Netherlands Food and Consumer Product Safety Authority
Ministry of Economic Affairs

National Plant Protection Organization, the Netherlands

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	Quick scan date: 27 October 2016	
1	What is the scientific name (if possible up to species level + author, also include (sub)family and order) and English/common name of the organism? *Add picture of organism/damage if available and publication allowed*.	*Pepper vein yellows virus* (PeVYV) PeVYV is a member of the genus *Polerovirus* and family *Luteoviridae* (Murakami et al., 2011). This virus species probably also includes the variant pepper yellow leaf curl virus (Dombrovsky et al., 2010) and a variant of which a partial genome fragment of 1630 nt has been deposited in NCBI GenBank under Accession Number FN600344 named as pepper yellows virus identified under the same name (pepper yellows virus) from Greece (Lotos et al., 2014). In all these variants will be considered as PeVYV, although not all reports mention this. Quickscan Pepper vein yellows virus October 2016
2	What prompted this quick scan? *Organism detected in produce for import, export, in cultivation, nature, mentioned in publications, e.g. EPPO alert list, etc.*	Recent publications report the occurrence and damaging effects of PeVYV in Greece, Italy and Spain (Lotos et al., 2014; Tomassoli et al., 2016; Villanueva et al., 2013).
3	What is the current area of distribution?	China (Liu et al., 2016; Tan et al., 2015; Zhang et al., 2015), Israel and Jordan (Dombrovsky et al., 2010), India, Indonesia, Mali, Philippines, Thailand and Taiwan (Knierim et al., 2013), Italy (Tomassoli et al., 2016), Ivory Coast (Bolou et al., 2015), Japan (Yonaha et al., 1995; Murakami et al., 2011), Spain (Villanueva et al., 2013), Sudan (Alfaro-Fernández, 2014), Turkey and Tunisia (Buzkan et al., 2013) and USA (Alabi et al., 2015). Considering that the reports relate to seventeen countries from four continents, the virus is assumed to have spread to more countries.

4	What are the host plants?	*Capsicum annuum* (Yonaha et al., 1995), *Capsicum chinense* (Tomassoli et al., 2016), *Capsicum frutescens* (Zhang et al., 2015), *Capsicum* spp (Alabi et al., 2015; Knierim et al., 2013; Tomassoli et al., 2016) and *Solanum nigrum* (Knierim et al 2013) have been reported as natural hosts. In addition, in experiments the virus was transmitted successfully via *Myzus persicae* to *Chenopodium amaranticolor*, *Curcubita pepo*, *Datura stramonium*, *Gomphrena globosa*, *Nicotiana clevelandii*, *Nicotiana benthamiana*, *Petunia hybrida* and *Physalis floridana* (Dombrovsky et al., 2010). Some of these species, including *P. hybrida* showed yellowing. However, Yanoha et al. (1995) failed to transmit the virus to *C. amaranticolor*, *D. stramonium*, *P. hybrida* and *P. floridana*.
5	Does the organism cause any kind of plant damage in the current area of distribution and/or does the consignment demonstrate damage suspected to have been caused by this organism? *Yes/no + plant species on which damage has been reported + short description of symptoms.* *Please indicate also when the organism is otherwise harmful (e.g. predator, human/veterinary pathogen vector, etc.).*	Symptoms of diseased *Capsicum* plants include shortening of the internodes, interveinal yellowing, narrowing of leaves and upward rolling of leaf margins. The fruits of diseased plants were smaller than normal and discoloured, resulting in reduced commercial value (Dombrovsky et al., 2010). Infection rates from 2 up to nearly 100% have been reported (Tomassoli et al., 2016; Villanueva et al., 2013).
6	Assess the probability of establishment in the Netherlands (NL) (i.e. the suitability of the environment for establishment). a. In greenhouses (low, medium, high) b. Outdoors (low, medium, high) c. Otherwise (e.g. storage facilities, human environment)	a. In the Netherlands, *Capsicum* spp. are grown in heated greenhouses where the climate is suitable for both the development of the vector and the virus. However, a commonly applied intercropping period in late autumn or early winter may limit establishment, because both the vector and the virus can be completely eliminated from the production site when the crop is removed and the glasshouse cleaned before a new crop is planted. b. Outdoors the virus will not establish easily, because the main hosts *Capsicum* spp. are not grown there and the climate may be less suitable. c. Not relevant.
7	Assess the probability of establishment in the EU (i.e. the suitability of the environment for establishment).	For other countries in the northern part of the EU, the probability of establishment may be similar to that for the Netherlands (see Question 6). The establishment potential may be affected by the cultivation methods, e.g. time and duration of intercropping periods in the various countries. In the southern part, the virus seems already established in Spain, where 'many greenhouses exhibited almost 100% incidence' (Villanueva, et al., 2013). In addition, the virus may have established in Greece and Italy where outbreaks were recently reported (Lotos et al., 2016; Tomassoli et al., 2016).
8	What are the possible pathways that can contribute to spread of the organism after introduction? How rapid is the organism expected to spread (by	Trade of plants for planting other than seeds and natural spread. The virus can be transmitted persistently by two aphid species, i.e., *Aphis gossypii* and *Myzus persicae* (Dombrovsky et al., 2010; Yonaha et al., 1995). In this way, the virus could be spread

