ARTÍCULO:

Inflorescences and plant selection by the green lynx spider *Peucetia viridans* (Hentz) in a dry forest of western Mexico.

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Inflorescences and plant selection by the green lynx spider *Peucetia viridans* (Hentz) in a dry forest of western Mexico.

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Abstract:

For some spiders, habitat selection is based on an innate preference for certain plant parameters which may be associated with prey availability (i.e. flowers), refuge against predators and shelter from adverse environmental conditions (plant cover and foliage density). In this study we assessed the influence of plant height, plant cover, number of inflorescences and number of male and female flowers on the presence of the Green Lynx Spider *Peucetia viridans* (Hentz, 1832) in a dry forest of western Mexico. The spider was found mainly on *Croton ciliatoglanduliferus*, a small shrub that grows in Mexican deciduous forests. In the first study period, August 2004, the presence of adult spiders was positively associated with plant cover and number of inflorescences. In addition, spiders deserted plants from which inflorescences were removed. In August 2005, *P. viridans* was patchily distributed in the study area. We counted the number of male and female flowers and found that the number of male flowers was higher in patches with spiders compared to patches without spiders. The same pattern was repeated in September 2005. A high number of inflorescences and male flowers in particular may attract more pollinators and serve as cues for prey availability for the spider.

Keywords: Plant selection; inflorescences, *Peucetia viridans*; *Croton ciliatoglandulifera*.

Selección de inflorescencias y plantas por la araña lince verde, *Peucetia viridans* (Hentz) en un bosque tropical caducifolio de México occidental.

Resumen:

En algunas arañas la selección de hábitat está basada en una preferencia innata por algunos parámetros de las plantas que pueden estar asociados con la disponibilidad de presas (por ej. flores), el refugio contra los predadores y la protección contra las condiciones ambientales adversas (cobertura vegetal y densidad del follaje). En este estudio evaluamos la influencia de la altura de la planta, la cobertura vegetal, el número de inflorescencias y el número de flores masculinas y femeninas sobre la araña lince verde *Peucetia viridans* (Hentz, 1832) en un bosque tropical caducifolio de México occidental. La araña se encuentra fundamentalmente en *Croton ciliatoglanduliferus*, un pequeño arbusto que crece en los bosques caducifolios mexicanos. En el primer periodo de estudio, agosto de 2004, encontramos una relación positiva entre la presencia de arañas adultas y la cobertura vegetal y el número de inflorescencias. Ade más, las arañas abandonaron las plantas de las que retiramos las inflorescencias. En agosto de 2005, la distribución de *P. viridans* en el área de estudio fue en agregados. Contamos el número de flores masculinas y femeninas y encontramos que el número de flores masculinas era mayor en los agregados con arañas que en los que carecían de arañas. Se repitió el mismo patrón en septiembre de 2005. Un mayor número de inflorescencias y de flores masculinas puede atraer más polinizadores y servir como indicador de la disponibilidad de presas para la araña.

Palabras clave: Selección de plantas, inflorescencias, *Peucetia viridans*, *Croton ciliatoglanduliferus.*

Introduction

The plant composition and vegetation spatial disposition partially define the habitat of spider communities. For some spiders, the search for an adequate microhabitat is based on innate preferences for certain plant features. Foliage density and biomass may provide shelter from predators and protect spiders against adverse environmental conditions (Riechert & Tracy, 1975; Halaj et al., 1998; Gunnarson, 1990; 1996), while inflorescences may be indicators of prey availability (Arango et al., 2000; Heiling et al., 2004; Romero & Vasconcellos-Neto, 2005; Souza & Martins, 2005). In this study we evaluated the possible influence of plant cover, plant height and inflorescence type and number on the distribution of the Green Lynx Spider *Peucetia viridans* (Hentz) in a dry forest of western Mexico.

Our results suggest that microhabitat preferences may be based on subtle differences between individuals of the chosen plant species. Furthermore, the spider response indicates that *P. viridans* adults are continually assessing microhabitat changes and moving to those plants which, arguably, advertise better conditions (sensu Domínguez et al., 1989). Little is known about microhabitat use for most spider species and even less about the ultimate causes of their selection. Nevertheless, research in this field is providing new and exciting information on one of the most facinating aspects of spider behaviour.

