

LOQUAT *ERIOBOTRYA JAPONICA* AS A WINTER NECTAR SOURCE FOR BIRDS IN CENTRAL SPAIN

EL NISPOLERO *ERIOBOTRYA JAPONICA* COMO FUENTE DE NÉCTAR INVERNAL PARA AVES EN LA ESPAÑA CENTRAL

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Several species of birds in the world are specialized in nectar feeding, establishing in some cases tight relationships between plants and birds. Meliphagidae from Australia, Trochilidae in America, Nectariniidae and Promeropidae from Africa and Drepanididae from Hawaiian Islands are among best-known examples of these relationships. However, there are not specialized groups of birds on nectar feeding in Western Europe, although this resource is used at least from time to time. For example, Blue Tits *Parus caeruleus* use to feed on the nectar of willow catkins during the breeding season (Kay, 1985). Other bird species have been found feeding on flowers from different plant species in Europe, for example, several species of *Sylvia* and *Phylloscopus* feeding on Aloe (Cramp, 1992). Here, we describe the pattern of visits to nectar feeding for several bird species on loquat trees *Eriobotrya japonica* during winter.

The loquat is an ornamental tree indigenous to China with an ample distribution in the Mediterranean region. This medium-sized tree has large, fuzzy, evergreen leaves. The fruit is a golden yellow oblong with sweet orange flesh surrounding 1 to 5 shiny brown seeds. Loquats flower in autumn or early winter and their fruits ripen in late winter or spring. Since they produce their flowers during the winter these represent a nectar source for birds in a season when other resources are scanty. The tree may also benefit from bird pollination when insects are rare. The sweetly fragrant flowers, borne in rusty-hairy, terminal panicles of 30 to 100 blooms, are white, 5-petalled and 1.25-2 cm wide.

A video camera was installed and directed at the flowers of a loquat tree on days 11, 18, and

27 December 1999 and 3 and 9 January 2000 in a private garden at Navalagamella (Madrid, 40° 28' N, 4° 07' W). Flowers were filmed beginning at 08:30 in the morning until 16:30. The number of visits, behaviour and time expended at flowers for different species of birds were noted. At the end of each day the number of open flowers was counted as well as the presence of insects and or broken flowers. Before and after visits of birds to a nearby tree (not filmed) we noted the presence of other potential sources of food as insects and/or pieces of flowers. The quantity of nectar available was noted by taking nectar with a capillary tube (75 mm length, 1.15 mm inner diameter, Brand, Germany) from flowers and measuring the length of the capillary tube filled with nectar.

Several bird species spent time visiting loquat flowers (Table 1). We did not find insects inside flowers and birds broke flowers only rarely. However, we once filmed clearly a Blue Tit and a Blackcap *Sylvia atricapilla* eating petals. Only on some especially sunny days were we able to detect insects flying amongst the flowers during short periods. Birds use to perch on (*Phylloscopus spp.*) or beside the flowers, introducing the beaks in sequence in different flowers from one panicle to another. The number of panicles with open flowers is shown in Table 1. We sampled nectar quantity from five flowers with the aid of a capillary tube on 19 December 1999. Nectar content varied across the day with a maximum in the early morning. At 9:30 we obtained 28,9 µl of nectar, 30,71 µl at 11:30 and 19,64 µl at 13:30. By 16:00 there was no nectar available in the flowers.

There was a tendency to increase the time spent visiting flowers by Sardinian Warblers *Sylvia melanocephala* as the number of pani-

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TABLE I

Average time spent on Loquats (seconds) by each bird species and number of panicles with open flowers each filming day.

[Tiempo medio (segundos) que pasan las aves sobre los Nisperos y número de inflorescencias con flores abiertas cada día de filmación.]

| Date [Fecha] | Species [Especie] | Time on trees (SE) [Tiempo en los árboles (ES)] | Number of visits [N.º de visitas] | Number of panicles [N.º de inflorescencias] |
|------------------------------|-------------------------------|---|---|---|
| 11-12-99 | <i>Phylloscopus collybita</i> | 62.33 (17.68) | 9 | 12 |
| | <i>Sylvia melanocephala</i> | 12 | 1 | |
| 18-12-99 | <i>Phylloscopus collybita</i> | 71.75 (19.97) | 4 | 14 |
| | <i>Sylvia melanocephala</i> | 62.67 (16.90) | 6 | |
| | <i>Parus caeruleus</i> | 5 | 1 | |
| 27-12-99 | <i>Phylloscopus collybita</i> | 64.04 (6.60) | 24 | 17 |
| | <i>Sylvia melanocephala</i> | 120 | 1 | |
| | <i>Parus caeruleus</i> | 28 | 1 | |
| 3-1-00 | <i>Sylvia melanocephala</i> | 48.33 (24.31) | 3 | 16 |
| 9-1-00 | <i>Sylvia melanocephala</i> | 20 | 1 | 12 |
| | <i>Sylvia atricapilla</i> | 151 | 1 | |
| Average (SE) [Media (ES)] | | 58.9 (13.54) | 4.64 (2.00) | 14.2 (1.02) |

