

Emaraviruses affecting important deciduous tree species in Europe

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ABSTRACT

European mountain ash ringspot-associated virus (EMARaV) is the type member of the genus *Emaravirus* comprising plant viruses with a segmented ss(-)RNA genome mainly infecting woody hosts. Emaraviruses consists of at least four conserved monocistronic genome segments within the enveloped spherical particle, encoding the replicase (RNA1), a glycoprotein precursor (RNA2), the viral nucleocapsid protein (RNA3), and a movement protein (RNA4). Some members of the genus contain up to four additional genomic RNA molecules encoding proteins of unknown function. Emaraviruses have a narrow host range usually restricted to few related species. The symptoms induced by EMARaV include chlorotic ringspot, mottle of leaves and decline of *Sorbus aucuparia* (European mountain ash, syn. rowan). Other broad-leafed tree species exhibiting similar virus-like symptoms are known for decades, but no virus has been associated with the disease, yet.

Sorbus spp. were assessed for EMARaV infection by visual inspection and RT-PCR. Other deciduous tree species showing virus-like symptoms were investigated for plant virus infection applying next-generation RNA sequencing technologies in combination with RT-PCR. Chlorotic ringspots, mottle and dieback occur frequently throughout the *S. aucuparia* population in several European countries including natural stands, managed forest and urban areas (Roßbach *et al.*, 2015). EMARaV is closely associated with the observed disease as demonstrated by RT-PCR. The virus was also detectable in whitebeam species (*S. aria* and *S. intermedia*) with respective symptoms. Further, previously unknown RNA viruses were identified in different tree species showing chlorotic ringspots, line pattern and mottle of leaves. Sequence analyses revealed closest relationship to emaraviruses, but also suggest that these viruses are distinct species of the genus.

EMARaV is the main viral agent which affects rowans throughout Europe and is capable to infect other *Sorbus* species. Related plant viruses are able to infect other broad-leafed tree species in Europe and some of them are also abundant in its respective host tree species. Thus, members of the genus *Emaravirus* have to be considered as relevant pathogens of woody species and need to be included into health management strategies of deciduous trees.

References

Roßbach J, Dieckmann HL, Büttner T, Mühlbach H-P, von Barges S, Büttner C. 2015. *Forests* 6: 4072-4087.