Peucetia viridans is a polyphagous cursorial predator that feeds on several orders of insects and spiders (including its own species) (Nyeffeler et al., 1992); it has a good vision and hunts its prey by stalking first and then jumping on them (Turner, 1979; Hoffmann, 1993). It is commonly found on grasses, shrubs and weeds (Kaston, 1972; Arango et al., 2000), often with glandular trichomes (Vasconcellos-Neto et al., 2006). At our study site it was mainly found on *Croton ciliatoglanduliferus* (Ortega: Euphorbiaceae) shrubs (Corcuera et al., 2004). The species is annual univoltine and females lay from 25 to 600 eggs which they guard until offspring hatching (Wiley & Adler, 1989). Reproduction starts in summer and ends in late fall. Spiderling dispersal takes place in late fall and winter. The species is found from southern United States to northern Colombia and the Antilles (Santos & Brescovit, 2003). The host plant, *C. ciliatoglanduliferus*, has glandular stipules and monoecious inflorescences. It grows in tropical deciduous forests and in the transitional area with oak woodland, and flowers from January to November (Martínez Gordillo,1995).

Methods

The study site is located at the state of Jalisco in western Mexico (20º 20' 42" and 20º 22' 16.4" N and 103º 40' 31" and 103º 45' 26" W), with an altitude of 1380 masl, a mean annual temperature of 20.3 °C and a mean annual precipitation of 826 mm. The rainy season starts in June and lasts until September. The dominant shrubs are *C. ciliatoglanduliferus* and *Acacia tortuosa* and the dominant tree species are *Prosopis juliflora* and *Ipomoea wolcottiana*.

The study was conducted during August 2004 and August and September 2005. During the first year we determined the presence of the spider on 100 randomly chosen *C. ciliatoglanduliferus* flowering plants. Plant height, cover (π x max branch spread x min branch spread) and number of inflorescences were measured for each plant. We then chose 100 additional plants, all with spiders present, and removed the inflorescences from 50 of them. The number of spiders on each plant was counted on August 1st and then in two further dates, August 8th and August 15th.

On the following year (August 2005) we found that spiders were patchily distributed. We chose two patches of approximately 15 m^2 radius, one with and one without spiders. We counted the number of racemes, the cover and the number of male and female flowers in each inflorescence in 25 plants from each patch. The same procedure was repeated one month later in two different patches.

Results

The preliminary counts (August 2004) of 100 plants resulted in 29 plants with spiders and 71 without them (Table 1).

A Kruskall-Wallis test showed that plants with spiders had a higher cover ($\chi^2 = 9.61$, df =1, P<0.01) and number of inflorescences (χ^2=9.1, df =1, P<0.01). Plant height did not significantly differed between the two groups (χ^2=1.6, df =1, P>0.05).

The inflorescence removal experiment showed that spiders deserted plants with no flowers (Table 2, Figure 1).

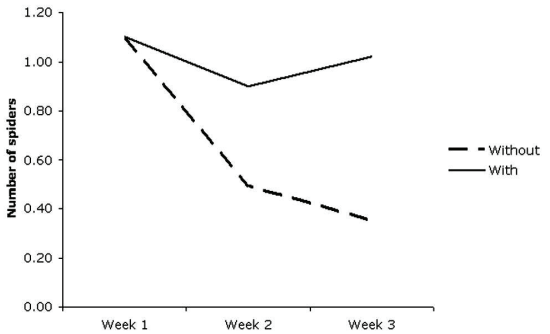

Figure 1.- Number of spiders on fifty intact *Croton glanduliferus* individuals and fifty plants from which inflorescences were removed. Spiders were counted on the same day in which flowers were cut and weekly for two more weeks.

