Vespula vulgaris 简体中文 正體中文

System: Terrestrial

Kingdom	Phylum	Class	Order	Family
Animalia	Arthropoda	Insecta	Hymenoptera	Vespidae

Common name common wasp (English), Gemeine Wespe (German), common yellowjacket (English, USA)

Synonym *Paravespula vulgaris*

Similar species

Summary Vespula vulgaris (the common wasp) nest underground and in the cavities of trees and buildings. In addition to causing painful stings to humans, they compete with other insects and birds for insect prey and sugar sources. They will also eat fruit crops and scavenge around rubbish bins and picnic sites.

view this species on IUCN Red List

Species Description
Distinguishing marks on workers include a black mark behind the eye on the side of the head; an anchor-shaped or dagger-shaped mark on the \"face\"; yellow pronotal bands which are almost parallel; black dots and rings on the abdomen, which are usually fused. Males can only be reliably distinguished by examining the aedeagus (part of the genitals) under a microscope.
Please see PaDIL (Pests and Diseases Image Library) Species Content Page Wasps: English wasp \r\n*Vespula vulgaris* (Linnaeus) for high quality diagnostic and overview images

Lifecycle Stages
Annual colonies initiated in spring by one queen. Colony expands through season and then produces sexual stages in autumn, before colony breaks down. In each cell of a new nest, the queen lays a single egg, which hatches into a larvae in 5 to 8 days. After five moults over about 90 days (the length of time spent in each stage is determined by environmental conditions), each larva spins a silken cap over the cell and pupates. After about 80 days an adult worker wasp emerges.

Reproduction
Sexual. Males and queens produced in late autumn. Fertilised queens overwinter, and then start a new colony in early spring. The queen produces sterile females, called workers, throughout the season.
c. 1000-2000 queens are produced per colony in autumn. Average colony density in New Zealand beech forest c. 12 per ha.

Nutrition
Common wasps collect protein and carbohydrate food. Honeydew and nectar are important food sources. They have a broad invertebrate diet with an emphasis on Diptera, Lepidoptera and Araneae. Notorious for their scavenging. *Vespula* wasps are also attracted to dead bait, such as chicken or fish meat (Toft and Harris 2004).

General Impacts
Wasps impact a range of human activities and values, from conservation, forestry, beekeeping and horticulture sectors to human-health. Wasp stings are painful, but can also be life-threatening. A small proportion of the population will have a severe allergic reaction (called anaphylactic shock), which can be fatal unless treated promptly (Landcare Research 2007).\r\n
In forests, wasps may eat huge numbers of native insects and consume large quantities of sugary honeydew. By eating so much, wasps take potential food sources away from native species and disrupt the natural food chain and ecosystem cycling of the forest (Landcare Research 2007). To elaborate, in temperate beech forests in the South Island of New Zealand honeydew drops produced by beech scale insects (*Ultracoelostoma assimile*) feeding on beech trees (*Nothofagus*) are collected by introduced wasp species: the German wasp (*Vespula germanica*) and the common wasp (*V. vulgaris*). Moller and colleagues found that in relation to cropping by native honeyeater birds and native insects, cropping by German wasps and particularly by common wasps, significantly reduces the number, size and sugar concentration of honeydew drops (by up to 99.1%) in the summer and autumn months. Removal of the honeydew by the introduced social wasps threatens the existence of some New Zealand native animals (Moller *et al*. 1991).\r\n

Wasps bring with them a financial burden. They are economic pests of primary industries such as beekeeping, forestry and horticulture (Beggs 2000). Wasps totally destroy or seriously affect 10% of beehives, which translates to a significant financial loss (Clapperton *et al*. 1989). Beehives are often placed near honeydew forests or other unique sources of nectar to produce strong-flavoured honey. However, wasps can reduce honey production by reducing nectar and honeydew supplies and cause honeybees to stay in the hive to conserve energy and protect the hive from raiding wasps (Landcare Research 2007).

Management Info
Please follow this link for detailed information on the control and management of *Vespula vulgaris*

Pathway
Queen wasps stowaway in human goods and accidentally transported.

