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With the increase in population, third world countries today are facing many problems, supply of sufficient food being one of them. In animal sciences we have to understand and preserve the vast diversity of species on our planet. Losing them would be a huge shame and almost a crime of humanity. We have caused a continuous trouble that leads to species extinction. Just because we are the “dominant” species on Earth, it doesn’t mean that we can do whatever we want without suffering consequences. We do not have to protect endangered species only, but we also have to protect species essential for the continuation of Earth’s life. Believe it or not, without animals, humans would die out pretty quickly. First of all, there would be no more meat. But we can’t all become vegetarians either if there are no insects to pollinate the plants. From animals, we can also learn about our anatomy and can understand the function of our bodies in a better way, which help us combat human diseases. In termination, animal’s science is an important field that applies to many real-world situations.

University of Sindh Journal of Animal Sciences (USJAS) will promote and involve the study of various disciplines in Zoological Sciences i-e Entomology, Endocrinology, Molecular biology, Parasitology, Wildlife management and Conservation, animal’s diversity and systematic etc. This journal will be ideal platform for anyone working in Animals Sciences. In addition, the published data to provide additional opportunity for access to advanced standing in existing tertiary level education programs. Researcher will be exposed to the main aspect of animal science including, safety management planning strategies, food and fiber, systematic of individual and making a means to preserve a rapidly declining global ecosystem.



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University of Sindh Journal of Animal Sciences (USJAS) will introduce a viable model of research linkages together with scholarly experience sharing and transferring of inspired evidence. It also promotes the latest emerging trends in zoological sciences along with provision of an awareness of the ethical aspects of animals. Besides its fundamental importance in maintaining the sustainable agricultural, protection and conservation of animals in country it will also educate the public about the need to protect and preserve the environment as a long range goal for the welfare of future generations. The core focus of (USJAS) is concentrated on promoting and propagating novel and innovative research amongst the readers of this journal.

AIM OF JOURNAL

The primary aim of University of Sindh Journal of Animal Sciences (USJAS) is to gain hands on experience in order to acquire the knowledge necessary for the critical analysis of the results and make appropriate recommendations in all fields of Animal sciences. The aim of this journal is to encourage researchers, investigators and scientists to publish their research findings allowing wider dissemination of their intellectual knowledge, with the aim of applying those for the benefit of the society. The newly launched journal would cover full spectrum of the specialties in Animals sciences. It would include original research articles, review articles, case reports, short commendation, and scientific findings from within specified domain areas of Zoology. The journal strictly follows the guidelines proposed by Higher Education Commission (HEC) Pakistan. The most important criterion for acceptance/rejection is originality of the material presented in the manuscript.



What is need for publishing this Journal?

The University of Sindh Journal of Animal Sciences (USJAS) with modernized and cost effectiveness will light the tools for numerous directions and problems related to improve identification of pest species, conservation of wild animals, diversity of animals including animal breeding, environmental impact of animal, agriculture, diseases, nutrition and animal products. When animals grow well and stay healthy, farmers can produce more meat, milk or eggs for our consumption. They check meat quality or screen milk for pathogens. Advances in food safety keep humans healthy and increase the world's supply of nutritious food. Beside this, articles regarding entomological science contribute to the betterment of humanity by detecting the role of insects in the spread of disease and discovering ways of protecting food and fiber crops, and livestock from being damaged. Journal provides the way how beneficial insects contribute to the well being of humans, animals, and plants. This journal will also defend and assess the application of well proven research activities in natural science particularly, Zoology, Physiology, Fresh Water Biology & Fisheries, Biochemistry and Biotechnology of host universities; neighboring and sister universities which are performing research activities on any area of animal's sciences. They have necessity of proper platform for their research exposure around the country as well as in world.



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Articles published in (USJAS) masses of all age and income groups. Moreover, this journal will make substantial contribution to the researchers and students of Zoology, Entomology, Pest Management, Plant Protection, Agriculture Sciences and Medical Sciences; further, wild life department and extension wings will also be benefited. The objectives set at promotion of research, the food and fiber crops, livestock, animal's diversity, diseases, obesity and to establish breeding programs, nutrition programs and help preserve exotic wildlife. Beside this, Parasitological section gives the reader a broad, in-depth coverage of medically important parasites. Such coverage is essential to give students the awareness and understanding necessary for proper diagnosis, treatment, and prevention of the parasitic infections. This journal will be valuable in skill enhancement, and knowledge refreshment of the working staff of academia and research.

