Notes on a collection of spiders from agricultural by-catch from the Matanuska-Susitna area of Alaska

by Jozef Slowik[1]

Spiders are in important natural predator in many ecosystems, though their contribution to pest control in agroecosystems does seem unclear (Nyffeler and Birkhofer, 2017). This is largely due to the limited habitat and spider diversity found in agricultural plots (Nyffeler and Sunderland, 2003). However, spiders are often specialists and recognizing which species may assist with a pest problem, and enhancing the field to encourage that species may be beneficial (Rypstra et al., 1999). There have been no studies on arachnids from agriculture in Alaska. This study looked at by-catch from several other pest related studies around Palmer, Alaska and identified the species associated with those agriculture systems.

Methods

Spider specimens were removed from by-catch vials collected as part of several USDA projects examining pests of crops grown in the Matanuska-Susitna valley. Fields sampled were at the Matanuska Experiment Farm and Extension Center (N 61.5686° W 149.2495°), The Point Mackenzie Correctional Farm (N 61.4186° W 150.0924°). Additionally, fields at Pyrah's (N 61.5319° W 149.0823°), Cambell's (N 61.5153° W 149.0800°), and VanderWheel's (N 61.5634° W 149.1495°) commercial farms were sampled.

Specimens were collected using either Aphid pan traps (APT) (Pantoja et al., 2010*b*) or click beetle traps (CBT) (Pantoja et al., 2010*a*). Specimens were collected off rhubarb (*Rheum* spp.), potato (*Solanum tuberosum* (L.)), or lettuce (*Lactuca sativa* L.). Collections occurred over the years 2006–2008.

A total of 1812 by-catch vials were examined. Spiders were identified to species if mature, and family if juvenile using Ubick et al. (2005). Family guild organization follows Uetz et al. (1999). Not all by-catch samples included crop information (24%). All specimens have been deposited at the University of Alaska Museum of the North.

Results

Of the 1812 by-catch vials examined 165 (9.1%) contained spiders. A total of 262 spiders were found, of those 176 were adult and could be identified to species. Forty-two species were identified representing 10 families (Table 1). One additional family, Theridiidae, was only represented by juveniles. The highest number of specimens and species was exhibited by the family Linyphiidae (Table 2). Rhubarb samples dominated the crop type sampled ($n = 133$) compared to potato ($n = 10$) and lettuce ($n = 7$). The Wandering Sheet guild dominated species and samples because of the inclusion of Linyphiidae. Second was the Ambusher (Thomisidae and Philodromidae) and Orbweaver (Araneidae and Tetragnathidae) guilds (Table 3).

Specimen data are available at `https://arctos.database.museum/viewAccn.cfm?transaction_id=21127085`.

Table 1: Species list, trap type species collected with, and crop species collected off of, for a collection of spiders from agricultural fields in the Matanuska-Susitna Valley, Alaska.

Family	Species	Trap type	Crop
Aranaeidae	*Araniella proxima* (Kulczyński, 1885)	APT	rhubarb
	Larinioides cornutus (Clerck, 1757)	APT	rhubarb
	Larinioides patagiatus (Clerck, 1757)	APT, CBT	rhubarb
Clubionidae	*Clubiona furcata* Emerton, 1919	CBT	rhubarb
	Clubiona riparia L. Koch, 1866	APT, CBT	rhubarb
Dictynidae	*Dictyna brevitarsa* Emerton, 1915	APT	rhubarb
	*Dictyna majo*r Menge, 1869	APT, CBT	rhubarb
	Emblyna annulipes (Blackwall, 1846)	APT, CBT	lettuce, rhubarb
	Emblyna manitoba (Ivie, 1947)	APT	rhubarb
Gnaphosidae	*Zelotes fratris* Chamberlin, 1920	CBT	
Linyphiidae	*Agyneta lophophor* (Chamberlin & Ivie, 1933)	CBT	

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[1]University of Alaska Cooperative Extension Service

Family	Species	Trap type	Crop
Linyphiidae	*Allomengea dentisetis* (Grube, 1861)	CBT	rhubarb
	Bathyphantes brevipes (Emerton, 1917)	APT	rhubarb
	Bathyphantes latescens (Chamberlin, 1919)	APT, CBT	rhubarb
	Bathyphantes pallidus (Banks, 1892)	CBT	rhubarb
	Centromerus sylvaticus (Blackwall, 1841)	APT, CBT	rhubarb
	Diplocephalus subrostratus (O. Pickard-Cambridge, 1873)		potato
	Erigone arctica (White, 1852)	CBT	lettuce
	Erigone atra Blackwall, 1833	APT, CBT	lettuce, rhubarb
	Erigone blaesa Crosby & Bishop, 1928	CBT	lettuce, potato
	Erigone dentigera O. Pickard-Cambridge, 1874	APT	rhubarb
	Erigone tanana Chamberlin & Ivie, 1947	APT	
	Gnathonarium taczanowskii (O. Pickard-Cambridge, 1873)	APT, CBT	lettuce, rhubarb
	Mecynargus paetulus (O. Pickard-Cambridge, 1875)	APT, CBT	rhubarb
	Microlinyphia pusilla (Sundevall, 1830)	APT, CBT	rhubarb
	Microneta viaria (Blackwall, 1841)	CBT	lettuce, rhubarb
	Misc #3	APT, CBT	rhubarb
	Phlattothrata parva (Kulczyński, 1926)	APT, CBT	rhubarb
	Praestigia kulczynskii Eskov, 1979	CBT	rhubarb
	Walckenaeria atrotibialis (O. Pickard-Cambridge, 1878)	CBT	rhubarb
Lycosidae	*Pardosa palustris* (Linnaeus, 1758)	CBT	rhubarb
Philodromidae	*Rhysodromus alascensis* (Keyserling, 1884)	CBT	rhubarb
	Philodromus cespitum (Walckenaer, 1802)	APT, CBT	rhubarb
	Philodromus placidus Banks, 1892	APT	potato
	Thanatus striatus C. L. Koch, 1845	CBT	rhubarb
Salticidae	*Attulus striatus* (Emerton, 1911)	APT	rhubarb
	Pelegrina montana (Emerton, 1891)	APT	rhubarb
Tetragnathidae	*Tetragnatha dearmata* Thorell, 1873	APT	rhubarb
	Tetragnatha laboriosa Hentz, 1850	APT	rhubarb
Thomsidae	*Misumena vatia* (Clerck, 1757)	APT	rhubarb
	Ozyptila gertschi Kurata, 1944	CBT	rhubarb
	Ozyptila sincera canadensis Dondale & Redner, 1975	CBT	rhubarb