Principal source:

Compiler: Jacqueline Beggs, School of Biological Sciences. Tamaki Campus, University of Auckland. New Zealand & IUCN/SSC Invasive Species Specialist Group (ISSG)

Review: Jacqueline Beggs, School of Biological Sciences. Tamaki Campus, University of Auckland. New Zealand.

Pubblication date: 2009-05-31

ALIEN RANGE

[2] AUSTRALIA
[1] NEW ZEALAND
[1] UNITED STATES
[1] ICELAND
[1] SAINT HELENA

Red List assessed species 1: EN = 1;

Nestor meridionalis **EN**

BIBLIOGRAPHY
91 references found for **Vespula vulgaris**

Managment information
Beggs, J. R. 1999. The ecological impact and control of introduced wasps (*Vespula* spp) in Nothofagus forest. Unpubl. PhD thesis, University of Otago, Dunedin, New Zealand. 197 pp.

Beggs, J.R. (2001). The ecological consequences of social wasps (*Vespula* spp.) invading an ecosystem that has an abundant carbohydrate resource. *Biological Conservation 99*: 17-28.
Beggs, J. R., Alspach, P. A., Moller, H., Toft, R. J. and Tilley, J. A. V. 1992. Impacts of the parasitoid *Sphecophaga vesparum* on colonies of the common wasp (*Vespula vulgaris*). Proceedings 41st Annual Conference Entomological Society of New Zealand.
Beggs, J. R. and Harris, R. J. 2000. Can the wasp parasitoid *Sphecophaga vesparum* significantly reduce the density of Vespula wasps? New Zealand Journal of Zoology 27: 73-74.
Beggs, J. R. in press. Impact and control of introduced Vespula wasps in New Zealand. Proceedings of the 4th International Hymenoptera Conference. CSIRO.
Beggs, J.R., Rees, J.S., Toft, R.J., Dennis, T.E. & Barlow, N.D. (2008). Evaluating the impact of a biological control parasitoid on invasive *Vespula* wasps in a natural forest ecosystem. *Biological Control 44*: 399–407.
Summary:
Beggs, J. R., Toft, R. J., Malham, J. P., Rees, J. S., Tilley, J. A. V., Moller, H. and Alspach, P. 1998. The difficulty of reducing introduced wasp (*Vespula vulgaris*) populations for conservation gains. New Zealand Journal of Ecology 22: 55-63.
Donovan, B. D. 1991. Life cycle of *Sphecophaga vesparum* (Curtis) (Hymenoptera:Ichneumonidae), a parasitoid of some vespid wasps. New Zealand Journal of Zoology 18: 181-192.
Donovan, B. J. 1989. Potential enemies of the introduced wasp parasitoid *Sphecophaga vesparum* (Hymneoptera:Ichneumonidae) in New Zealand. New Zealand Journal of Zoology 16: 365-367.
Donovan, B. J. and Read, P. E. C. 1987. Attempted biological control of social wasps, *Vespula* spp., (Hymenoptera:Vespidae) with Sphecophaga vesparum (Curtis) (Hymenoptera:Ichneumonidae) in New Zealand. New Zealand Journal of Zoology 14: 329-335.
Donovan, B. J., Moller, H., Plunkett, G. M., Read, P. E. C. and Tilley, J. A. V. 1989. Release and recovery of the introduced wasp parasitoid, Sphecophaga vesparum vesparum (Curtis) (Hymenoptera:Ichneumonidae) in New Zealand. New Zealand Journal of Zoology 16: 121-125.
Glare, T. R., Harris, R. J. and Donovan, B. J. 1996. Aspergillus flavus as a pathogen of wasps, Vespula spp., in New Zealand. New Zealand Journal of Zoology 23: 339-344.
Harcourt, S. J., Harris, R. J., Rose, E. A. F., Glare, T. R. and Nelson, T. L. 1997. The potential of Beauveria bassiana for the control of common and German wasps (Vespula vulgaris L. and V. germanica F.) in New Zealand. Proceedings of 4th international workshop on microbial control of soil dwelling pests.
Harris, R J. and P.E.C. Read., 1999. Enhanced biological control of wasps. SCIENCE FOR CONSERVATION 115
Summary: Available from: http://www.doc.govt.nz/upload/documents/science-and-technical/Sfc115.pdf [Accessed 18 February 2008]
Harris, R. J. and Read, P. E. C. 1999. Enhanced biological control of wasps. Science for conservation 115: 39pp.
Harris, R. J and Rose, E. A. F. 1999. Factors influencing reproductive strategies of the vespid parasitoid *Sphecocphaga vesparum vesparum* (Hymenoptera: Ichneumonidae). New Zealand Journal of Zoology 26: 89-96.
