



UNIVERSITI PUTRA MALAYSIA

**AN ECOLOGICAL STUDY OF RED JUNGLEFOWL (*Gallus gallus
spadiceus*) IN AGRICULTURE AREAS**

MUHAMMAD IRSHAD ARSHAD

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**AN ECOLOGICAL STUDY OF RED JUNGLEFOWL (*Gallus gallus
spadiceus*) IN AGRICULTURE AREAS**

By

MUHAMMAD IRSHAD ARSHAD

**Dissertation Submitted in Fulfilment of the Requirements for the
Degree of Doctor of Philosophy in the Faculty of Forestry
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TABLE OF CONTENTS

		Page
ACKNOWLEDGEMENTS		ii
LIST OF TABLES		vii
LIST OF FIGURES		xiv
LIST OF PLATES		xvii
LIST OF ABBREVIATIONS		xviii
ABSTRACT		xix
ABSTRAK		xxi
 CHAPTER		
I	INTRODUCTION	1
	Problem Statement.....	6
	Objectives of the the Study.....	8
	General Objective.....	
	Specific Objectives	
	Structure of Thesis.....	8
 II	LITERATURE REVIEW	 10
	Habitat of Red Junglefowl.....	10
	Population Density.....	13
	Predators.....	14
	Home Range.....	16
	Studies in Malaysia.....	17
	Studies Using Radio-Telemetry on Junglefowl.....	19
	Home Range Size	19
	Breeding Ecology.....	20
	Food and Feeding Habit.....	23
	Roosting Behaviour.....	26
	Calling Behaviour.....	27
 III	MATERIALS AND METHODS	 29
	Sites.....	29
	Population Ecology of Red Junglefowl.....	33
	Population Density.....	33
	Data Analyses.....	36
	Arthropods Collection.....	36
	Vegetation Composition.....	39
	Home Range.....	40
	Trapping Methods	40
	Radio Tracking	43
	Data Analyses	47
	Breeding Ecology... ..	48
	Data Collection.....	48



	Data Analyses.....	49
	Food and Feeding Habits.....	49
	Data Collection.....	49
	Data Analyses.....	50
	Roosting Behaviour.....	50
	Data Collection	50
	Data Analyses	51
	Calling Behaviour.....	51
	Data Collection.....	51
	Data Analyses.....	52
IV	RESULTS.....	53
	Population Ecology.....	53
	Population density	53
	Group Size.....	55
	Arthropods Collection.....	58
	Vegetation analysis	62
	Vegetation Composition and Red Junglefowl Population	65
	Mortality.....	65
	Home Range	67
	Trapping.....	67
	Description of Trapped Red Junglefowls.....	67
	Home Range Pattern and Size.....	68
	Comparison of Home Range Size Among Males and	
	Between Male and Female.....	78
	Relationship Between Home Range Size, Movement and	
	Environmental Factors.....	82
	Movement.....	83
	Relationship of Environmental Variables with	
	Movement.....	89
	Breeding Ecology.....	89
	Courtship.....	89
	Nest.....	92
	Breeding Season	95
	Egg Dimensions.....	95
	Clutch Size	100
	Incubation	100
	Predation.....	104
	Food and Feeding Habits.....	104
	Roosting Behaviour.....	108
	Roosting of Red Junglefowl in Orchard Area.....	108
	Roosting of Red Junglefowl in Oil Palm Plantation.....	113
	Calling Behaviour.....	114
	Description of Calls.....	114
	Calls of Male Red Junglefowls at Universiti Putra	
	Malaysia.....	115
	Calls of Male Red Junglefowls in Oil Palm Plantation at	
	Sungai Sedu Estate.....	117

	Environmental Affects on Calling Behaviour.....	117
	Night Calling.....	119
V	DISCUSSION.....	121
	Population Ecology	121
	Home Range.....	124
	Breeding Ecology	129
	Food and Feeding Habits.....	134
	Roosting Behaviour.....	138
	Calling Behaviour.....	141
VI	SUMMARY	146
	Conclusion.....	149
	Recommendation.....	150
	Scope of Future Work.....	151
	BIBLIOGRAPHY	152
	APPENDICES	163
	A Additional Result Tables.....	164
	VITA	195



