# NOTE

## A Survey of Spiders in Apple Trees in the Willamette Valley of Oregon[1]

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The role of spiders in the natural control of agricultural pests is not totally understood even though spiders form a major component of arthropod fauna in many agroecosystems (Sunderland 1999. J. Arachnol. 27: 308-316). In deciduous orchards, spiders constitute a large and frequently-occurring component of the predatory arthropod fauna, and they prey upon active stages of plant-feeding mites, scales, aphids, and various lepidopteran larvae (Chant 1956. J. Hort. Sci. 31: 35-46; Putman 1967. Can. Entomol. 99: 160-170; MacLellan 1973. Can. Entomol. 105: 681-700; Dondale et al. 1979. Can. Entomol. 111: 377-380; Mansour 1984. Phytoparasitica 12: 163-166; Mansour 1987. Phytoparasitica 15: 31-41). The reduction in pest population may occur through actual spider predation, pest abandonment of plant parts occupied by spiders, or both (Sunderland 1999). However, very few attempts have been made to determine spider/prey interactions in apple orchards perhaps because very little information is available on spider species structure in apple ecosystem. Reported here are results of a four-year survey of spiders and their relative abundance in apple orchards in the Willamette Valley of Oregon.

Surveys were conducted in one abandoned (Benton Co.) and two highly managed apple orchards (Oregon State Univ. Entomology Farm and Lewis Brown Farm, Linn Co.) near Corvallis. A block of 20 to 25 unsprayed trees at all three locations was consecutively sampled during the growing seasons of 1992-1995. Spiders were collected by methods described by Dondale et al. (1979). All spiders collected were immediately preserved in alcohol for subsequent identification and enumeration. Attempts were made to identify the specimens to genus and/or species (Vincent 1986. Amer. Arach. Soc. Univ. Florida, Gainesville, FL; Moldenke et al. 1987. Gen. Tech. Rep. PNW-GTR-207. PNW Res Sta. Portland, OR). However, for simplicity, some spiders were grouped according to subfamilies. Verification of representative identifications was made by a specialist (A. R. Moldenke, Department of Entomology, Oregon State Univ., Corvallis, OR). The representative specimens are preserved at

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**Table 1. Spiders (Araneida) collected in beating sheet samples from apple trees in orchards of the Willamette Valley of Oregon during 1992-1995 seasons**

| Family | Subfamily/species | Abundance (%) |
|---|---|---|
| Salticidae | **All species** | **33.48** |
| | *Metaphidippus aeneolus* Curtis | 21.59 |
| | *Eris marginata* (Walckenaer) | 5.94 |
| | *Tutelina similis* (Banks) | 0.52 |
| | *Salticus scenicus* (L.) | 0.52 |
| Linyphiidae | **All species** | **21.32** |
| | *Spirembolus mundus* Chamberlin and Ivie | 14.25 |
| | *Erigone* spp. | 0.52 |
| | *Bathyphantes* spp. (immature) | 0.43 |
| | *Neriene* spp. | 0.22 |
| | *Pityohyphantes rubrofasciatus* Keyserling | 0.22 |
| | Miscellaneous Micryphantinae | 5.63 |
| Clubionidae | *Cheiracanthium inclusum* (Hentz) | **13.37** |
| Philodromidae | **All species** | **9.44** |
| | *Philodromus spectabilis* Keyserling | 8.04 |
| | *Philodromus rufus* Walckenaer | 1.05 |
| | *Philodromus speciosus* Gertsch | 0.17 |
| | *Apollophanes margareta* Lowrie and Gertsch | 0.09 |
| | *Tibellus oblongus* (Walckenaer) | 0.09 |
| Theridiidae | **All species** | **7.95** |
| | *Theridion lawrencei* Gertsch and Archer | 4.50 |
| | *Theridion differens* Emerton | 1.66 |
| | *Theridion californicum* Banks | 1.01 |
| | *Theridion murarium* Emerton | 0.43 |
| | *Theridion neomaxicanum* Banks | 0.17 |
| | *Dipoena nigra* (Emerton) | 0.17 |
| Dictynidae | *Dictyna peragrata* (Bishop and Ruderman) | **4.37** |
| Thomisidae | **All species** | **3.15** |
| | *Xysticus loculpes* Keyserling | 2.27 |
| | *Misumena vatia* (Clerck) | 0.52 |
| | *Misumenops celer* (Hentz) | 0.35 |