Summary: Available from: http://www.rsnz.org/publish/nzjz/1999/10.php [Accessed 18 February 2008]
Harris, R.J. & Etheridge, N.D. (2001). Comparison of baits containing fipronil and sulfluramid for the control of *Vespula* wasps. *New Zealand Journal of Zoology 28*: 39-48.
Harris, R. J., Harcourt, S. J., Glare, T. R., Rose, E. A. F. and Nelson, T. L. 2000. Susceptibility of *Vespula vulgaris* (Hymenoptera: Vespidae) to generalist entomopathogenic fungi and their potential for wasp control. Journal of Invertebrate Pathology 75: 251-258.
Landcare Research. 2007a. Home > Research > Biodoversity and Conservation > Invasive invertebrates > Identification & surveillance.
Summary: Available from: from: http://www.landcareresearch.co.nz/research/biocons/invertebrates/id_surveillance.asp [Accessed 11 April 2007]
Landcare Research. 2007d. Home > Research > Biodoversity and Conservation > Invasive invertebrates > Wasps > Wasp Control.
Summary: Available from: http://www.landcareresearch.co.nz/research/biocons/invertebrates/Wasps/wasp_control.asp [Accessed 10 April 2007]
Leathwick, D. M. 1997. Growth and development of queen colonies of *Vespula germanica* and *V. vulgaris*. New Zealand Journal of Zoology 24: 17-23.
Summary: Available from: http://www.rsnz.org/publish/nzjz/1997/3.php [Accessed 18 February 2008]
Spurr, E.B., 1991. Reduction of wasp (Hymenoptera:Vespidae) populations by poison-baiting; experimental use of sodium monofluroacetate (1080) in canned sardine. New Zealand Journal of Zoology 18: 215-222.
Spurr, E.B., 1993. The effectiveness of sulfluramid in sardine bait for control of wasps (Hymenoptera: Vespidae). Proceedings New Zealand plant protection conference 46: 307-312.
Summary: Available from: http://nzpps.org/journal/46/nzpp46_307.pdf [Accessed 18 February 2008]
Spurr, E.B., 1995. Protein bait preferences of wasps (*Vespula vulgaris* and *V. germanica*) at Mt Thomas, Canterbury, New Zealand. New Zealand Journal of Zoology 22: 281-289.
Summary: Available from: http://www.rsnz.org/publish/nzjz/1995/73.php [Accessed 18 February 2008]
Spurr, E.B., and Elliott, G. 1996. User trials with Finitron wasp bait. New Zealand beekeeper 3: 18-20.
Toft, R. J. and Rees, J. S. 1998. Reducing predation of orb-web spiders (Araneidae) by controlling common wasps (*Vespula vulgaris*) in a New Zealand beech forest. Ecological Entomology 23: 90-95.
Walker, K. 2007. English wasp (*Vespula vulgaris*) Pest and Diseases Image Library.
Summary: PaDIL (Pests and Diseases Image Library) is a Commonwealth Government initiative, developed and built by Museum Victoria s Online Publishing Team, with support provided by DAFF (Department of Agriculture, Fisheries and Forestry) and PHA (Plant Health Australia), a non-profit public company. Project partners also include Museum Victoria, the Western Australian Department of Agriculture and the Queensland University of Technology.
The aim of the project is: 1) Production of high quality images showing primarily exotic targeted organisms of plant health concern to Australia. 2)Assist with plant health diagnostics in all areas, from initial to high level. 3) Capacity building for diagnostics in plant health, including linkage developments between training and research organisations. 4)Create and use educational tools for training undergraduates/postgraduates. 5) Engender public awareness about plant health concerns in Australia. PaDIL is available from : http://www.padil.gov.au/aboutOverview.aspx, this page is available from: http://www.padil.gov.au/viewPestDiagnosticImages.aspx?id=795 [Accessed 10 November 2007]

Weston, R. J., Woolhouse, A. D., Spurr, E. B., Harris, R. J. and Suckling, D. M. 1997. Spiroacetals and other venom constituents as potential wasp (Hymenoptera: Vespidae) attractants. Journal of Chemical Ecology 23: 553-568.