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PRELIMINARY STUDIES ON CURCULIONOIDEA (INSECTA: COLEOPTERA) OF KANNUR, KERALA INDIA

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MM collected the data and performed the experiment. SMS designed the study and wrote the paper.

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Curculionoidea, agro ecosystems, Kannur district, predators, pests, scavengers, pollinators, vectors, diseases.

ABSTRACT

The present study is a preliminary attempt to document the Curculionoidea weevils from different agro ecosystems of Kannur district, Kerala. Being the largest superfamily of weevils, they play important role in the ecosystem as predators, pests, scavengers, pollinators, and vectors that transmit plant diseases. Collection of these group was made by using standard hand net, hand picking and light traps; for a period of seven months from February 2019 to August 2019. The specimens were collected from four different sites including Taliparamba, Kannadiparamba, cheleri and Thottada of Kannur district, Kerala. From this study Curculionoidea belonging to Five families were obtained. They include Curculionidae, Dryophthoridae, Brentidae, Anthribidae and Attelabidae. Of these Curculionidae was the dominant family with maximum number of species. Least number of species were obtained for the family Anthribidae and Attelabidae. Also, the comparative study between the four study sites shows maximum Shannon and Simpson index at Kannadiparamba (1.245 & 0.6756) and minimum at Taliparamba (0.8487 & 0.438 respectively).

1. INTRODUCTION

Curculionoidea is the largest superfamily of weevils or snout beetles. It is one of the most hyper diverse groups of insects. They are economically very important groups, play important role in the ecosystem as predators, pests, scavengers, pollinators, and vectors that transmit plant diseases. Research on the taxonomy of Curculionoidea of Kerala are very little. Most of these species other than major pests have been little studied, and their complex ecosystem roles have not been elucidated due to the lack of proper identification manuals. The present study is a preliminary attempt to document the Curculionoidea weevils from different agro ecosystems of Kannur District, Kerala.

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2. MATERIALS AND METHODS

Periodical survey and collection trips were conducted in four different areas of Kannur from February 2019 to August 2019. The Collection of weevils were made by using standard hand net, hand picking and also by light traps. Live specimens were killed using ethyl acetate. Collected specimens were preserved in 4% formalin and were mounted on triangular cards or pinned on the entomological pins suiting the requirements. Mounted specimens were labeled and stored in insects' boxes for later examination. For identification standard identification manuals were used. The family, subfamily and generic level classification proposed by Thompson (1992), Zimmerman (1993) and Alonzo-Zarazaga and Lyal (1999) was followed. The preserved and identified

specimens were examined; these specimens were run through the keys (Chevrolat, 1885; Kuschel, 1961; Wattanapongsiri, 1966; Zimmerman, 1968; Morimoto, 1978; Hallet et al., 2004) for identification. For male and female genitalia study, terminologies of Wattanapongsiri (1966), Zimmerman (1968), Supare et al., (1990), Thompson (1992), Poorani and Ramamurthy (1997), Wanat (2007) and Davis (2009) was followed.

3. RESULTS AND DISCUSSION

The collection of weevils was carried out for a period of seven months from February 2019 to August 2019 from four different sites, Taliparamba, Kannadiparamba, Cheleri and Thottada of Kannur District. A total of 26 species of Curculionoidea belonging to 19 genera of 5 families such as Anthribidae, Attelabidae, Brentidae, Curculionidae, and Dryophthoridae were recorded during the study. Majority of Curculionoidea collected during the study belonged to family Curculionidae (13), whereas least number in the family Anthribidae and Attelabidae (2).

4. CONCLUSION

The study shows that Curculionidae was the dominant family with maximum number of species (13), this may be because it is the largest family, with most hyperdiverse groups of weevils. This is followed by Dryophthoridae(5), Brentidae (4). Least number of species were obtained in the family Anthribidae and Attelabidae (2). The comparative study between the four study sites shows maximum Shannon and Simpson index at Kannadiparamba (1.245 & 0.6756) and minimum at Taliparamba (0.8487 & 0.438 respectively). High diversity of host plants may be the major reason for greater diversity at Kannadiparamba.

5. CONFLICT OF INTEREST

All authors have declared that there is no conflict of interests regarding the publication of this article.