LIST OF TABLES

Table	Page
2.1	Habitats of Red Junglefowl in Different Countries..... 11
2.2	Methods Used to Estimate the Population Density of Different Pheasant Species in Different Regions of the World..... 15
2.3	Animal Species, which had been Radio Tagged in Malaysia..... 18
2.4	Home Range of Different Species of Galliformes..... 20
2.5	Breeding Season, Clutch Size and Incubation Period of Red Junglefowl in Different Countries..... 21
2.6	Plant and Animal Contents of Crop in 37 Red Junglefowls Collected in India..... 24
2.7	Plant and Animal Contents of Crops and Gizzards in 23 Adult Red Junglefowl Collected in Thailand , February-March 1963..... 25
3.1	Details of Period Spent on Trapping the Red Junglefowls by Different Methods in Study Areas at Sungai Sedu Estate During 1996-97..... 40
4.1	Density of Red Junglefowl in Different Study Areas at Universiti Putra Malaysia (1995-96) and Sungai Sedu Estate (1996-97)..... 54
4.2	Population Size and Birds Seen per Survey in Different Study Areas at University Putra Malaysia (1995-96) and Sungai Sedu Estate (1996-97) 54
4.3	Group Density of Red Junglefowl in Different Study Areas at Universiti Putra Malaysia (1995-96) and Sungai Sedu Estate (1996-97) 55
4.4	Group Size of Red Junglefowl in Different Study Areas at Universiti Putra Malaysia (1995-96) and Sungai Sedu Estate (1996-97)..... 58
4.5	Number of Territorial Males and Male/Female Sex Ratios of Red Junglefowl in Different Study Areas at Universiti Putra Malaysia (1995-96) and Sungai Sedu Estate (1996-97)..... 59
4.6	Abundance of Arthropods According to Orders by Pitfall Method (n=20) Observed in Rubber Plantation, Orchard Area and 22-Year Old Oil Palm Plantation at Universiti Putra Malaysia 60
4.7	Abundance of Arthropods According to Orders by Different Methods Observed in 4-Year and 8-Year Old Oil Palm Plantations at Sungai Sedu Estate During 1996-97..... 61



4.8	Mortality of Red Junglefowl Observed in Different Study Areas at Universiti Putra Malaysia and Sungai Sedu Estate During Study Period 1995-97.....	66
4.9	Daily Home Range Size of Male I in Different Months Estimated in Oil Palm Plantation at Sungai Sedu Estate During 1996-97.....	69
4.10	Monthly Home Range Size of Male I Estimated in Oil Palm Plantation at Sungai Sedu Estate During 1996-97.....	71
4.11	Daily Home Range Size of Male I with and without Female in Oil Palm Plantation at Sungai Sedu Estate During 1996-97.....	71
4.12	Daily Home Range Size of Male II in Different Months in Oil Palm Plantation at Sungai Sedu Estate During 1996-97.	73
4.13	Monthly Home Range Size of Male II Estimated in Oil Palm Plantation at Sungai Sedu Estate During 1996-97.....	73
4.14	Daily Home Range Size of Male III in Different Months in Oil Palm Plantations at Sungai Sedu Estate and Smallholders Land During 1996-97.....	74
4.15	Monthly Home Range Size of Male III Estimated in Oil Palm Plantation at Sungai Sedu Estate and Smallholders Land During 1997-97.....	76
4.16	Daily Home Range Size of Female in Different Months Estimated in Oil Palm Plantation at Sungai Sedu Estate and Smallholders Land During 1996-97.....	78
4.17	Monthly Home Range Size of Female Estimated in Oil Palm Plantations at Sungai Sedu Estate and Smallholders Land During 1996-97.....	79
4.18	Daily Home Range Size of Males of Red Junglefowl Estimated in Oil Palm Plantation at Sungai Sedu Estate and Small Holders Land During 1996-97.....	79
4.190	Monthly Home Range Size of Males of Red Junglefowl Estimated by in Oil Palm Plantation at Sungai Sedu Estate and Smallholders Land During 1996-97.....	80
4.20	Daily Home Range Size of Male and Female of Red Junglefowl Estimated in Oil Palm Plantation at Sungai Sedu Estate and Smallholders Land During 1996-97.....	80
4.21	Monthly Home Range Size of Male and Female of Red Junglefowl Estimated in Oil Palm Plantation at Sungai Sedu Estate and Small Holders Land During 1996-97.....	80



