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CELALETTİN GÖZÜAÇIK

MUSTAFA GÜLLÜ

TUNCAY TÜRKEŞ

AYDA KONUKSAL

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## The determination of spider species (Araneae) in barley and wheat fields of Northern Cyprus

Celalettin GÖZÜAÇIK<sup>1\*</sup>, Mustafa GÜLLÜ<sup>2</sup>, Tuncay TÜRKEŞ<sup>3</sup>, Ayda KONUKSAL<sup>4</sup>

<sup>1</sup>Department of Plant Protection, Faculty of Agriculture, Iğdır University, Iğdır, Turkey

<sup>2</sup>Biological Control Research Station, Adana, Turkey

<sup>3</sup>Department of Biology, Faculty of Science and Arts, Niğde, Niğde University Turkey

<sup>4</sup>Agriculture Research Institute, Lefkoşa, Turkish Republic of Northern Cyprus

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**Abstract:** This study was carried out to determine the spider fauna in barley and wheat fields of Northern Cyprus. It was conducted in 36 cereal fields of 24 villages in the Lefkoşa, Girne, Güzeyurt, Gazimağusa, and İskele districts in the years 2012 and 2013. In the study, the Oxyopidae (2), Thomisidae (5), Salticidae (2), Araneidae (3), Philodromidae (2), Clubionidae (3), and Theridiidae (1) families from Araneae were determined. Seventeen of the 18 species, excluding *Kochiura aulica* (C. L. Koch), were found for the first time and included in the fauna of Northern Cyprus.

**Key words:** Spider species, Araneae, barley, wheat, Northern Cyprus

### 1. Introduction

Spiders are known as one of the most important predatory groups in terrestrial ecosystems because they feed on insects and thus can play an important role in pest control. Consequently, they are important for integrated pest management. There are more than 3924 genera and 44,540 spider species that have been recognized throughout the world (Platnick, 2014), out of which 78 species have been reported from Cyprus (<http://cyarthros.myspecies.info/content/checklist>). The spider fauna of Cyprus is rather poorly known when compared to other regions of the world.

Cereal is very important for the Turkish Republic of Northern Cyprus. Almost all of the cultivated area of Northern Cyprus is planted with barley and wheat. Some significant insect pests that feed on cereal include *Syringopais temperatella* (Lederer), *Mayetiola destructor* (Say), *Pachytychius hordei* (Brullé), *Cnephasia pasiuana* (Hübner), and *Eurygaster integriceps* Puton, and some aphid species, including *Rhopalosiphum maidis* (Fitch) *Sitobion avenae* (Fabricius), *Rhopalosiphum padi* (Linnaeus), *Anoecia corni* (Fabricius), and *Tetraneura ulmi* (Linnaeus) (Güllü et al., 2014a, 2014b). During this research, some spiders were observed feeding on these insects.

The aim of this study was to contribute to the knowledge base of the spider diversity of the Turkish Republic of

Northern Cyprus by adding new species records and new locality data, as well as zoogeographical remarks for each species.

### 2. Materials and methods

The specimens were collected from barley and wheat fields in Northern Cyprus in 2012 and 2013. Spiders were collected by sweep net and aspirator from among leaves and stems of plants, on the ground, and in soil cracks. They were preserved in 70% ethanol. Examined specimens were deposited at NUAM (Arachnology Museum of Niğde University). Identification was made by means of a SZ-61 Olympus stereomicroscope; the keys of Locket and Millidge (1951, 1953), Heimer and Nentwig (1991), and Roberts (1995) were used. Spider species were identified by Tuncay Türkeş.

### 3. Results

#### Family Araneidae Simon, 1895

#### *Aculepeira ceropegia* (Walckenaer, 1802)

**Material examined:** Lefkoşa district, Gaziköy, 35°9'23.3"N, 33°33'27.1"E, 83 m, 26.03.2012, 1 ♀; Serhat köy, 35°11'42.9"N, 33°06'44.3"E, 83 m, 26.03.2012, 1 ♂; Girne district, Göçeri, 35°16'54.2"N, 33°13'39.8"E, 313 m, 27.03.2012, 1 ♀; Hisarköy, 35°17'47.2"N, 33°06'20.3"E, 27.03.2012, 2 ♀♀; Şirinevler, 35°17'00.7"N, 33°09'41.0"E,

\* Correspondence: cgozuacik46@gmail.com

251 m, 28.03.2012, 2 ♀♀; Güzelyurt district, Güneşköy, 35°10'43.1"N, 32°56'47.3"E, 38 m, 16.04.2013, 1 ♂, 1 ♀; İskele district, Dipkarpaz, 35°38'47.6"N, 34°32'16.1"E, 13 m, 16.04.2013, 1 ♂.