General information
Archer, M.E. 2005. A numerical model of seasonal foraging characteristics of successful underground colonies of *Vespula vulgaris* (Hymenoptera,Vespidae) in England. *Insectes Sociaux 52*: 231-237.
Barr, K., Moller H., Christmas, E., Lyver, P. and Beggs, J. 1996. Impacts of introduced common wasps (*Vespula vulgaris*) on experimentally placed mealworms in a New Zealand beech forest. Oecologia 105: 266-270.
Beggs, J. R. 1991. Altitudinal variation in abundance of common wasps (*Vespula vulgaris*). New Zealand Journal of Zoology 18: 155-158.
Beggs, J. R. 1999. Bandits of the beech forest. New Zealand science teacher 91: 33-36.
Beggs, J. R. 1999. Comparison of the quality of red and silver beech (Nothofagus) seeds in Nelson Lakes National Park, New Zealand. New Zealand Journal of Botany 37: 495-501.
Summary: Available from: http://www.rsnz.org/publish/nzjb/1999/44.php [Accessed 18 February 2008]
Beggs, J. R. 1999. The war against wasps. Proceedings of the *Manaaki Whenua* conference, 21-23 April 1999. Abstracts published on conference website.
Beggs, J. R. 2001. The ecological consequences of social wasps (*Vespula* spp.) invading an ecosystem that has an abundant carbohydrate resource. Biological conservation 99: 17-28.
Beggs, J. R. and Moller, H. 1991. New Zealand wasp research - uncoordinated goals or still stuck in the descriptive bottleneck? New Zealand Journal of Zoology 18: 230-231.
Beggs, J. R. and Rees, J. S. 1999. Restructuring of Lepidoptera communities by introduced Vespula wasps in a New Zealand beech forest. Oecologia 119: 565-571.
Beggs, J. R. and Wilson, P. R. 1991. The kaka, *Nestor meridionalis*, a New Zealand parrot endangered by introduced wasps and mammals. Biological Conservation 56: 23-38.
Beggs, J. R., Harris, R. J. and Read, P. E. C. 1996. Invasion success of the wasp parasitoid *Sphecophaga vesparum vesparum* (Curtis) in New Zealand. New Zealand Journal of Zoology 23: 1-9.
Summary: Available from: http://www.rsnz.org/publish/nzjz/1996/90.php [Accessed 18 February 2008]
Berry, J. A., Harris, R. J., Read, P. E. C. and Donovan, B. J. 1997. Morphological and colour differences between subspecies of *Sphecophaga vesparum* (Curtis) (Hymenoptera:Ichneumonidae). New Zealand Journal of Zoology 24: 35-46.
Summary: Available from: http://www.rsnz.org/publish/nzjz/1997/5.pdf [Accessed 18 February 2008]
Buck, M., Marshall, S.A. & Cheung, D.K.B. (2008). Identification Atlas of the Vespidae (Hymenoptera, Aculeata) of the northeastern Nearctic region, 98. *Vespula vulgaris* (Linnaeus, 1758). [Accessed 16 July, 2009 from http://www.biology.ualberta.ca/bsc/ejournal/bmc_05/98v_vulgaris.html]
Summary:
Clapperton, B. K. 1999. Abundance of wasps and prey consumption of paper wasps (Hymenoptera, Vespidae: Polistinae) in Northland, New Zealand. New Zealand Journal of Ecology 23(1): 11-19.
Clapperton, B. K., Alspach, P. A., Moller, H. and Matheson, A. G. 1989. The impact of common and German wasps (Hymenoptera:Vespidae) on the New Zealand beekeeping industry. New Zealand Journal of Zoology 16: 325-332.
