

CONSUMPTION OF *DIDYMOPANAX PACHYCARPUM* UNRIPE FRUITS BY BIRDS IN SOUTHEASTERN BRAZIL

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Unripe fruits frequently contain high concentrations of chemical components in the pulp that act as palatability inhibitors (e.g., tannins) or as toxins (e.g., alkaloids) for animals (ROBINSON, 1979; HERRERA, 1982; IZHAKI & SAFRIEL, 1989; STILES, 1989). As it occurs with leaves, these "secondary compounds" may constitute defense against predation. In general, at this stage of development they are considerably more difficult for a vertebrate to digest and they may contain toxins that make them less nutritive than ripe fruits (see STILES, 1989).

Thus, large-scale consumption of unripe fruits is a potentially dangerous and metabolically expensive enterprise (FREELAND & JANZEN, 1974; FOSTER, 1977; STILES, 1989) and under food abundance conditions unripe fruits are habitually rejected. In this work the consumption of unripe fruits of *Didymopanax pachycarpum* (Araliaceae) are described and its implications for the seed dispersal/predation process are discussed.

During July and August 1990 fruit production and fruit removal of *D. pachycarpum* was monitored in a 4ha study plot located within the 2.320ha Sertãozinho Reserve (21°08' S, 47°59' W), State of São Paulo, southeastern Brazil. The Sertãozinho Reserve is composed of four woodlots of subtropical and mesophytic secondary forest according to the classification of HUECK (1956, 1972). The woodlots have a total surface area of 675ha, and are separated by pastures and plantations.

Didymopanax pachycarpum trees frequently reach heights of 20-26m, forming part of the forest canopy or as emergents. Nevertheless, they can produce fruits when they reach heights of 7-9m. The ripe fruits are dark violet with two, three and occasionally four seeds, surrounded by a thin mesocarp.

During July and August, only trees with green fruits or without fruit were found in the Reserve. Examination of seeds showed that they were whitish and still soft.

Seeds of *D. pachycarpum* (n=136) were collected in fresh faeces of unidentified bird species under the top of six fruiting adult trees. They were put on moist filter paper in a covered petri dish. A similar sample of seeds (n=140) from fruits picked off a tree was placed under the same conditions.

Six months later none of the seeds had germinated in either sample. It was assumed that the fruits were unripe and that seeds were not completely developed.

In 14 hours of observation seven species of birds were seen feeding regularly (July-August) on these unripe fruits: *Leptotila verreauxi*, *Elaenia flavogaster*, *Pitangus sulphuratus*, *Tyrannus melancholicus*, *Turdus amaurochalinus*, *Tersina viridis*, and *Thraupis sayaca*. Three other species were observed feeding occasionally (during one month): *Myiozetetes similis*, *Tangara cayana* (July) and *Nemosia pileata* (August). Also, *Ramphastos toco* was seen in the fruiting trees, but fruit ingestion was not confirmed. All the above species made more than one feeding visit during a minimum interval of one hour.

Although *T. amaurochalinus* sometimes defended the fruiting trees, on some occasions more than one species was observed eating simultaneously at the same crown (e.g., *T. amaurochalinus* + *E. flavogaster* + *M. similis*).

Leptotila verreauxi, when consuming ripe fruits of other plants, may be a digestive-predator of developed seeds (Guix, unpublished data). In Central Brazil, *Tangara cayana* and *Thraupis sayaca* were observed selecting the ripe pulp of *Didymopanax morototoni* fruits and discarding seeds under the mother trees (MOTTA, 1990). The other species are considered potential seed dispersers of *Didymopanax* spp (KUHLMANN & KÜHN, 1947; MOTTA, 1990).

Some of the bird species observed are probably passage migrants (*T. amaurochalinus*, *E. flavogaster*, *T. cayana*) or vagrants (*T. melancholicus*, *P. sulphuratus*, *M. similis*, *T. viridis*) that exploit the winter fruiting peak of several plant species in the remanent woodlots of the region (WILLIS, 1979).

Other birds that often eat fruits of different plants were detected in the same area during the study period, but these were not seen eating *D. pachycarpum* (e.g., *Columba cayenensis*, *Hemithraupis ruficapilla*, *Brotogeris chiriri*, *Pionus maximiliani*, *Trogon surrucura*).

The consumption of unripe fruits of *D. pachycarpum* may be a consequence of local food scarcity. Between June and September, the area was subjected to freezing days that induced a subsequent fall of leaves, flowers, and fruits (ripe and at development) of other plant species. The low temperatures and the seasonal scarcity of rainfall during this period was not favorable to insect activity. Although this subtropical region is subjected to freezing in some years, the 1990 winter

may be considered atypical, because of the low temperatures (minima below 3°C). Under food scarcity conditions, some bird communities may have been compelled to eat unripe fruits.

The consumption of unripe fruits by birds does not necessarily destroy certain types of seeds. "Unripe" fruits of *Ardisia revoluta*, largely consumed by *Chiroxiphia linearis* during a period of fruit scarcity, may germinate almost as frequently as ripe fruits (FOSTER, 1977; see also LEVEY, 1987). Nevertheless, in most cases, seed predation during the predispersal stage (the period between ovule formation and seed ripening) by the "conventional seed destroyers" (parrots and parakeets, seed-eating monkeys, fruit-eating pigeons, etc.) may decrease the number of viable diaspores potentially dispersed (JANZEN, 1971).

Our data suggest that the fruits consumed contained seeds which were still not completely developed. In the ecological conditions described for the Sertãozinho Reserve during the study period the potential seed dispersers could act as predispersal seed predators.

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ABSTRACT

Consumption of Didymopanax pachycarpum unripe fruits by birds in southeastern Brazil.— For two

months, the fruit production of *Didymopanax pachycarpum* trees was studied in a remanescent woodlot of subtropical and mesophytic secondary forest at São Paulo State, Brazil. Ten species of birds were observed feeding on the unripe fruits. It is suggested that the potential seed dispersers could act as seed predators of these tree species under food scarcity conditions.

Key words: Frugivory, Seed dispersal, Predispersal seed predation, Birds, Unripe fruits, Southeastern Brazil.

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