4.22	Total Home Range Size of Red Junglefowls in Oil Palm Plantation at Sungai Sedu Estate and Smallholders Land During 1996-97.....	82
4.23	Dimensions of Eggs of Red Junglefowl Among Oil Palm Habitats During 1996-97	98
4.24	Composition of Food Contents Observed in the Crops of Red Junglefowls (n=80, 32 males and 48 females).....	106
4.25	Food Item of Red Junglefowl with their Percentage of Dry Weight in Crop Analysis.....	107
4.26	Per cent of Intake of Oil Palm Fruit and Invertebrates by Male and Female of Red Junglefowl.....	107
4.27	Percentage of Invertebrates Consumed by Male and Female of Red Junglefowl.....	108
4.28	Tree Species Used by Male IV Red Junglefowl for Roosting in Orchard Area at Universiti Putra Malaysia.....	109
4.29	Number of Days Spent for Roosting of each Tree by Male IV and V in Orchard Area at Universiti Putra Malaysia.....	111
4.30	Average Roosting Height on Different Tree Species Used by Male IV Red Junglefowl in Orchard Area at Universiti Putra Malaysia.....	112
4.31	Night Calls of Different Males Red Junglefowl in Oil Palm Plantation at Sungai Sedu Estate.....	119
4.32	Day and Night Calls of Male Red Junglefowl Recorded in Oil Palm Plantation at Sungai Sedu Estate.....	120
A.1	Analysis of Variance on Group Size of Red Junglefowl in Observed in Different Study Areas During 1995-97 at Universiti Putra Malaysia and Sungai Sedu Estate.....	164
A2	Arthropods Collected by Pitfall Traps in 8-Year Old Oil Palm Plantation at Sungai Sedu Estate During August 1996 to July 1997.....	165
A3	Arthropods Collected by Pitfall Traps in 4-Year Old Oil Palm Plantation at Sungai Sedu Estate During August 1996 to July 1997.....	166
A4	Arthropods Collected by Sweep Net in 8-Year Old Oil Palm Plantation at Sungai Sedu Estate During August 1996 to July 1997.....	167
A5	Arthropods Collected by Sweep Net in 4-Year Old Oil Palm Plantation at Sungai Sedu Estate During August 1996 to July 1997.....	168



A6	Arthropods Collected by Litter Analysis in 8-Year Old Oil Palm Plantation at Sungai Sedu Estate During August 1996 to July 1997.....	169
A7	Arthropods Collected by Litter Analysis in 4-Year Old Oil Palm Plantation at Sungai Sedu Estate During August 1996 to July 1997.....	170
A8	Plant Species Composition, Area Covered by each Species and Litter Cover and Bare Area in Different Study Areas	171
A9	Correlation Coefficient and Significant Level of Red Junglefowl Density with Grass and Herb Cover, Grass and Herb Height, Bole Height, Tree Canopy Cover, Number of Plant Species, Bare Area and Litter Cover.....	174
A10	Relationship of Red Junglefowl Density with Canopy Cover.....	174
A11	Physical Characteristic of Trapped Birds Measured in Study Areas at Sungai Sedu Estate During 1996-97.....	175
A12	Daily Home Range Size of Male I in Oil Palm Plantation at Sungai Sedu Estate During November 1996 to May 1997.....	176
A13	Daily Home Range Size of Male II in Oil Palm Plantation at Sungai Sedu Estate During November 1996 to January 1997	177
A14	Daily Home Range Size of Male III in Oil Palm plantation at Sungai Sedu Estate and Small Holders Land During February 1997 to July 1997.....	178
A15	Daily Home Range Size of Female in Oil Palm plantation at Sungai Sedu Estate and Small Holder Areas During October 1996 to July 1997	179
A16	Summary of Analysis of Variance of Daily Home Range Size of Radio-tagged Red Junglefowls by Month.....	180
A17	Summary of Analysis of Variance of Daily Home Range Size Among Different Males of Red Junglefowl.....	180
A18	Summary of Analysis of Variance of Monthly Home Range Size Among Males of all Red Junglefowl.....	180
A19	Analysis of Variance by Multiple Regression on Home Range Size as Dependent Variable and Movement as Independent Variables.....	181
A20	Summary of Analysis of Variance of Male I Movement Among Periods (Morning, Afternoon and Evening) in Different Months.....	181
A21	Summary of Analysis of Variance of Male II Movement Among Periods (Morning, Afternoon and Evening) in Different Months.....	181



