Netherlands Food and Consumer
Product Safety Authority
Ministry of Economic Affairs

National Plant Protection Organization, the Netherlands

Quick scan number: QS.VIR.2013.02

	Quick scan date: 8th November 2013	
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*.	Melon yellow spot virus (MYSV), genus *Tospovirus*, Family *Bunyaviridae* (12), Physalis severe mottle virus (PSMV) is known as an isolate of MYSV (1).
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.*	This Quick scan is prompted by report 2013/039 of the EPPO Reporting Service (2). Diseases caused by MYSV result in great losses in cucurbits in Japan (4). Imports of cucurbits (fruits, plants for planting) and soil (infected pupae or other stages of the virus vector *Thrips palmi* may be present in soil) from countries where the virus and vector are present pose a risk to cultivation of cucurbitaceous crops in Europe. In addition, MYSV shares several characteristics with the related *Watermelon silver mottle virus*, which is on the EPPO A1 list (3).
3	What is the (most likely) area of distribution?	Japan: Shizuoka (4) and Kochi prefectures (5). Taiwan: Miaoli (6) and Changhua counties (7). Thailand: Kanchanaburi , Nakohnratchaseema, Kalasin, Khon Kaen and Nakhon Pathom provinces (8). China: Hainan and Guangxi provinces (9).
4	Has the organism been detected, sighted and/or has it established itself in nearby countries (DE, BE, LU, FR, UK) *Yes/no. If 'yes', provide details. No interceptions*	No. Establishment of both MYSV and its vector *Thrips palmi* have not been reported in nearby countries.

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 + host plants + short explanation of symptoms.* *Please indicate also when the organism is otherwise harmful (e.g. predator, human/veterinary pathogen vector, etc.).*	Yes. The virus naturally infects *Cucumis melo* (6, 10), *Cucumis sativa* (5, 7), *Citrullus lanatus* (6), *Momordica charantia* (11). Additionally, MYSV has been detected outside cucumber greenhouses in 13 weed species i.e., *Acalypha australis*, *Capsella bursa-pastoris*, *Conyza canadensis*, *Conyza sumatrensis*, *Erigeron canadensis, Gnaphalium purpureum var spathulatum*, *Lamium amplexicaule*, *Mazuz pumilus, Oxalis corniculata*, *Sonchus oleraceus*, *S. media*, *Stellaria neglecta*, *Veronica persica* (12). The virus induces different types of symptoms in crops: in general yellow and necrotic spots on leaves and fruits. For example, severe yellowing and necrotic spots on leaves and fruits of *C. melo* (4, 9), mosaic on upper new leaves and yellow spots on lower leaves in *C. sativus* (7), sometimes mottling on cucumber fruits (13), and necrotic spots and yellowing on leaves in *M. charantia.* The infection rate in cucumber can be up to 100% and fruits with symptoms lose yield and marketing value (13). Some MYSV-infected weeds do not show symptoms. However, these symptomless plants are important in the epidemiology of MYSV in indoor and outdoor cultivations (12). MYSV systemically infects *Solanum lycopersicum* (tomato) after mechanical inoculation (7) but natural infections have not been reported. Among above-mentioned hosts, fruits of *C. melo, C. sativus* and *M. charantia* have been imported form Thailand (information from the NPPO of the Netherlands), where both the virus and vector occur.
6	Indicate the (provisional) probability of establishment of the organism in the Netherlands regarding climate and ecology. a. In greenhouses (low, medium, high) b. Outdoors (low, medium, high) c. Otherwise (e.g. storage facilities, human environment) *Please illustrate with information/references*	a) In greenhouses there is a low probability of establishment as long as the virus vector *T palmi* is not present in the Netherlands (current situation). In the presence of its vector, however, there would be a high probability of establishment of MYSV, especially since there are no natural resistant cucumber lines against MYSV (12). b) Outdoors there is a low probability of establishment because the vector *T palmi* is not present and outdoor conditions are unlikely to be suitable for establishment of *T. palmi*.
7	What are the host plants and which host plants are commercially grown in the Netherlands and which are present in the natural environment? *If establishment is restricted to greenhouse climate, list only host plants in greenhouses.*	*C. sativus* (cucumber) is the most important host of MYSV in the Netherlands. Other commercially grown hosts are *C. melo* (melon) and *Citrullus lanatus* (watermelon). All are grown in greenhouses. *C. sativus* is also grown outdoors. In addition, some weed hosts are also known to occur outdoors.
8	Provide a provisional estimation of type and probable amount of direct and indirect economic damage (e.g. lower quality, lower production, export restrictions, threat to biodiversity, etc.) likely to occur if the organism would become established?	Direct economic impact of MYSV is expected to be high when also the vector *T. palmi* would become established. MYSV infections lowers both the quality and quantity of the production (Mitsuru Okuda, personal communication, 05-06-2013). Based on records in Japan, the virus can cause severe damage in melon and cucumber (4). These include yellowing and necrotic spots on the leaves resulting in losses of both the quantity and quality of the fruits. Indirect economic damage might occur due to export restrictions if the virus would become

