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HEMIPTERA AND COLEOPTERA ON *CHENOPODIUM QUINOA*

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Dioli P., Colamartino A.D., Negri M., Limonta L. – Hemiptera and Coleoptera on *Chenopodium quinoa*.

Heteroptera and Coleoptera, collected in experimental fields of *Chenopodium quinoa*, are reported. Twelve species of Heteroptera and five species of Coleoptera were recorded; a large number of the phytophagous species, *Lygus rugulipennis*, *Orthotylus flavosparus*, *Aphis craccivora*, *A. fabae* and *Chaetocnema tibialis*, and of the predator *Hippodamia variegata* were found.

KEY WORDS: Hemiptera, Miridae, Anthocoridae, Rhopalidae, Lygaeidae, Coleoptera, Coccinellidae, Chrysomelidae.

INTRODUCTION

Chenopodium quinoa Willd. is a plant of the family *Amaranthaceae*, and its cultivation is very ancient, the first historical data concerning the quinoa crop dates back to 5000 BC in the Andean region, South America. Because of its high nutritional value, including the presence of all nine essential amino acids, its use has spread to several Western countries, where the cultivation was recently introduced. *C. quinoa* is infested by numerous insects in the Andean area, and reports from Northern Europe and from Southern Europe include moths, aphids, capsid bugs, leafhoppers, and leaf beetles (RASMUSSEN *et al.*, 2003; SIGSGAARD *et al.*, 2008). Experimental fields of quinoa have been sown in Northern Italy, with the aim of optimizing the agro-techniques in our Country. The presence of several specimens of *Nysius cymoides* (Lygaeidae), parasite of native *Chenopodiaceae*, was recorded in 2014 in San Giorgio Piacentino (Piacenza) (BOCCHI *et al.*, 2016, in press). In 2015, additional sampling in experimental fields, revealed the establishment of phytophagous Hemiptera and Coleoptera and their predators.

MATERIALS AND METHODS

In 2015, crops of *Chenopodium quinoa* were monitored in Alseno and Gossolengo (Piacenza province), and in Ceresara (Mantova province). Pea (*Pisum sativum*), corn (*Zea mays*) and soy (*Soja hispida*) crops, and spontaneous plants like velvet leaf (*Abutilon theophrasti*), white goosefoot (*Chenopodium album*), common chamomile (*Matricaria chamomilla*), Aleppo grass (*Sorghum halepense*) and hairy vetch (*Vicia villosa*), were present in Alseno; in Gossolengo, pea and sweet corn were cultivated, and redroot pigweed (*Amaranthus retroflexus*), white goosefoot (*C. album*), hop (*Humulus lupulus*), bittersweet nightshade (*Solanum dulcamara*), and black nightshade (*S. nigrum*), developed as weeds; corn and soy were grown in Ceresara, white goosefoot (*C. album*), ribwort plantain (*Plantago*

lanceolata), and broadleaf plantain (*P. major*) occurred as uncultivated plants. Panicles of quinoa, from different areas of the fields, were collected and examined in the laboratory in July and in August.

Plants of quinoa, grown in pots, were monitored in Milano. In this case, insects were collected from the plants, placed in vials, and observed in the laboratory.

RESULTS AND DISCUSSION

Table 1 lists the species and the number of *Hemiptera* and *Coleoptera* collected in the province of Piacenza and Mantova, and in Milan; only *Aphis* species were not counted as, when present, they occurred in large colonies. Fourteen phytophagous species and three predators, linked to the phytophages, were collected. All the species recorded are common in Italy. Many of the species can colonize crops and field margin vegetation, especially white goosefoot (*Chenopodium album*), plant that belongs to the same family of quinoa, *Amaranthaceae*, recorded in Alseno, Ceresara, and Gossolengo.

Among Hemiptera Heteroptera, Mirids colonize wild vegetation bordering crops and they can move from the spontaneous plants to the crops. *Lygus rugulipennis* (Poppius, 1911), the most abundant species, is a palearctic, well-known pest of spontaneous and cultivated plants. It colonizes sunflower, apple orchard, vineyard, *Matricaria* sp., *Rumex* sp., *Trifolium* sp. and *Urtica dioica*, (WAGNER and WEBER, 1964). It is recorded also on *Chrysanthemum* sp., *Medicago sativa*, *Nicotiana tabacum*, *Rubus idaeus*, *Sesamus indicum*, *Solanum tuberosum* and *Triticum* sp.; damages are observed on bud, fruit, and leaf (SOUTHWOOD and LESTON, 1959). Also *Orthotylus flavosparus* (Sahlberg, 1842), palearctic species, colonized quinoa in all the three localities, coming from spontaneous plants of the same family; it is a bivoltine species, the first adults are observed in June, the adults of the second generation appear in August-September, and the species overwinters as egg (WAGNER, 1970-1975). Monitoring of *Polymerus cognatus*

Table 1 – Species and number of Hemiptera and Coleoptera recorded in Alseno (PC), Ceresara (MN), Gossolengo (PC), and Milano, total number of specimen and percentage.

