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True bugs (Hemiptera: Heteroptera) in a rural garden in the Netherlands

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Abstract. In a rural garden in the southwest of the Netherlands 42 true bugs were observed, belonging to 39 genera and 15 families. The importance of true bugs for biodiversity and gardens for biodiversity are discussed.

Key words: true bugs, biodiversity, rural garden, barnyard, non-native species, the Netherlands.

Introduction

True bugs (Heteroptera) are often studied because of their agricultural risks and benefits (e.g. Schaefer & Panizzi 2010); however, they may also benefit biodiversity and play a role in stabilising the fauna biodiversity. Last year's several investigations showed a decline of insect biodiversity (Hallmann et al. 2017; Sánchez-Bayo & Wyckhuys 2019). The knowledge of insects, including true bugs, is of great importance for adequate measures. The knowledge of true bugs in urban areas such as gardens and backyards is limited. This study focuses on the presence of true bugs in a rural garden and discusses its contribution to biodiversity.

Material and Methods

In 2020 and 2021 a rural garden in Goes is, at least weekly, qualitatively investigated for the presence of fauna and insects; the pond is investigated twice a year. The rural garden of about 2000 m2 contains several fruit trees and scrubs, native and exotic flora and a small pond. The garden is located in the province of Zeeland in the Netherlands and the soil consists of marine clay and peat. More detail about the garden is given by van der Velden (2021).

The monitoring was carried out by photographic capture and biometrical identification, and for aquatic organisms by capture using a 0.5 mm macrofauna net and identification using a microscope and identification keys (Stoffelen et al. 2013). The monitoring included all stadia of organisms.

Results

In the garden 636 different faunistic taxa were found in 2020 (van der Velden 2021) and 2021. These taxa belonged to 5 phyla, 17 classes, 47 orders and 235 families in which the arthropods are by far the largest phylum (88%) of the found taxa. This study focuses on the Heteroptera. The Heteroptera observed in 2020 and 2021 are given in Table 1. In total 42 species of Heteroptera were distinguished; the recorded species belonged to 39 genera and 15 families. In 2020, 26 species were found, and in 2021 32 species. Despite the high frequency of monitoring, only 16 species (38%) were found both in 2020 and 2021. Six species were totally or partly dependent on an aquatic environment.

None of the 42 species is designated as rare, and two species are designated as non-native according to the Dutch species register (Nederlands Soortenregister 2022). The non-native species are *Leptoglossus occidentalis* Heidemann, 1910 (Coreidae) and *Tropidosteptes pacificus* (van Duzee, 1921) (Miridae).

Discussion

For a garden, the presence of 42 species of true bugs is relatively high. Since the total number of true bugs in 2021, compared to 2020, increased by 62%, the actual number in this garden is expected to be considerably higher than 42. There is hardly any literature on the species richness of true bugs in rural gardens. Lis (2012) reported 62 species of true bugs in a botanic garden in Moravia (Czech Republic). Fedyay et al. (2018) recorded 44 species of the infraorder Pentatomomorpha (Heteroptera) in the public gardens and lawns of the suburbs of the city Kharkiv (Ukraine); in the present study 18 species of Pentatomomorpha were found in a single garden.

In the garden two non-native true bugs were found; this is 5%. This percentage is somewhat higher than the percentage (1,7%) of the total non-native species in Europe in 2010, but the number of non-native true bugs is exponential increasing (Rabitsch 2010). Both non-native species originated from North America and were observed for the first time in the Netherlands in 2007 (Rabitsch 2010; Aukema 2008; Aukema et al. 2009).

Current measures to improve biodiversity often focus on the protection of rare species. This is necessary, but biodiversity is defined as a balanced distribution of species abundance. True bugs not only play a role in

biodiversity by their intrinsic presence, but true bugs, especially zoophagous species, may also play a relevant role in a balanced abundance of arthropods by having a flattening and stabilizing effect on dominant arthropods and, therefore, in the protection of rare arthropods. The ecosystem 'gardens' probably does not play a significant role in protecting rare true bugs. However, they may play a relevant role in conserving more common true bugs, thus preventing the increase of rare species.

