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Literature review of thrips species recorded in New Zealand and Japan

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A report prepared for
South Island Asparagus Growers Association

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Contents

1 Executive summary

The South Island Asparagus Growers Association requested a literature review of thrips species recorded in New Zealand and Japan to determine whether the same species occur in both countries**.** If the same species do occur in both countries, market access of asparagus exported to Japan could be improved. At present, asparagus for export to Japan must be fumigated if any live thrips are found.

A literature search using the resources available at Crop & Food Research was undertaken to list the species of thrips recorded in New Zealand and Japan**.** Electronic databases including CAB abstracts, MAF PPIN, the Crop Protection Compendium, and the internet were searched for records of thrips species found on asparagus.

Based on the present literature review and internet search, more than 400 species of thrips have been recorded in New Zealand (121 species) and Japan (330 species). Fewer than 6% of these species have been found in both countries. Of the 96 species in New Zealand but not Japan, six have been reported on asparagus. One species, *Apterygothrips collyerae,* was recorded in the MAF PPIN database, so there is no information about its abundance on asparagus spears. The other species were recorded from asparagus spears and/or sticky traps in crops grown in the Waikato (Townsend & Watson 1984). Their abundance on asparagus depended on the amount of weeds present in the asparagus crop (Townsend & Watson 1984). The wingless species, *Apterothrips apteris*, was the most abundant, making up 5 to 34% of total thrips recorded on asparagus spears, followed by *Thrips obscuratus* with 2 to 8% of total thrips. *Tenothrips frici* was not found on asparagus spears but was captured on sticky traps in the asparagus crops (2 to 8% of total thrips). *Desmidothrips walkerae* and *Limothrips cerealium* were recorded at <1% of total thrips, but Townsend & Watson do not state whether they were found in asparagus spears and/or sticky traps. However, *Limothrips cerealium* is also recorded on the PPIN database as having been found on asparagus spears.

The thrips fauna in New Zealand differs quite markedly from those species recorded in Japan so far. Consequently, thrips must be reduced in numbers or eliminated from asparagus exported from New Zealand to Japan in order to maintain market access.

2 Introduction

Asparagus exported to Japan can be contaminated with thrips. Thrips are extremely small (less than 3 mm) slender insects that can secret themselves within the bracts of asparagus spears. Shipments of asparagus are inspected for thrips and if any live thrips are found the shipment may have to be fumigated.

The South Island Asparagus Growers Association requested a literature review of thrips species recorded in New Zealand and Japan in order to determine whether the same species occur in both countries. If the same species occur, then it could be argued that fumigation may be unnecessary.

2.1 Thrips taxonomy

The order Thysanoptera, commonly referred to as thrips, is divided into two main groups or suborders, the Terebrantia and the Tubilifera. Within these two suborders there are over 5500 described species of an estimated 8000 extant species of thrips worldwide (Morse & Hoddle 2006). Around 1% of the described species are considered serious pests (Morse & Hoddle 2006). Most of these pest species are in the Thripidae family, within the Terebrantia suborder.

Mound (2005) has described species identification as a matter of prediction, so the more information available, the more accurate the prediction. New Zealand is considered to have a well described thrips fauna compared with Japan (Okajima 2006), so identifying species in New Zealand is considered relatively straightforward. Although substantially more than 200 species of thrips have been recorded in Japan, there could be more than twice this number (Okajima 2006).

Since Mound & Walker (1982, 1986) undertook a study of New Zealand thrips in the early to mid 1980s, there have been few corrections or additions to the thrips fauna. Only two species have been added, one a species new to New Zealand (*Frankliniella intonsa*) (Gill 2002), and a completely new species (*Thrips martini*) (PlantSynz 2007). Conversely, a recent publication of Tubilifera in Japan has described 4 new genera and 71 new species, with 13 genera and 28 species recorded from Japan for the first time (Okajima 2006). Unfortunately there is no equivalent body of work for Terebrantia species in Japan.

2.2 Objectives

The objective of this project was to determine whether the same species of thrips occur in both New Zealand and Japan, with particular reference to species that have been found on asparagus in New Zealand and/or Japan. Reports of species of thrips found on asparagus in other countries were also investigated to determine whether species present in New Zealand or Japan may occur on asparagus even if they have not been reported as such.

