

**PITTOSPORUM PSYLLID *TRIOZA VITREORADIATA*
(HEMIPTERA: TRIOZIDAE) EXPANDING DISTRIBUTION
AND HOST RANGE IN THE UK**

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ABSTRACT

The pitosporum psyllid *Trioza vitreoradiata* (Maskell) (Hemiptera: Triozidae), an insect native to New Zealand, became established in south west England in 1993. It has since spread to many regions where its host plants (*Pittosporum* spp.) can be grown in England, Scotland and the Republic of Ireland. It has been recorded feeding on eight species of *Pittosporum*, including some that are not native to New Zealand, indicating that it may be able to damage a wide range of *Pittosporum* species. The effect *T. vitreoradiata* is having on the horticultural trade in the UK is discussed.

INTRODUCTION

The occurrence of pitosporum psyllid or pitosporum sucker *Trioza vitreoradiata* (Maskell) (Hemiptera: Psylloidea: Triozidae) in the UK is the first outside its native country of New Zealand. The first published record of this psyllid in the UK was from St Mawes, Cornwall in July 1993 (Martin & Malumphy, 1995). However, it is likely that the first discovery of *T. vitreoradiata* was from the Isles of Scilly earlier in 1993 (Andrew Tompsett, *pers. comm.*). By the end of 1994 it was found to be widespread in Cornwall and the Isles of Scilly (Martin & Malumphy, 1995). *Trioza vitreoradiata* can damage *Pittosporum* (Pittosporaceae) plants grown commercially, ornamentally or occasionally as a wind break, by leaf distortion and the production of honeydew and subsequent growth of sooty moulds. It is the only psyllid that feeds on *Pittosporum* currently found in the UK (Martin & Malumphy, 1995).

The presence of *T. vitreoradiata* can easily be detected by conspicuous shallow pit galls, caused by the feeding activity of the nymphs, these pits remain green as the leaf develops (Plate 5, Fig. 1). The eggs are attached to leaf surfaces by a short basal stalk; they are shiny white or yellowish and approximately 0.35mm long with an apical spine (Plate 5, Fig. 2). The dorsally flattened nymphs are usually bright green, but darken as they mature and are marginally fringed with short, fine glassy wax rods (Plate 5, Figs 3–4). The winged adults are yellowish-green and are 3–4mm in length (Plate 5, Fig. 5). Extensive notes on identification, including additional couplets to published keys to British Psylloidea (Hodkinson & White, 1979; White & Hodkinson, 1982) are given in Martin & Malumphy (1995). In New Zealand *T. vitreoradiata* overwinters as an adult, the females laying eggs in the spring. The complete lifecycle of this sexually reproducing species takes 60 days or more and the species can have up to five generations a year (Carter, 1949; Harrison, 1976; Martin, 2010). In Britain, it appears to be able to breed throughout the year on *Pittosporum* grown indoors and all developmental stages may be found during the winter months (C. Malumphy, *pers. observ.*).

Between 1993 and the end of 2010 more than 40 verified reports of *T. vitreoradiata* had been received by the Royal Horticultural Society (RHS) and Food and Environment Research Agency (Fera), enabling the updated distribution, host range

and assessment of the economic impact of *T. vitreoradiata* in the UK and the Republic of Ireland presented here.

DISTRIBUTION IN BRITAIN AND IRELAND

Since 1993 41 verified reports of *T. vitreoradiata* have been received by the RHS and Fera (Fig. 1). The first published report was from St Mawes, Cornwall in August 1993, although it is now thought that *T. vitreoradiata* was first detected on the Isles of Scilly in June 1993 where the heavy infestations indicated that it may have been present for several years. By 1995 *T. vitreoradiata* had been found in several locations in Cornwall and the Isles of Scilly (Martin & Malumphy, 1995). The psyllid continued to be reported from Cornwall, the most recent report being Newquay 2008. It was reported outside Cornwall for the first time in 1998 at East Budleigh, Devon (11/1998), and was reported outside south west England in March 2002, when