**Distribution in the world:** England, Ireland, North Europe (Roberts, 1995), Palearctic (Platnick, 2014).

***Agalenatea redii* (Scopoli, 1763)**

**Material examined:** Gazimağusa district, Ulukışla, 35°11'56.7"N, 33°37'09.2"E, 62 m, 26.03.2012, 1 ♂, 1 ♀; Güzelyurt district, Bostancı-2, 35°08'33.4"N, 32°59'08.8"E, 127 m, 26.03.2012, 1♀; İskele district, Kalecik, 35°20'34.5"N, 33°59'43.3"E, 13 m, 16.04.2013, 1 ♀; Lefkoşa district, Gönyeli, 35°13'04.5"N, 33°15'00.9"E, 181 m, 28.03.2012, 1 ♂, 1 ♀; Hamitköy, 35°12'50.0"N, 33°23'25.7"E, 148 m, 28.03.2012, 1♀.

**Distribution in the world:** England (Roberts, 1995), Palearctic (Platnick, 2014).

***Neoscona adianta* (Walckenaer, 1802)**

**Material examined:** Girne district, Şirinevler, 35°17'00.7"N, 33°09'41.0"E, 251 m, 28.03.2012, 1 ♂, 2 ♀♀; Gazimağusa district, Serdarlı, 35°14'28.1"N, 33°35'25.3"E, 96 m, 17.04.2013, 1 ♂; İskele district, Mehmetcik, 35°11'56.7"N, 33°37'09.2"E, 62 m, 16.04.2013, 2 ♂♂, 10 ♀♀; Güzelyurt district, Bostancı-2, 35°08'33.4"N, 32°59'08.8"E, 127 m, 26.03.2012, 3 ♂♂, 3 ♀♀.

**Distribution in the world:** England, Ireland, North Europe (Roberts, 1995), Palearctic (Platnick, 2014).

**Family Clubionidae Wagner, 1887**

***Clubiona neglecta* O. P.-Cambridge, 1862**

**Material examined:** Gazimağusa district, Çayönü, 35°05'09.2"N, 33°47'29.4"E, 52 m, 26.03.2012, 1 ♂, 1 ♀; Serdarlı, 35°14'28.1"N, 33°35'25.3"E, 96 m, 17.04.2013, 1 ♂; Girne district, Hisarköy, 35°17'47.2"N, 33°06'20.3"E, 27.03.2012, 1 ♀; Şirinevler, 35°17'00.7"N, 33°09'41.0"E, 251 m, 28.03.2012, 1 ♂, 1 ♀; İskele district, Dipkarpaz, 35°38'47.6"N, 34°32'16.1"E, 13 m, 16.04.2013, 1 ♂, 1 ♀; Lefkoşa district, Gönyeli, 35°13'04.5"N, 33°15'00.9"E, 181 m, 28.03.2012, 1 ♂.

**Distribution in the world:** Trans-Palearctic range to China and South Korea, Mongolia (Mikhailov, 2011).

***Clubiona lutescens* Westring, 1851**

**Material examined:** Gazimağusa district, Güvercinlik, 35°06'53.3"N, 33°52'07.8"E, 8 m, 26.03.2012, 1 ♂, 1 ♀; Girne district, Şirinevler, 35°17'00.7"N, 33°09'41.0"E, 251 m, 28.03.2012, 1 ♂, 1 ♀; Güzelyurt district, Bostancı-2, 35°08'33.4"N, 32°59'08.8"E, 127 m, 26.03.2012, 1 ♂; Lefkoşa district, Gönyeli, 35°13'04.5"N, 33°15'00.9"E, 181 m, 28.03.2012, 1 ♂.