A22	Summary of Analysis of Variance of Male III Movement Among Periods (Morning, Afternoon and Evening) in Different Months.....	182
A23	Summary of Analysis of Variance of Female Movement Among Periods (Morning, Afternoon and Evening) in Different Months.....	182
A24	Summary of Analysis of Variance of Movement of Red Junglefowl Among Periods.....	182
A25	Summary of Analysis of Variance of Daily Distance Covered by all Red Junglefowl (radio-tagged) in Different Months.....	183
A26	Daily Distance Covered by Male I in Oil Palm Plantation at Sungai Sedu Estate in Different Months During 1996-97.....	183
A27	Daily Distance Covered by Male II in Oil Palm Plantation at Sungai Sedu Estate in Different Months During 1996-97.....	183
A28	Daily Distance Covered in Different Months by Male III in Oil Palm Plantation at Sungai Sedu Estate and Smallholders Land During 1996-97.....	184
A29	Daily Distance Covered in Different Months by Female in Oil Palm Plantation at Sungai Sedu Estate and Smallholders Land During 1996-97.....	184
A30	Summary of Analysis of Variance of Multiple Regression of Environmental Variables on Movement of Red Junglefowl.....	185
A31	Summary of Analysis of Variance of Eggs Dimensions of Red Junglefowl Among Clutches.....	185
A32	Summary of Analysis of Variance of Eggs Dimensions of Red Junglefowl Among Habitats.....	185
A33	Clutch Size of Red Junglefowl Recorded in Different Aged of Oil palm Plantations During 1996-97.....	186
A34	Hatchability and Deserted Percentage of Eggs of Red Junglefowl.....	186
A35	Analysis of Variance of Oil Palm Fruit Intake Between Male and Female of Red Junglefowl	187
A36	Analysis of Variance of Invertebrates Intake Between Male and Female of Red Junglefowl.....	187
A37	Analysis of Variance of Isoptera (Termites) Intake Between Male and Female of Red Junglefowl.....	188



A38	Analysis of Variance of Hymenoptera (Ants) Intake Between Male and Female of Red Junglefowl.....	188
A39	Analysis of Variance of Coleoptera (Beetles) Intake Between Male and Female of Red Junglefowl.....	188
A40	Analysis of Variance of Dermaptera (Earwigs) Intake Between Male and Female of Red Junglefowl.....	188
A41	Analysis of Variance of Orthoptera (Hoppers and Cockroaches) Intake Between Male and Female of Red Junglefowl.....	188
A42	Analysis of Variance of Araneida (Spiders) Intake Between Male and Female of Red Junglefowl.....	189
A43	Analysis of Variance of Hirudinea (Leeches) Intake Between Male and Female of Red Junglefowl.....	189
A44	Summary of Analysis of Variance of Gastropoda (Snails) Intake Between Male and Female of Red Junglefowl.....	189
A45	Analysis of Variance of Isopoda Intake Between Male and Female of Red Junglefowl.....	189
A46	Analysis of Variance on Roosting Trees Species Used by Male IV (Red Junglefowl) in Orchard Area at Universiti Putra Malaysia.....	189
A47	Analysis of Variance on Roosting Height on Tree Species Used by Male IV (Red Junglefowl) in Orchard Area at Universiti Putra Malaysia.....	190
A48	Male and Female Roosting Height of Red Junglefowl in Orchard Area at Universiti Putra Malaysia.....	190
A49	Departure Time Between Male IV and Male V (Red Junglefowl) in Orchard Area at Universiti Putra Malaysia.....	190
A50	Roosting Time of Male and Female of Red Junglefowl in Orchard Area at Universiti Putra Malaysia.....	190
A51	Departure Time between Male and Female of Red Junglefowl in Orchard Area at Universiti Putra Malaysia.....	191
A52	Sunrise Time and Departing Time of Red Junglefowl in Orchard Area at Universiti Putra Malaysia.....	191
A53	Roosting Time of Red Junglefowl and Sunset Time in Orchard Area at Universiti Putra Malaysia.....	191