Clapperton, B. K. and Dymock, J. J. 1997. Growth and survival of colonies of the Asian paper wasp, *Polistes chinensis antennalis* (Hymenoptera: Vespidae), in New Zealand. New Zealand Journal of Zoology 24: 9-15.
Summary: Available from: http://www.rsnz.org/publish/nzjz/1997/2.pdf [Accessed 15 August 2005]
Clapperton, B. K. and Lo, P. L. 2000. Nesting biology of Asian paper wasps *Polistes chinensis antennalis* Perez, and Australian paper wasps *P. humilis* (Fab.) (Hymenoptera: Vespidae) in northern New Zealand. New Zealand Journal of Zoology 27(3): 189-195.
Summary: Available from: http://www.rsnz.org/publish/nzjz/2000/22.php [Accessed 15 August 2005]
Clapperton, B. K., Lo, P. L., Moller, H. and Sandlant, G. R. 1989. Variation in colour markings of German wasps *Vespula germanica* (F.) and common wasps *Vespula vulgaris* (L.) (Hymenoptera:Vespidae) in New Zealand. New Zealand Journal of Zoology 16: 303-313.
Clapperton, B. K., Moller, H. and Sandlant, G. 1989. Distribution of social wasps (Hymenoptera:Vespidae) in New Zealand in 1987. New Zealand Journal of Zoology 16: 315-323.
Clapperton, B. K., Tilley, J. A. V. and Pierce, R. J. 1996. Distribution and abundance of Asian paper wasps *Polistes chinensis antennalis* Perez and Australian paper wasps *P.humilis* (Fab.) (Hymenoptera:Vespidae) in various habitats in New Zealand. New Zealand Journal of Zoology 23: 19-25
Summary: Available from: http://www.rsnz.org/publish/nzjz/1996/92.php [Accessed 15 August 2005]
Clapperton, B. K., Tilley, J. A. V., Beggs, J. R. and Moller, H. 1994. Changes in the distribution and proportions of *Vespula vulgaris* (L.) and *Vespula germanica* (Fab.) (Hymenoptera:Vespidae) between 1987 and 1990 in New Zealand. New Zealand Journal of Zoology, 1994, Vol. 21: 295-303
Summary: Available from: https://www.rsnz.org/publish/nzjz/1994/29.php [Accessed 15 August 2005]
Donovan, B. J. 1984. Occurrence of the common wasp, *Vespula vulgaris* (L.) (Hymenoptera:Vespidae) in New Zealand. New Zealand Journal of Zoology 11: 417-427.
Donovan, B. J. 1991. Nest initiation by German and common wasp queens (Hymenoptera:Vespidae) and nest fate at Christchurch, New Zealand. New Zealand Journal of Zoology 18: 95-99.
Donovan, B. J., Howie, A. M. E., Schroeder, N. C., Wallace, A. R.and Read, P. E. C. 1992. Comparative characteristics of nests of *Vespula germanica* (F.) and *Vespula vulgaris* (L.) (Hymenoptera:Vespinae). New Zealand Journal of Zoology 19: 61-71.
Dubatolov, V.V. & Milko, D.A. (2004). Social wasps of the subfamily Vespinae (Hymenoptera, Vespidae) of the Kyrghyz Republic. *Entomological Science 7*: 63-71.
Summary:
Dymock, J. J., Forgie, S. A. and Ameratunga, R. 1994. A survey of wasp sting injuries in urban Auckland from December to April in 1991/92 and 1992/93. New Zealand Medical Journal 107: 32-33.
Fordham, R. A. 1962. Spread of the German wasp in New Zealand. Tuatara 9: 129-130.