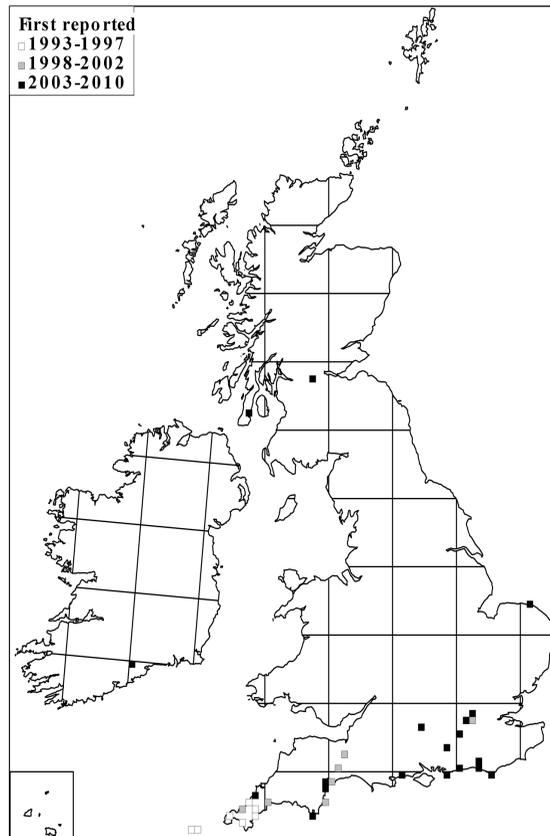


Fig. 1. *Pittosporum* psyllid, *Triosa vitreoradiata* distribution in Britain and Ireland. 10 km dots. RHS and Fera data (January 2011) produced using Dmap. This data will be made available via the National Biodiversity Network (www.nbn.org.uk).

a sample was received by the RHS from Kingston on Thames, Surrey. By the end of 2010 *T. vitreoradiata* had become widespread in southern England, broadly under a line between the Severn and Thames estuaries. Outside this area a single report has been received from Sheringham, Norfolk (11/2008). *Pittosporum* psyllid has been reported twice from Scotland, Campbeltown, Kintyre (02/2005) and Kilsyth, Stirlingshire (02/2009).

The psyllid was recorded in the Republic of Ireland at Cappoquin, Co. Wicklow on a commercial nursery in 2003 (O'Connor, Dunne, & Whelton, 2004). It was found in a botanical garden on Batz Island, off the coast of Normandy, France in 2007, where it had probably been present since 2005; and soon after was found near Roscoff and St. Pol-de-Leon on the French mainland (Cocquempot, 2008). Some of the localised spread of this psyllid is likely to be due to natural movement, *T. vitreoradiata* is a poor flier but excellent jumper (Malumphy, Cheek, & Martin, 1994). Over greater distances spread is more likely by the movement of infested host plants. In some cases the psyllid has been found on plants that had recently been imported from elsewhere in Europe; from France (Hassocks, West Sussex, 06/2005; Liphook, Hants, 08/2010) and possibly from The Netherlands (Kilsyth, Stirlingshire, 02/2009). However, *T. vitreoradiata* has not yet been reported from The Netherlands (Misfud *et al.*, 2010).

HOST RANGE

Trioxa vitreoradiata is almost exclusively found on species of *Pittosporum* (Pittosporaceae), although it has been reported on *Hymenosporum flavum* Muell (Pittosporaceae) and *Feijoa sellowiana* (Berg) (Myrtaceae) in New Zealand (Martin & Malumphy, 1995). However, *H. flavum* is considered a very rare host and reports on *F. sellowiana* remain unsubstantiated (Martin, 2010). It has been recorded colonizing *P. colensoi* Hook, *P. crassifolium* Banks & Sol, *P. ellipticum* Kirk, *P. eugenioides* Cunn, *P. fairchildii* Cheeseman and *P. tenuifolium* Gaertn in New Zealand (Carter, 1949, Tuthill, 1952; Harrison, 1976; Martin, 2010). Martin & Malumphy (1995) reported that in Britain *T. vitreoradiata* had been found feeding on *P. crassifolium*, *P. tenuifolium* and

Table 1. Host records of the *Pittosporum* psyllid (*Trioxa vitreoradiata*) reported in the UK (1993–2010, based on RHS and Fera data). Some infestations are on more than one host plant at a site.