**Distribution in the world:** Holarctic (Platnick, 2014).

**Family Oxyopidae**

***Oxyopes lineatus* Latreille, 1806**

**Material examined:** Lefkoşa district, Alayköy, 35°12'39.5"N, 33°12'50.8"E, 178 m, 28.03.2012, 1 ♂, 1 ♀;

Gazimağusa district, Serdarlı, 35°14'28.1"N, 33°35'25.3"E, 96 m, 17.04.2013, 1 ♀; Girne district, Şirinevler, 35°17'00.7"N, 33°09'41.0"E, 251 m, 28.03.2012, 2 ♀♀; Güzelyurt district, Akçay, 35°11'02.2"N, 33°01'14.5"E, 66 m, 18.04.2013, 2 ♀♀; Bostancı-2, 35°08'33.4"N, 32°59'08.8"E, 127 m, 26.03.2012, 1 ♂; Güneşköy, 35°10'43.1"N, 32°56'47.3"E, 38 m, 16.04.2013, 1 ♂, 1 ♀.

**Distribution in the world:** Palearctic (Platnick, 2014).

***Oxyopes heterophthalmus* (Latreille, 1804)**

**Material examined:** Gazimağusa district, Akdoğan, 35°06'18.6"N, 33°41'39.5"E, 57 m, 26.03.2012, 1 ♂, 1♀; Geçitkale, 35°15'58.3"N, 33°44'48.1"E, 83 m, 26.03.2012, 1 ♂, 1 ♀; Girne district, Tepebaşı, 35°17'46.5"N, 33°02'39.3"E, 232 m, 17.04.2013, 1 ♀; Güzelyurt district, Bostancı-2, 35°08'33.4"N, 32°59'08.8"E, 127 m, 26.03.2012, 2 ♂♂, 1 ♀; İskele district, Kalecik, 35°20'34.5"N, 33°59'43.3"E, 13 m, 16.04.2013, 1 ♀;

Lefkoşa district, Gönyeli, 35°13'04.5"N, 33°15'00.9"E, 181 m, 28.03.2012, 1 ♂, 2 ♀♀.

**Distribution in the world:** Palearctic (Platnick, 2014).

**Family Philodromidae Thorell, 1870**

***Thanatus vulgaris* Simon, 1870**

**Material examined:** Lefkoşa district, Erdemli, 35°03'57.7"N, 33°36'15.0"E, 157 m, 26.03.2012, 1 ♂; Girne district, Şirinevler, 35°17'00.7"N, 33°09'41.0"E, 251 m, 28.03.2012, 1 ♂; Gönyeli, 35°13'04.5"N, 33°15'00.9"E, 181 m, 28.03.2012, 1 ♂, 2 ♀♀; Gazimağusa district, Geçitkale, 35°15'58.3"N, 33°44'48.1"E, 83 m, 17.04.2013, 1 ♂; Girne district, Hisarköy, 35°17'47.2"N, 33°06'20.3"E, 27.03.2012, 1 ♂, 1 ♀; İskele district, Kalecik, 35°20'34.5"N, 33°59'43.3"E, 13 m, 16.04.2013, 1 ♀.

**Distribution in the world:** Holarctic (Platnick, 2014).

***Thanatus sabulosus* (Menge, 1875)**

**Material examined:** Gazimağusa district, Dörtöy, 35°10'43.0"N, 33°44'58.4"E, 38 m, 26.03.2012, 3 ♀♀; Geçitkale, 35°15'58.3"N, 33°44'48.1"E, 83 m, 17.04.2013, 1 ♂, 2 ♀♀; Girne district, Göçeri, 35°16'54.2"N, 33°13'39.8"E, 313 m, 27.03.2012, 1 ♀; Güzelyurt district, Güneşköy, 35°10'43.1"N, 32°56'47.3"E, 38 m, 16.04.2013, 1 ♂, 1 ♀.