3 Methods

A literature review was undertaken using the resources available at Crop & Food Research, including: the electronic database CAB Abstracts; the library interloan system to obtain key references from within New Zealand and overseas; the MAF PPIN (Ministry of Agriculture and Fisheries, Plant Pest Information Network) database; the Crop Protection Compendium (CAB International 2005); PlantSynz database (Crop & Food Research) and the internet**.** Species names were confirmed using the Thysanoptera world check list database (www.ento.csiro.au/thysanoptera/worldthrips.html).

CAB Abstracts is produced by CABI Publishing and provides a comprehensive source of international research information in agriculture, environment and all related applied science disciplines, including coverage of global journal articles, academic books, abstracts, published theses, conference proceedings, bulletins, monographs and technical reports from over 140 countries in 50 languages. CAB Abstracts contains more than 4.9 million records dating back to 1973, with more than 200 000 records added each year, and is updated monthly.

The MAF PPIN database is a national database and scientific network for the collection, collation, management and dissemination of plant pest surveillance information (Beal 1997). It holds records of pest/organism occurrence, their hosts and distribution, including fungi, bacteria, viruses, nematodes, and insects. Currently PPIN holds over 6000 association records and 7000 observation records for main import/export crops. MAF Quality Management (MQM) maintains PPIN on behalf of the MAF Regulatory Authority (MAF RA) (Beal 1997).

Plant-SyNZ™, pronounced plant signs, is the short name for a database of invertebrate herbivores found on New Zealand plants and provides a new tool for assessing the biodiversity of insect and mite herbivores on native plants. It was developed and is administered by Crop & Food Research.

The Crop Protection Compendium, published by CAB International, is a database that contains over 2350 pest and natural enemy species of worldwide or regional importance, as well as data for more than 300 crops and trees of 150 countries.

The Thysanoptera world check list includes about 7400 species-group and 1200 genus-group names, together with their authors and dates of publication; among these are many names placed into synonymy. The list is “live” with further data and extensive nomenclatural references being added regularly. This electronic checklist is maintained at CSIRO Entomology, Canberra by Laurence Mound. It is derived from card-catalogues maintained over many years at the Natural History Museum, London. Data has been cross-checked with card-catalogues developed by Richard zur Strassen at the Senckenberg Museum, Frankfurt. The major thrips collections in Frankfurt, London and Washington DC were also visited for final confirmation of thrips species identification.

4 Results

Based on the present literature review and internet search, there is a total of 121 species of thrips recorded in New Zealand (53 Terebrantia and 68 Tubilifera; Mound & Walker 1982, 1986,). In Japan, 330 species have been reported, with 90 from the Terebrantia suborder and 240 from the Tubilifera suborder (Miyazaki & Kudo 1988; Okajima 2006). New Zealand and Japan have 25 thrips species in common (18 Terebrantia, seven Tubilfera). The 96 species of thrips recorded in New Zealand, but not Japan are listed in Table 1, along with their geographical distribution, and potential hosts and/or habitats. Of these 96 species, 19 Terebrantia and 41 Tubilifera have been found in New Zealand only (Mound & Walker 1982, 1986). The majority of tubiliferan species only found in New Zealand feed on fungus or have been found in leaf litter of associated with grasses. Two terebrantian species, *Thrips martini* and *T. obscuratus,* are described as polyphagous herbivores of both introduced and native plant species.

Twenty-three species recorded from New Zealand and/or Japan have been reported to occur on asparagus (Table 2). Six of these species are found in New Zealand but not Japan, and comprise five Terebrantia species (*Apterothrips apteris*, *Desmidothrips walkerae, Limothrips cerealium*, *Tenothrips frici*, *Thrips obscuratus*) and one tubilifera species (*Apterygothrips collyerae*) (Townsend & Watson 1984; MAF PPIN database 2007).

Reports of species on asparagus present in Japan, but not New Zealand, were from studies in countries other than Japan (Tong 1976; Chen 1981; Lewis 1997). Additionally, three species not yet found in New Zealand or Japan (*Thrips angusticeps* Uzel, *Scirtothrips aurantii* Faure, and *Frankliniella tritici* (Fitch)) have been found on asparagus elsewhere (Tarasco 2001; CAB International 2005).