	natural dispersal and human activity)?	after introduction.
9	Provide an assessment of the type and amount of direct and indirect damage (e.g. lower quality, lower production, export restrictions, threat to biodiversity, etc.) likely to occur if the organism would become established in NL and the EU, respectively?	If the virus would become established in the Netherlands and other EU member states, *Capsicum* fruit production would be reduced as a result of growth reduction and other symptoms. In addition, fruit quality would decrease, due to smaller sizes and discolourations of infected fruits. The degree of yield and quality reduction will depend on the extent of colonising vector aphids as well as environmental conditions, e.g., light intensity and temperature. In Spain, Villanueva et al. (2013) reported 'severe outbreaks of this disease syndrome'. In the Netherlands, however, symptom expression may be reduced due to lower light intensities because the yellowing symptoms were not observed in shaded parts of greenhouses in Israel (Dombrovsky et al., 2010).
10	Has the organism been detected on/in a product other than plants for planting (e.g. cut flowers, fruit, vegetables)? *If "no", go to question 12*	No, but the virus may be present in fruits that are imported from regions where the virus is present.
11	If the organism has been found on/in a product other than plants for planting (e.g. cut flowers, fruit, vegetables), what is the probability of introduction (entry + establishment)? *Only to be answered in case of an interception or a find.*	
12	Additional remarks	Pepper vein yellows virus is distinct from pepper yellow vein virus (Fletcher et al., 1987), a partially described virus from pepper that is transmitted by *Olpidium*. Clarification is needed regarding the classification of PeVYV and the variant of pepper yellow leaf curl virus described by Dombrovsky et al., 2010 and 2013 (see also Question 1).
13	References	Alabi, OJ, Al-Rwahnih M, Jifon JL, Gregg L, Crosby K, Mirkov TE, 2015. First report of Pepper vein yellows virus infecting pepper (Capsicum spp.) in the United States. Plant Disease 99, 1656. Alfaro-Fernández A, El Shafie EE, Ali MA, El-Bashir OOA, Córdoba-Sellés MC, Font San Ambrosio MI, 2014. First report of Pepper vein yellow virus infecting hot pepper in Sudan. Plant Disease 98, 1446. Bolou BA, Moury B, Abo K, Kalou DJ, Girardot G, Kouassi NP, Kouadio EJN, Kouakou BSM, Kone D, 2015. First report of pepper vein yellows virus in field-grown-pepper in Ivory Coast. Journal of Plant Pathology 97 S75. Buzkan N, Arpaci BB, Simon V, Fakhfakh H, Moury B, 2013. High prevalence of poleroviruses in field-grown pepper in Turkey and Tunisia. Archives of Virology 158,

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14	**Conclusions**	*Pepper vein yellows virus* (PeVYV) causes disease in *Capsicum* crops. It is naturally transmitted by aphids. The virus is already present in southern parts of the EU where its presence has led to significant crop losses. Potentially, it is also a threat to *Capsicum* crops grown under protected cultivation in northern parts of the EU. In northern EU, outbreaks in glasshouses may be eliminated through intercropping periods in autumn and winter.
15	**Follow-up measures**	Communication to stakeholders