A54	Departure Time Between Male I and Male III (radio-tagged) Red Junglefowl in Oil Palm Plantation at Sungai Sedu Estate.....	191
A55	Sunset Time and Roosting Time of Red Junglefowl in Oil Palm Plantation at Sungai Sedu Estate.....	192
A56	Departure Time of Red Junglefowl and Sunrise Time in Oil Palm Plantation at Sungai Sedu Sedu Estate	192
A57	Correlation Coefficient and Significant Level of Roosting Time of Red Junglefowl with Environmental Variables in Oil Palm Plantation at Sungai Sedu Estate.....	192
A58	Correlation Coefficient and Significant Level of Departure Time with the Environmental Variables in Oil Palm Plantation at Sungai Sedu Estate.....	192
A59	Montly Calls of Male IV (Red Junglefowl) in Orchard Areas at Universiti Putra Malaysia.....	193
A60	Analysis of Variance of Red Junglefowl Calling Among Periods (Morning, Afternoon and Evening) in Oil Palm Plantation at Sungai Sedu Estate.....	193
A61	Analysis of Variance of Daily Calling of Red Junglefowl Among Males in Oil Palm Plantation at Sungai Sedu Estate.....	193
A62	Analysis of Variance of Calls Per Bout of Red Junglefowl Among Males in Oil Palm Plantation at Sungai Sedu Estate.....	193
A63	Analysis of Variance of Multiple Regression on Environmental Factors as Independent Variables and Calling as Dependent Variables	194



LIST OF FIGURES

Figure	Page
1.1	Distribution of Red Junglefowl as Adapted from Beebe (1921) and Delacour (1977)..... 3
1.2	Distribution of Red Junglefowl (<i>Gallus gallus spadiceus</i>) in Peninsular Malaysia 4
3.1	Map of Peninsular Malaysia Showing the Study Sites..... 30
3.2	Map of Universiti Putra Malaysia Showing the Study Areas..... 31
3.3	Map of Sungai Sedu Estate Showing the Study Areas and Transect Lines 32
3.4	Map of 22-Year Old Oil Palm Plantation at Universiti Putra Malaysia Showing the Transect Lines..... 34
3.5	Map of Rubber Plantation at Universiti Putra Malaysia Showing the Transect Lines..... 34
3.6	Map of Orchard Area at Universiti Putra Malaysia Showing the Transect Lines. Transect Line II was Made in April 1996 due to Disturbance by the Construction of Hostel..... 35
3.7	Map of Sungai Sedu Estate Showing the Trapping Sites of Red Junglefowls in Study Areas and Sites they Moved to During the tracking Period..... 45
4.1	Frequency of the Group Sizes of Red Junglefowl Observed in Different Study Areas During 1995-97..... 56
4.2	Frequency of Average Group Sizes of Red Junglefowl Observed in Different Study Areas During 1995-97..... 57
4.3	Monthly Catch Trend of Arthropods in 4-Year and 8-Year Old Oil Palm Plantation at Sungai Sedu Estate from August 1996-July 1997.... 63
4.4	Main Arthropods Considered as for Food of Red Junglefowl in 4-Year and 8-Year Oil Palm Plantation at Sungai Sedu Estate..... 63
4.5	Density of Red Junglefowl in Relation to Canopy Cover..... 66
4.6	Monthly Home Range Patterns (MCP) of Male I in Different Aged Oil Palm Plantation at Sungai Sedu Estate from November 1996 to May 1997..... 70



4.7	Monthly Home Range Patterns (MCP) of Male II in Old Oil Palm Plantation at Sungai Sedu Estate from November 1996 to January 1997.....	72
4.8	Monthly Home Range Patterns (MCP) of Male III in Oil Palm Plantation at Sungai Sedu Estate and Smallholders Land from February to July 1997.....	75
4.9	Monthly Home Range Patterns (MCP) of Female in Oil Palm Plantation at Smallholders Land near Sungai Sedu Estate from November 1996 to July 1997.....	77
4.10	Total Home Range Patterns of Red Junglefowl (Male I, II, III and Female) in the Oil Palm Plantation at Sungai Sedu Estate and Smallholders Land.....	81
4.11	Movement of Male I (every 30 min) in Different Months in Oil Palm Plantation at Sungai Sedu Estate During 1996-97.....	84
4.12	Movement of Male II (every 30 min) in Different Months in Oil Palm Plantation at Sungai Sedu Estate During 1996-1997.....	84
4.13	Movement of Male III (every 30 min) in Different Months in Oil Palm Plantation at Sungai Sedu Estate and Smallholders Land During 1996-97.....	86
4.14	Movement of Female (every 30 min) in Different Months in Oil Palm Plantation at Sungai Sedu Estate and Smallholders Land During 1996-97.....	86
4.15	Movement of Male and Female (Every 30 min) in Oil Palm Plantation at Sungai Sedu Estate and Smallholders Land During 1996-97.....	87
4.16	Movement of Red Junglefowl (Every 30 min) in Oil Palm Plantation at Sungai Sedu Estate and Smallholders Land During 1996-97.....	87
4.17	Mean Daily Distance Covered by Male I in Oil Palm Plantation at Sungai Sedu Estate in Different Months During 1996-97.....	88
4.18	Mean Daily Distance Covered by Male II in Oil Palm Plantation at Sungai Sedu Estate in Different Months During 1996-97.....	88
4.19	Daily Distance Covered by Male III in Oil Palm Plantations at Sungai Sedu Estate and Smallholders Land in Different Months During 1996-97.....	90
4.20	Daily Distance Covered by Female in Different Months in Oil Palm Plantations at Sungai Sedu Estate and Smallholders Land During 1996-97.....	90



