The effects of having different unmanaged (wild) plant species in California vineyards and how they influence spider abundance, taxonomic diversity, and guild diversity

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Cal Poly Humboldt, ESTABLISHED 1913

Plant-Dwelling Spiders Care Where They Live: Higher Diversity and Greater Abundance On Native Plant Species, Specific Plant Types, and in Areas With Vegetation Richness

BACKGROUND:

Spiders are very effective biocontrol agents, particularly when their communities are more diverse. In the progression of more sustainable and natural agriculture, supporting spider communities in California vineyards has potential to keep vines safer from pests. The viability of this idea is unstudied for the Central Valley of California, where both wine production and biodiversity are highly concentrated. I decided to observe spider taxonomic and guild richness, as well as abundance, on crop and non-crop vegetation in vineyards, while recording a site's plant species richness and assigning each of those species to be native or not. I set out to determine what factors support more spiders, more spider diversity, and ultimately, how those factors may encourage spider communities on the vines themselves.

METHODS

1. Assigned two plots for three vineyard sites. Each plot consisted of two transects: one for wild vegetation and one for a nearby grapevine row.
2. Collected spiders using a beat sheet and aspirator from 15 individual plants (or cluster of grape leaves) per transect.
3. For wild vegetation, determined plant species and classified it as native or non-native.
4. Counted spider specimens, identified all via microscope to genus level, identified sex, and assigned guild type as described by *Cardoso et al 2011*.
5. Performed Poisson linear regression for all predictor and response variables.

Napa Valley, California
- ❖ Continuum Estate
- ❖ Matthiasson Wines
- ❖ Staglin Family Vineyard

Figure 1 — SPIDER ABUNDANCE

Nativeness: P < 0.0001 (Native vs Non-Native)
Plant Type: P = 0.002 (Shrub), P = 0.05 (Tree)

Mean Genera Richness Per Plant vs (regression) P = 0.05

Mean Abundance Per Plant (regression) P < 0.0001

Spider Abundance on Grapevines vs Total Spider Abundance on Wild Vegetation, P < 0.0001

Mean Guild Richness Per Plant vs Number of Unique Plant Species at a Site, P = 0.045

Figure 3 — SPIDER GENERA RICHNESS
Nativeness: P = 0.062
Plant Type: P = 0.043 (Shrub)

Figure 4 — SPIDER GUILD RICHNESS
Nativeness: P = 0.104
Plant Type: P = 0.054 (Shrub)

	TOTAL	Continuum	Matthiasson	Staglin
All Vegetation Spp.	33	9	16	16
Native Spp.	18	30	8	9
Non-Native Spp.	14	0	22	21
Spiders Collected	237	61	121	55
Spiders (W.V.)	221	54	115	52
Spiders (G.V.)	16	7	6	
Spider Family Count	10	10	9	7
Spider Genera Count	30	20	17	15
Spider Guild Count	6	6	6	6
WV Transect 1 Veg. Spp.	-	5	9	8
WV Transect 2 Veg. Spp.	-	6	10	10

Guild Type	TOTAL	Grapevines	Wild Veg	Continuum	Matthiasson	Staglin
Active	19	3	16	3	15	1
Ambushers	25	2	23	12	7	6
Foliage Runners	36	3	33	12	10	14
Orb Weavers	45	1	44	12	15	18
Space Web Weavers	67		67	11	50	6
Stalkers	42	7	35	8	25	9

Spider Family	TOTAL	Grapevines	Wild Veg
Anyphaenidae	25		25
Araneidae	45	1	44
Clubionidae	11	3	8
Dictynidae	60		60
Oxyopidae	19	3	16
Philodromidae	3	1	2
Salticidae	42	7	35
Theridiidae	7		7
Thomisidae	22	1	21
[UNIDENTIFIED]	3	0	3

Spider Family	Spider Genus	TOTAL	Grapevines	Wild Veg
Anyphaenidae	Anyphaena	25		25
Araneidae	Araneus	2	0	2
Araneidae	Indiscernable	1	0	1
Araneidae	Larinia	1	0	1
Araneidae	Mangora	8	0	8
Araneidae	Metepeira	8	1	7
Araneidae	Unknown B	1	0	1
Araneidae	Unknown D	7	0	7
Araneidae	Unknown E	17	0	17
Clubionidae	Clubiona	11	3	8
Dictynidae	Brommella	56	0	56
Dictynidae	Dictyna sp.	1	0	1
Dictynidae	Dictynid spp.	1	0	1
Dictynidae	Lathys	2	0	2
Oxyopidae	Oxyopes	19	3	16
Philodromidae	Ebo	1	1	0
Philodromidae	Thanatus	1	0	1
Philodromidae	Tibellus	1	0	1
Salticidae	Colonus	6	0	6
Salticidae	Sassacus	26	5	21
Salticidae	Unknown A	10	2	8
Theridiidae	Emertonella	2	0	2
Theridiidae	NA	1	0	1
Theridiidae	Steatoda	2	0	2
Theridiidae	Theridion	1	0	1
Theridiidae	Unknown F	1	0	1
Thomisidae	Mecaphesa	11	1	10
Thomisidae	Misumena	2	0	2
Thomisidae	Unknown C	1	0	1
Thomisidae	Xysticus	8	0	8
[UNIDENTIFIED]	[UNIDENTIFIED]	3	0	3

Spider Sex	Count
F	81
J	140
M	10
UA	1
UNK	1
[SP. DES.]	4

Scan me to view a slideshow of all the spider specimens! There are some lookers in there.