Host	No. of reports	Frost Hardiness	Origin
<i>Pittosporum</i> spp.	19	Frost hardy to frost tender*	
<i>P. crassifolium</i> Banks & Sol.	3	Frost hardy, can withstand temperatures down to -5°C^*	New Zealand
<i>P. omeiense</i> Chang & Yan	1	Probably frost hardy**	China
<i>P. tenuifolium</i> Gaertn	2	Frost hardy, can withstand temperatures down to -5°C^*	New Zealand
<i>P. tobira</i> (Thunb.)	16	Half hardy, can withstand temperatures down to 0°C^*	China, Korea, Japan
<i>P. undulatum</i> Vent	1	Half hardy, can withstand temperatures down to 0°C^*	Australia

*Brickell (2008). **A small group of this species has been grown outdoors in a reasonably sheltered position at RHS Garden Wisley, Surrey since 1998. They have never shown any damage from frost (J. Armitage, *pers comm.*).

P. tobira (Thunb.). Reports received between 1995 and 2010 add *P. omeiense* Chang & Yan and *P. undulatum* Vent to the list of host plants (Table 1).

The genus *Pittosporum* contains approximately 200 species and the group is primarily native to Australasia, but some species are native to southern Africa and South East Asia (Brickell, 2008). In the UK and Ireland they are grown primarily as ornamental plants, in private gardens and for landscaping schemes, and as a foliage plant for the cut flower industry. *Pittosporum crassifolium* is naturalised in the Isles of Scilly, where it is often used as a windbreak (Martin & Malumphy, 1995). Three of the species (*P. omeiense*, *P. tobira* and *P. undulatum*) on which *T. vitreoradiata* has now been recorded in the UK are not plants native to New Zealand (Table 1). This may indicate that more plants in the genus *Pittosporum* are potential hosts for this insect.

Pittosporum species are frost hardy to frost tender, with frost tender species able to withstand short spells at temperatures below 0°C, provided the wood has been well ripened during the summer (Brickell, 2008; Table 1). Considering average minimum winter temperatures given in Brickell (2008), some species of *Pittosporum* can be grown out of doors throughout much of southern England (broadly in a line between the Severn and Thames estuaries) and most of the coastal regions of England and Wales. In Scotland *Pittosporum* should survive in the south west coastal areas and the central region between the Firth of Forth and Firth of Clyde; in the Republic of Ireland in parts of the south and west. The fact that all UK and Ireland records of *T. vitreoradiata* are within these regions indicates that it may be able to establish anywhere that it is currently possible to grow *Pittosporum* out of doors.

NATURAL ENEMIES

In New Zealand predation of *T. vitreoradiata* has been observed by lacewings (Neuroptera: Hemerobiidae), predatory bugs (Hemiptera: Miridae) and several species of ladybird (Coleoptera: Coccinellidae), including the two-spotted ladybird *Adalia bipunctata* (L.), a UK native species (Carter, 1949; Martin, 2010). However, predation has not yet been documented in the UK.

In New Zealand two species of parasitoid wasp (Hymenoptera) have been reared from *T. vitreoradiata* nymphs; an undescribed species in the family Encyrtidae (Carter, 1949) and a *Tamarixia* sp. (Eulophidae). The *Tamarixia* sp. was first found in 1997 and is now very common in Auckland, where high levels of parasitism can occur in the autumn (Martin, 2010). A sample containing a high level of parasitised nymphs, from which the adult wasps had emerged or the pupae were dead (Plate 5, Fig. 4), has been received by Fera from a commercial nursery in West Sussex, UK (08/2010); however as no adult wasps were available no identification was possible. The plants, and presumably the parasitoids, were imported from France.