4.1 Species reported on asparagus in New Zealand but not in Japan

Apterothrips apteris was reported on asparagus spears in New Zealand by Townsend & Watson (1984) after they undertook a survey of thrips on asparagus grown in the Waikato. This species made up 5 to 34% of 411 thrips found on over 3700 asparagus spears examined by Townsend & Watson. This wingless species may have originated in California, where it apparently breeds primarily on *Erigeron*. Mound & Walker (1982) originally identified this species in New Zealand as *Apterothrips seticornis*, but it was recently redescribed as *A. apteris* by MAF scientists (N Martin, pers. comm.). It is widespread southwards from California down the western coast of South America to the Falkland Islands, and across the southern ocean to Western Australia, Tasmania, and New Zealand (Moritz et al. 2004). This species is abundant on grasses from central Chile to southern South America, is sometimes a pest of lucerne (*Medicago sativa*) in Australia and New Zealand, and has been found damaging garlic (*Allium sativum*) leaves in Tasmania (Moritz et al. 2004).

Desmidothrips walkerae was reported by Townsend & Watson (1984) to make up less than 1% of total thrips found on asparagus spears. However, they did not state whether this was on asparagus spears or on sticky traps within the asparagus crops surveyed. Mound & Walker (1982) reported specimens of this species on flowers of *Hebe strcta* along with large numbers of *Thrips obscuratus*, which they suggested were prey of *D. walkerae*. Other specimens were found in leaf litter or from foliage of *Muehlenbeckia, Coprosma, Leptopermum ericoides* and *L. scoparium*. There are no records of it being found outside New Zealand.

Limothrips cerealium, the cereal thrips, was also reported by Townsend & Watson (1984) to make up less than 1% of total thrips found on asparagus spears. However, as with *Desmidothrips walkerae*, they did not state whether this was on asparagus spears or on sticky traps within the asparagus crops surveyed. This species was also on the MAF PPIN database listed under insect species found on asparagus. The MAF PPIN database records the presence of insects, pathogens, etc., but does not report on abundance, so we do not know how frequently it may occur on asparagus. This species is likely to have evolved in Europe, and is now widespread in many temperate areas, including New Zealand, but not Japan. It breeds on the leaves and in the florets of grasses and cereals and sometimes causes yield reductions in cereal crops. It can also reduce germination of barley seed produced for the brewing industry (Moritz et al. 2004).

Tenothrips frici was recorded by Townsend & Watson (1984) on sticky traps placed within asparagus crops (3 to 4% of 3033 thrips collected on a total of 45 sticky traps), but was not found on asparagus spears. It is reported to breed in the flowers of various Compositae (Moritz et al. 2004). This species is native to eastern and southern Europe. It was introduced to New Zealand and Australia where it is frequently abundant, and is also found in western USA, Hawaii, Argentina and the highlands of Colombia (Moritz et al. 2004). Mound & Walker (1982) previously identified this species as *Ceratothrips frici*, which is now recognised as a synonym of *Tenothrips frici*.

Thrips obscuratus, the New Zealand flower thrips, is known only from New Zealand (Mound et al. 2004). It has not been reared on asparagus, but has been found on asparagus spears, making up 2 to 8% of the total thrips found on spears (Townsend & Watson 1984). It has been reared in New Zealand from the flowers of 51 different plant species in 44 genera and 22 families (Teulon & Penman 1990).

Apterygothrips collyerae was listed in the MAF PPIN database to have been found on asparagus spears. It is a predatory thrips that preys on the European red mite, *Panonychus ulmi* (Mound & Walker 1986). This thrips may be native to New Zealand, although it has been found in Tasmania, suggesting that it may be an immigrant either from Tasmania or elsewhere (Mound & Walker 1986).

Table 1: Thrips species recorded in New Zealand, but not in Japan, along with their geographical distribution and hosts and/or habitat if known. Information for Terebrantia species obtained from Mound & Walker (1982), and for Tubilfera species, from Mound & Walker (1986).