4.21	Mean Daily Distance Covered by Male and Female Estimated in Oil Palm Plantation at Sungai Sedu Estate and Smallholders Land During 1996-97.....	91
4.22	Nest Material of Red Junglefowl Nests Recorded During Study Period 1995-97.....	94
4.23	Nest Width and Depth of Clutch 2, 3, 4 , 5, 6 were Recorded During Study Period 1995-97.	96
4.24	Nests of Red Junglefowl were Recorded During the Study Period 1995-97.....	97
4.25	Mean Weight, Width and Length of Red Junglefowl Eggs of Different Clutch Sizes Recorded During Study Period 1995-97.....	99
4.26	Clutch Sizes of Red Junglefowl Observed During Study Period 1995-97.....	101
4.27	Means Clutch Size of Red Junglefowl in Different Months Recorded During Study Period 1995-97.....	102
4.28	The Number of Days Spent for Roosting by Male IV on Different Tree Species.....	110
4.29	Early Morning Roosting Calls of Three Territorial Males Red Junglefowl in the Rubber Plantation and the Orchard Area at Universiti Putra Malaysia.....	116
4.30	Morning Territorial Calls Between Two Males (territorial and non-territorial) in the Oil Palm Plantation at Universiti Putra Malaysia.....	116
4.31	Mean Number of Calls (Every 30 min) of Male Red Junglefowl at Different 'times' of the Day in Oil Palm Plantation at Sungai Sedu Estate and Smallholders Land.....	118
4.32	Mean Number of Daily Calls (6:30 a.m. to 8.00 p.m.) by Red Junglefowl Males (Radio-tagged) in Oil Palm Plantation at Sungai Sedu Estate and Smallholders Land	118



LIST OF PLATES

Plate		Page
1.1	Adult Red Junglefowls <i>Gallus gallus Spadiceus</i> : (A) Male, (B) Female.....	5
3.1	Radio-Transmitter Attached to the Male Red Junglefowl Before Releasing in the 8-Year Old Oil Palm Plantation at Sungai Sedu Estate	46
4.1	A Clutch of Three Eggs of Red Junglefowl in Oil palm Plantation	93
4.2	A Female of Red Junglefowl Incubating her Eggs.....	93

LIST OF ABBREVIATIONS

/	Per
ANOVA	Analysis of Variance
cm	Centimetre
DF	Degree of Freedom
DMRT	Duncan Multiple Range Test
g	Gram
hr	hour
km ²	Kilometre square
Male I	Radio-transmitter attached Male I
Male II	Radio-transmitter attached Male II
Male III	Radio-transmitter attached Male III
Female	Radio-transmitter attached Female
Male IV	First male whose roosting behaviour observed in orchard area
Male V	Second male whose roosting behaviour observed in orchard area
MCP	Minimum convex polygon
mm	Millimetre
m	Metre
min	Minutes
MS	Mean Square
SS	Sum of Square
Smallholders land	Area of local people adjacent to Sungai Sedu Estate
SE	Standard error
UPM	Universiti Putra Malaysia



Abstract of dissertation presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirements for the degree of Doctor of Philosophy.

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IN AGRICULTURE AREAS**

By

MUHAMMAD IRSHAD ARSHAD

April 1999

Chairman: Mohamed Zakaria Hussin, Ph.D.