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Table. 1. List of Curculionoidea recorded from different collection sites

S. No.	Scientific Name	Family	Kannadiparamba	Cheleri	Taliparamba	Thottada
1	<i>Basitropis sp.</i>	Anthribidae	+			
2	<i>Eucorynus crassicornis</i>	Anthribidae	+			
3	<i>Paraplapoderus sp.</i>	Attelabidae		+		
4	<i>Paratrachelophorus sp.</i>	Attelabidae		+		
5	<i>Apion ampullum</i>	Brentidae			+	
6	<i>Baryrhynchus poweri</i>	Brentidae	+			
7	<i>Cylas formicarius</i>	Brentidae	+			+
8	<i>Hormocerus reticulatus</i>	Brentidae				+
9	<i>Acicnemis sp</i>	Curculionidae	+			
10	<i>Acicnemis sp</i>	Curculionidae	+			+
11	<i>Aclees hirayamai</i>	Curculionidae	+		+	
12	<i>Alcidodes liae</i>	Curculionidae		+		
13	<i>Alcidodes waltoni</i>	Curculionidae		+		+
14	<i>Alcidodes sp.</i>	Curculionidae		+		
15	<i>Cyrtepidomus castaneus</i>	Curculionidae			+	+
16	<i>Myllocerus hilleri</i>	Curculionidae			+	
17	<i>Myllocerus subfasciatus</i>	Curculionidae	+		+	
18	<i>Myllocerus undecimpustulatus</i>	Curculionidae	+			
19	<i>Myllocerus viridanus</i>	Curculionidae	+		+	
20	<i>Myllocerus sp.</i>	Curculionidae			+	
21	<i>Sternochetus mangiferae</i>	Curculionidae	+			
22	<i>Cosmopolites sordidus</i>	Dryophthoridae	+			
23	<i>Diocalandra frumenti</i>	Dryophthoridae				+
24	<i>Odoiporus longicollis</i>	Dryophthoridae	+	+	+	
25	<i>Rhynchophorus ferrugineus</i>	Dryophthoridae	+			+
26	<i>Sitophilus oryzae</i>	Dryophthoridae	+	+	+	+

Table. 2. Characteristics of Curculionoidea at four different sites in Kannur

Study Site	Kannadiparamba	Cheleri	Taliparamba	Thottada
Taxa_S	4	3	3	3
Individuals	15	7	9	8
Dominance_D	0.3244	0.3469	0.5062	0.3438
Simpson_1-D	0.6756	0.6531	0.438	0.6563
Shannon_H	1.245	1.079	0.8487	1.082
Evenness_e^H/S	0.8686	0.9806	0.7789	0.9837
Menhinick	1.033	1.134	1	1.061
Equitability_J	0.8984	0.9821	0.7725	0.9851

