium × hortorum and Pelargonium peltatum in the USA (Daughtrey et al., 1997).
What is the likely economic impact of the pest irrespective of its infestation source in the absence of phytosanitary measures? (= official measures)

Is the economic impact due to the presence of the pest on the named host plant for planting, acceptable to the propagation and end user sectors concerned?

Is there unacceptable economic impact caused to other hosts (or the same host with a different intended use) produced at the same place of production due to the transfer of the pest from the named host plant for planting?

Conclusion:

Not candidate
Justification:

 **CONCLUSION ON THE STATUS:**

Disqualified: Not recommended for the RNQP Status despite listed in a EPPO PM 4 Standard on this host, because of lack of evidence on economic impact and pathway importance on this host. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

No
Proposed Tolerance levels:

Delisting. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

No
Proposed Risk management measure:

Delisting. **REFERENCES:**

* Daughtrey ML, Jones RK, Moyer JW, Daub ME & Baker JR (1997) Tospoviruses strike the greenhouse industry—INSV has become a major pathogen on flower crops. Plant Disease 81, 1220–1230;
* EFSA Panel on Plant Health (PLH) (2012) Scientific Opinion on the pest categorisation of the tospoviruses. EFSA Journal 10, 2772. 4264 pp.;
* Elliott DR, Lebas BSM, Ochoa-Corona FM, Tang J & Alexander BJR (2009) Investigation of Impatiens necrotic spot virus outbreaks in New Zealand. Australasian Plant Pathology 38, 490–495;
* Hausbeck MK, Welliver RA, Derr MA & Gildow FE (1992) Tomato spotted wilt survey among greenhouse ornamentals in Pennsylvania. Plant Disease 76, 795–800;
* Lebas BSM, Ochoa-Corona FM, 2007. Impatiens necrotic spot virus. In: Characterization, diagnosis and management of plant viruses. v 4, Grain crops & Ornamentals, Eds:RaoGP, Bragard C and Lebas BSM.Studium Press, LLC Texas, USA, 221-243;
* ICTV 2015: Implementation of non-Latinized binomial species names in the family Bunyaviridae;
* International Committee on Taxonomy of Viruses (ICTV) (2015) Implementation of non-Latinized binomial species names in the family Bunyaviridae.
* Shahraeen N, Ghotbi T & Mehraban AH (2002) Occurrence of Impatiens necrotic spot virus in ornamentals in Mahallat and Tehran provinces in Iran. Plant Disease 86, 694;
* Van Regenmortel MH, Burke DS, Calisher CH, Dietzgen RG, Fauquet CM, Ghabrial SA, Jahrling PB, Johnson KM, Holbrook MR, Horzinek MC, Keil GM, Kuhn JH, Mahy BW, Martelli GP, Pringle C, Rybicki EP, Skern T, Tesh, RB, Wahl - Jensen V, Walker PJ & Weaver SC (2010) A proposal to change existing virus species names to non - Latinized binomials. Arch. Virol. 155, 1909 - 1919;
* Verhoeven TJ & Roenhorst JW (1998) Occurrence of tospoviruses in the Netherlands. Proceedings of the Fourth International Symposium on Tospoviruses and thrips in Floral and Vegetable Crops, Wageningen, Netherlands. 77-80;