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Insight into Epidemiological Importance of Phytoplasma Vectors in Vineyards in South Moravia, Czech Republic

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Electronic supplementary material (ESM)

Table S1. List of insect species captured in Perná vineyard and their phytoplasma vector status according to literature

Classification	Species	Confirmed vector	Insect bearing phytoplasma
Auchenorrhyncha			
Aphrophoridae	*Aphrophora alni* (Fallén, 1805)		
	Lepyronia coleoptrata (Linnaeus, 1758)		
	Philaenus spumarius (Linnaeus, 1758)		STOL[1]; AY[2]
Cicadellidae	*Agallia consobrina* Curtis, 1833		
	Allygidius abbreviatus (Lethierry, 1878)		
	***Anaceratagallia ribauti* (Ossiannilsson, 1938)**	STOL[3]	AY[4]
	***Aphrodes bicincta* (Schrank, 1776)**	STOL[5*, 6*, 13#]; AY[25*]	AY[2, 6]
	Aphrodes makarovi Zachvatkin, 1948		STOL[23]
	Arocephalus languidus (Flor, 1861)		
	Arthaldeus striifrons (Kirschbaum, 1868)		
	Artianus interstitialis (Germar, 1821)		
	Balcanocerus larvatus (Herrich-Schäffer, 1837)		
	Balclutha rhenana Wagner, 1939		

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Classification	Species	Confirmed vector	Insect bearing phytoplasma
Cicadellidae	*Chlorita paolii* (Ossiannilsson,1939)		
(continuation)	*Chlorita viridula* (Fallén, 1806)		
	Cicadella viridis (Linnaeus, 1758)		STOL[9]
	Cicadula persimilis (Edwards, 1920)		
	Deltocephalus pulicaris (Fallén, 1806)		
	Doratura homophyla (Flor, 1861)		
	Doratura impudica Horváth, 1897		
	Elymana sulphurella (Zetterstedt, 1828)		
	Emelyanoviana mollicula (Boheman, 1845)		STOL[7]
	Empoasca decipiens Paoli, 1930	AY[10]	STOL[24]
	Empoasca pteridis (Dahlbom, 1850)		
	Empoasca vitis (Goethe, 1875)		
	Enantiocephalus cornutus (Herrich-Schäffer, 1838)		
	Errastunus ocellaris (Fallén, 1806)		STOL[7]; AY[4]
	Eupteryx atropunctata (Goeze, 1778)		STOL[7]
	Eupteryx aurata (Linnaeus, 1758)		
	Eupteryx calcarata Ossiannillsson, 1936		
	Eupteryx cyclops Matsumura, 1906		
	Eupteryx florida Ribaut, 1936		
	Eupteryx notata Curtis, 1837		
	Eupteryx tenella (Fallén, 1806)		
	Eupteryx urticae (Fabricius, 1803)		
	***Euscelidius variegatus* (Kirschbaum, 1858)**	STOL[13#]; AY[11, 12]	
	Euscelidius schenckii (Kirschbaum, 1868)		
	***Euscelis incisus* (Kirschbaum, 1858)**	STOL[5*]; AY[11, 26]	AY[2]
	Evacanthus acuminatus (Fabricius, 1794)		STOL[23]
	Graphocraerus ventralis (Fallén, 1806)		
	***Hardya tenuis* (Germar, 1821)**	STOL[14]	

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Classification	Species	Confirmed vector	Insect bearing phytoplasma
Cicadellidae	*Jassargus obtusivalvis* (Kirschbaum, 1868)		AY[2, 4]
(continuation)	*Macropsis scutellata* (Boheman, 1845)		
	***Macrosteles laevis* (Ribaut, 1927)**	STOL[15]; AY[6*]	AY[2]
	Macrosteles ossiannilssoni Lindberg, 1954		
	***Macrosteles quadripunctulatus* (Kirschbaum, 1868)**	STOL[16], AY [6*, 11, 12]	
	Macrosteles sardus Ribaut, 1948		STOL[7]
	Macrosteles viridigriseus (Edwards, 1922)	AY[27*]	
	Mocuellus collinus (Boheman, 1850)		STOL[7], AY[4]
	Mocydia crocea (Herrich-Schäffer, 1837)		STOL[8], AY[4]
	Neoaliturus fenestratus (Herrich-Schäffer, 1834)	AY[17*]	STOL[7, 18]
	Ophiola decumana (Kontkanen, 1949)		AY[19]
	Platymetopius major (Kirschbaum, 1868)		
	Platymetopius rostratus (Herrich-Schäffer, 1834)		
	Psammotettix alienus (Dahlbom, 1850)		STOL[1]; AY[1, 7]
	Psammotettix confinis (Dahlbom, 1850)		AY[19]
	Psammotettix kolosvarensis (Matsumura, 1908)		STOL[7]
	Rhoananus hypochlorus (Fieber, 1869)		
	Stictocoris picturatus (C. Sahlberg, 1871)		
	Streptanus aemulans (Kirschbaum, 1868)		
	Streptanus sordidus (Zetterstedt, 1828)		
	Zyginidia pullula (Boheman, 1845)		
Cixiidae	*Cixius nervosus* (Linnaeus, 1758)		
	***Hyalesthes obsoletus* Signoret, 1865**	STOL[6*, 20]	
	***Reptalus panzeri* (P. Löw, 1883)**	STOL[1, 21]	
Cercopidae	*Cercopis sanguinolenta* (Scopoli, 1763)		
Delphacidae	*Asiraca clavicornis* (Fabricius, 1794)		
	Chloriona unicolor (Herrich-Schäffer, 1835)		
	Dicranotropis hamata (Boheman, 1847)		

