

Interesting insects and other invertebrates: a guide to the Landcare Research internet factsheets

Nicholas A. Martin

Research Associate, Landcare Research, Private Bag 92170, Auckland 11072. Email: martinn@landcareresearch.co.nz

Where in New Zealand would you go to find pictures and information about Brown shield bugs (Pentatomidae) that look like the Brown marmorated stinkbug, or to find out if the strange looking ladybird is the very variable Harlequin ladybird that has just arrived in your area, or is it a local species that you had not seen before?

Answer:

- go to the internet factsheets, “Interesting Insects and other Invertebrates”
<http://nzacfactsheets.landcareresearch.co.nz/Index.html>,
- click on FACTSHEETS
- scroll down to Brown shield bug - *Dictyotus caenosus*, or Harlequin ladybird - *Harmonia axyridis*
- click on ‘Recognition’.

There you will find a brief description of the distinctive features of the taxa and similar looking species, followed by pictures of the relevant life stages of these taxa. With luck there will be a factsheet on the species of Shield bug (7 species) or ladybird (21 species) that you have found.

There are now over 100 of these factsheets on-line with more being added each month. Maybe soon you will be able to make your own contribution? In this brief article I will summarise the features of the series, its current contents and how to find your way around them, followed by a brief history of this project.

The idea behind the factsheets is to make available basic information with appropriate illustrations about our invertebrate fauna to entomologists and non-entomologists including students. The format has certain mandatory fields, but is also flexible (Table 1). It will be possible to add new fields if

required. Each heading and field only shows up if it is used in a factsheet. Because the factsheets are for non-entomologists I have minimised the use of technical terms and explained them when first used. There is a glossary with fuller explanations of some terms. I have also avoided the standard method of citing references by using a suitable phrase.

All Factsheets have two illustrations at the beginning. I use them to show the adult and juvenile or distinctive plant damage such as leaf mines or galls. There is a provision for a distribution map in the 'Biostatus and Distribution' field and an illustration of the life cycle or annual cycle at the start of the 'Annual Cycle and Life Stages' field (see Pohutukawa gall fly - *Fergusonina metrosiderosi*). All other illustrations come at the end of the relevant field. All images are enlarged by clicking on them. You can then scroll through the enlarged images.

Because I wanted to make the factsheets 'user friendly' I decided to put a common name at the start of the title. I appreciate that this may make them difficult to find when scrolling through the list of titles under the 'FACTSHEETS' tab. However, we have provided a SEARCH function that has turned out to be much more useful than I initially expected. You can search on the current name of an organism or its synonym, its classification (technical and common names), its plant hosts (scientific and common names, plant families), its biostatus, main feeding behaviour. The SEARCH window has the available filters on the left and the results of the search on the right. For each species found in a search, the name is accompanied by information from the 'Biostatus and Distribution' field and the first image which is always an illustration of the organism, usually the adult (Fig. 1).

The Factsheets are available for all invertebrates, though only insects and mites have been entered so far. If you enter 'Arthropoda' in the search box, you will get a summary of the contents of the factsheets in the 'Available filters' on the left, for example, the number of factsheets for each Arthropod Order (Fig. 2), Feeding type and Biostatus (Fig. 3).

An example of the flexibility of these factsheets is the uses to which the field 'Additional Information' can be put. If you search on 'Research Project' you will get a list of factsheets where this heading has been used. Open the Factsheet, click on Additional Information, and you should find a suggestion of a topic that could provide an interesting project for someone. Other

headings used in the ‘Additional Information’ field include ‘Biological Control’, ‘Behaviour of moths’, ‘Why Stink bugs’, ‘Effect of giant willow aphid honeydew on bee honey’ and ‘Why are some nymphs hairy and others smooth?’.

One of the big advantages of the internet over printed publications is that it is easy to make changes and keep a factsheet up-to-date. All these factsheets show when they were last revised. However, it is also important to know what has been changed. For example, is it the addition of a photograph, correction of an error or the addition of new information? Every change to these factsheets is documented in ‘Update History’ field. I have just completed the change of scientific name of a moth, Poroporo fruit borer. Luckily the common name stays the same so non-entomologists will still be able to find it easily.

