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Soil Feeding Behaviour of Globally Threatened Nilgiri Woodpigeon *Columba elphinstonii* in the Western Ghats, South India

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Abstract

Among birds, mineral use is notable in only a few species of pigeons and doves. Such behaviour has now been confirmed in the Nilgiri Woodpigeon *Columba elphinstonii* a pigeon which is globally threatened and which is endemic to the Western Ghats. During an ecological study in the Upper Palni Hills between April 2002 and 2004 supplementary nutrition through soil feeding was observed. Soil feeding flocks were observed between March and May mainly in dilapidated buildings and on the sides of forest roads and coincided with the species' breeding season.

1. Introduction

Reproduction of the Nilgiri Woodpigeon is closely linked with favourable environmental conditions, as this species has a high metabolic rate and specialized dietary needs for raising offspring. Pigeons are symmetrical with environmental conditions because they do feed chicks with crop milk (Dawson et al. 2001, Dawson 2002).

Information on the basic ecology, in particular on food and supplementary feeding of most of the columbids in the tropics is very limited (Recher & Date 1988). In India, no such studies have been conducted so far on columbids (Somasundaram & Vijayan 2010), except for few incidental observations on *Treron phoenicoptera* (Ali & Ripley 1987).

In India, 29 species of columbids are found, of which three are listed as Threatened. Of the 12 Columbidae species reported in the Western Ghats, Nilgiri Woodpigeon *Columba elphinstonii*, is endemic (Ali & Ripley 1987) and it is also listed as “threatened category” (BirdLife International 2011). Details of plant

species fed by Nilgiri Woodpigeon were explained in Somasundaram & Vijayan (2010). Here, this note reports supplementary nutrition through soil feeding by Nilgiri Woodpigeon.

2. Study Site and Methods

The Palni Hills consist of two well marked topographic divisions, i.e. the Upper and Lower Palnis. The Upper Palnis, with elevations ranging between 1,500m and 2,450m asl, have a moderate climate with mean temperatures of 12°C to 23°C in summer (March–May) and 8.3°C to 17.3°C in winter (December–February). The annual rainfall averages 1,650mm. The vegetation is predominantly of the wet montane temperate forest type or Shola (Champion & Seth 1968). The profile of the forest is stunted trees with a canopy height of approximately 15 m (Ramesh & Pascal 1998). Common plants include *Syzygium*, *Ternstroemia*, *Sideroxylon*, *Meliosma*, *Elaeocarpus*, *Symplocos*, *Eurya*, *Litsea* and *Rhododendron*. The forest has adjacent agricultural fields and exotic plantations of *Acacia*, *Eucalyptus* and *Pinus* species (Somasundaram & Vijayan 2010).

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Table 1. Seasonal variation in the diet of the Nilgiri Woodpigeon. Note: Figures as percentages of food item.

Food item(%) / Season	Summer (March – May)	South-west monsoon (June – August)	North-east monsoon (September- November)	Winter (December- February)	Total
Fruit	71.5	72.5	70.0	70.0	71.0
Flower buds	4.5	1.5	7.0	12.5	6.38
Invertebrates	9.0	18.5	14.5	3.5	11.38
Soil	15.0	7.5	8.5	14.0	11.25
Total No. of observations	350	430	361	379	1,520

Nilgiri Woodpigeons were observed by using a focal animal sampling or scan sampling method (Altmann 1974) between April 2002 and April 2004 during the behaviour study. When a flock of birds was encountered in the forest, activity was scanned for one minute and seven minute intervals were given (scan sampling). Within the group one individual bird was observed for five minutes and three minutes break was given (Focal animal sampling). In total, 1,520 foraging observations were made during the two-year study. In each feeding observation, food item and location were recorded in different seasons in the Upper Palni Hills. Most of the observations on the soil feeding behaviour were made within 5m radius from the focal bird so the possibility of observer bias is nil.

3. Results

The Nilgiri Woodpigeon is primarily a frugivore, even though it feeds on leaf buds, flowers, ground invertebrates such as snails and coleopteran grubs and soil. Based on feeding observations, more than 70% of food item intake of the Nilgiri Woodpigeon consisted of fruits, followed by soil, invertebrates and buds. Fruits were the major food in all seasons. Apart from the fruits, they were found feeding on soil during summer and flower buds during winter. Invertebrates were also consumed in sizable quantities during the monsoons (Table 1).

The soil feeding flocks of the pigeons were recorded in dilapidated buildings closer to the forest edges and the edges of steep cuttings on the sides of forest roads. The soil feeding flocks were observed between March and May. Out of 44 soil feeding observations, 23 were in dilapidated buildings and 21 were on forest road edges (Table 2). This indicates that there was no site preference. The number of birds participating in the soil feeding flocks ranged from five to 55 birds.

Table 2. Number of soil feeding observations of Nilgiri Woodpigeon in different locations.

Location/Month	March	April	May	Total
Dilapidated building	13	7	3	23
Sides of the forest roads	6	11	4	21
Total No. of observations	19	18	7	44

4. Discussion

Most of the tropical forest fruits contain poor minerals and essential nutrients (Jordano 1984) and many avian species take minerals from natural or anthropogenic sources to supplement mineral-deficiency in their diet (Graveland 1996, Perrins 1996). However, congregations of birds at mineral sites, sometimes called mineral licks, are rare and it is not a universal characteristic among any family of birds. The most plausible hypotheses proposed to explain the use of mineral sites by frugivores are: (1) to provide grit for grinding food in the stomach; (2) to serve as a mineral supplement; (3) to buffer acidic or alkaline foods in the gizzard (Bechtold 1996); (4) to detoxify secondary plant compounds such as alkaloids and tannins (Diamond 1998); (5) to replace electrolytes lost during daily diuresis (Adam & Des Lauriers 1998).

Soil feeding noted in the present study was particularly prevalent during the Nilgiri Woodpigeon's breeding season (February to June) (Ali & Ripley 1987, Somasundaram 2006). March & Sadleir (1975) found high levels of serum calcium in the blood during ovulation and the same level was maintained during the crop milk production in Band-tailed Pigeons *Columba fasciata*. Both adult males and females regurgitate crop milk, a curd-like substance, to feed their young for about one week after hatching and then decreased to nil while fledging (March & Sadleir 1975, Griminger 1983). Crop milk contains about 0.5 mg calcium per g and March & Sadleir (1975) estimated that Band-tailed Pigeons needed 10

mg per day of calcium to maintain calcium equilibrium in the birds while feeding young ones. In the Pacific North-West, Jarvis & Passmore (1992) hypothesised that breeding Band-tailed Pigeons principally feed on berries of Red Elder *Sambucus racemosa* var. *arborescens* and Cascara *Rhamnus purshiana*, which are deficient in calcium and therefore these birds seek mineral sites to supplement dietary calcium. Braun (1994) reported, based on literature, that calcium intake by adults is extremely important in the breeding cycle, especially while feeding nestlings. However, the calcium deficiency hypothesis has not been tested in many species (Sanders & Jarvis 2000). Among birds, mineral use is notable only for a few species of pigeons and doves (Ali & Ripley 1987, Jarvis & Passmore 1992), and is now confirmed in the Nilgiri Woodpigeon. However, the nutrient quality of the soil and the Nilgiri Woodpigeon's blood serum calcium level could not be tested in this study. Further research in this regard could be very useful.

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