Table 2: Spider families, number of specimens, and number of representative species for a collection of spiders from agricultural fields in the Matanuska-Susitna Valley, Alaska.

Family	Number of specimens	Percent of specimens	Number of species	Percent of species
Araneidae	16	6.1	3	7.1
Clubionidae	9	3.4	2	4.8
Dictynidae	11	4.2	4	9.5
Gnaphosidae	1	0.4	1	2.4
Linyphiidae	169	64.5	20	47.6
Lycosidae	5	1.9	1	2.4
Philodromidae	14	5.3	4	9.5
Salticidae	4	1.5	2	4.8
Tetragnathidae	13	5.0	2	4.8
Theridiidae	5	1.9	0	0
Thomisidae	15	5.7	3	7.1

Table 3: Guild, number of specimens, and number of representative species for a collection of spiders from agricultural fields in the Matanuska-Susitna Valley, Alaska.

Guild	Number of specimens	Number of species
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Foliage Runners	9	2
Ground Runner	6	2
Stalker	4	2
Ambusher	29	7
Wandering Sheet	169	20
Orb Weaver	29	5
Space Web Builder	16	4

Discussion

These data represent the first sampling of spider species occurring in association with agriculture in Alaska. It is also the first data on species occurrences in Southcentral Alaska since Chamberlin and Ivie's work in 1947. Although these data are from agricultural settings, the data are representative of other diversity surveys in Alaska (Slowik, 2006; Slowik and Blagoev, 2012; Sikes et al., 2013). These data do differ from agricultural data from the contiguous United States in which Linyphiidae do make up the most diverse group found, but they are not the most commonly collected family (Young and Edwards, 1990), but they agree with agricultural data from Europe (Nyffeler and Birkhofer, 2017).

Generally wandering guilds including the families Salticidae and Lycosidae will make up a larger proportion of specimens and species (Young and Edwards, 1990; Kerzicnik et al., 2013). However, this is likely an artifact of the collection methods as both traps are above ground level requiring the spider to climb up the vegetation to become victim of the trap. Given that only 9.1% of samples had spiders in the samples, this implies that the trapping methods were not very efficient at trapping spiders. For an IPM application these traps were effective at collecting their intended pest and spared natural predators like spiders, though the true abundance of spiders is not known for comparison. Unfortunately, crop comparison could not be conducted due to the low number of samples from potato and lettuce, but these data are an initial baseline to build on.

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Pollination, pilfering, and predation in an orchid pollinator network in the Juneau area of Southeast Alaska

by Marlin Bowles[1] *and Robert Armstrong*[2]

Summary

We studied insect pollinators and other visitors to 14 native orchids of the Juneau area of Southeast Alaska. At least 15 insect pollinators, a pollen consumer, and 4 spiders were found among ten orchid species. New North American records included pollination of *Coeloglossum viride* by march flies (Bibionidae), visitation and possible pollination of *Listera cordata* by *Dryomyza* flies, pollen transfer on *Corallorhiza trifida* by dance flies (Empididae) and pollination of *Corallorhiza mertensiana* by a *Bombus* species. New pollinators of *Platanthera dilatata* included the hawkmoth *Hyles gallii*, the butterfly *Pieris marginalis* and several new Noctuidae species. We observed for the first time the bee mimic *Eristalis anthophorina* foraging on *Spiranthes romanzoffiana*. A complex network occurred among these orchids and insects. Some orchids had multiple pollinators, while some insects pollinated multiple orchids. Several insects were nectar thieves, including one pollinator. Noctuidae moths pollinate *Platanthera dilatata*, but they appear to be nocturnal nectar thieves of two other orchid species (*Goodyera oblongifolia* and *S. romanzoffiana*) that are diurnally pollinated by *Bombus* species. Plume moths (*Amblyptilia* sp.) are nectar thieves on *G. oblongifolia* and *P. dilatata* but do not pollinate other orchids. More work is needed to understand interactions among these orchids and their pollinators and nectar thieves.

[1]Juneau, Alaska, mbowles@mortonarb.org
[2]Juneau, Alaska, bob@discoverysoutheast.org