Faculty: Forestry

A two-year study on the ecology of Red Junglefowl (*Gallus gallus spadiceus*) was conducted in five selected agriculture areas in the state of Selangor. In the first year (from August 1995 to July 1996), the study was done in three areas viz. rubber plantation, 22-year old oil palm plantation and orchard area at Universiti Putra Malaysia. In the second year (from August 1996 to July 1997), another two areas viz. 4-year and 8-year old oil palm plantations at Sungai Sedu Estate, Selangor were selected.

Red Junglefowl density was estimated by transect survey. The densities in 4-year, 8-year and 22-year old oil palm plantations, orchard area and rubber plantation were 84.22/km², 27.80/km², 21.43/km², 15.66/km² and 6.06/km² respectively. Male and female ratio was 1:1.25. The abundance of arthropods did not seem to affect the density of Red Junglefowl.

Four Red Junglefowls were radio tagged in oil palm plantation to observe the home range size and movement. The Red Junglefowl tracking was made by triangulation technique. The daily and monthly home range of male was larger than that of female and also the total daily movement of male was larger than female. The



maximum home range size of male and female were 312.50 ha and 49.07 ha respectively.

The study on breeding ecology showed that generally, one male was observed with a single female and rarely with two to four females. A total of 95 nests were observed during the entire period of study. The Red Junglefowl breeds throughout the year with a peak in December 1996. The mean clutch size was 4.08 eggs. The incubation period in captivity was approximately 19.5 days. The hatching percentage of eggs in nature was 99% whereas, the rate of desertion of nests was 80%. The predators of eggs and chicks in the agriculture areas were stray dogs, snakes, monitor lizards and big carnivorous birds.

Foraging ecology of Red Junglefowls shows that they fed in open areas early in the morning and evening and the rest of the day they fed under trees. They are opportunistic feeders and ate a variety of animal and plant components. The male Red Junglefowl consumed oil palm fruit more than the female whereas the female consumed more animal materials than the male.

Roosting ecology shows that the Red Junglefowl preferred horizontal branch/frond for roosting at night and changed branches and trees from time to time. The roosting height varied between 5 to 9 m in orchard area and 4 to 12 m in oil palm plantations. Red Junglefowl departed about 3 minutes earlier before sunrise and roosted about 6 minutes before sunset.

The male Red Junglefowl crowed for finding or attracting a mate and for announcing or protecting its territory. The crowing frequency was high when a non-territorial male entered the territory of a territorial male. Alarm calls were given by both sexes when there was a danger especially when predators were nearby.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah.

KAJIAN EKOLOGI AYAM (*Gallus gallus spadiceus*) HUTAN DI DALAM KAWASAN PERTANIAN

Oleh

MUHAMMAD IRSHAD ARSHAD

April 1999

Pengerusi: Mohamed Zakaria Hussin, Ph.D.

Fakulti: Perhutanan

Satu kajian selama dua tahun telah diadakan ke atas ekologi ayam hutan (*Gallus gallus spadiceus*) di lima buah kawasan pertanian terpilih di Negeri Selangor. Pada tahun pertama (dari Ogos 1995 hingga Julai 1996) kajian telah dijalankan di tiga kawasan iaitu kawasan ladang getah, kawasan ladang kelapa sawit yang berusia 22 tahun dan kawasan dusun (kebun buah-buahan) di Universiti Putra Malaysia. Manakala pada tahun yang kedua pula (dari Ogos 1996 hingga Julai 1997), kajian dijalankan di dua kawasan ladang kelapa sawit yang berusia 4 tahun dan 8 tahun yang terletak di kawasan Estet Sungai Sedu, Selangor.

Kepadatan ayam hutan ditentukan dengan menggunakan bancian "Transek". Taburan bilangan ayam hutan adalah lebih tinggi di kawasan ladang kelapa sawit berbanding kawasan ladang getah dan kawasan dusun. Kepadatan ayam hutan di kawasan perladangan kelapa sawit yang berumur 4 tahun, 8 tahun dan 22 tahun adalah masing-masing $84.22/\text{km}^2$, $27.80/\text{km}^2$ dan $21.34/\text{km}^2$. Manakala Kepadatan di kawasan dusun dan kawasan ladang getah adalah masing-masing $15.66/\text{km}^2$ dan $6.06/\text{km}^2$. Nisbah ayam jantan dan betina pula ialah 1:1.25. Bilangan arthropod yang banyak nampak seperti tidak menjejaskan bilangan taburan ayam hutan.