Table 1. Fields available in the factsheets are listed in order in which they are seen. Fields are only shown if there is content in the factsheet being read.

* Mandatory fields

Unique Identifier*	Two Images*
Display Title*	Recognition*
Author*	Life Stages and Annual Cycle*
Date*	Biostatus and Distribution*
Classification* (up to 9 fields, 4 mandatory)	Natural Enemies*
Taxonomic Name*	Host Plants
Common Names*	Honeydew feeding
Suggested Citation*	Prey – Hosts
Synonyms	Control
Taxonomic Notes	Other Images
Browse* (for searching)	Bug Signs
Information Sources	Acknowledgements
	Update History

Figure 1. Two results from a search for ladybirds. The text is from the ‘Biostatus and Distribution’ field’, and the figure is the first image of the Factsheet.

[Southern Ladybird - *Cleobora mellyi*](#)

This adventive ladybird comes from Tasmania and southern areas of mainland Australia, hence its common names. Adults and larvae live in trees feeding on soft-bodied insects and their eggs. It was released into New Zealand in 1977 for the biological control of eucalypt tortoise beetle, *Paropsis charybdis* (Coleoptera: Chrysomelidae). It only survived in Marlborough. In 2006 and 2007, the ladybirds were again spread to other parts of New Zealand. It has now established in Northland and Bay of Plenty. It favours places with *Acacia* species that harbour abundant leaf feeding psyllids. Conservation status : This strikingly coloured ladybird is being actively spread around New Zealand for control of leaf feeding beetles and psyllids on *Eucalyptus* and *Acacia* species.



[Eleven-spotted ladybird - *Coccinella undecimpunctata*](#)

This adventive ladybird comes from the northern hemisphere. It is present in Europe, Asia and North America. It is now widespread in New Zealand, where it occurs in grasslands, vegetable crops, field crops, cereals, and other habitats with low-growing vegetation where it feeds on a variety of insects. Conservation status : Eleven-spotted ladybird is widespread and not threatened. It is a useful biological control agent in many commercial and domestic crops.



Figure 2. The number of factsheets for species in each Arthropod order (as of 9 September 2017).

Order
Coleoptera (29)
Hemiptera (28)
Trombidiformes (16)
Diptera (11)
Lepidoptera (10)
Hymenoptera (5)
Thysanoptera (4)
Neuroptera (2)

Figure 3. The number of factsheets for two types of biological characters, Feeding type and Biostatus (as of 9 September 2017).

Feeding Type
Herbivore (75)
Predator (26)
Parasite/Parasitoid (4)

Biostatus
Endemic (59)
Adventive (41)
Native (5)

Origins of the Factsheets

The ABOUT tab gives the official origins of the factsheet series as follows: ‘The development of these factsheets was made possible by funding from the TFBIS (Terrestrial and Freshwater Biodiversity Information Systems) Fund, administered by the Department of Conservation. Landcare Research developed the software to create, store and generate the factsheets and Nicholas Martin of Plant & Food Research, in conjunction with Landcare Research, developed the content specifications. Feedback from people representing end-user groups was an important part of the process, and we thank them for their valuable input.’ However, my wish to produce factsheets on insects and mites developed from an idea I had about 20 years ago.

In the 1990s there was a lot of discussion about biodiversity and how to measure it. All methods then - as now - were based on an arbitrary selection of taxa and required expensive expertise (e.g. Holdaway et al. 2017). In the late 1990s, while working on pest control with the vegetable industry, I read about a UK Super Market scheme to have a superior brand based on

Environmentally Friendly methods of production and requiring plans to protect the local wild life (e.g. rabbits, hares and foxes). Such schemes require independent monitoring. How could we develop such a scheme in New Zealand that included protection and enhancement in indigenous habitats that could be assessed by a consultant? I felt that it needed to go beyond plants and birds.