Thrips species; current name & authority	Geographic distribution	Hosts/habitat
Terebrantia		
Adelphithrips cassiniae Mound & Palmer	New Zealand	*Cassinia vauvilliersi*
Adelphithrips dolus Mound & Palmer	New Zealand	*Senecio stewartiae*
Adelphithrips nothofagi Mound & Palmer	New Zealand	*Nothofagous menziesii*, *N. solandri*
Anaphothrips dubius (Girault)	Australia, New Zealand	polyphagous herbivore/introduced plants
Anaphothrips varii Moulton	Australia, New Zealand	grasses
Anaphothrips woodi Pitkin	Australia, New Zealand	grasses/alpine grasslands
Anaphothrips zelandicus Mound	New Zealand	polyphagous herbivore/leaf litter, *Salicornia*
Anaphrygmothrips otagensis Mound & Walker	New Zealand	tussocks?
Apterothrips apteris (Daniel)	Pacifica, Australasia	*Erigeron*, lucerne, garlic, grasses
Ceratothrips ericae (Haliday)	Europe, Australia, New Zealand	Compositae, Ericaceae flowers
Dichromothrips spiranthidis (Bagnall)	Australia, New Zealand	orchid flowers
Dikrothrips diphyes Mound & Walker	New Zealand	*Nestegis montana, N. lanceolata*
Hercinothrips bicinctus (Bagnall)	Tropics, sub-tropics, Europe (glasshouses), New Zealand	polyphagous herbivore/ native plants
Karphothrips dugdalei Mound & Walker	New Zealand	grasses
Limothrips cerealium (Haliday)	Widespread temperate regions	grasses and cereals
Lomatothrips paryphis Mound & Walker	New Zealand	grasses or liliaceous plants
Merothrips brunneus Ward	New Zealand	leaf litter (fungus feeders)/native forests
Parabaliothrips montanus (Girault)	Australia, New Zealand	trees and shrubs
Pezothrips kellyanus (Bagnall)[1]	Europe, Australia, New Caledonia, New Zealand	polyphagous herbivore
Physemothrips chrysodermus Stannard	New Zealand	grasses

Thrips species; current name & authority	Geographic distribution	Hosts/habitat
Physemothrips hadrus Mound	New Zealand	grasses
Pseudanaphothrips achaetus (Bagnall)	Australia, New Zealand	polyphagous herbivore/pasures, alpine grasslands
Sigmothrips aotearoana Ward	New Zealand	polyphagous on native plants
Scirtothrips inermis Priesner	California, Canaray Islands, Australia, New Zealand	polyphagous herbivore
Scirtothrips pan Mound & Walker	New Zealand	oligophagous herbivore/native forest
Tenothrips frici (Uzel)	Europe, North & South America, Haiwaii, Australia, New Zealand	polyphagous herbivore
Thrips austellus Mound	New Zealand	native plants
Thrips coprosmae Mound	New Zealand	*Coprosmae robusta*
Thrips imaginis Bagnall	Australia, Pacifica Islands, New Zealand	polyphagous herbivore
Thrips martini Mound & Masumoto [2]	New Zealand	polyphagous herbivore
Thrips obscuratus (Crawford)	New Zealand	polyphagous herbivore
Thrips phormiicola Mound	New Zealand	*Phormium tenax, P. cookianum*
Thrips physapus Linnaeus	Europe, North America, New Zealand	polyphagous herbivore
Thrips vulgatissimus Haliday	Europe, North America, Australia, New Zealand	polyphagous herbivore
Tubilifera		
Anaglyptothrips dugdalei Mound & Palmer	New Zealand	grasses
Apterygothrips australis Pitkin	Australia, New Zealand	grasses
Apterygothrips collyerae Mound & Walker	Australia, New Zealand, possibly introduced from elsewhere?	predator
Apterygothrips kohai Mound & Walker	New Zealand	unknown
Apterygothrips sparsus Mound & Walker	New Zealand	grasses
Apterygothrips viretum Mound & Walker	New Zealand	grasses
Baenothrips moundi (Stannard)	Australia, New Zealand	grasses
Carientothrips badius (Hood)	Australia, New Zealand	grasses
Carientothrips loisthus Mound	Australia, New Zealand	grasses

