PAN-PACIFIC ENTOMOLOGIST
62(3), 1986, pp. 224–225

Scientific Note

Arthropod Visitors at *Washingtonia filifera* (Wendl) Flowers[1]

Although some species of palm are wind-pollinated, others are known to rely upon insects for pollination (Tomlinson, 1979, Ann. Rev. Ecol. Syst., 10:85–107; Blombery and Rodd, 1982, Palms, Angus and Robertson, London). It has not yet been determined which of these two systems is operative for the desert fan palm, *Washingtonia filifera,* of the Sonoran Desert. McClenaghan and Beauchamp (1986, Evolution, 40:315–322) speculated that the lack of genetic differentiation among *W. filifera* populations might be the result of insect, rather than wind, pollination. Lepesme (1947, Les insectes des palmiers, Rue de Tournon, Paris) listed 20 insect species associated with *W. filifera* but, with the exception of *Dinapate wrightii,* did not describe the relationship between the insects and the palms. A first step in ascertaining the mechanism of pollination is to determine which, if any, insects visit *W. filifera* flowers.

On 20 and 21 July 1984, insects and other arthropods were observed or collected at inflorescences of three desert fan palms located in Palm Canyon, Riverside Co., Ca. Identifications of arthropods were made by the author, and Saul Frommer and Robert Wagner of the University of California at Riverside. These taxa are listed in Table 1 in decreasing frequency of occurrence. None of the species collected appeared in Lepesme's (1947) list.

[1] Supported by a grant from the Richard King Mellon Foundation to the Palm Springs Desert Museum.

Table 1. Arthropods observed or collected on inflorescences of the desert fan palm, *Washingtonia filifera.* Listed in decreasing frequency of occurrence.

Scientific name	Common name	Order
Apis mellifera	Honey bee	Hymenoptera
*Polistes**	Paper wasps	Hymenoptera
P. major		
P. apachus		
P. dorsalis		
Xylocopa californica	California carpenter bee	Hymenoptera
Dermestidae†	Hide beetles	Coleoptera
Forelius foetidus	ant—no common name	Hymenoptera
Stratiomyidae†	Soldier flies	Diptera
Pepsis sp.	Tarantula hawks	Hymenoptera
Tripoxylon xantianum	Mud dauber wasp	Hymenoptera
Alleculidae†	Comb-clawed beetles	Coleoptera
Litoprosopus coachella	Palm moth	Lepidoptera
Tachytes sp.	Sand wasps	Hymenoptera
Prionyx parkeri	Sand wasp	Hymenoptera
Megachile sp.	Leafcutter bees	Hymenoptera
Salticidae†	Jumping spiders	Araneae

* As a genus, the second most frequent visitor.
† Arthropod could only be identified to the family level.

The desert fan palm inflorescences observed in this study were visited by over 75 insects per hour. The most frequent visitor was the introduced honey bee (*Apis mellifera*) followed by paper wasps (*Polistes*), and the California carpenter bee (*Xylocopa californica*). The latter insect often destroys the flower as it feeds (Cornett, 1985, Pan-Pacific Entomologist, 61:251–252). Most insects would visit 5 or more flowers on a single inflorescence and then fly from the palm. It could not be determined if they immediately visited a second palm. Many of these species may be pollinators of *W. filifera* and the diversity and abundance of insects in general suggest that the flowers of this palm species are insect pollinated.

J. W. Cornett, *Natural Science Department, Palm Springs Desert Museum, Palm Springs, California 92263.*

PAN-PACIFIC ENTOMOLOGIST
61(3), 1985, pp. 251–252

Scientific Note

Notes on the Use of Spadices of *Washington filifera* (Wendl) by *Xylocopa californica* (Cresson) (Hymenoptera: Apoidea)[1]

The Southern California carpenter bee, *Xylocopa californica* Cresson, is known to nest in the trunks of the desert fan palm, *Washingtonia filifera* Wendl (Hurd, 1978, an annot. cat. of the carpenter bees of the West. Hem., Smith. Inst. Press, Washington, D.C.). Although the species has not been observed to construct its own entrance tunnels into the trunks, females are known to enter the exit holes of the giant palm boring beetle, *Dinapate wrightii* (Horn). They have been observed remaining in the holes for at least one-half hour and no doubt the females enlarge these holes for nesting.

Recently, Ron Grunt of Twentynine Palms, California, brought me several shed spadices of *W. filifera*. He had picked them up off the ground in the western (and privately owned) portion of the Oasis of Mara, San Bernardino County, California. Typically, the spadices of this species of palm are approximately 3.5 m long, develop between two and five hundred thousand 6 mm-diameter-flowers and are from 4 to 10 cm wide at their proximal end. These usually break off within two years after fruit production. A loud buzzing from within the spadices caused Grunt to inspect them at which time he discovered dime-sized holes in the proximal ends of approximately 20% of them. Within minutes after he picked them up numerous specimens of *X. californica* flew from the holes.

He brought me ten spadices for examination on March 12, 1984. All of them had tunnels starting from where the spadices had broken off from the tree and running from 7 to 38 cm toward the tip. One stalk had three tunnels. The entrance holes had a mean diameter of 15 mm. Each contained from five to twelve mature carpenter bees identified as *X. californica*.

Two stalks were cut lengthwise revealing 12 and 13 discolored ridges that appeared to indicate larval chambers. Grunt believed the bees hibernated in these tunnels for adults were found in spadices during winter and were observed leaving them in the spring.

The grove at the east end of the Oasis of Mara is dense, significantly disturbed and sits around and in a small motel complex. The trees receive fault-associated groundwater that nearly reaches the surface and irrigation from domestic watering. The spadices had been on the ground for approximately two years and, in general, were wider at their base than spadices produced by trees in undisturbed settings.

I checked spadices from nine other undisturbed palm groves in the Colorado Desert of southeastern California and could not find additional *Xylocopa* tunnels except at Mortero palms in Anza-Borrego Desert State Park in San Diego County, California. This grove was similar to the western portion of the Oasis of Mara in that the trees were so dense that the center of the oasis received little or no sunlight. Approximately 10% of the spadices had been burrowed into by carpenter bees in

[1] Supported by a grant from the Richard King Mellon Foundation to the Palm Springs Desert Museum.

the same manner as at Mara. I cut two of these lengthwise revealing five adult and two larvae in the first and two adult and six larvae in the second.

Carpenter bees are common in some palm groves. They are seen entering palm boring beetle exit holes and also at the flowers in June and July. Often, the bees destroy the ovaries as they feed on the nectar. To my knowledge, the utilization of fallen palm spadices for nesting chambers, and perhaps as hibernaculums, has not been previously noted. That they utilize them in this manner is not surprising—most desert plants do not have trunks or branches of sufficient girth to meet the nesting requirements of *Xylocopa*. Why then are the spadices not used in every palm oasis? I suspect the rarity of this technique may be due to the fact that the vast majority of the dead flower stalks either fall into direct sunlight, making them thermally unsuitable, or into the paths of floodwaters. All of the spadices which were, or had been, occupied by *Xylocopa* were in constant or at least abundant shade and not subject to being washed away by floods as so often occurs in canyon oases. Only dense stands of *W. filifera* not subject to floods are likely to provide the necessary conditions.

J. W. Cornett, *Natural Science Department, Palm Springs Desert Museum, Palm Springs, California 92262.*