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Pesticidal mortality of Crimson-breasted Barbet *Megalaima haemacephala* with a note on its body size

by Manjit S. Dhindsa, Jaswinder S. Sandhu & Amrik S. Sohi

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Chemical pesticides efficiently control obnoxious animals and thus are extensively used throughout the world; but many cases of direct and indirect mortality of non-target animals are known. This communication reports accidental mortality of Crimson-breasted Barbets *Megalaima haemacephala* following infusion of an organophosphorus insecticide monocrotophos (=Nuvacron SC 40) into Cluster Fig *Ficus glomerata* trees for insect control. The Crimson-breasted Barbet is found throughout India and as far south and east as the Philippines and Indonesia (Ali & Ripley 1970). It is almost exclusively frugivorous, preferring mainly the fruits of *Ficus* spp. *F. glomerata* produces big fruits c. 2.5–3.75 cm in diameter (Brandis 1921) which are relished by barbets and other birds as well as consumed by human beings.

Accidental poisoning of birds due to monocrotophos is not new. This insecticide was involved in mass mortality of birds like pipits, wagtails, larks, thrushes, Chaffinches, buntings, lapwings etc. following aerial sprays on alfalfa crop fields to control the Levant Vole *Microtus guentheri* in Israel. In addition, as many as 400 raptors, owls and kites also died after feeding on poisoned voles and birds in an area of 8 km^2 within 3 months (Mendelssohn & Paz 1977). Recently, poisoning of about 100 birds, mostly ducks and geese, has occurred in western Louisiana (USA) as a result of monocrotophos application to rice fields (White *et al.* 1983). Since the insecticide is so highly toxic to birds (Walker 1983), it has been used, along with dicrotophos, as poison bait on rice seed for the deliberate killing of birds around rice fields in Texas (USA) (Flickinger *et al.* 1984). However, there is no previous report of mortality of frugivorous birds due to this chemical. We present here a case which shows that monocrotophos can cause mass mortality of frugivorous birds if infused into fruit trees. Taking the opportunity this mortality presented, we have also analysed the morphometrics of Crimson-breasted Barbets.

In an experiment, laid out by one of us (ASS) on 20 May 1984 for the chemical control of Fig Wasp *Apocryptophagus* sp., monocrotophos was infused by making holes into the trunks of Cluster Fig trees situated in the Punjab Agricultural University Campus, Ludhiana (30°56′N, 75°52′E, c. 247 m a.s.l.). There were 9 trees in a row separated by 3.6–4.2 m. One tree was kept as control, whereas the other 8 were divided into 4 groups of 2 trees each and different amounts of the insecticide were infused into them at c. 45 cm above the ground level. Trees of the first, second, third and fourth groups received insecticide in amounts of 0.12, 0.25, 0.50 and 1.0 ml respectively per 2.5 cm (one inch) of their girth i.e., a tree of the first group with x cm girth got $(0.12/2.5)x$ ml of insecticide.

On 25 May we first noticed that Crimson-breasted Barbets were dying after feeding on fruits of treated Cluster Fig trees. We collected all dead and dying birds at 10:00 and thereafter visited the trees every hour to observe and capture all affected birds. Two birds had probably died on the previous day (i.e. 4 days after insecticide treatment) since their flesh had partly been consumed by ants.

Mortality

Seventeen barbets had died by 17:00 on 25 May. Six more died on the next day and one each on 27 and 28 May (total 25). Among these, 9 were adult males, 2 adult females, 5 juvenile males, 6 juvenile females and 2 juveniles whose sex could not be ascertained. The preponderance of adult males suggests they might have been more susceptible, but the sex-ratio of this species in the field is not known.

House Sparrows *Passer domesticus,* Common Mynas *Acridotheres tristis,* Red-vented Bulbuls *Pycnonotus cafer,* Rose-ringed Parakeets *Psittacula krameri* and Koels *Eudynamis scolopacea* were observed feeding on the poisoned fruits. However, only 2 Red-vented Bulbuls and one Koel were affected to the extent that they fell to the ground. Besides birds, Five-striped Palm Squirrels *Funambulus pennanti* were also seen feeding on the fruits, but with no visible adverse effect.

The affected birds would lose their balance, fall onto the lower tree branches and try to perch there, sometimes hanging upside down by their claws for a few moments. Having fallen to the ground, they would try to reach a hedge for cover. All were panting and their balance was upset due to their claws being tightly closed. Flickinger *et al.* (1984) stated that birds dying of monocrotophos and dicrotophos poisoning exhibited symptoms like loss of muscular coordination, prostration, tetany, outstretching of wings and convulsions.