Thrips species; current name & authority	Geographic distribution	Hosts/habitat
Cartomothrips manukae Stannard	Australia, New Zealand	fungus feeders
Cartomothrips neboissi Mound & Walker	Australia, New Zealand	fungus feeders
Cleistothrips idolothripoides Bagnall	New Zealand	unknown
Cryptothrips okiwiensis Mound & Walker	New Zealand	unknown
Deplorothrips bassus Mound & Walker	New Zealand	fungus feeders
Emprosthiothrips bogong Mound	Australia, New Zealand	leaf litter, grasses
Haplothrips (Trybomiella) salicorniae Mound & Walker	New Zealand, possibly introduced from elsewhere?	unknown
Heptathrips cottieri Mound & Walker	New Zealand	fungus feeders
Heptathrips cumberi Mound & Walker	New Zealand	fungus feeders
Heptathrips kuscheli Mound & Walker	New Zealand	fungus feeders
Heptathrips tillyardi Mound & Walker	New Zealand	fungus feeders
Heptathrips tonnoiri Moulton	New Zealand	fungus feeders
Hoplandrothrips bidens (Bagnall)	Europe, New Zealand	fungus feeders
Hoplandrothrips choritus Mound & Walker	New Zealand	fungus feeders
Hoplandrothrips ingenuus Mound & Walker	New Zealand	fungus feeders
Hoplandrothrips vernus Mound & Walker	New Zealand	fungus feeders
Hoplothrips anobii Mound & Walker	New Zealand	fungus feeders
Hoplothrips kea Mound & Walker	New Zealand	fungus feeders
Hoplothrips oudeus Mound & Walker	New Zealand	fungus feeders
Hoplothrips poultoni (Bagnall & Kelly)	Australia, New Zealand	fungus feeders
Idolothrips spectrum Haliday	Australia, New Zealand	fungus feeders
Lissothrips dentatus Mound & Walker	New Zealand	fungus feeders
Lissothrips dugdalei Mound & Walker	New Zealand	fungus feeders
Lissothrips gersoni Mound & Walker	New Zealand	fungus feeders
Macrophthalmothrips argus (Karny)	Hawaii, Australia, Tanzania, New Zealand	fungus feeders
Nesothrips alexandrae Mound & Walker	New Zealand	leaf litter, grasses
Nesothrips doulli (Mound)	New Zealand	leaf litter, grasses
Nesothrips eastopi (Mound)	New Zealand	leaf litter, grasses
Nesothrips pintadus Mound & Walker		
Nesothrips propinquus (Bagnall)	South Africa, Australia, New Zealand	grasses
Nesothrips rangi Mound & Palmer	New Zealand	grasses

Thrips species; current name & authority	Geographic distribution	Hosts/habitat
Nesothrips zondagi (Mound)	New Zealand	grasses
Ozothrips eurytis Mound & Palmer	New Zealand	native plants
Ozothrips janus Mound & Palmer	New Zealand	grasses
Ozothrips priscus Mound & Palmer	New Zealand	leaf litter
Ozothrips tubulatus Mound & Walker	New Zealand	leaf litter
Ozothrips vagus Mound & Walker	New Zealand	unknown
Priesneriella gnomus Mound & Palmer	New Zealand, possibly introduced from elsewhere?	unknown
Podothrips orarius Mound & Walker	New Zealand	grasses
Podothrips turangi Mound & Walker	New Zealand	grasses
Poecilothrips albopictus Uzel	Europe, North America, New Zealand	fungus feeders
Psalidothrips moeone Mound & Walker	New Zealand	leaf litter
Psalidothrips tane Mound & Walker	New Zealand	dead twigs
Psalidothrips taylori Mound & Walker	Australia, New Zealand	leaf litter
Sophiothrips aleurodisci Mound & Walker	New Zealand	fungus feeders
Sophiothrips duvali Mound & Walker	New Zealand	fungus feeders
Sophiothrips greensladei Mound & Walker	Australia, New Zealand	fungus feeders
Strepterothrips tuberculatus (Girault)	Australia, New Zealand	grasses
Teuchothrips annulosus (Priesner)	Australia, New Zealand	*Cassinia aculeata*
Teuchothrips disjunctus (Hood)	Australia, New Zealand	*Callistemon citrinus, C. teritifolius*
Walkerthrips neatus Mound & Walker	New Zealand	unknown
Yarnkothrips kolourus Mound & Walker	New Zealand	predator

[1] *Pezothrips kellyanus* information from Moritz et al. 2004.
[2] *Thrips martini* information from Plant Synz database, www.crop.cri.nz

Table 2: Species of thrips found on asparagus (Townsend & Watson 2004; MAF PPIN database; Tong 1976; Mau & Martin 1993) and presence of species in New Zealand (Mound & Walker 1982, 1986, Gill 2002, PlantSynz database) or Japan (Miyazaki & Kudo 1988; Okajima 2006) and confirmation of species name (Thysanoptera World checklist database). An "X" denotes the presence of the species in New Zealand and/or Japan.