cles with open flowers increased ($r_s = 0.87$, $n = 5$, $P = 0.081$). Sardinian Warblers were the only species to visit flowers across all the flowering period. The maximum number of bird visits corresponds to the day with higher availability of panicles with open flowers (Table 1). Chiffchaffs *Phylloscopus collybita* were the most frequent visitors, but only during the period of increase in the number of open flowers. Blue Tits and Sardinian Warblers were occasional visitors and were able to consume flowers. By dividing the time of filming in periods of two hours, a reduction in visits through the day was observed ($r_s = -1.00$, $n = 4$, $P < 0.001$). In addition, there existed a non-significant relationship between time spent by birds on the tree and average nectar quantity available ($r_s = 1.00$, $n = 4$, $P < 0.001$).

The loquat is a late flowering species in Spain (December to February) that produces a great number panicles of flowers of about 1 cm (López González, 1982). To our knowledge this is the first description of loquat as nectar source for birds. Birds using this food use to feed on insects in spring and fruits during autumn-winter (Jordano & Herrera, 1981). Ho-

wever, these species have been reported feeding on nectar previously. For example, Kay (1985) described nectar feeding by Blue Tits on willows (*Salix caprea*, *Salix cinerea*) in spring and Fitzpatrick (1994) reported Blue Tit selection of flowers producing higher quantities of nectar from several plant species. During blooming, nectar represents a 32.7% of daily average metabolic rate of male and 49.3% of female Blue Tits (Fitzpatrick, 1994). There also exist several reports of Sardinian Warblers feeding on Aloe nectar and even defending flowers against other individuals (see references in Cramp, 1992). Blackcaps and Chiffchaffs have been also reported feeding on nectar from several plants (Cramp, 1992). These species also inhabit Macaronesian islands where bird pollination has been reported (Vogel *et al.*, 1984; Olesen, 1985).

The use of loquat by birds increases as the number of panicles with open flowers increase, the Chiffchaff being the principal user (Table 1). Nectar availability is higher early in the morning when birds may have more difficulty finding cold, low motile insects. In addition, birds may need an energetic food at this time

due to low temperatures. As the number of panicles begins to reduce, Chiffchaffs stopped visiting trees and *Sylvia* warblers appeared only occasionally, consuming not only nectar but also petals. House (*Passer domesticus*) and Tree Sparrows (*Passer montanus*) and Great (*Parus major*) and Crested Tits (*Parus cristatus*) also visited the trees occasionally but they did not use flowers.

Most of studies of these birds in the Iberian Peninsula describe a frugivorous diet during winter. These studies are based on faecal analyses where fruit remains are identified (see for example, Jordano & Herrera, 1981). However, nectar feeding is difficult to detect except in cases of direct behavioural observations. The value of nectar in the diet of these birds is unknown, but it may be of great importance as it is a highly energetic product. Loquats are a source of food during first hours in the morning and during coldest months of the year, thus representing an important food for species feeding on nectar in a season where other resources are scanty. In addition, there exists the possibility that trees are also benefited by bird pollination, transporting pollen in the base of their beaks from one tree to another.

RESUMEN.—*Se presentan datos sobre el uso del nispero Eriobotrya japonica como fuente de néctar para distintas especies de aves durante los meses de invierno en una localidad del centro de España. La especie que con más frecuencia visita las flores es el Mosquitero común Phylloscopus collybita pero sólo mientras aumenta el número de inflorescencias con flores abiertas. El néctar es un alimento muy ener-*

gético y el nispero lo produce principalmente a primera hora de la mañana y en los meses más fríos del año siendo por tanto una fuente de alimento de gran utilidad para las aves.

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BIBLIOGRAPHY

- CRAMP, S. 1992. *Handbook of the birds of Europe, the Middle East and North Africa. The birds of western Palaearctic. Vol. VI. Warblers.* Oxford University Press, Oxford.
- FITZPATRICK, S. 1994. Nectar-feeding by suburban blue tits: contribution to the diet in spring. *Bird Study*, 41: 136-145.
- JORDANO, P. & HERRERA, C. 1981. The frugivorous diet of blackcap populations *Sylvia atricapilla* wintering in southern Spain. *Ibis*, 123: 502-507.
- KAY, Q. O. N. 1985. Nectar from willow catkins as a food source for blue tits. *Bird Study*, 32: 40-44.
- LÓPEZ GONZÁLEZ, G. 1982. *La guía de INCAFO de los árboles y arbustos de la península Ibérica.* INCAFO, Madrid.
- OLESEN, J. M. 1985. The Macaronesian bird flower element and its relation to bird and bee opportunists. *The Botanical Journal of the Linnean Society*, 91: 395-414.
- VOGEL, S., WESTERKAMP, C., THIEL, B. & GESSNER, K. 1984. Ornithophilie auf den Canarischen Inseln. *Plant Systematics and Evolution*, 146: 225-248.

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