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Short Communication

Effect of Arthropods Abundance on the Red Junglefowl Population in Oil Palm Plantation Habitat

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Abstract. The study was conducted for one year in the 4-year and 8-year old oil palm plantation at Sungai Sedu Estate, Selangor, Malaysia, to observe whether the abundance of arthropods affects the density of red junglefowl (*Gallus gallus spadiceus*). The arthropods were collected by three methods i.e., litter, pitfall and sweep net. The results indicated that the arthropods abundance in both the study areas was found to be almost similar. It is suggested that arthropods abundance has little effect on the density of red junglefowl in oil palm plantation.

Keywords: arthropods, red junglefowl density, oil palm plantation, *Gallus gallus spadiceus*

The red junglefowl (order Galliformes) is referred as the ancestor bird of local poultry (Darwin, 1875). It is distributed throughout India, Burma, South China, Malaya, Sumatra, Philippines Islands, Fiji and New Guinea (Delacour, 1977). In Peninsular Malaysia, its sub species *Gallus gallus spadiceus* is found up to the elevation of 1676 m (Yatim, 1993), and most of its populations inhabit agriculture areas such as oil palm, rubber and tea plantation (Arshad and Zakaria, 2009; Azhar *et al*., 2008; Zakaria *et al*., 2003; Abdullah and Babjee, 1982; Davison and Scriven, 1987). It is highly opportunistic and omnivorous in diet (Collias and Collias, 1967) and takes a wide variety of insects particularly teremites and ants (Medway and Well, 1976).

This study was undertaken to determine whether arthropods abundance has any effect on the density of red junglefowls in different aged oil palm plantation.

The study of arthropod abundance was conducted from August 1996 to July 1997 at Sungai Sedu Oil Palm Estate, Banting, Selangor, Malaysia in the 4 year and 8 year old oil palm plantation. Three methods namely litter collection pitfall traps and sweep net were used for the sampling of arthropods (Southwood, 1978).

Arthropods in litter. Litter samples were collected systematically. Five plots, 30x30 m, were selected randomly and marked. In each plot, four samples were collected monthly. Sample was taken at random by placing a 0.25 m^2 wooden frame on the ground. The litter inside each square was collected up to 1 cm soil depth and samples were collected into plastic bags.

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Pitfall traps. Uncapped glass bottles of 8.5 cm mouth diameter and 7.5 cm deep were buried in the ground at random with their open tops flush to the litter surface. Bottles were filled to a depth of 5 cm with water and then covered with a piece of plywood raised from about 15 to 18 cm above the bottle to prevent the entry of rain water. Sorbic acid was used as preservative at the rate of one gram per sample. The bottles were examined after seven days. The sample insect collections were preserved in 70% ethanol.

Sweep net. Twenty strips, 30 m long and 1 m wide were selected randomly in both study areas. Ten sweeps were taken in each strip through the upper layer of vegetation and considered as one sample. Contents of sweep net were placed in ethylacetate kill jar until the arthropods were dead, then the insect material was transferred to labeled plastic bottle and preserved in 70% ethanol. Samples were not taken during drizzling or immediately after rain.

Data analysis. Arthropod abundance was defined as number of arthropods per sample. Data of arthropods abundance obtained by all trapping methods were pooled. Student's t-test analysis (Steel and Torrie, 1980) was used to detect the difference of abundance of arthropods between study sites. The eight orders of arthropods i.e., Hymenoptera (Formicidae), Orthoptera, Coleoptera, Hemiptera, Isoptera, Dermaptera, Arachnida and Isopoda that were considered to be important food sources for red junglefowl (Arshad *et al*., 2000). Student's t-test was also used to determine the difference of abundance of insects in 4 year and 8 year old oil palm plantations. Published data of earlier similar study

on population density of red junglefowl by Zakaria *et al*. (2003) was reviewed for comparison with arthropods abundance. The results were declared significant at P=0.05. All statistical analyses were performed by using Statistical Analysis System software (SAS, 1990).

The total number of arthropods caught in 4 year old oil palm plantation was 15872, whereas total of arthropods counted in 8 year old oil palm plantation were 14616 (Table 1). The results indicated that there was no significant variation in the abundance of arthropods caught in both study areas (t=1.41, P>0.05; Fig. 1). The eight orders that were considered to be main food items for red junglefowl were also found in the same abundance in both study areas (t=0.12, P>0.05; Fig. 2).