**Table 1. Continued.**

| Family | Subfamily/species | Abundance (%) |
|---|---|---|
| Tetragnathidae | *Tetragnatha laboriosa* Hentz | **1.92** |
| Araneidae | **All species** | **1.51** |
| | *Araneus diadematus* Clerck | 1.31 |
| | *Araniella displicata* (Hentz) | 0.10 |
| | *Metepeira grandiosa* Chamberlin and Ivie | 0.10 |
| Anyphaenidae | *Anyphaena pacifica* Banks | 0.35 |
| Opilionidae | *Leuronychus parvulus* Banks | 0.87 |
| Oxyopidae | *Oxyopes scalaris* Hentz | 0.78 |
| Miscellaneous | All species | 1.49 |

**Table 2. Abundance (%) of some common spiders in apple orchards, Oregon, 1992-1995**

| Spider species | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|
| *Cheiracanthium inclusum* | 18.80 | 2.94 | 8.63 | 17.41 |
| *Eris marginata* | 8.54 | 29.41 | 1.18 | 10.30 |
| *Metaphidippus aeneolus* | 8.54 | 14.70 | 5.50 | 30.73 |
| *Philodromus spectabilis* | 5.98 | 4.71 | 16.67 | 5.75 |
| *Spirembolus mundus* | 9.40 | 18.53 | 39.60 | 3.79 |

Department of Entomology, Oregon State University, Corvallis, OR. All collections were made between 0600 and 0900 PDT. In the 1992-1993 experiment, samples were collected twice between 18 July or 30 July and 10 September, the seasonal period when spiders were most abundant as indicated in the preliminary surveys. In 1994-1995, five to seven collections were made from mid-June to late-August or mid-September each year, with an average interval of 15 days between sampling.

A total of 1,144 individual spiders were collected in this survey. These represented 12 families, 26 genera, and 30 identifiable species (Table 1). The most common spider species collected were: *Metaphidippus aeneolus* Curtis (22%), *Spirembolus mundus* Chamberlin & Ivie (14%), *Cheiracanthium inclusum* (Hentz) (13%), *Philodromus spectabilis* Keyserling (8%), *Eris marginata* (Walckenaer) (6%), and *Theridion lawrencei* Gertsch and Archer (5%). *Cheiracanthium inclusum, E. marginata, S. mundus,* and *M. aeneolus* were the most abundant species collected in 1992, 1993, 1994 and 1995, respectively (Table 2). Individuals of these species were recorded in 50 to 60% of all samples collected during all 4 yrs of the survey. Population dynamics of these species were highly variable from year to year. This may be because of com-

petition, predator-prey interactions and climate that can affect population changes within and between years (Woolhouse and Harmsen 1984. Proc. Entomol. Soc. Ont. 115: 1-11).

The species structure and relative abundance of spiders we found in our survey differ from those collected from eastern North America apple orchards (LeRoux 1960. Ann. Ent. Soc. Queb. 6: 87-121; Parent 1967. Can. Entomol. 99: 771-778; Dondale et al. 1979). The most abundant genera collected in our survey were *Metaphidippus, Spirembolus* and *Cheiracanthium.* Individuals from these genera composed about 50% of total spider species collected. On the other hand, the genera *Theridion, Araniella,* and *Philodromus* were the most abundant found in apple orchards in the eastern United States. In the Pacific Northwest, the genera *Metaphidippus* and *Spirembolus* are also abundant on Douglas fir and true firs (Moldenke et al. 1987).