Malays. Appl. Biol. (2017) 46(2): 153–156

RESEARCH NOTE

THE USE OF TARTAR EMETIC TO STUDY THE DIET OF INSECTIVOROUS BIRDS IN BORNEO

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Accepted 8 May 2017, Published online 27 June 2017

Obligate insectivorous birds (insectivores) such as babblers and flycatchers and partial insectivores such as bulbuls are abundant in various types of habitats in Borneo (Myers, 2009; Phillipps and Phillipps, 2009) and serve as suitable subjects to study the diet of insectivores. Various methods have been used to determine birds' diets. Observation of what birds eat (Mizutani & Hijii, 2002; Anthal & Sahi, 2013; Mohd-Azlan *et al.,* 2014; Mansor *et al*., 2015; Styring *et al.,* 2016), examination of fecal samples (Ralph *et al.,* 1985; Parrish *et al.,* 1994; Burger *et al.,* 1999), analysis of stomach contents (Ballarini *et al.,* 2013; Bettycopa *et al.,* 2015), stomach flushing (Gionfriddo *et al.,* 1995; Barrett *et al.*, 2007; Fijn *et al.,* 2012) and examination of regurgitated samples (Poulin *et al.*, 1994; Poulin & Lefebvre, 1995; Valera *et al.,* 1997; Mallet-Rodrigues, 2001; Durães & Marini, 2003; Zduniak, 2005; Carlisle & Holberton, 2006; Ceresa *et al.,* 2014) have all been used. Stable isotope techniques have also been used to study the trophic position of babblers (Hamer *et al*., 2015) but require sophisticated equipment that may not be available.

The usage of regurgitated samples to determine birds' diets has an advantage over several other methods. The food items in the sample have not been subjected to extensive digestion so the samples have a higher chance of yielding intact prey bodies thus facilitating enumeration of both prey species and abundance. Previous studies have shown that regurgitated samples obtained by using emetics such as antimony potassium tartrate (APT) (tartar) or apomorphine (AM) provided useful information about the diets of birds ranging from small-bodied nectarivores to large carnivores (Lederer & Crane, 1978; Poulin *et al*., 1994; Valera *et al*., 1997; Mallet-Rodrigues, 2001; Durães & Marini, 2003; Zduniak, 2005; Carlisle & Holberton, 2006; Ceresa *et al*., 2014). The downside of this method is that it can be lethal if improper volumes and concentrations of emetic are administrated (Carlisle & Holberton, 2006). Proper administration of the emetic solution includes making sure that it does not enter the trachea (causing the bird to drown) and identifying the appropriate dosage - enough to elicit regurgitation but not to cause the bird discomfort. In this communication, we report the results of a study comparing two different dosages of tartar emetic to collect regurgitated samples from small insectivorous birds.

The study was carried out in regenerated secondary forests and a nearby primary forest at Pelagus National Park, Kapit Division, Sarawak, Malaysia (Borneo). Mist nets (9 m long, 2.5 m high, with 3 shelves and 20 mm mesh size) were deployed to capture small insectivorous birds over the period December 2014 to November 2015. The nets were checked every two hours daily during sampling between 06:00 and 18:00 hours. All captured birds were ringed, identified with reference to Phillipps and Phillipps (2009), measured and released. Birds from the target groups (babblers, flycatchers and bulbuls) were retained to be dosed with tartar emetic solution (1%) prepared by diluting 5 g antimony potassium tartrate (APT) in 500 ml of distilled water.

We initially chose to administer a dose of 0.2 ml of 1% APT per individual (dosage 1) (Mallet-Rodrigues, 2001) because the body size and feeding pattern of the babblers, bulbuls and flycatchers in our study were similar to those of the gleaners

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