

NEW RECORDS OF COCCINELLIDAE (COLEOPTERA) TO THE AZORES ISLANDS

ANTÓNIO O. SOARES, ISABEL BORGES, SUSANA CABRAL,
HELENA FIGUEIREDO & ROBERTO RESENDES

*Departamento de Biologia, Universidade dos Açores, Rua da Mãe de Deus, 13-A
PT - 9500-801 Ponta Delgada, Portugal*

ABSTRACT

In order to record new Coccinellidae species to the Azores, forty one samplings were made in S. Miguel, Graciosa and Pico islands. Graciosa and Pico islands surveys were performed during the scientific expeditions organised by the Department of Biology from the University of the Azores, between the 7th and 15th of June, 2004 and the 6th and 15th of June, 2005, respectively. A total of eleven species were collected. The presence of two new species was noticed: one Scymnini species to Pico island, *Clitosthetus arcuatus* (Rossi) and one Coccinellini species to S. Miguel island, *Myrrha octodecimguttata* (Linnaeus).

INTRODUCTION

The knowledge of Coccinellidae faunal composition in the ecosystems, including agro-ecosystems, is very important because species richness is one of the parameters used to measure the biodiversity (Magurran, 1991) and this family includes many predators used as natural enemies on biological control (Dixon, 2000). Of the predatory species most feed on either aphids or coccids, with few feeding on both types of prey. Some species feed on others species as mites, aleyrodids, ants, chrysomelid larvae, cicadellids, pentatomids, fungi and psyllids (Dixon, 2000; Hodek & Honek, 1996). Thus the food of ladybirds in a particular region is likely to reflect the faunal composition of the potential prey in that area (Dixon, 2000). The aim of this work is to contribute to the knowledge of the biological control agents of the Coccinellidae family, in the Azores archipelago.

MATERIAL AND METHODS

Thirty sampling sites in S. Miguel, Graciosa and Pico islands were selected. A total of forty one samplings were made [S. MIGUEL: Ponta Delgada (1); GRACIOSA: Terreiros (1), Negro (1), Porto Afonso (1), João Gomes (1), Serra Branca (2), Folga (1), Alto do Sul (2), Fenais (1), Pinheiro (1), Lagoa (2), Facho (1), Caldeira do Enxofre (1), Pico Timão (1), Guadalupe (1), Luz (1) and Pico Machado (1); PICO: Terras (2), Manhenha (2), Sta. Luzia (3), Cabrito (1), Madalena (2), Candelária (1), S. Mateus (2), S. João (1), Lajes (1), Prainha (1), Piedade (1), S. Roque do Pico (2) and Cais do Mourato (1)].

Depending on the type of vegetal cover, we used direct observation, beating and sweeping methods, cromotropic and Malaise traps, collecting ladybeetle adults or larvae

with a suction tube aspirator or a forceps, respectively. We never took more than one hour in each sampling site. Larvae were reared until adult emergence. The collected specimens were preserved in 70% alcohol and afterwards mounted and classified. The specimens collected were deposited on the Ecology Section of the Department of Biology from the University of the Azores.

The names of species provided on Table I. are according to the accepted names of the Fauna Europaea database (Canepari, 2004).

RESULTS AND DISCUSSION

On overall samples a total of 11 species of ladybird beetles were collected. In S. Miguel island, we collected the following species: *Chilocorus bipustulatus* (Linnaeus), *Scymnus subvillosus* (Goeze), *Adalia decempunctata* (Linnaeus), *Myrrha octodecimguttata* (Linnaeus), *Rhyzobius lophanthae* (Blaisdell) and *R. chrysomeloides* (Herbst.). In Graciosa island, the collected species were *R. lophanthae* and *R. litura* (Herbst.). Finally, in Pico island we collected 3 species: *Clitosthetus arcuatus* (Rossi), *S. interruptus* (Goeze) and *S. nubilus* Mulsant. *M. octodecimguttata* and *C. arcuatus*, were, for the first time recorded to S. Miguel and Pico islands, respectively. Species richness for the Azorean island is now updated to 18 species for S. Miguel, 18 species for Sta. Maria, 12 species for Terceira, 9 species for Graciosa, 11 species for S. Jorge, 6 species for Pico, 8 species for Faial, 7 species for Flores and 6 species for Corvo (Table I).