Gardens and backyards may play a relevant role in the abundance of common species, as ecological corridors and as refugia for nearby agricultural areas (van der Velden 2021). Probably gardens and backyards are comparable with other small areas such as small woodlands. Valdéz et al. (2019) show in a broad European study that small woodlands do not harbour many rare species, but many organisms per surface that provide essential ecosystem services such as pest control potential. Measures for the protection of biodiversity are currently mainly focused on nature reserves. Probably measures on nature reserves only are not sufficient to improve biodiversity. As nature policy on private property is considerably more complicated than on nature reserves, policy makers should quickly start developing policies on private property such as gardens and backyards.

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Table 1. The presence of Heteroptera in a rural garden in the Netherlands in 2020 and 2021.

Species / presence	2020	2021	total 2020/2021	both 2020/2021
Anthocoridae				
Orius majusculus (Reuter, 1879)		x	x	
Artheneidae				
Chilacis typhae (Perres, 1857)	x		x	
Coreidae				
Coreus marginatus (Linnaeus, 1758)	x	x	x	x
Gonocerus acuteangulatus (Goeze, 1778)	x	x	x	x
Leptoglossus occidentalis Heidemann, 1910	x	x	x	x
Syromastus rhombeus (Linnaeus, 1767)	x		x	
Corixidae				
Corixa punctata (Illiger, 1807)	x	x	x	x
Gerridae				
Gerris lacustris (Linnaeus, 1758)	x	x	x	x
G. odontogaster (Zetterstedt, 1828)	x		x	
Heterogastridae				
Heterogaster urticae (Fabricius, 1775)		x	x	
Lygaeidae				
Kleidocerys resedae (Panzer, 1797)	x	x	x	x
Nysius senecionis (Schilling, 1829)	x		x	
Miridae				
Apolygus lucorum (Meyer-Dür, 1843)	x		x	
A. spinolae (Meyer-Dür, 1841)	x	x	x	x
Closterotomus fulvomaculatus (De Geer, 1773)		x	x	
Deraeocoris ruber (Linnaeus, 1758)	x	x	x	x
Dicyphus epilobii Reuter, 1283	x		x	
Liocoris tripustulatus (Fabricius, 1781)		x	x	
Lygus pratensis (Linnaeus, 1758)	x		x	
L. rugelipennis Poppius, 1911	x	x	x	x
Macrolophus pygmaeus (Rambur, 1839)		x	x	
Orthops basalis (Costa, 1853)		x	x	
Phytocoris ulmi (Linnaeus, 1758)		x	x	
Pilophorus perplexus (Douglas & Scott, 1875)		x	x	
Plagiognathus arbustrorum (Fabricius, 1794)	x	x	x	x
Stenodema calcarata (Fallén, 1807)	x	x	x	x
Tropidosteptes pacificus (van Duzee, 1921)		x	x	

Species / presence	2020	2021	total 2020/2021	both 2020/2021
Nabidae				
Himacerus mirmicoides (Costa, 1834)		x	x	
Nabis ferus (Linnaeus, 1758)		x	x	
Nepidae				
Ranatra linearis (Linnaeus, 1758)	x		x	
Notonectidae				
Notonecta glauca Linnaeus, 1758		x	x	
Pentatomidae				
Arma custos (Fabricius, 1794)	x		x	
Dolycoris baccarum (Linnaeus, 1758)	x	x	x	x
Graphosoma italicum (O.F. Müller, 1766)	x	x	x	x
Palomena prasina (Linnaeus, 1761)		x	x	
Peribalus strictus (Fabricius, 1803)		x	x	
Rhaphigaster nebulosa (Poda, 1761)	x	x	x	x
Sciocoris cursitans (Fabricius, 1794)		x	x	
Pleidae				
Plea minutissima Leach, 1817	x	x	x	x
Pyrrhocoridae				
Pyrrhocoris apterus (Linnaeus, 1758)	x	x	x	x
Rhopalidae				
Corizus hyoscyami (Linnaeus, 1758)		x	x	
Rhopalus subrufus (Gmelin, 1790)	x		x	
Total presence	**26**	**32**	**42**	**16**

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