**Distribution in the world:** Palearctic (Grbić and Savić, 2010).

**Family Salticidae Blackwall, 1841**

***Heliophanus equester* L. Koch, 1867**

**Material examined:** Lefkoşa district, Balıkesir, 35°12'48.8"N, 33°29'52.7"E, 104 m, 26.03.2012, 1 ♀; Girne district, Hisarköy, 35°17'47.2"N, 33°06'20.3"E, 27.03.2012; Tepebaşı, 35°17'46.5"N, 33°02'39.3"E, 232 m, 17.04.2013, 1 ♀; Güzelyurt district, Güneşköy, 35°10'43.1"N, 32°56'47.3"E, 38 m, 16.04.2013, 1 ♂, 2 ♀♀; İskele district, Kalecik, 35°20'34.5"N, 33°59'43.3"E, 13 m, 16.04.2013, 2 ♂♂.

**Distribution in the world:** Italy to Azerbaijan (Platnick, 2014).

***Mogrus neglectus* (Simon, 1868)**

**Material examined:** Girne district, Şirinevler, 35°17'00.7"N, 33°09'41.0"E, 251 m, 28.03.2012, 1 ♂; Gazimağusa district, Serdarlı, 35°14'28.1"N, 33°35'25.3"E, 96 m, 17.04.2013, 1 ♂, 1 ♀; Geçitkale, 35°15'58.3"N, 33°44'48.1"E, 83 m, 17.04.2013, 1 ♂, 2 ♀♀; **İskele** district, Sınırüstü, 35°11'56.7"N, 33°37'09.2"E, 62 m, 16.04.2013, 1 ♀; Dipkarpaz, 35°38'47.6"N, 34°32'16.1"E, 13 m, 16.04.2013, 1 ♂, 1 ♀; Lefkoşa district, Gönyeli, 35°13'04.5"N, 33°15'00.9"E, 181 m, 28.03.2012, 1 ♂.

**Distribution in the world:** Greece, Macedonia, Turkey, Israel, Iran, Azerbaijan (Platnick, 2014).

**Family Theridiidae Sundevall, 1833*****Kochiura aulica* (C. L. Koch, 1838)**

**Material examined:** Lefkoşa district, Alayköy, 35°12'39.5"N, 33°12'50.8"E, 178 m, 28.03.2012, 1 ♂; Gazimağusa district, Serdarlı, 35°14'28.1"N, 33°35'25.3"E, 96 m, 17.04.2013, 1 ♂, 2 ♀♀; Girne district, Göçeri, 35°16'54.2"N, 33°13'39.8"E, 313 m, 27.03.2012, 1 ♀; Şirinevler, 35°17'00.7"N, 33°09'41.0"E, 251 m, 28.03.2012, 1 ♂, 1 ♀; **İskele** district, Dipkarpaz, 35°38'47.6"N, 34°32'16.1"E, 13 m, 16.04.2013, 1 ♂, 1 ♀; Kalecik, 35°20'34.5"N, 33°59'43.3"E, 13 m, 16.04.2013, 2 ♂♂, 1 ♀.

**Distribution in the world:** East Macedonia, Greece (Buchholz, 2013).

**Family Thomisidae Sundevall, 1833*****Xysticus audax* (Schränk, 1803)**

**Material examined:** Gazimağusa district, Serdarlı, 35°14'28.1"N, 33°35'25.3"E, 96 m, 26.03.2012, 9 ♀♀; Girne district, Hisarköy, 35°17'47.2"N, 33°06'20.3"E, 27.03.2012; Şirinevler, 35°17'00.7"N, 33°09'41.0"E, 251 m, 28.03.2012, 1 ♀; Güzelyurt district, Bostancı-2, 35°08'33.4"N, 32°59'08.8"E, 127 m, 26.03.2012, 1 ♂, 1 ♀.

**Distribution in the world:** Palearctic, temperate zone (Azarkina and Logunov, 2000).

***Thomisus onustus* Walckenaer, 1805**

**Material examined:** Gazimağusa district, Geçitkale, 35°15'58.3"N, 33°44'48.1"E, 83 m, 17.04.2013, 1 ♂; Güzelyurt district, Bostancı-2, 35°08'33.4"N, 32°59'08.8"E, 127 m, 26.03.2012, 1 ♂, 2 ♀; Güneşköy, 35°10'43.1"N, 32°56'47.3"E, 38 m, 16.04.2013, 1 ♂, 1 ♀; **İskele** district, Dipkarpaz, 35°38'47.6"N, 34°32'16.1"E, 13 m, 16.04.2013, 1 ♂, 1 ♀.