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Classification	Species	Confirmed vector	Insect bearing phytoplasma
Delphacidae	*Javesella pellucida* (Fabricius, 1794)		AY[2]
(continuation)	*Laodelphax striatella* (Fallén, 1826)		STOL[8, 14], AY[2, 14]
	Megadelphax sordidula (Stål, 1853)		
	Ribautodelphax albostriata (Fieber, 1866)		
	Stenocranus minutus (Fabricius, 1787)		
Dictyopharidae	*Dictyophara europaea* (Linnaeus, 1767)		STOL[1]
	Stictocephala bisonia Kopp et Yonke, 1977		STOL[8]
Heteroptera			
Heterogastridae	*Heterogaster urticae* (Fabricius, 1775)		
Miridae	*Adelphocoris lineolatus* (Goeze, 1778)		
	Apolygus lucorum (Meyer-Dür, 1843)		
	Brachycoleus decolor Reuter, 1887		
	Chlamydatus pullus (Reuter, 1871)		
	Halticus apterus (Linnaeus, 1761)		
	Liocoris tripustulatus (Fabricius, 1781)		
	Lygus pratensis (Linnaeus, 1758)		STOL[22]
	Lygus rugulipennis Poppius, 1911		STOL[2, 22]
	Orthops basalis (Costa, 1852)		
	Trigonotylus caelestialium (Kirkaldy, 1902)		
Rhyparochromidae	*Megalonotus sabulicola* (Thomson, 1870)		
Psylloidea			
Aphalaridae	*Aphalara avicularis* Ossiannilsson, 1981		
	Aphalara freji Burckhardt & Lauterer, 1997		
	Aphalara maculipennis Löw, 1886		
Triozidae	*Bactericera nigricornis* (Förster, 1848)		
	Heterotrioza chenopodii (Reuter, 1876)		
	Trioza urticae (Linnaeus, 1758)		

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STOL represents '*Ca*. P. solani'; AY represents '*Ca*. P. asteris'; confirmed '*Ca*. P. solani' vector marked in bold; # transmission assays to *in vitro* grapevine plants; *evaluation based on symptomatology without molecular pathogen characterisation

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Table S2. Phytoplasma detection in insects captured in Perná vineyard

Clasification	Species	Number of collected adults	Number of PCR positive/ analysed adults	Phytoplasma identified	Number of collected larvae	Number of PCR positive/ analysed larvae	Phytoplasma identified
Auchenorrhyncha							
Aphrophoridae	*Philaenus spumarius* (Linnaeus, 1758)	1	0/1		0		
Cicadellidae	*Agallia consobrina* Curtis, 1833	2	0/2		0		
	***Anaceratagallia ribauti* (Ossiannilsson, 1938)**	102	26/102	3× AY-F 23× STOL	8	0/4	
	***Aphrodes bicincta* (Schrank, 1776)**	3	nt		7	2/7	2× AY-F
	Aphrodes makarovi Zachvatkin, 1948	6	1/2	1× STOL	0		
	Chlorita paolii (Ossiannilsson,1939)	123	0/24		8	nt	
	Doratura homophyla (Flor, 1861)	65	8/31	3× AY-F* 5× STOL*	71	nt	
	Emelyanoviana mollicula (Boheman, 1845)	213	0/24		12	nt	