At that time, I was interested in leaf miners and realised that if a consultant was assessing the species of plants present in a habitat, they could also identify and record the leaf miners on the plants if they had a pictorial guide for the required plant species. This concept expanded to include plant galls and other forms of unique plant damage. I created a database to handle the information on invertebrate-host plant associations and the photographs. After about 2 years funding, the active work on the project ceased until there was an opportunity through TFBIS to put the database, named Plant-SyNZ™, on line. I then thought that if people were finding galls and leaf mines, they would want to know what the invertebrate causing the damage looked like: hence the idea for simple Factsheets.

The original idea for plant species-based pictorial identification guides was for 1-2 pages of laminated A4 paper. However, the advent of relatively cheap tablet computers has brought the concept into the 21st Century. Tablet computers enable the pdf pictorial identification guides to have many more photos and to include fungi and other micro-organisms as well as predators and parasitoids of the herbivores found on the plant. Tablet computers are also good for scrolling through the photos, it is easy to enlarge the images up to three times, and see much more detail. Each of the new identification guides are still for a single plant species. The original new Plant-SyNZ guides for New Zealand Flax and Cabbage tree have just been updated and four more plants have been added. With the current concern about protecting the environment from the excesses of some farmers and growers, maybe the time has come to implement the original idea behind the internet factsheets?

The Future

IT experts at Landcare are currently working to improve the entry of information into the Factsheet Database. Once that has happened, it will be possible to make the database available outside of the Landcare Research

Tamaki Campus. The Entomology Group of Landcare Research will continue to have a moderating role.

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References

Holdaway RJ, Wood JR, Dickie IA, Orwin KH, Bellingham PJ, Richardson SJ, Lyver PO, Timoti P, Buckley TR. 2017. Using DNA metabarcoding to assess New Zealand's terrestrial biodiversity. *New Zealand Journal of Ecology* 41 (2): 218-225.

Internet Factsheets: Interesting Insects and other Invertebrates

nzacfactsheets.landcareresearch.co.nz/Index.html

Plant-SyNZ™ internet database: herbivore - host plant associations

plant-synz.landcareresearch.co.nz/SearchForm.aspx

Plant-SyNZ™: an invertebrate herbivore biodiversity assessment tool

plant-synz.landcareresearch.co.nz/index.asp

Brown shield bug - *Dictyotus caenosus*

This adventive shield bug comes from Australia. It is present in the North and South Islands of New Zealand. It is also present in New Caledonia. The Brown shield bug feeds on developing seeds of plants such as plantain (*Plantago* species) and lucerne. Conservation status : This Australian shield bug lives in non-forest areas and feeds on seeds of crops and wild plants.

**Australasian green shield bug - *Glaucias amyoti***

This native shield bug is found throughout the North Island of New Zealand and Nelson and Marlborough on the South Island. It is also present in Australia, East Timor, Indonesia (West Timor), Palau and Papua New Guinea. It occurs on host plants, a variety of trees and shrubs, in city gardens and parks as well as in native ecosystems. Conservation status : Widespread, not threatened.

**Pittosporum shield bug - *Monteithiella humeralis***

This adventive shield bug comes from Australia and is found in the North and South Islands of New Zealand. It was first detected in New Zealand in 1950. It occurs on host plants, *Pittosporum* species, in gardens and parks as well as in native ecosystems. Conservation status : Widespread Australian insect that is a minor pest of *Pittosporum* species.

**Green vegetable bug - *Nezara viridula***

The cosmopolitan Green vegetable bug was found in Northland, New Zealand in 1944. This adventive shield bug is now found throughout the North Island and in the warmer parts of the South Island. It feeds on native plants and is a pest of vegetable, arable, fruit and nut crops. Conservation status : Widespread, living on some native plants and a major pest of some vegetable and agricultural crops

**Kawakawa looper - *Cleora scriptaria***

This endemic moth is found throughout New Zealand. The green or brown caterpillars feed on young leaves of its favoured host plant, kawakawa, *Piper excelsum* (Piperaceae) and other native trees and shrubs in native ecosystems, parks, gardens and forests. Conservation status : Widespread, not threatened.

**Cabbage tree moth - *Epiphyryne verriculata***

This endemic moth is found throughout New Zealand where its host plants, *Cordyline* species (cabbage trees), are found. It is present in cities and native ecosystems. Conservation status : Widespread, not threatened.