Fordham, R. A. 1991. Vespulid wasps at the upper forest margin in Tongariro National Park - a threat to the native biota? New Zealand Journal of Zoology 18: 151-153.
Fordham, R. A., Craven, A. J. and Minot, E. O. 1991. Phenology and population structure of annual nests of the German wasp Vespula germanica (Fab.) in Manawatu, New Zealand, with particular reference to late summer and autumn. New Zealand Journal of Zoology 18: 127-137.
Gruner, D.S. & Foote, D. (2000). Management strategies for Western yellowjackets in Hawaii. [Accessed 14 July, 2009 from http://www.bml.ucdavis.edu/facresearch/gruner/2002_Packard.pdf]
Harris, A. C. 1979. Occurrence and nesting of the yellow Oriental paper wasp, *Polistes olivaceus* (Hymenoptera: Vespidae), in New Zealand. New Zealand Entomologist 7: 41-44.
Harris, A. C. 1984. An American bald-faced hornet (*Dolichovespula maculata*; Hymenoptera: Vespidae) captured live in the Dunedin town belt. New Zealand Entomologist 8: 44-46.
Harris, R. J. 1989. An entrance trap to sample foods of social wasps (Hymenoptera: Vespidae). New Zealand Journal of Zoology 16.: 369-371.
Harris, R. J. 1991. Diet of the wasps *Vespula vulgaris* and *V. germanica* in honeydew beech forest of the South Island, New Zealand. New Zealand Journal of Zoology 18: 159-170.
Harris, R. J. 1995. Effect of starvation of larvae of *Vespula vulgaris* (L.) (Hymenoptera: Vespidae) on subsequent survival and adult size. New Zealand Journal of Zoology 22: 33-38.
Summary: Available from: http://www.rsnz.org/publish/nzjz/1995/51.php [Accessed 18 February 2008]
Harris, R. J. 1996. Frequency of over wintered *Vespula germanica* (Hymenoptera:Vespidae) colonies in scrubland - pasture habitat and their impact on prey. New Zealand Journal of Zoology 23: 11-17.
Summary: Available from: http://www.rsnz.org/publish/nzjz/1996/91.php [Accessed 18 February 2008]
Harris, R. J. and Beggs, J. R. 1995. Variation in the quality of *Vespula vulgaris* (L.) queens (Hymenoptera:Vespidae) and its significance in wasp population dynamics. New Zealand Journal of Zoology 22: 131-142.
Summary: Available from: http://www.rsnz.org/publish/nzjz/1995/60.php [Accessed 20 May 2007]
Harris, R. J. and Oliver, E. H. 1993. Prey diets and population densities of the wasps *Vespula vulgaris* and *V. germanica* in scrubland-pasture. New Zealand Journal of Ecology 17: 5-12.
Harris, R. J. and Rose, E. A. F. 1999. White and yellow cocoon production in the vespid parasitoid *Sphecophaga vesparum* (Hymenoptera: Ichneumonidae). New Zealand Journal of Zoology.
Harris, R. J., Moller, H. and Tilley, J. A. V. 1991. Weather-related differences in attractiveness of protein foods to *Vespula* wasps. New Zealand Journal of Ecology 15: 167-170.
Harris, R. J., Moller, H. and Winterbourn, M. J. 1994. Competition for honeydew between two social wasps in South Island beech forests, New Zealand. Insectes Sociaux 41: 379-394.
Harris, R. J., Thomas, C. D. and Moller, H. 1991. The influence of habitat use and foraging on the replacement of one introduced wasp species by another in New Zealand. Ecological Entomology 16: 441-448.
Landcare Research. 2007b. Home > Research > Biodoversity and Conservation > Invasive invertebrates > Wasps > Distribution> Distribution of Social Wasps in New Zealand.
Summary: Available from: http://www.landcareresearch.co.nz/research/biocons/invertebrates/Wasps/distribution.asp [Accessed 10 April 2007]
Leathwick, D. M. and Tilley, J. A. V. 1996. Overwintering colonies of the common wasp (*Vespula vulgaris*) in Palmerston North, New Zealand. New Zealand Journal of Zoology 23: 355-358.
Summary: Available from: http://www.rsnz.org/publish/nzjz/1996/125.php [Accessed 18 February 2008]