Zakaria *et al*. (2003) reported that the density of ref junglefowl in the 4 year old oil palm plantation was 84.22±5.45/km^2 while in the 8 year old oil palm plantation was 27.80±3.57/km^2. This indicated that the population density of red junglefowl did not depend on arthropods. This is because even though the abundance of arthropods in the two areas was about the same, the density of red junglefowl was higher in the 4 year old oil palm plantation. There may be other factors that affect the density of red junglefowl. Zakaria *et al*., 2003 reported that canopy cover significantly affects the density of red junglefowl.

The red junglefowls are opportunist feeders in the oil palm habitat, i.e. plant materials (80.88%) as well as

Table 1. Abundance of arthropods by different methods in 4 year and 8 year old oil palm plantation at Sungai Sedu Estate

Arthropods	4 Year old oil palm plantation			8 Year old oil palm plantation		
	Pitfall trap	Litter analysis	Sweep net	Pitfall trap	Litter analysis	Sweep net
Insecta						
Coleoptera	552	551	247	604	695	259
Collembola	530	276	16	1041	280	1
Dermaptera	114	157	1	75	-	1
Diplura	-	-	-	-	5	-
Diptera	181	7	194	132	-	156
Hempitera	15	10	194	17	4	72
Homoptera	5	10	367	6	-	410
Hymenoptera (Formicidae)	4581	1791	1062	4673	979	1168
Hymenoptera(Others)	13	33	51	14	-	67
Isoptera	38	3	3	62	-	1
Lepidoptera	44	11	64	35	5	58
Neuroptera	8	1	-	6	2	-
Odonata	-	-	9	-	-	-
Orthoptera	1021	325	561	709	179	594
Psocoptera	-	3	-	-	7	1
Thysanoptera	1	-	-	2	-	-
Unidentified insects	3	48	4	38	21	1
Chilopoda	81	32	1	39	9	-
Diplopoda	19	48	-	2	1	-
Crustacea						
Amphipoda	234	9	-	114	1	-
Isopoda	22	22	-	7	4	-
Arachnida						
Acarina	116	321	5	21	61	-
Araneida	489	95	1254	570	73	1231
Chelonethida	-	2	-	-	-	-
Phalangida	7	9	1	-	2	1
Total	8074	3764	4034	8167	2328	4121
G. Total		15872			14616	

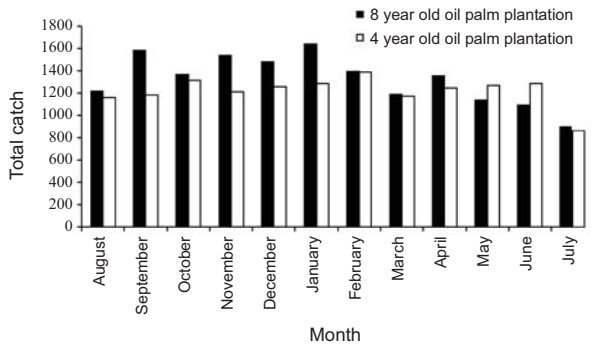

Fig. 1. Monthly catch trend of arthropods in the 4 year and 8 year old oil palm plantations at Sungai Sedu Estate.

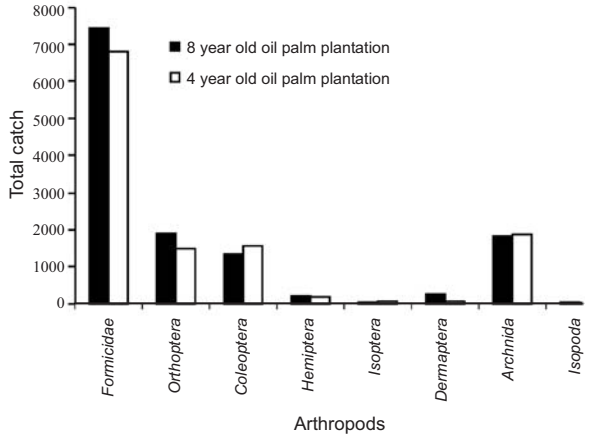

Fig. 2. Main arthropods considered as food for red junglefowl in the 4 year and 8 year old oil palm plantations at Sungai Sedu Estate.

animal materials (19.12%) (Arshad *et al*., 2000). Although the findings of this study showed that the population of red junglefowl did not depend upon the arthropod abundance but many studies highlighted the importance of arthropods in the diet of galliformes. Arthropods are also important food for ruffed grouse (*Bonasa umbellus*) chicks. The diet of chicks less than three weeks of age is more than 90% invertbrates, and these are dominant in their diet for about five weeks after hatching (Kimal and Samuel, 1984). Therefore, arthropods might be important food sources for red junglefowl but might not be sufficient to regulate the red junglefowl population size. Other factors such as suitability of habitats and plant food sources might also affect its abundance.

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