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Physical Method of Control on Common Myna (*Acridotheres tristis)* In Sigatoka-Fiji Islands

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----------ABSTRACT----------
The invasive common myna is becoming a biggest threat on the indigenous biodiversity in Sigatoka. The study focused on three areas: urban (Sigatoka town), semi-urban (Malevu) and rural (Navola and Namatakula villages). A combination of two different methods was used to control myna in Sigatoka-1) The use of Pee Gee (PG) trap which was less effective due to the distractions caused by villagers, dogs and humans (thieves) and it removed 30% of the common myna. 2) The removal of the myna nests was quite successful as a total of 16 (44%) nests were removed but did not show a significant decrease in the common myna population. Data was collected through questionnaires which focused on myna population, roosting sites, threats and control measures used by framers. The most prominent standing crops and fruits damaged by myna in Sigatoka were eggplant, cabbage, chili, banana and pawpaw. A total of 530 common mynas were seen in Sigatoka with 11 roosting sites, more on trees (77%) and 36 nests on roofs (89%). However, 38% people in Sigatoka regarded myna as a beneficial bird of which 28.5% people were not using any form of control against myna.

KEYWORDS: *Trap, removal, roosting site, studying sites, nest*

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I. INTRODUCTION

The common myna *(Acridotheres tristis*) was introduced to Fiji in 1890 to control the pest in sugar cane and it has become one of the worst invasive species in Fiji (Watling, 2001). Approximately by 1960-1969, common myna reached Sigatoka and spread throughout the island and now it is highly colonised in the rural and urban parts in Sigatoka and especially in human modified land areas (Canning, 2011; Peacock *et al.*, 2007). Sigatoka lies on the island of Viti Levu which is 126.6 km away from the capital city Suva. It is relatively a small town located on the mouth of Sigatoka river at a longitude of 177.4° E and latitude of 18.1° S (Weather Underground, Sigatoka Fiji 2013). The place is highly populated with Fijians with a total population of approximately 9622 of 2007 census (Fiji Islands Bureau of Statistics 2012). Sigatoka is also known as "salad bowl of Fiji" due to its relatively high production of fruits and vegetables. The place is one of the tourists' destinations due to its location along the coral coast and the presence of sandy beaches, sand dunes, Kula Eco Park (houses different species of birds), hotels and resorts for tourists to stay. Not much is known about its flora and fauna species and loss of its biodiversity by invasion of mynas. It receives occasional rains and few thunderstorms (Fiji Meteorological Service). Average maximum temperature recorded is 32°C and humidity of 58% (Weather Underground, Sigatoka Fiji, 2013).

Previously researchers attempted to worked on controlling myna population; Canning (2011) in Fregate Island, Seychelles, did research for 8 months using nest traps, cage traps and walk-in traps and out of all the best result was obtained by cage trap, 742 (92%) mynas were trapped and in total 745 mynas with 42 eggs were eradicated. He also tried shooting common mynas but was unsuccessful as only 4 mynas were shot. Feare (2010) in St. Helena and Ascension islands, Atlantic Ocean, worked for 4 months feeding starlicide treated rice (3g/3 kg in 400 ml of warm water).There was a decline of 70% (from 360 -109) population of common myna. However, non-targeted species like pigeons were killed as well. Lastly, Tidemann (2001) in Canberra worked for 18 months using 10 – 20 traps and captured about 300 common mynas. From the observations of Peacock, *et al.* (2007) it was also hypothesized that the increase in the human habitation increased myna population in Sigatoka. Colonization of common myna in Sigatoka is posing a biggest threat on the fauna, for example, competing for food (Eguchi and Amano, 2004; Holzapfel *et al.*, 2006), habitat and space with other birds (parrots and java) and mammals thus drawing indigenous species away from their habitats (Peacock *et al.*, 2007)

and also on the human health, for instance spread of lice Eguchi and Amano, 2004) and on the environment with its droppings. Also the building of nests in the roofs using dried grass and papers increasing the risk of fire (Markula, *et al.*, 2009).

This research paper primarily focuses on the control of common myna in Sigatoka through the use of trap and removal of the nest.

II. METHOD

The following methods were used to control and determine the population of myna in the Sigatoka.

Study area and Myna

The biogeography of study sites was recorded in terms of its location, population of humans and common myna, roosting sites, contributing factors for growth of myna population, beneficial and harmful impacts in general. Three different areas were selected: urban (Sigatoka Town), semi-urban (Malevu) and rural (Navola and Namatakula Villages). In each area the village protocols and rules were followed. The entire research site was located on the Queen's road. As this work was of first kind in this area, majority of the inhabitant had supported and participated actively in this study. Completing a set of semi-structured questionnaire followed by face-to-face interview was used as tool to collect data from the farmers, teachers and university students on myna bird knowledge. Obtained observations and data are presented in tables 1thorough 6.