**Distribution in the world:** Palearctic (Platnick, 2014).

***Synema globosum* (Fabricius, 1775)**

**Material examined:** Lefkoşa district, Balıkesir, 35°12'48.8"N, 33°29'52.7"E, 104 m, 26.03.2012, 3 ♀♀; Girne district, Şirinevler, 35°17'00.7"N, 33°09'41.0"E, 251 m, 28.03.2012, 1 ♂; Güzelyurt district, Güneşköy, 35°10'43.1"N, 32°56'47.3"E, 38 m, 16.04.2013, 1 ♂; **İskele** district, Dipkarpaz, 35°38'47.6"N, 34°32'16.1"E, 13 m, 16.04.2013, 1 ♂, 1 ♀.

**Distribution in the world:** Palearctic (Platnick, 2014).

***Runcinia grammica* (C. L. Koch, 1837)**

**Material examined:** Gazimağusa district, Ulukışla, 35°11'56.7"N, 33°37'09.2"E, 62 m, 26.03.2012, 1 ♀; Girne district, Şirinevler, 35°17'00.7"N, 33°09'41.0"E, 251 m, 28.03.2012, 3 ♀♀; Tepebaşı, 35°17'46.5"N, 33°02'39.3"E, 232 m, 17.04.2013, 1 ♀; Güzelyurt district, Güneşköy, 35°10'43.1"N, 32°56'47.3"E, 38 m, 16.04.2013, 1 ♂, 1 ♀; Lefkoşa district, Gönyeli, 35°13'04.5"N, 33°15'00.9"E, 181 m, 28.03.2012, 1 ♂, 1 ♀.

**Distribution in the world:** Palearctic (Platnick, 2014).

***Monaeses israeliensis* Levy, 1973**

**Material examined:** Girne district, Şirinevler, 35°17'00.7"N, 33°09'41.0"E, 251 m, 28.03.2012, 1 ♀; **İskele** district, Sınır Üstü Köyü, 35°11'56.7"N, 33°37'09.2"E, 62 m, 16.04.2013, 1 ♀; Lefkoşa district, Gaziköy, 35°09'23.3"N, 33°33'27.1"E, 83 m, 28.03.2012, 1 ♂, 1 ♀; Gönyeli, 35°13'04.5"N, 33°15'00.9"E, 181 m, 28.03.2012, 1 ♀.

**Distribution in the world:** Mediterranean species whose ranges extend eastward to Central Asia, East Macedonia, Greece (Buchholz, 2013); Greece, Turkey, Israel, Lebanon, Central Asia (Platnick, 2014).

**4. Discussion**

In this study, 17 species of spider are recorded from the cereal field fauna of Northern Cyprus for the first time. With the additions in this paper, the number of species of Araneae in Northern Cyprus has increased to 95. The spiders regulating insect populations in many ecosystems are an important factor for natural balance. However, the pesticides used against pests and diseases on cultivated plants cause high mortality rates in spiders and disrupt their behavior (Boller et al., 1989; Everts et al., 1989; Feber et al., 1998; Holland et al., 2000; Amalin et al., 2001; Yardım and Edwards, 1998; Tahir et al., 2011; Mukhtar et al., 2013). Many pests and diseases have been identified on barley and wheat so far (Fidan et al., 2014; Güllü et al., 2014a, 2014b; Hekimhan et al., 2014a). Farmers randomly use insecticides and fungicides to control pests and diseases. These chemicals are commonly synthetic pyrethroids (as alpha-cypermethrin, beta-cyfluthrin, cypermethrin, lambda-cyhalothrin, zeta-cypermethrin) and partly organic phosphoruses (as chlorpyrifos-ethyl). Many investigations have shown that spiders are usually more sensitive than insects to synthetic pyrethroids and organic phosphoruses (Brown et al., 1983; Birnie et al., 1998; Huusela-Veistola, 1998; Yardım and Edwards, 1998; Marc et al., 1999; Holland et al., 2000; Tanaka et al., 2000). When considered from this perspective, it is important to protect and sustain the fauna of natural enemies of pests in the cereal agroecosystem of Northern Cyprus.

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