Thrips species; current name & authority	New Zealand	Japan	References
Terebrantia			
Aeolothrips fasciatus Linnaeus	X	X	Miyazaki & Kudo 1988; Mound & Walker 1982; Townsend & Watson 1984
Anaphothrips obscurus (Müller)	X	X	Miyazaki & Kudo 1988 (no synonyms); Mound & Walker 1982; MAF PPIN database
Apterothrips apteris (Daniel)	X		Mound & Walker 1982 (first synonym); Thysanoptera world check list; Townsend & Watson 1984; MAF PPIN database
Aptinothrips rufus (Haliday)	X	X	Miyazaki & Kudo 1988 (no synonyms); Mound & Walker 1982; Townsend & Watson 1984; Thysanoptera world check list
Caliothrips fasciatus (Pergande)		X	Miyazaki & Kudo 1988; Harman et al. 2007; Thysanoptera world checklist
Chirothrips manicatus (Haliday)	X	X	Miyazaki & Kudo 1988 (no synonyms); Mound & Walker 1982; Townsend & Watson 1984; MAF PPIN database; Thysanoptera world check list
Desmidothrips walkerae Mound	X		Mound & Walker 1982, Twonsend & Watson 1984
Frankliniella intonsa (Trybom)	X	X	Miyazaki & Kudo 1988; Thysanoptera world checklist; Tong 1976
Frankliniella tenuicornis (Uzel)		X	Miyazaki & Kudo 1988 (no synonyms); Thysanoptera world checklist; Tong 1976
Limothrips cerealium (Haliday)	X		Mound & Walker 1982; Thysanoptera world check list; MAF PPIN database

Thrips species; current name & authority	New Zealand	Japan	References
Pseudodendrothrips mori (Niwa)		X	Miyazaki & Kudo 1988; Thysanoptera world checklist; Tong 1976
Scirtothrips dorsalis Hood		X	Miyazaki & Kudo 1988 (no synonyms); Thysanoptera world checklist; Tong 1976
Thrips australis (Bagnall)	X	X	Miyazaki & Kudo 1988 (first synonym); Thysanoptera world check list; Mound & Walker 1982; Townsend & Watson 1984
Thrips floreus Kurosawa		X	Miyazaki & Kudo 1988; Thysanoptera world checklist; Tong 1976
Thrips hawaiiensis (Morgan)	unlikely[1]	X	Miyazaki & Kudo 1988; Mound & Walker 1982 (no synonyms); Mau & Martin, 1993 (not on asparagus in NZ)
Thrips nigropilosus Uzel	X	X	Miyazaki & Kudo 1988 (no synonyms); Mound & Walker 1982 (no synonyms); Thysanoptera world check list; Townsend & Watson 1984; MAF PPIN database 2007
Thrips tabaci Lindeman	X	X	Miyazaki & Kudo 1988; Mound & Walker 1982 (no synonyms); Townsend & Watson 1984; Thysanoptera world check list
Tenothrips frici (Uzel)	X		Mound & Walker 1982 (first synonym); Thysanoptera world check list (not first synonym); Townsend & Watson 1984
Thrips obscuratus (Crawford)	X		Mound & Walker 1986; Thysanoptera world check list; Townsend & Watson 1984; MAF PPIN database
Tubilifera			
Apterygothrips collyerae Mound & Walker	X		Mound & Walker 1986; Thysanoptera world check list; MAF PPIN database
Haplothrips niger (Osborn)	X	X	Townsend & Watson 1984; Mound & Walker 1986; Miyazaki & Kudo 1988
Hoplothrips orientalis (Ananthakrishnan)	X	X	Mound & Walker 1986; Okajima 2006; MAF PPIN database 2007

[1] A single female specimen identified as *Thrips hawaiiensis* was reported from Campbell Island by Stannard in 1964 (Mound & Walker 1982). However this species is unlikely to survive in New Zealand, particularly the sub-Antarctic islands since it is widespread and abundant in tropical regions of the world.

5 Discussion and recommendations

The New Zealand thrips fauna is quite distinct from the thrips fauna found in Japan, with fewer than 6% of over 400 described species from both countries beingin common**.** Consequently, thrips will continue to be a quarantine issue for asparagus exported to Japan**.** Reducing or eliminating thrips in asparagus prior to and/or after harvest is likely to be the only way to ensure market access**.**

6 Acknowledgements

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