Trapping myna

The Pee Gee (PG) trap was specifically designed and is extensively used in Australia to control myna population (Tidemann, 2001). The trap consisted of two parts: feeding and catching cage. The food was placed in the feeding cage which allowed the myna to walk in to the catching cage but cannot return to the feeding section because the entrance was bell shaped. The trap was environment friendly therefore allowed other non-targeted animals and birds (Table 6) to walk-in by chance and later they were released to the environment. To encourage myna trapping, ripped pawpaw, cooked rice was used as baits along with bread and water (Feare, 2010). The trap was placed near the roosting sites and monitored regularly, every morning and evening. The pawpaw attracted most of the myna plus others. The bycatch of ten trials was recorded and tabulated (Table 6); two trials were successful where 30% mynas were trapped.

Physical Removal of Nests

In this study a total of 12 building roofs and 46 different types of trees was searched for myna nests (Table 2) followed by a complete removal with brooms and wooden sticks. As it was a non-breeding season, the nests were empty (no egg/chick).

III. RESULT

The following results were obtained through personal observation and interview.

Table 1 *Type of control used by farmers in Sigatoka to control the common myna*

AREA	TYPE OF CONTROL MEASURE
Urban	• Chemicals (Grama-zone and Lenite)†, • Chasing using stone or stick • Hay-man • Compact disks and/or video tapes • Setting traps using basin (artisan made)
Semi- urban	• Hay–man • Offering leftover food to avoid damage to the farm crops.
Rural	• Chemicals (Royalthene)† • Throw stones • Hay –man • Traps using basin or fishing line (artisan made)

†Grama–zone (manufactured by Hextar Chemicals SDN BHD, Malaysia), lenite (PCT International, Australia) and Royalthene (distributed in Fiji by G.M.R Muhammad & Sons, Nakasi, Fiji) were treated with rice and

ripped pawpaw baits to attract mynas because of the colour and smell. Farmers in three study sites use the methods of control only during the breeding season.

According to the farmers, chemical method is very effective and easy to use as it kills the birds on the same day. However, some farmers have stopped using chemical because it is non-affordable, also kills the household birds (chickens and ducks), dogs and cats on accidental consuming plus Grama–zone destroys the useful plants and vegetables on contact. Thus, alternatively farmers have adapted other common methods as given in Table 1, which are cheap, less time consuming, environment friendly, effective and humane.

Table 2 *Location and total number of common mynas nest found in each area of Sigatoka*

AREA	LOCATION		TOTAL NUMBER		TOTAL
	ROOFS	TREES	ROOFS	TREES	
Urban	Market Lawaqa Park – Pavilion	—	20	—	20
Rural	Teachers Cottage Church		2 6		
Navola	Seminar House Inside the house	Yaqona plant	1 1	1	11
Namatakula	Roof	Mango Rain	1	1 1	3
Semi-urban	Roof	Lemon	1	1	2
		TOTAL	32	4	36

A total of 36 nests- 56% in urban, 6% in semi-urban and 38% in rural were discovered from the studied areas. Further, 89% on roofs and 11% on trees were sighted. However, only 16 nests (44%) were physically removed (semi–urban and rural) while from the urban roof nests were beyond reach to remove totally. It was observed that mynas built nests usually in roofs rather than in trees because they prefer to live in human vicinity to get free food and protection from predators as well as adverse weather conditions.

Table 3 Total number of common myna counted in each area and the human population

AREA	Myna count	Human Population
Urban	200	3,000
Semi-urban	80	232
Rural	250	2,672
Total	530	5,904

The areas with a higher human population had higher myna counts (Spearman rho=0.667; $p>0.05$). Further, higher myna count was observed at rural and urban sites because of certain favorable factors such as feeding of chickens in open area, discarding leftover food carelessly; ripen fruits not harvested on time and the pig pens having no cover (personal observations).

Table 4 Major fruits and crops damaged by myna.

AREA	**Fruits/ Crops**
Urban	capsicum, tomatoes, eggplant and cabbage
Semi – urban	mangoes, banana, chilies and corn
Rural	pawpaw, guava, banana and eggplant

The major vegetable damaged by common myna was eggplants and chilies and fruit was banana. Though myna used to damage these fruits and vegetables, it also helps in the seed dispersal of these fruits.

Table 5 Roosting site with total number of myna

AREA	Roosting Site	Myna counts
Rural	Mango tree (2) Coconut tree (2) Roof (2)	40 26 6
Semi – urban	Mango tree (1)	8
Urban	Roof (1) Mango tree (1) Bamboo tree (2)	12 8 6
Total	11	106

Mynas prefer mango trees as a community roosting site. Out of 11 roosting sites, 73% on trees and 27% on roofs; 55% in rural, 9% in semi –urban and 36% in urban were recorded. Mynas look for dense canopy and garden vegetation for roosting because of easy access to the food source and easy escape from predators.