Species	Alseno	Ceresara	Gossolengo	Milan	Total	%
HEMIPTERA						
MIRIDAE						
<i>Adelphocoris lineolatus</i> (Goeze)			1		1	0.2
<i>Lygus rugulipennis</i> (Poppius)	37	14	164		215	45.2
<i>Lygus pratensis</i> (L.)			1		1	0.2
<i>Orthotylus flavosparsus</i> (Sahlberg)	39	8	11		58	12.2
<i>Polymerus cognatus</i> (Fieber)	1	9			10	2.1
<i>Liocoris tripustulatus</i> (F.)				6	6	1.3
ANTHOCORIDAE						
<i>Orius niger</i> (Wolff)	1	7			8	1.7
RHOPALIDAE						
<i>Liorhyssus hyalinus</i> (F.)	2	-	1		3	0.6
LYGAEIDAE						
<i>Nysius ericae</i> (Schilling)				4	4	0.8
<i>Nysius graminicola</i> (Kolenati)				1	1	0.2
APHIDIDAE						
<i>Aphis craccivora</i> Koch				**		
<i>Aphis fabae</i> Scopoli				**		
COLEOPTERA						
CHRYSOMELIDAE						
<i>Chaetocnema tibialis</i> (Illiger)	113	25	2		140	29.5
<i>Chaetocnema picipes</i> Stephens	1				1	0.2
<i>Phyllotreta vittula</i> (Redtenbacher)		3			3	0.6
COCCINELLIDAE						
<i>Hippodamia variegata</i> Goeze	5	16	1		23	4.8
<i>Scymnus rubromaculatus</i> (Goeze)		2			2	0.4

** High number of specimens.

(Fieber, 1858) is particularly interesting as in Italy it is usually recorded in salty habitat of the peninsula coast on *Salsola kali* and other *Salsolaceae*, but it is also present in marsh (DIOLI, 1995). *Lygus pratensis* (Linnaeus, 1758) and *Liocoris tripustulatus* (Fabricius, 1781) are common in rangelands and the presence on quinoa could be accidental, as *Adelphocoris lineolatus* (Goeze, 1778), holarctic species, that thrives mainly on Papilionaceae and Asteraceae (DIOLI, 1997), and is a pest of alfa-alfa, clover, cotton, jujube, and legume (ZHANG *et al.*, 2015). Few specimen of *Liorhyssus hyalinus* (Fabricius, 1794) were collected. This cosmopolitan Rhopalidae is recorded mainly on Asteraceae and Poaceae (MOULET, 1995). The only predator in Hemiptera, *Orius niger* (Wolff, 1811) (Anthocoridae), was mainly collected in Ceresara. This species is spread in Europe and in Central Asia, it preys on aphids and thrips (DIOLI, 1992), on *Artemisia* spp., *Achillea* spp., and *Verbascum* spp. (PERICART, 1972).

The turanic-mediterranean Coleoptera, *Chaetocnema tibialis* (Illiger, 1807) was abundant. Adults damage heavily *Beta vulgaris* leaves, while larvae feed on roots. Only one specimen of *C. picipes* (Stephens, 1831) was recorded, usually present on *Polygonaceae*. Another leaf beetle was collected, *Phyllotreta vittula* (Spinola, 1844), known to colonize cereals, and also in this case its presence on quinoa can be considered accidental.

Two species of Coccinellidae were collected, *Hippodamia variegata* (Goeze, 1777) and *Scymnus rubromaculatus* (Goeze, 1777), both predators of aphids; the two genera were already recorded on quinoa (DUGHETTI, 2015).

The insects collected on quinoa, cultivated in pots, in Milan were different from the species collected in the open fields. Two phytophagous Lygaeidae were collected, *Nysius ericae* (Schilling, 1892), eurasiatic, polyphage on Asteraceae and on Fabaceae (PERICART 1998), and *Nysius graminicola* (Kolenati, 1845), a xerophilic, turanic-mediterranean

species, found on Poaceae (STICHEL, 1959-1961), and Asteraceae (PERICART, 1998). The presence of *Nysius cymoides*, recorded in 2014 on quinoa (BOCCHI *et al.*, 2016), suggests the propensity of Lygaeidae to Amaranthaceae. In September, quinoa in Milano was colonized by two polyphagous aphids, *Aphis craccivora* (Koch, 1854) and *Aphis fabae* (Scopoli, 1763).

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