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Clasification	Species	Number of collected adults	Number of PCR positive/ analysed adults	Phytoplasma identified	Number of collected larvae	Number of PCR positive/ analysed larvae	Phytoplasma identified
Cicadellidae	***Empoasca decipiens* Paoli, 1930**	3	1/2	1× STOL			
(continuation)	*Empoasca pteridis* (Dahlbom, 1850)	165	7/20	7×STOL*	7	nt	
	Empoasca vitis (Goethe, 1875)	3	0/3		1	nt	
	Errastunus ocellaris (Fallén, 1806)	42	1/17	1× AY-F	6	nt	
	Eupteryx atropunctata (Goeze, 1778)	41	0/24		0		
	Eupteryx aurata (Linnaeus, 1758)	52	0/24		0		
	Eupteryx calcarata Ossiannillsson, 1936	95	0/21		0		
	Eupteryx urticae (Fabricius, 1803)	69	0/24		34	nt	
	***Euscelidius variegatus* (Kirschbaum, 1858)**	10	2/10	1× AY-F	14	nt	
				1× STOL			
	***Euscelis incisus* (Kirschbaum, 1858)**	5	2/4	2× STOL	2	nt	
	***Hardya tenuis* (Germar, 1821)**	1	nt				
	Jassargus obtusivalvis (Kirschbaum, 1868)	26	2/14	2× AY-F	18	0/6	
	***Macrosteles laevis* (Ribaut, 1927)**	25	0/21		1	nt	
	***Macrosteles quadripunctulatus* (Kirschbaum, 1868)**	64	5/24	4× AY-B	4	nt	
				1× STOL			
	Macrosteles sardus Ribaut, 1948	2	0/1		0		
	Mocuellus collinus (Boheman, 1850)	51	17/36	4× AY-F			
				13× STOL			
	Mocydia crocea (Herrich-Schäffer, 1837)	5	1/5	1× STOL	2	0/2	
	Neoaliturus fenestratus (Herrich-Schäffer, 1834)	13	8/13	8× STOL	0		
	Ophiola decumana (Kontkanen, 1949)	37	2/24	2× STOL*	17	nt	
	Psammotettix alienus (Dahlbom, 1850)	54	3/24	3× AY-F	15	0/2	
	Psammotettix confinis (Dahlbom, 1850)	139	10/31	4× AY-F	6	nt	
				6× STOL*			
	Psammotettix kolosvarensis (Matsumura, 1908)	35	5/20	2× AY-B*	1	nt	
				3× AY-F			

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Clasification	Species	Number of collected adults	Number of PCR positive/ analysed adults	Phytoplasma identified	Number of collected larvae	Number of PCR positive/ analysed larvae	Phytoplasma identified
Cicadellidae	*Stictocoris picturatus* (C. Sahlberg, 1871)	9	0/7		3	nt	
(continuation)	*Streptanus aemulans* (Kirschbaum, 1868)	8	5/8	1× AY-B* 1× AY-F* 3× STOL*	25	8/11	8× AY
Cixiidae	***Hyalesthes obsoletus* (Signoret, 1865)**	146	64/146	64× STOL			
	***Reptalus panzeri* (P. Löw, 1883)**	4	0/1		0		
Delphacidae	*Dicranotropis hamata* (Boheman, 1847)	139	12/77	1× AY-C* 3× AY-F* 8× STOL*	57	nt	
	Javesella pellucida (Fabricius, 1794)	98	10/97	1× AY-C 8× AY-F 1× STOL*	0		
	Laodelphax striatella (Fallén, 1826)	51	1/40	1× AY-F	4	nt	
Dictyopharidae	*Dictyophara europaea* (Linnaeus, 1767)	8	0/2		4	1/3	1× STOL
Membracidae	*Stictocephala bisonia* Kopp et Yonke, 1977	18	2/13	2× STOL			
Heteroptera							
Miridae	*Adelphocoris lineolatus* (Goeze, 1778)	22	2/19	2× STOL*			
	Liocoris tripustulatus (Fabricius, 1781)	19	1/8	1× STOL*			
	Lygus pratensis (Linnaeus, 1758)	9	0/9				
	Lygus rugulipennis Poppius, 1911	69	12/26	12× STOL	7	nt	
Psylloidea							
Aphalaridae	*Aphalara avicularis* Ossiannilsson, 1981	449	5/43	5× STOL*	0		
	Aphalara maculipennis Löw, 1886	9	0/4		1	nt	
Triozidae	*Trioza urticae* (Linnaeus, 1758)	1832	1/82	1× STOL*	0		

nt – not tested; STOL – '*Candidatus* Phytoplasma solani'; AY – '*Canadidatus* Phytoplasma asteris', subgroubs marked by letters; *newly detected phytoplasma host in this work; confirmed '*Ca*. P. solani' vector in bold –confirmed '*Ca*. P. solani' vector to grapevine marked by grey background