Table 6 *Myna trapping using Pee Gee trap*

Trials	Species	Number Caught
1	Bulbul	1
2	-	-
3	Dog (little puppy)	1
4	Frog	2
5	-	-
6	Bulbul	3
7	Common myna	2
8	-	-
9	-	-
10	Common myna	1
Total		10

From ten trapping trials, only two were successful where a total of 3 (30%) common mynas were caught. Trapped mynas were euthanized by dislocating the neck vertebrae. The other non-targeted trapped species were released into the environment.

IV. DISSCUSSION

Rural Area: The common myna was always seen in pairs or in groups foraging fields for food, feeding of the nestlings and collecting materials to build the nest. During afternoon and evening, the mynas were roosting on the power lines, making collective annoying noise and even looked down the ground in searching of food. After lunch, lots of mynas were seen in the school playground where they search for the left-over/discarded foods. The nest was very common in the roofs (Dhami and Nagel, 2009; Markula 2009; Canning, 2011) and just because the nest were in the roofs, their droppings emitted bad odor in the vicinity areas (Brochier *et al*., 2010). Peacock *et al.* (2007) noted the problems of myna dropping with buildings looking ugly in Southern Africa; people annoyed by myna noise (Brochier *et al*., 2010; Holzapfel *et al.*, 2006) which were corroborated in this research.

Urban Area: The mynas were seen singly or in pairs searching for foods but in the evening, they were seen in groups sitting on the roofs of the buildings, market and bus shelters with terrible noise (Brochier *et al*., 2010; Holzapfel *et al.*,2006). Extensive dropping marks were seen near the market area because of the preferred roosting sites plus the availability of the left over/discarded fruits and vegetables by the market vendors and the snacks by the people near the bus shelter areas. It was noted that public in general in Sigatoka lacked the knowledge on the negative impacts of myna on human health and the agriculture sector. These included- the

spread of weeds such as lantana (Peacock, *et al.* 2007; Eguchi and Amano, 2004), ecto-parasites such as lice and mites and economic loses by damaging fruits and vegetables (such as making holes on the cabbage and eggplant). This study recorded an occurrence of lice infestation at Namatakula village after myna nest building in a farmer's house roof. Canning (2011) reported the building roofs and trees as an ideal nesting sites for mynas.

The two methods were used to control the population of common myna in Sigatoka. It is notable that use of trap was effective compared to the technique of removing the nest. Numerous non-targeted animal species were also attracted to the bait used in the trap but the frequency was relatively low. The factors that may have caused the attraction are location the trap placed or feeding pattern. Overall, a decrease in occurrence of mynas was observed after removal of the nests in areas where there were flocks with large in numbers was sighted. This bird learned quickly as trap was avoided if it managed to escape at first place. The continuous setting to target mynas ensured that it was successful. However, due to the shortcomings such as thieves, objection from villagers, disturbances from village kids, traffics and predators (cats and dogs) made it less effective for the physical eradication of myna. Previous studies have indicated trapping using caller bird was a very effective and safe method of controlling myna population (Canning, 2011; Tidemann, 2001).

From the interview observations, it was evident that 62% people considered this bird as a pest, therefore it should be controlled. The problems highlighted and described were: stealing of food from the kitchen, damage of crops and fruits, noise pollution, polluting drinking water with droppings and the buildings look dirty emitting foul smell and dirty the clothes on washing lines. However, 38% of the interviewers identified the benefits of myna that includes: help in waking up in the morning, eating harmful insects, myna itself is a source of food (only in times of shortage of food) and contributed in dispersal of the fruit seeds like pawpaw, guava and chili. The roosting sites on the three study sites for mynas were similar which included mostly big trees like mango tree. Also from the interviewers, who were mostly farmers, the most damaged crop and fruits were identified. Myna was frequently damaging the ripe banana, pawpaw and chili on the plants; and then left half eaten; cabbage and eggplant where they made tiny holes with their beaks and lastly pulled the seedlings out from the soil. From the farmers view point, the climate, absence of predators and abundance of food has lead to the increase of the common myna population in Sigatoka. Further, it was also observed that apart from common myna, red vented bulbuls were the worst invasive bird species in Sigatoka which continuously damaged a wide range of vegetables and fruits ready to harvest. In future, the increase population of bulbul would become a major threat to the agricultural sector. It would be helpful if future researchers investigate and develop a method to control this species as well..

The main objective in this study was to test if trapping and removal of nest could have a positive significant impact on decreasing the number of common myna in Sigatoka. Described two techniques in this research were proved to be effective in controlling the population size of this invasive species. Extensive study is needed to investigate on the other methods of control on common myna and other invasive birds especially with the use of biological or chemical control will prove to be safe, effective and humane for eradicating invasive bird species.

V. CONCLUSION

Physical methods (trapping and removal of nest) may provide a valuable tool in common myna control but due to the limitations and larger number of mynas feeding at one time made it less effective. This method was low cost and environment friendly. Physical methods need to be integrated with chemical control for successful eradicating of controlling of mynas. Physical methods like hay-man and compact disks and chemical controls are use by farmers in Sigatoka to control the myna population..

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