Rev. Biol. Trop., 27(2): 203-205, 1979

Centris dirrhoda (Anthophoridae), the bee visiting West Indian cherry flowers *(Malpighia punicifolia)*

by

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(Received for publication February 1, 1979)

Abstract: The very substantial set of West Indian cherries *(Malpighia punicifolia)* in Jamaican orchards is apparently due to the numerous visits by the anthophorid bee *(Centris dirrhoda)*. This relationship is typical of the need of members of the Malpighiaceae to be visited by their specialist pollinators. In Hawaii, where the fruit was introduced from the Caribbean region, the yields were poor and they did not increase when colonies of honey bees were placed in the orchards.

The West Indian cherry *(Malpighia punicifolia* L, Malpighiaceae) is grown throughout the Caribbean region (Purseglove 1968). In addition, it has been introduced to Hawaii, but the yields of fruit there are poor and placing colonies of honey bees in the orchards did not increase the set (Yamane and Nakasone 1961). As its pollination requirements are still not understood (McGregor 1976) the results of a brief study I made on the plant in Jamaica will help to identify the problem.

Many flowers set fruit in a cherry orchard in Jamaica so the insects that visited them were observed during the peak of flowering in August 1970. The visitors were almost all females of *Centris dirrhoda* Moure, a species of solitary bee that nests in earth banks. It was originally recorded from Jamaica as *C. haemorrhoidalis* (F), which is the Puerto Rican species. However, Moure (1960) considers the Jamaican population to be a distinct species. Both are robust bees about 15 mm long, largely black with a blue sheen on the basal part of the abdomen and orange-red apical segments. The sexes appear superficially similar.

During six hours of observations *C. dirrhoda* females visited 1770 cherry flowers, *Polistes crinitus* (Felton) females visited four and an *Eristalis* species visited one flower. Honey bees were common and visited weeds under the cherry trees, buy only once did I see a honey bee inspect two cherry flowers and it flew off without alighting. Instead of nectar, flowers of most Malpighiaceae, including *Malpighia,* provide oils, particularly in glands on the calyx for their visitors (Vogel 1971) and females of *Centris* have specialized scoops of spatulate hairs on the fore tarsi to collect the oils from the glands. However, honey bees lack these structures.

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The *C. dirrhoda* females never walked from one flower even to a contiguous one, but always flew to each flower approaching from directly in front of it, presumably to ensure that their fore legs could touch the calyx glands. Pollen adhered to the ventral side of the bee and was transferred to the scopae while she was flying.

C. dirrhoda females foraged chiefly from 9.00 to 13.00 hrs. each day. Twenty foraging females were observed continuously until they flew out of sight. They worked rapidly, collecting pollen from 26.0 (S.E. ± 0.5) and oils from 41.8 (S.E. ± 1.4) flowers per minute. One bee visited 272 flowers in 8 min 41 sec collecting oils from twenty flowers and pollen from the remainder. She carried almost no pollen at the start of observation and full loads at the end. Another female with large pollen loads collected only oils from 292 flowers in 6 min 49 sec. From these and other observations it is estimated that a foraging bee visits about 20 flowers for oils, 250 for pollen and a further 290 for oils totalling 560 flowers in about 17 minutes collecting per foraging trip. Presumably the bees used some of the oils collected at the start of the foraging trips to moisten the collected pollen because pollen on the scopae appeared more moist that that on other parts of the bees or on flowers.

The trees bore on average 70 open flowers at a time and it was calculated that the bees visited 27.1 (S.E. ± 3.1) flowers per tree on each foraging trip. The bees always moved from one tree to an adjacent one if it bore flowers and often they returned to trees they had just left. It was estimated that about half of the flowers set fruits and, similarly, Yamane and Nakasone (1961) obtained an average of 51.7% set from hand pollinated flowers.

Samples of pollen loads were examined from bees foraging in the orchard and 1000 grains identified in each. In 24 samples from *C. dirrhoda* females, cherry comprised 84.7% of the pollen and Compositae was absent, whereas 98.9% of the pollen in the 50 samples from honey bees was *Emilia* spp. and *Vernonia cinerea* (L), both in the Compositae, while cherry pollen was absent. Honey bees also collected pollen of *Stachytarphaeta jamaicensis* (L), (Verbenaceae) and *Mimosa pudica* L (Mimosaceae) while that collected by *C. dirrhoda* included *Psidium guajava* L (Myrtaceae).

The substantial set of cherries in the Jamaican orchard can be attributed to the numerous visits of *C. dirrhoda* to the flowers. The relationship is typical of the need of members of the Malpighiaceae to be visited by their specialist pollinators which are anthophorid bees with fore legs specialized to collect the oils from the flowers. Both the plants and the bees are almost entirely confined to the Neotropics. Conversely, the poor set of cherries in Hawaii must result from the absence of the specialist pollinators from the islands and the need of the flowers to be cross pollinated, demonstrated by Yamane and Nakasone (1961). In Jamaica small numbers of the specialist bees visit large numbers of cherry flowers so the value of each bee as a pollinator is great. Hence, the injudicious use of insecticides would be especially detrimental to yields of fruits.

RESUMEN

Las buenas cosechas de acerola *(Malpighia punicifolia)* en Jamaica se deben aparentemente a las múltiples visitas que hacen a sus flores las abejas antofóridas *(Centris dirrhoda).* Esta relación es típica de las malpigeáceas y sus polinizadores especializados. En Hawaii, en donde la fruta fue introducida de la región del Caribe, las cosechas fueron pobres y no aumentaron con el establecimiento de colonias de abejas *(Apis mellifera)* en las plantaciones.

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PC: *Malpighia punicifolia*, flows. abaja [illegible]
Apis mellifera