Sickly birds rescued from below the trees were brought to the laboratory and fed on 10% glucose solution and uncontaminated fruits of Cluster Fig. In all, we caught 10 sickly barbets, 2 bulbuls and one koel. Eight barbets were kept in a cage at room temperature – average °C on 24-28 May: maximum 44.8°, minimum 27.6°, mean 36.2°. Of these, one fully recovered within 2 hours and was released, whereas 6 died within 12 hours and one died after 19 hours. Two barbets which were kept in a cage in an aircooled room (25° ± 2°C) fully recovered within 18 hours. A Koel collected in a semiparalysed condition and with folded claws recovered enough to sit on its feet within 70 minutes and was able to fly within the next 50 minutes. A bulbul fully recovered in a little more than 5 hours while another revived in about 3 hours.

Body size of Crimson-breasted Barbets

No information is available on the body size of this species except the ranges of a few measurements of museum skins and the weights (32-47 g) of 10 ♂ ♀ (Ali & Ripley 1970). We recorded measurements of 5 body size characters, namely, body weight, and lengths of bill, wing, tarsus and tail, of 18 (11 ♂♂, 7 ♀♀, 10 adults, 8 juveniles) freshly dead barbets following the methods of Dhindsa & Sandhu (1984) and Dhindsa *et al.* (1985). Sexes were confirmed by dissection and birds with completely ossified skulls were taken to be adults.

TABLE 1

Body size of Crimson-breasted Barbets *Megalaima haemacephala* and univariate comparisons between sexes and between adults and juveniles

Character	Total sample N=18	Males N=11	Females N=7	F—ratio for comparison between sexes (d.f.=1 & 16)
Weight (g)	29.59±3.26 (25.5–40.1)	30.18±3.62 (27.0–40.1)	28.66±2.55 (25.5–32.7)	0.93 P>0.050
Bill (mm)	19.22±0.94 (18.0–21.5)	19.64±1.10 (18.5–21.5)	18.57±0.61 (18.0–19.5)	5.44 P<0.050
Wing (mm)	83.22±1.67 (79.0–87.0)	84.64±1.63 (82.0–87.0)	81.00±1.73 (79.0–84.0)	20.32 P<0.001
Tarsus (mm)	20.83±0.67 (19.5–22.0)	21.00±0.63 (20.0–22.0)	20.57±0.73 (19.5–21.5)	1.74 P>0.050
Tail (mm)	36.67±1.59 (34.0–41.0)	37.45±1.69 (35.0–41.0)	35.43±1.40 (34.0–38.0)	6.95 P<0.050
		Adults N=10	**Juveniles N=8**	**F—ratio for comparison between age samples (d.f.=1 & 16)**
Weight (g)		30.50±3.59 (27.0–40.1)	28.45±2.55 (25.5–32.7)	1.85 P>0.050
Bill (mm)		19.85±1.00 (19.0–21.5)	18.44±0.42 (18.0–19.0)	13.85 P<0.010
Wing (mm)		83.90±2.13 (80.0–87.0)	82.38±2.67 (79.0–86.0)	1.82 P>0.050
Tarsus (mm)		20.80±0.63 (19.5–21.5)	20.88±0.79 (20.0–22.0)	0.05 P>0.050
Tail (mm)		37.50±2.01 (34.0–41.0)	35.63±0.92 (34.0–37.0)	5.90 P<0.050

Although the sample sizes were small, they were sufficient to reduce the standard errors to less than 2% of character means (Wooller 1984) in all characters except body weight (Table 1). In univariate comparisons, bill, wing and tail lengths of males were significantly longer than those of females,

TABLE 2

Results of MANOVA tests between male and female and between adult and juvenile Crimson-breasted Barbets *Megalaima haemacephala* (see Cooley & Lohnes 1971)

Test	Criterion	F-ratio	ndf_1	ndf_2	Significance
Between males & females					
For equality of dispersions	M=29.681	1.215	15	645	P>0.05
For overall discrimination	Λ=0.2481	7.270	5	12	P<0.01
Between adults & juveniles					
For equality of dispersions	M=23.274	0.998	15	906	P>0.05
For overall discrimination	Λ=0.3168	5.180	5	12	P<0.01

whereas body weight and tarsus length did not differ significantly between the sexes. Between adults and juveniles, bill and tail lengths were significantly longer in adults, but there was no significant difference in the other 3 characters. Overall size dimorphism was tested with the MANOVA programme of Cooley & Lohnes (1971), and this revealed a distinct size dimorphism between males and females and between adults and juveniles, with males significantly larger than females and adults larger than juveniles in overall body size (Table 2).

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Spurs and their function in some female game-birds

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Although Galliformes' weaponry is confined to a single type – leg spurs –, there is a wide range in spur representation and number on the 2 sexes. There are 96 species with spurs only in males, and 17 with spurs normally in both sexes (Davison 1985). Spurs of males are always as large as or larger than those of females of equivalent age. The question then arises whether females' weaponry is adaptive, or represents incomplete suppression of the genotype for a feature which is non functional in that sex (cf. Kiltie 1985).

All species with multiple spurs show great variability in spur number, which is likely to be reflected by individual variation in wound inflicting ability. It is the purpose of this note to examine spur number and its variation, with special reference to females of some multiple spurred species. Statistical tests follow Conover (1980).