DISCUSSION

It is clear that *Trioza vitreoradiata* is established in the UK and the Republic of Ireland, where it may be able to infest its host plants wherever they can be grown (i.e. in areas where the minimum winter temperature is rarely lower than -5°C). *Trioza vitreoradiata* has been found on *Pittosporum* species that do not originate from the pest's native New Zealand, and it is possible that *T. vitreoradiata* is able to feed on additional *Pittosporum* species to those listed.

The impact this pest has on plants has several elements. There is a direct loss to the plant by sap depletion, especially by the later nymphal instars. Young leaves react to the pest's feeding by forming shallow pit galls. These remain green and so may not

adversely affect photosynthesis, but as these leaves remain puckered and distorted, the aesthetic properties of the plant are diminished. The nymphs and adults excrete honeydew and sooty mould often grows upon it, giving the plants a black powdery appearance (Harrison, 1976). This damage will further reduce the aesthetic value of Pittosporums, both in private gardens and amenity plantings, and there may also be an increase in insecticide usage on what were previously relatively pest-free plants. Martin & Malumphy (1995) listed the economic effects of *T. vitreoradiata* damage to foliage of *P. tenuifolium* grown for use in the cut-flower industry, and noted that reduced vigour of *P. crassifolium* may diminish its effectiveness as a windbreak plant on the Isles of Scilly. In addition it is likely that there will also be some reduction in sales or the value of nursery stock at garden retail outlets and commercial nurseries. During 2010 outbreaks in commercial nurseries in Surrey and West Sussex caused severe economic damage to *Pittosporum* used for landscaping (Fera data). For example, at one nursery 300 × 25L and 300 × 10L plants with a retail value of £17,000 were all infested with pittosporum psyllid (and low numbers of cottony camellia scale *Pulvinaria floccifera* (Westwood) (Hemiptera: Coccidae)) and were unusable.

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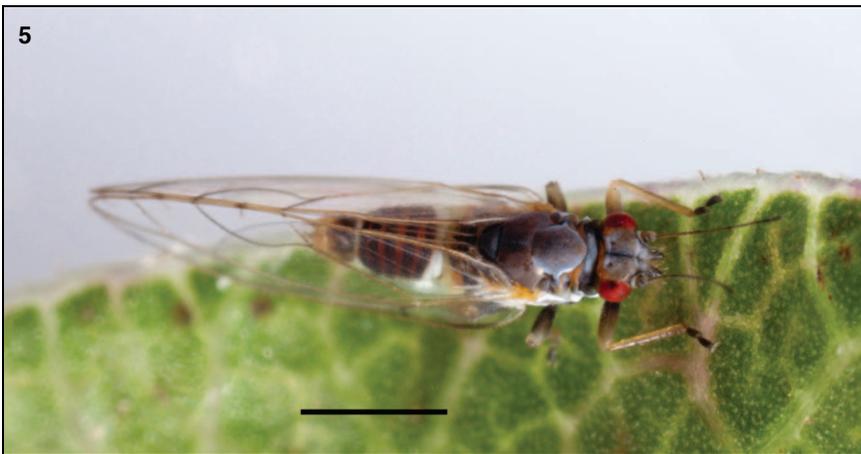
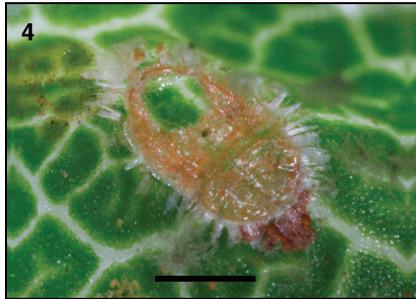


PLATE 5. Figs 1–5. *Pittozorium* psyllid *Trioza vitreoradiata*. 1: Foliage, upper and lower leaves showing pittozorium psyllid damage; 2: eggs; 3: nymph; 4: nymph with hymenopterous parasitoid emergence hole; 5: adult. Scale bar = 1mm. © Fera.