Empat ekor ayam hutan telah di pasang radio transmit untuk meneliti saiz kawasan rumah dan pergerakannya dan kerja-kerja mengesan dilakukan dengan cara pemetaan kawasan dan menggunakan rangkaian segi tiga. Kajian harian dan bulanan menunjukkan bahawa kawasan rumah ayam hutan jantan adalah lebih besar saiznya daripada ayam hutan betina. Saiz maksimum kawasan rumah ayam hutan jantan adalah 312.50 hektar dan ayam hutan betina pula adalah 49.07 hektar.

Secara amnya, kajian ekologi pembiakan menunjukkan seekor ayam hutan jantan biasa ditemui bersama dengan seekor ayam hutan betina dan jarang-jarang sekali ditemui dengan dua hingga empat ekor ayam hutan betina. Sejumlah 95 sarang telah ditemui di sepanjang tempoh kajian dijalankan. Masa bagi ayam hutan membiak ialah di sepanjang tahun dengan waktu kemuncaknya pada bulan Disember 1996. Saiz minimum sekelompok telur ialah 4.08 biji telur. Tempoh pengeraman dalam kurungan adalah lebih kurang 19.5 hari. Peratus penetasan telur dalam keadaan semula jadi ialah 99% manakala kadar peninggalan sarang adalah 80%. Pemangsa bagi dan anak ayam hutan di kawasan pertanian adalah anjing liar, ular, biawak dan burung karnivor yang besar.

Untuk ekologi pemakanan pula, ia menunjukkan bahawa ayam hutan mencari makanan pada waktu pagi dan petang di kawasan yang terbuka, tetapi pada waktu yang lain ia akan mencari makanannya di bawah pokok. Ayam hutan adalah pemakan yang boleh memakan pelbagai jenis makanan, termasuk komponen tumbuhan dan haiwan. Bagi ayam hutan jantan, mereka lebih suka makan buah kelapa sawit, berbanding dengan ayam hutan betina yang lebih gemar kepada makanan komponen haiwan.

Kajian ekologi rehat ayam hutan menunjukkan, ayam hutan gemar tidur di waktu malam pada dahan yang melintang dan juga sering bertukar dahan pokok dari

semasa ke semasa. Ketinggian tempat ayam hutan tidur adalah pelbagai di antara lima hingga sembilan meter untuk di kawasan dusun dan empat hingga 12 meter di kawasan ladang kelapa sawit. Ayam hutan akan meninggalkan kawasan tersebut tiga minit lebih awal sebelum matahari terbit dan kembali ke kawasan tidurnya enam minit sebelum matahari terbenam.

Ayam hutan jantan akan berkokok untuk memikat atau mencari pasangannya dan sebagai tanda pernyataan kawasannya atau melindungi kawasannya. Frekuensi kokokannya adalah tinggi apabila ayam hutan jantan asing memasuki kawasan teritorinya. Bunyi amaran akan dikeluarkan oleh kedua-dua ayam hutan jantan dan betina apabila ada bahaya terutama jika ada haiwan pemangsa berdekatan.

CHAPTER I

INTRODUCTION

Peninsular Malaysia has 31,598 square kilometers area of land and lies near the Equator between latitudes 1° and 7° North and longitudes 100° and 119° East. It is a part of the floristic subregion of West Malesia. This subregion also known as the Sunda subregion and is bounded in the north by the Isthmus of Kra (~10° N) and Wallace's line in the east. It includes the Malay Peninsula, Sumatra, Java and Borneo. The principal forest formation of West Malesia is lowland evergreen rain forest, often referred to as Dipterocarp forest because of large number of huge trees belonging to the family Dipterocarpaceae (Whitemore, 1984). The total area under forest was approximately 45% (Anonymous, 1996).

After the Second World War, agriculture became the most important sector in the country of which rubber was the most important crop. Large areas of virgin forests were converted over into rubber estates to meet the overseas demand for rubber. The lean time in the early eighties resulted in the decline of the demand for rubber. As a result most of rubber plantations were then converted into oil palm estates. The development of monoculture plantations in place of natural forests resulted in the disappearance of most forest-dependent wildlife but some species have managed to colonize the new environment. The colonization of these species is

