

# Plants and frugivorous birds in the Botanic Garden of Pisa

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Ornithochory, i.e. seed dispersal by birds (1), is one of the close correlations between plants and animals.

Since 1980s, many papers have shown the importance of this kind of dispersal in most natural or semi-natural biomes (2, 3, 4, 5, 6).

## OBSERVATIONS ON PLANT-BIRDS INTERACTIONS

In the Botanic Garden of Pisa, from 2017 up to 2019, we have recorded 207 notes related to 18 plant species - mainly trees and shrubs - and to 15 birds species.

According to Snow & Snow (1), 89 out of 207 are fruit-eating observations, involving 12 plant species and 7 bird species, mainly in autumn and winter. One record was scored if at least one fruit was eaten by an individual bird; the second record for a bird was scored after at least 5 minutes (Table 1).

## RESULTS

Blackcap (*Sylvia atricapilla*)  
 Blackbird (*Turdus merula*)  
 Blue tit (*Cyanistes caeruleus*)  
 Great tit (*Parus major*)  
 Starling (*Sturnus vulgaris*)  
 Jackdaw (*Corvus monedula*)  
 Greenfinch (*Carduelis chloris*)  
**Total**

<i>Diospyros kaki</i> Thunb.	17	1	3	1	1					<b>23</b>
* <i>Ilex aquifolium</i> L.	5	12								<b>17</b>
* <i>Stranvaesia nussia</i> (Buch.-Ham. ex D.Don) Decne.	4	7								<b>11</b>
<i>Ziziphus jujuba</i> Mill.	4		5	1						<b>10</b>
<i>Diospyros lotus</i> L.	5	5								<b>10</b>
* <i>Hedera helix</i> L.		5								<b>5</b>
<i>Morus nigra</i> L.	2	1								<b>3</b>
* <i>Euonymus europaeus</i> L.		3								<b>3</b>
* <i>Ligustrum lucidum</i> W.T. Aiton	2						1			<b>3</b>
<i>Carya illinoensis</i> (Wangenh.) K.Koch		1				1				<b>2</b>
<i>Arbutus unedo</i> L.		1								<b>1</b>
* <i>Mahonia aquifolium</i> (Pursh) Nutt.		1								<b>1</b>
<b>Total</b>	<b>39</b>	<b>37</b>	<b>8</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>89</b>

Table 1: List of plant and bird species by decreasing number of feeding contacts.

\* Plants in which the whole fruit is eaten.

## ABOUT FLESHY FRUITS ...

As regards the colour of fleshy fruits, we have observed feeding contacts mainly on orange fruits, but red, black and blue are also consumed (4, 9) (Figures 1, 2, 3).

Fruit pulp is an important nutritional source for many bird species (7, 8).

Fruits may provide sugars, lipids, proteins, minerals, water (2, 5) and secondary metabolites, some of which potentially toxic (10, 11, 12).

For 6 of the 12 species of plants listed above (\*) (Table 1) the adaptive role in bird dispersal of seeds is clear, given that the whole fruit is eaten and the seeds could be dispersed.

A case of dispersion of a seed recorded in the Botanic Garden, likely due to more than one species of bird, is reported in the box.

Photos taken by the authors except if otherwise specified

- The fruits of Persimmon (*Diospyros kaki*) were eaten by the highest number of bird species: Blackbird, Blackcap, Blue tit, Great tit and Starling.



Figure 1: A half eaten orange fruit of Persimmon, 20<sup>th</sup> November 2017.



Figure 2: Blackcap feeding on red fruits of Holly (left) and Blackbird on black fruits of Ivy (right).

<https://www.sciencephoto.com/media/384199/view/male-blackcap-bird>;

<https://www.alamy.com/stock-photo-female-blackbird-feeding-on-ivy-berries-30517271.html>

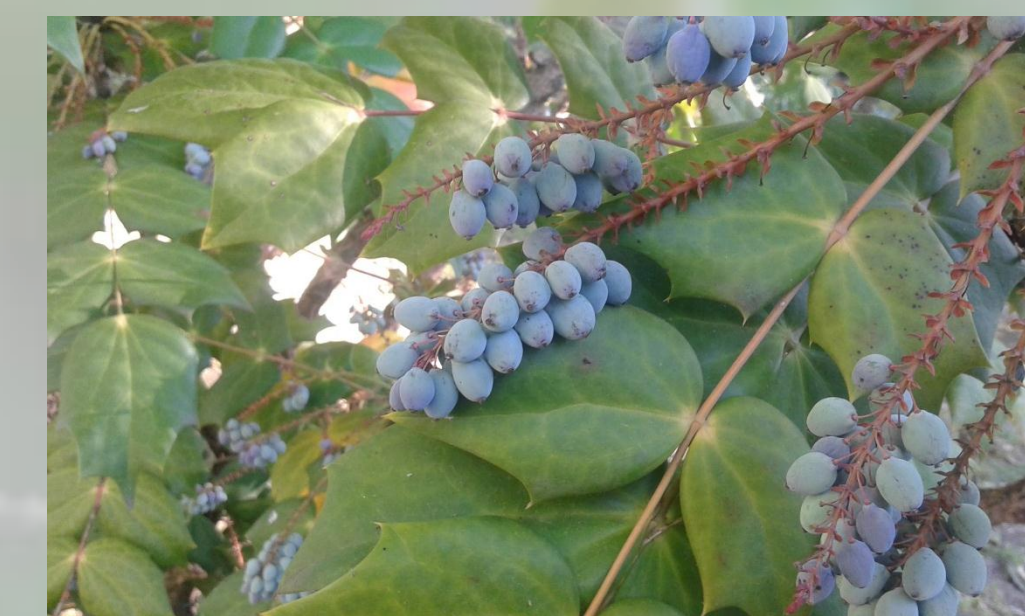


Figure 3: Blue fruits of *Mahonia aquifolium*, 16<sup>th</sup> May 2019.

- Blackbird and Blackcap are the species showing the broadest dietary spectrum, with 10 and 7 out of the 12 plant species, respectively.

## A case of ornithochory in the Botanic Garden

- A seed of the fruit of a dwarf palm (*Chamaerops humilis*) cultivated in the Garden (left) has germinated on a century-old Virginia oak (*Quercus virginiana*) at more than 10 metres height (centre and right).



- This event might be related to the nesting at the top of the tree of a pair of Hooded crows (*Corvus cornix*, right).

Andreas Trepte, [www.photo-natur.net](http://www.photo-natur.net); [https://en.wikipedia.org/wiki/Hooded\\_crow](https://en.wikipedia.org/wiki/Hooded_crow)



FURTHER SURVEYS ARE IN PROGRESS, ENCOURAGED BY SHORTAGE OF INFORMATION ABOUT THE ITALIAN BIRD COMMUNITY

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