New Disease Reports

Potyviruses and tobraviruses infecting ornamental *Allium* species in the United Kingdom

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In autumn 2013, anda range of bulbs of ornamental *Allium* species was planted in the Royal Horticultural Society's garden at Wisley to assess their vigour and aesthetic qualities. The trial included 179 accessions of plant material, representing 32 species or hybrids, from six nurseries in the United Kingdom or The Netherlands. Yellow flecking and striping with occasional reddening on the leaf surfaces and leaf curling was observed on many of the plants during April 2015 (Figs. 1-4). Leaf samples were collected from symptom-bearing plants of 20 accessions. RNA was extracted using an RNeasy Plant Mini Kit (Qiagen, Manchester, UK) and tested by RT-PCR using broad-spectrum primers for carlaviruses and tospoviruses (Agdia, Elkhart, USA), potyviruses (Marie-Jeanne *et al*., 2000) and tobraviruses (Jones *et al.,* 2008). No samples tested positive for tospoviruses but all tested positive using at least one of the three other primer sets. *A. jesdianum* 'Pendjikent', *A. nigrum* and *A. siculum* (syn. *Nectaroscordum siculum*) tested positive using the carlavirus primers but it was not possible to sequence the product. The remaining amplicons of the expected size were directly sequenced in both directions and were identified by BLAST analysis; representative sequences were deposited in GenBank (Table 1). GenBank Accession Nos. KT223098, KT223099, KT223100, KT223101, KT223102 and KT223103 had 98, 98, 99, 92, 99 and 85 % nucleotide sequence identity with *Leek yellow stripe virus* (AB194628), *Onion yellow dwarf virus* (KR025485), Ornamental onion stripe mosaic virus (OrOSMV; EU042750) *Pea early browning virus* (PEBV; X14006) *Tobacco rattle virus* (JX144383), and *Turnip mosaic virus* (TuMV; AB701697), respectively. The limited sequence identity of the *Allium* TuMV isolate with other isolates of the species may suggest that the isolate belongs to a distinct strain. This is the first report of PEBV infecting *Allium* and does not accord with Brunt *et al*. (1996) who reported that *A. cepa* was not experimentally susceptible to the virus. The remaining viruses have been reported previously from *Allium* spp. However, with few exceptions such as Noda *et al*. (1989), the specific identity of ornamental hosts has not been reported and therefore this is the first report of many of these virus-host associations. This is also the first report of OrOSMV in the UK. Since the early 1800's ornamental *Allium* species have been grown widely in UK gardens as herbaceous perennials. They are prized for their architectural qualities and large, colourful umbels that attract pollinating insects. They are generally hardy and well suited to most UK soil types (Block, 2010). The increasing importance of ornamental *Allium* (including *Nectaroscordum*) is illustrated by the 8% rise in production area over the last 4 years (to 228 ha in 2014/15) in The Netherlands (Bloembollenkeuringsdienst, 2015).

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References

Block E, 2010. *Allium* Botany and Cultivation, Ancient and Modern: *Alliums* as Ornamentals. In: *Garlic and Other Alliums: The Lore and the Science.* Cambridge, UK: The Royal Society of Chemistry Publishing, 14-18.

Bloembollenkeuringsdienst, 2015. Voorlopige statistiek voorjaarsbloeiers 2014-2015. http://www.bkd.eu/wp-content/uploads/2015/01/Voorlopige-statistiek-voorjaarsbloeiers-2014-2015-versie-2-27-01-2015-Website.pdf. (Accessed 14 July 2015.)

Brunt AA, Crabtree K, Dallwitz MJ, Gibbs AJ, Watson L, eds, 1996. Viruses of plants. Descriptions and lists from the VIDE database. Wallingford, UK: CABI.

Jones D, Farreyrol K, Clover GRG, Pearson MN, 2008. Development of a generic PCR detection method for tobraviruses. *Australasian Plant Pathology* **37**, 132-136.

Marie-Jeanne V, Ioos R, Peyre J, Alliot B, Signoret P, 2000. Differentiation of Poaceae potyviruses by reverse transcription-polymerase chain reaction and restriction analysis. *Journal of Phytopathology* **148**, 141-151. http://dx.doi.org/10.1046/j.1439-0434.2000.00473.x

Noda C, Inouye N, 1989. Leek yellow stripe virus isolated from an ornamental *Allium* plant in Japan. *Annals of the Phytopathological Society of Japan* **55**, 2018-215. http://dx.doi.org/10.3186/jjphytopath.55.208

Figure 1

Figure 2

Figure 3

Figure 4

Table 1. Viruses identified in ornamental *Allium* species and representative GenBank accession numbers.

Viral genus	Viral species	Host species	GenBank Accession No.
Potyvirus	*Leek yellow stripe virus*	*A. ampeloprasum*	KT223098
		A. ostrowskianum 'Red Mohican'	KT223099
	Onion yellow dwarf virus	*A. ampeloprasum*	
		A. ostrowskianum 'Red Mohican'	
		A. sphaerocephalon	KT223100
	Ornamental onion stripe mosaic virus	*A. cristophii*	
		A. jesdianum 'Pendjikent'	
		A. nigrum	
		A. ostrowskianum 'Kwakoni'	
		A. sphaerocephalon	KT223101
	Turnip mosaic virus	*A. ostrowskianum* 'Kwakoni'	KT223102
Tobravirus	*Pea early browning virus*	*A. karataviense* 'Ivory Queen'	KT223103
	Tobacco rattle virus	*A. ostrowskianum* 'Kwakoni'	

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