Leathwick, D. M., Godfrey, P. L., Fordham, R. A. and Potter, M. A. 1999. Comparative growth and seasonality of *Vespula germanica* and *V. vulgaris* (Hymenoptera: Vespidae) colonies in the Manawatu region of New Zealand. New Zealand Journal of Zoology 26: 27-38.
Summary: Available from: http://www.rsnz.org/publish/nzjz/1999/4.php [Accessed 18 February 2008]
Malham, J. P., Rees, J. S., Alspach, P. A., Beggs, J. R. and Moller, H. 1991. Traffic rate as an index of colony size in Vespula wasps. New Zealand Journal of Zoology 18: 105-109.
Matthews, R.W., Goodisman, M.A.D., Austin, A.D. & Bashfo, R. 2000. The introduced English wasp *Vespula vulgaris* (L.) (Hymenoptera: Vespidae) newly recorded invading native forests in Tasmania. *Australian Journal of Entomology 39*: 177-179.
Moller, H. 1990. Wasps kill nestling birds. Notornis 37: 76-77.
Moller, H. 1996. Lessons for invasion theory from social insects. Biological Conservation 78: 125-142.
Moller, H. and Tilley, J. A. V. 1989. Beech honeydew: seasonal variation and use by wasps, honeybees and other insects. New Zealand Journal of Zoology 16: 289-302.
Moller, H., Clapperton, B. K., Alspach, P. A. and Tilley, J. A. V. 1991. Comparative seasonality of *Vespula germanica* (F.) and *Vespula vulgaris* (L.) colonies (Hymenoptera:Vespidae) in urban Nelson, New Zealand. New Zealand Journal of Zoology 18: 111-120.
Moller, H., Clapperton, K., Gaze, P., Sandlant, G., Thomas, B. and Tilley, J. 1987. Honeydew - life blood of South Island beech forests. Forest and Bird 18: 14-16.
Moller, H., Clapperton, K., Sandlant, G. and Tilley, J. 1987. Wasps - the new invaders. New Zealand Environment 56: 3-8.
Moller, H., Plunkett, G. M., Tilley, J. A. V., Toft, R. J. and Beggs, J. R. 1991. Establishment of the wasp parasitoid, *Sphecophaga vesparum* (Hymenoptera: Ichneumonidae), in New Zealand. New Zealand Journal of Zoology 18: 199-208.
Moller, H., Tilley, J. A. V., Plunkett, G. M. and Clapperton, B. K. 1991. Nest sites of common and German wasps (Hymenoptera:Vespidae). New Zealand Journal of Zoology 18: 121-125.
Moller, H., Tilley, J. A. V., Thomas, B. W. and Gaze, P. D. 1991. Effect of introduced social wasps on the standing crop of honeydew in New Zealand beech forests. New Zealand Journal of Zoology 18: 171-179.
Plunkett, G. M., Moller, H., Hamilton, C. and Thomas, C. D. 1989. Overwintering colonies of German (*Vespula germanica*) and common wasps (*Vespula vulgaris*) (Hymenoptera: Vespidae) in New Zealand. New Zealand Journal of Zoology 16: 343-353.
Sandlant, G. R. and Moller, H. 1989. Abundance of common and German wasps (Hymenoptera: Vespidae) in the honeydew beech forests of New Zealand. New Zealand Journal of Zoology 16: 333-343.

Thomas, C. D., Moller, H., Plunkett, G. M. and Harris, R. J. 1990. The prevalence of introduced *Vespula vulgaris* wasps in a New Zealand beech forest community. New Zealand Journal of Ecology 13: 63-72.
Thomas, C. R. 1960. The European Wasp (*Vespsula germanica* Fab.) in New Zealand. DSIR Information Series No. 27. 74pp.
Toft, R. J. and Beggs, J. R. 1995. Seasonality of crane flies (Diptera:Tipulidae) in South Island beech forest in relation to the abundance of Vespula wasps (Hymenoptera:Vespidae). New Zealand Entomologist 18: 37-43.
Toft, R. J., Malham, J. P. and Beggs, J. R. 1999. Mortality and emergence pattern of over-wintering cocoons of the wasp parasitoid *Sphecophaga vesparum vesparum* (Hymenoptera: Ichneumonidae) in New Zealand. Environmental Entomology 28: 9-13.
Wilson, P. R., Karl, B. J., Toft, R. J., Beggs, J. R. and Taylor, R. H. 1998. The role of introduced predators and competitors in the decline of kaka (*Nestor meridionalis*) populations in New Zealand. Biological Conservation 83: 175-185.