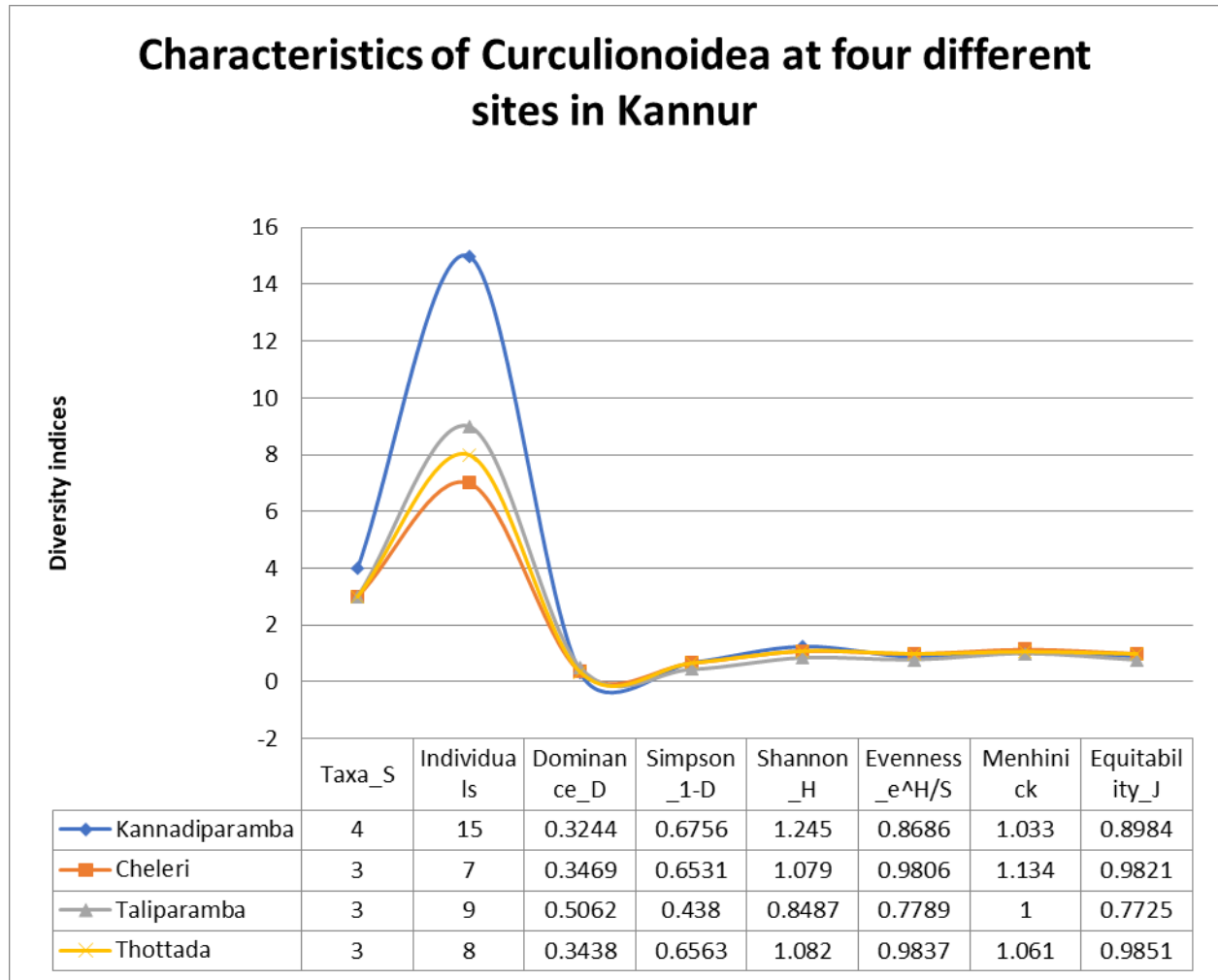


Fig.1. Characteristics of Curculionoidea at four different sites in Kannur



KNOWLEDGE BASED AWARENESS AND TRENDS OF BREAST FEEDING IN THE LIGHT OF HOLY QURAN

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ABSTRACT

This is a survey-based Article conducted from Sukkur and Khairpur Districts of Sindh, Pakistan with the help of girls/females belongs to the concerned cities as well as our self. For this survey a questionnaire prepared and asked the questions from the females having the childs below than 3 years of age. The main objective of survey is to know knowledge, Awareness, Trends of mothers giving breast milk to their children in the light of Holy Quran. In this connection interviewed females according to questionnaire to ascertain their infant feeding and some other information were collected from the mothers like age at marriage, Age at first birth of child, literacy of Holy Quran, literacy other than Holly Quran, period of mother feeding, average number of childrens up to childbearing age, distribution of mother by birth urban and rural areas.

1. INTRODUCTION

Breastfeeding is the perfect and most common method for supporting newborn children. The significance of breastfeeding has been demonstrated unequivocally, and the Assembled Countries Kids' Store (UNICEF) and World Wellbeing Association (WHO) have issued rules to guarantee breastfeeding. Over 14 centuries is that in Islamic lessons with the most thorough, most lovely and most great inspiration, is brought imperative focuses up in the type of guidance and instruction about breastfeeding. Incorporated into Islam prescribed each mother to breastfeed her kids up to the age of two years if the lactation time frame was to be finished. Mindful of these proposals and the use of them, will prompt the most proficient and successful motivations to advance bosom encouraging, (11).

In the heavenly Quran Stanza 233/Sura Al-Baqara "Allah" stated:

"The moms will offer suck to their posterity for two entire years for him who wants to finish the term. Be that as it may, he will bear the expense of their nourishment and attire on impartial terms." (1)

Breastfeeding is a characteristic motivation of all moms as it enables them to express their affection, delicacy and security of their kids. It is crucial for a youngster's survival, maternal wellbeing, and kid spacing, (2) Islam perceives and features this reality as the above section of the heavenly Quran trained over fourteen centuries prior that moms bosom feed their kids for two years.¹ For the initial four to a half year of life, select breastfeeding can give every one of the supplements and water that an infant needs, (3) The World Wellbeing Association (WHO) and UNICEF have suggested that every one of the moms (i.e. 100%) should bosom feed their infants only for four to a half year and keep breastfeeding, enhanced

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by other proper sustenances, up to the second year of life or later, (2– 4).

All around archived proof is expanding on advantageous impacts of bosom drain and breastfeeding.⁵ It gives the perfect nourishment to the solid development and advancement of newborn children as far as sustenance, immunological security, monetary, mental, biochemical, hostile to hypersensitive, and mitigating benefits notwithstanding the advantage of tyke separating because of lactation amenorrhea, (2– 07) In spite of these extensive focal points the rate of breastfeeding has declined worldwide, (6,08,09). The quantity of moms who bosom feed their infants has been falling consistently over the most recent three decades both in the created and creating countries, (10).