The following species *S. mimulus*, *P. decemplagiatus* (Borges *et al.*, 2005a), *H. variegata* and *H. undecimnotata* need further taxonomic work for confirmation of their presence in the Azores.

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Table I. List of Coccinellid species collected to the Azores islands. Legend: **1** Drouet (1859; **2** Tarnier (1860); **3** Drouet (1861); **4** Crotch (1867); **5** Uyttenboogaart (1930 in F rsch 1966); **6** M quignon (1942); **7** Uyttenboogaart (1947 in F rsch 1966); **8** F rsch (1966); **9** Serrano (1982); **10** Israelson (1984); **11** Israelson (1985); **12** Raimundo & Alves (1986); **13** Gillerfors (1986); **14** F rsch (1987); **15** Serrano & Borges (1987); **16** Borges & Serrano (1989); **17** Borges (1990b); **18** Soares et al. (1999); **19** Borges (1990a; pers. comm.); **20** Soares et al. (2003); **21** Borges et al. (2005b); **22** Present survey. Legend: # Synonymy of *Stethorus wollastoni* Kapur, * Synonymy of *Scymnus levallanti* Mulsant, * Synonymy of *Lindorus lophanthae* Blaisdell.

Subfamilies	Tribe	Genus	Species	S. Miguel	S. Maia	Tenreira	Garlitos	S. Jorge	Pico	Faial	Ponies	Corvo	Azores	
Chilocorinae	Stethorini	Stethorus	<i>C. lapidivittatus</i> [Linnaeus]	6, 7, 12, 20, 21, 22	4, 21								8	
			<i>S. jureticum</i> Westw. *	6, 8, 9, 14, 20, 21	4, 8, 19, 21	21		8, 20, 21		4, 8, 19, 21			8	
			<i>C. acutatus</i> [Roc�s]	14, 20, 21		21	20, 21	20, 21	22					8
			<i>S. interstitialis</i> [Goeze]	8, 12, 20	8, 9, 14, 20	16, 20	20	16, 20	11, 20, 22	13, 20	11	19		
			<i>S. laevigatus</i> [Goeze]		16									
Chilocorinae	Scymnini	Scymnus	<i>S. subcostatus</i> [Goeze]	6, 21, 22	9, 21	4, 16, 21		9, 21		4, 8, 21			7, 8, 14	
			<i>S. subdorsalis</i> [Goeze]		13, 14, 21									8
			<i>S. adonidis</i> [Thurber]	12, 13, 20	13, 20	16, 20	16, 20	20	13, 20, 22	13, 20	20			14
			<i>S. notatus</i> Mulsant *											14
			<i>S. ruficollis</i> [Goeze]											
			<i>S. ruficollis</i> [Goeze]											
			<i>S. ruficollis</i> [Goeze]											
			<i>S. ruficollis</i> [Goeze]											
			<i>S. ruficollis</i> [Goeze]											
			<i>S. ruficollis</i> [Goeze]											
Coccinellinae	Coccinellini	Coccinella	<i>C. septempunctata</i> [Linnaeus]	7, 9, 20, 21		15, 21		6, 9, 21			21		5, 6, 14	
			<i>M. fuscicornis</i> [Vollstedt]	20, 21			20, 21	20, 21				20, 21		8
			<i>M. fuscicornis</i>											
			<i>P. decempunctata</i> [Mulsant]	12, 21	3, 12, 20, 21, 22	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2	
			<i>A. bipunctata</i> [Linnaeus]											8, 9
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	7, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	7, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	7, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	7, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	7, 8, 2
Coccinellinae	Coccinellini	Coccinella	<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2	
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
Coccinellinae	Coccinellini	Coccinella	<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2	
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
Coccinellinae	Coccinellini	Coccinella	<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2	
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
Coccinellinae	Coccinellini	Coccinella	<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2	
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
Coccinellinae	Coccinellini	Coccinella	<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2	
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
Coccinellinae	Coccinellini	Coccinella	<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2	
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
			<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21, 22	3, 21	3, 21	3, 21	1, 3, 21	3, 21	3, 21	3, 21	3, 21	3, 21	1, 4, 6, 8, 2
Coccinellinae	Coccinellini	Coccinella	<i>C. septempunctata</i> [Linnaeus]	3, 12, 20, 21,										