		established and higher costs for testing of planting material, especially in combination with establishment of its vector *T. palmi*.
9	How rapid is the organism expected to spread after introduction (by natural dispersal and human activity)?	MYSV can only be naturally transmitted by its vector species *T. palmi*. Concerning human activity, the virus can be spread efficiently by distribution of infected planting material (seedlings) of host plants. The chance of spreading by fruits of infected plants, is considered low.
10	In what manner could the organism enter the Netherlands? *Mention pathways*.	1. Planting material (excluding seeds) of host plants i.e., cucumber, melon, watermelon 2. Plants and planting material of hosts and non-hosts carrying viruliferous insects of *T. palmi* 3. Soil infested with MYSV-acquired (pre-)pupae of *T. palmi* 4. Virus isolates requested for research by the universities or breeding companies.
11	Has the organism been detected on/in a product (cut flowers, fruit…) destined for the consumer market? *If "no", please go to question 13*	No.
12	If the organism has been found on/in product other than plants for planting (e.g. cut flowers, fruit, vegetables), are there any risks of introduction and establishment in crop areas and/or natural environment in the Netherlands?	Not applicable.
13	Additional remarks	In the Netherlands, the vector, *T. palmi*, has occasionally been found in greenhouses since 1988. Spread was limited and infestations were eradicated successfully (14). In addition to MYSV, *T. palmi* is able to transmit seven other tospovirus species i.e. *Tomato spotted wilt virus* (TSWV), Calla lily chlorotic spot virus (CCSV), *Groundnut bud necrosis virus* (GBNV), *Watermelon silver mottle virus* (WSMoV), Capsicum chlorosis virus (CaCV), Watermelon bud necrosis virus (WBNV) and Tomato necrotic ringspot virus (TNRV) (15). According to the EFSA 'Scientific opinion on the pest categorisation of the tospoviruses' (15), MYSV has been considered to belong to the category 'limited risk with significant uncertainty', based on the fact that both the virus and vector *T. palmi* are not present in Europe. It is stressed, however, that when new experimental data will become available on e.g. additional vectors, extended occurrence or prevalence, risks might increase. In this case, the assessment should be re-evaluated.
14	References:	1. Cortez, I., Saaijer, J., Wongjkaew, Pereira, A.-M., Goldbach, R., Peters, D. Kormelink, R. 2001. Identification and characterization of a novel tospovirusspecies using a new RT-PCR. Archives of Virology 2: 265-278. 2. Melon yellow spot virus: an emerging disease of cucurbits in Asia. EPPO Reporting Service 2013/039. 3. EPPO A1 List, 2012. http://www.eppo.int/QUARANTINE/listA1.htm. 4. Okuda, M., Takeuchi, S., Taba, S., Kato, K., Hanada, K. 2002. Melon Yellow Spot Virus and

		Watermelon Silver Mottle Virus: Outbreak of Cucurbit Infecting Tospovirus in Japan. Acta Horticualturae 588:143-146. 5. Takeuchi S, Okuda M, Hanada K, Kawada Y, Kameya-Iwaki M. 2001. Spotted wilt disease of cucumber (Cucumis sativus) caused by Melon yellow spot virus (in Japanese with English summary). Japanese Journal of Phytopathology 67:46–51. 6. Chen, T.-C., Lu, Y.-Y., Cheng, Y.- H., Chang, C.-A., Yeh, S. -D. 2007. *Melon yellow spot virus* in watermelon a first record from Taiwan. Plant Disaese Reports 16, 13. 7. Chao, C.-H., et al., 2010. Characterization of Melon yellow spot virus Infecting Cucumber (*Cucumis sativus* L.) in Taiwan. Plant Pathology Bulletin 19: 41-52. 8. Chiemsombat, P., Gajanandana, O., Warin, N., Hongprayoon, R., Bhunchoth, A., Pongsapich, P. 2008. Biological and molecular characterization of tospoviruses in Thailand. Archives of Virology 153:571–577. 9. Gu, Q.S., Wu, H.J., Chen, H.Y., Zhang, X.J., Wu, M.Z., Wang, D.M., Pen, B., Kong, X.Y., Lui, T.J. 2012. *Melon yellow spot virus identified* in China for the first time. New Disease Reports 25:7. 10. Kato, K., Hanada, K., Kameya-Iwaki, M. 2000. Melon yellow spot virus: a distinct species of the genus Tospovirus isolated from melon. Phytopathology 90:422–426. 11. Takeuchi, S., Shimomoto, Y., Ishikawa, K. 2009. First report of Melon yellow spot virus infecting balsam pear (Momordica charantia L.) in Japan. Journal of General Plant Pathology 75(2): 154-156. 12.Yamasaki, S., Okazaki, S., Okuda, M. 2012. Temporal and spatial dispersal of melon yellow spot virus in cucumber greenhouses and evaluation of weeds as infection sources. European Journal of Plant Pathology 132(2): 139-177. 13. Sugiyama, M., Okuda, M., Sakata, Y. 2009. Evaluation of resistance to melon yellow spot virus in a cucumber germplasm collection. Plant Breeding 128: 696-700. 14. Vierbergen, G. 2001. *Thrips palmi*: pathways and possibilities for spread OEPP/EPPO Bulletin 31, 169-171. 15. EFSA Panel on Plant Health (PLH) Scientific Opinion on the pest categorisation of the tospoviruses. EFSA Journal 2012;10(7):2772. [101 pp.] doi:10.2903/j.efsa.2012.2772.
15	**Conclusions**	This Quick scan was prompted by an EPPO report on an emerging virus disease in Cucurbitaceae in Asia caused by Melon yellow spot virus. The virus is vectored by *Thrips palmi* which is absent from the Netherlands and the rest of the EU. *Thrips palmi* is regulated in the EU and measures should be taken to prevent its introduction (Council directive 2000/29/EC). Without its vector, the virus can probably not establish in the Netherlands.
16	**Follow-up measures**	No specific measures. The vector of MYSV is already regulated in the EU and EFSA recently finished a pest categorisation for tospoviruses and classified MYSV in the category "Limited risk with significant uncertainty" (uncertainties concerned the vector range or changes in the distribution of the known vector species).