

## Intensity of Seed Predation on *Brosimum utile* by Mealy Parrots (*Amazona farinosa*).

Nothing is known of the intensity of seed predation by Neotropical rainforest parrots. In the lowlands of the Corcovado National Park (Osa Peninsula, Costa Rica), with a Questar telescope, I observed the crown of a 40-meter-tall fruit-bearing *Brosimum utile* ("ojoche"; Moraceae) for two days (7-8 May 1978). During these two rainy-season days, almost no fruit- or seed-eating birds were observed in the tree crown until about 3:30 pm when a pair of mealy parrots arrived, followed shortly thereafter by approximately eight other mealy parrots. They remained about one and one-half hours, flying off about a half hour before dark. Two *Pionus senilis*, two *Amazona ochrocephala*, and one *Ramphastos swainsonii* entered the tree briefly during the two days, but did not appear to feed.

When a mealy parrot arrived, it sat on a stout branch and reached out to take one of the green-colored, 1.5- to 2.5-cm-diameter fruits with its beak. The 2- to 4-mm-thick, soft, and loosely fitting fruit wall was pared off with the lower bill and dropped. The parrot split the spherical seed into two pieces, each representing one of the two hemispherical cotyledons. One piece was held in the foot, and the lower bill was used to scrape off the thin white aril of the other piece; the aril was then dropped. The bird then chipped the cotyledon into small pieces and swallowed them. The second half was then treated in the same manner. Occasionally a mature fruit or seed was dropped. Sometimes a branch with three to 10 fruits was cut off and held in the foot while the fruits were processed in the manner described above. Pea-sized immature fruits were occasionally picked and then immediately dropped without opening them.

It was possible to observe five parrots from the beginning to the end of an uninterrupted feeding bout. Each bird ate an average of 0.80 seeds per minute (s.d.=0.15), removed an average of 0.84 fruits per minute (s.d.=0.17), and averaged 34 minutes per feeding bout (s.d.=6.0) (range 0.6 to 1.0 fruits per minute, 24 to 37 minutes per feeding bout). At a rate of 30.0 seeds per day per parrot, the set of mealy parrots was taking about 300 seeds per day from this tree. The parrots fed primarily in the upper and outer margins of the crown, and therefore the relative seed predation in these areas was much more intense than lower in the crown. I estimated that the tree contained 11,000 to 16,000 full-sized fruits. There were at least as many tiny fruits in the crown which would presumably have ripened at a later date, indicating that this *Brosimum* could serve as a food source for several months. It would require about 36 to 53 days for these mealy parrots to consume the entire seed crop; however, I suspect that most of these fruits would have been carried off by the bats that normally disperse *Brosimum* fruits before this period had passed.

*Brosimum utile* seeds and fruits are highly edible to humans, horses, cattle, and wild animals. When the parrots had finished feeding, their crops bulged conspicuously. The seeds of *B. utile* are relatively hard, and even the fragments chipped up by the bill should be slow to digest. It appears that the parrot fills its crop with a hard and slowly digesting food type in the late afternoon and that the digestion process should last out the night. I suspect that during the morning and midday hours these parrots feed on softer and more quickly digested materials, which are more of a quick-energy source which does not weigh down the bird and can be replaced as they are digested.

Thanks are offered to T. Schwan for his suggestions on the manuscript. This study was supported by NSF grant DEB 77-04889.

**M. L. Higgins**  
Department of Entomological Sciences  
201 Wellman Hall  
University of California  
Berkeley, California 94720, U.S.A.