The number of spiders on plants from which inflorescences were removed was significantly lower on the second (Kruskal-Wallis test: χ^2=4.35, df =1, P<0.05) and third dates (χ^2=14.94, df =1, P<0.001). There were no significant differences in mean plant height (χ^2=0.07, df =1, P>0.05) and cover (χ^2=0.06, df =1, P>0.05).

On the second year, the number of male flowers

was significantly higher in patches where spiders were present (Kruskal-Wallis test: χ^2=7.34, df =1, P<0.01) (Table 3). The number of female flowers did not show any significant difference (χ^2=0.31, df =1, P>0.05).

This relationship was confirmed one month later in two additional patches (χ^2=10.31 df =1, P<0.001, χ^2= 0.8, df =1, P>0.05 for male and female flowers, respectively).

Discussion

Microhabitat selection of *Peucetia viridans* was influenced by the number of inflorescences, the number of male flowers and plant cover of *Croton ciliatoglanduliferus*. It has been suggested that spiders in plants with a higher volume of foliage suffer less predation from birds (Gunnarsson, 1990, 1996). It is unlikely that a higher cover of *C. ciliatoglanduliferus* provides better protection for *P. viridans* against predators since foraging observations indicate that birds very seldom look for prey in this shrub (Corcuera, 2001). Furthermore, spiders of most guilds were more abundant in plants favoured by insectivores (Corcuera et al., 2004).

Lynx spiders are strongly associated with plants bearing glandular trichomes (Vasconcellos-Neto et al., 2006). This certainly seems to be the case for the Green Lynx spider in this study area. While insects caught in resinous hairs might provide food for the spiders as suggested by Vansconcellos-Neto et al. (2006), we found that *P. viridans* also chooses those plants which may attract more visitors.

Other studies have also found that spiders chose plants with certain types of flowers. Souza and Martins (2004) and Souza and Módena (2004) showed that inflorescences attracted more spiders than vegetative branches in different plant species in Brazil, while Arango et al. (2000) found that the abundance of *P. viridans* was positively correlated with the number of inflorescences in *Cnidoscolus aconitifolius* in Mexico. In our study, the positive relationship between spider presence and number of inflorescences, as well as desertion of *P. viridans* from plants from which inflorescences were removed, confirm the importance of inflorescences on the distribution of some spiders.

In the last part of this study, patches in which *P. viridans* was present had significantly more open male flowers. A study comparing spider abundances between two *Haplopappus* (Asteraceae) species showed that abundances were higher in the shrub that attracted more insect visitors (Louda, 1982). Since male flowers produce pollen and, in certain cases more nectar as well, inflorescences of *C. ciliatoglanduliferus* with a higher proportion of male flowers could attract more visitors and therefore provide more food resources for the spiders.

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Table 1.

Mean and standard deviation of the number of inflorescences, plant height and plant cover for *Croton ciliatoglanduliferus* plants with and without *Peucetia viridans* spiders. Mean number of spiders is also shown.

Plants	With spiders (n=29)	Without spiders (n=71)
Number of inflorescences	35.1 ±22.3	23.3 ±20.5
Height (cm)	90.9 ±19.6	84.2 ±19.2
Cover (m^2)	2.53 ±1.7	1.56 ±1.1
Number of spiders	1.4 ±0.8	

Table 2

Mean ± SD of spiders found in 50 plants with inflorescences and 50 plants from which inflorescences were removed. Data from three consecutive dates after inflorescence removal are provided.

Plants	With flowers (n=50)	Without flowers (n=50)
No. Inflorescences	49 ±38	
No. Spiders. Date 1	1.1 ±0.5	1.1 ±0.5
No. Spiders. Date 2	0.9 ±1.1	0.5 ±0.7
No. Spiders. Date 3	1.2 ±1.1	0.4 ±0.6

Table 3

Mean ± SD number of male and female flowers and number of spiders per plant in patches with and without *Peucetia viridans*.

Inflorescence characteristics and number of spiders	With spiders	Without spiders
Female flowers	17.2 ±11.7	18.8 ±13.8
Male flowers	13.0 ±11.2	6.0 ±5.9
Spiders per plant	1.44 ±0.7	