2. MATERIALS AND METHODS

This study is done in two Districts of Sindh, Pakistan i.e Sukkur and Khairpur. In this connection forms of questionnaire were distributed to females having the children less than 3 years old and forms returned.

A great care taken during fillings forms and compilation of results. The questions were in Urdu & English.

Mothers were given a detailed printed questionnaire through by researcher's females and our-self. Questions were concerned personal information of mothers ie feeding Knowledge and awareness of Holy Quran, literacy position of Holy Quran and other variables also included in study a age at marriage, age at first child.

Literacy other than Holy Quran, Place of birth in rural or urban, number of chidrens up to childbearing age.

Data analysis was performed personally with great care. Frequencies and percentage were computed to present all categorical variable.

3. RESULTS

To achieve the goal of results 120 forms distributed to the mothers who having the childs below than 3 years and interviewed. But returned only 84 forms and remaining 36 forms not returned/Non-response. From 84 forms we have prepared results.

From 84 forms were collected and following observations were made. In table No. 1 asked age at

marriage. In this able age of marriage found 16 years to 25 years of age in majority which stands of 94.05 percent of total married women. While from 26 years age to 44 years of age females are married contain 5.95 percent. In same table another question was age of women at first child. We found that women giving the birth in age 16 years to 25 years of age. Which stands 92.86 of total birth. This shows that after 25 years birth rate is too less as compared to the below 26 years of age.

Table No. 2 Shows the result of age group of women with mean number of children ever born. It is found that from age 18 to above years of age more than 46 years having the childs 260 of 84 females and mean average 3.2 childs per female.

Table No. 3 is concerned to know the knowledge and Awareness of mother giving breast feeding to their children in the light of Holy Quran. It is found that 89.29 percent women having the knowledge and Awareness that Allah Pak told the mothers to give breast milk to their children. But 10.72 percent having no knowledge and Awareness of Allah Pak's orders in Holy Quran.

Table No. 4 shows the results of asked the question about the literacy of Holy Quran. In this connection. It is found that 82.14 percent women found liteate Holy Quran and 17.86 percent women are illiterate Holy Quran.

Table No. 5, shows the trends of mothers who are giving breast feeding to their children according to period. It is found that 61.90 percent women are giving two years mother feeding to their children and remaining 35.71 percent giving only one year mother feeding and 2.38 percent giving only six months mother feeding to their children.

Table No. 6 is concerned to know the literacy of mothers other than Holy Quran. It is found that 65.48 percent women are literate other than Holy Quran, and 34.52 percent are illiterate. This shows that more than 65 percent are literate, and majority of mothers are literate.

Table No. 7 shows the distribution of mothers according to Rural and Urban wise by birth. It is found that 51.19 percent mothers belong to by birth rural and 48.81 percent mothers belongs to urban by birth.

Table No.8 is concerned the population of Pakistan rapidly increase. In 1950 the population of Pakistan was 37 million people was on the 13th most

populous country in the world but now Pakistan is on the sixth most populous country in the world. This means the population of Pakistan is continuously increasing.

4. DISCUSSION

In this study we sought to establish the age between 18 to 30 years to marriage below 16 years age for marriage is dangerous for child as well as for mother. To motivate the mothers to give mothers feeding up to 2 years of age which is best for child's health and also for mothers.

To provide basic facilities to the children for basic education at least matriculate because mother is first school of child. If the mother is literate than child will be literate otherwise illiterate.

Mothers who not giving mother are feeding to their children they become under the diseases of breast cancer and engorgement of breast and also effects the child growth and body growth. They become mental weak, under the attack of diara and mortality rate is also increase.

he women of USA, UK, France and Japan are reluctant to suck their babies their own milk but it is reported that such women of these countries have become under diseases

5. CONCLUSION

Overall, it could be concluded that mothers who are not giving feeding to their children have great chance to expose towards breast cancer and engorgement of breast and effects the child growth and body growth. They become mental weak, under the attack of Diara and mortality rate is also increase. Holy Quran strongly recommended that mother must adopt their breast feeding in order to avoid this problem.

6. ACKNOWLEDGEMENTS

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7. CONFLICT OF INTEREST

All authors have declared that there is no conflict of interests regarding the publication of this article.

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Table No – 1. Age group of Women at Marriage with number of First Child Birth.

Age group of women at marriage	No. of married women		Age of women at first child birth	No. of women at First child birth	
	No of women	%		No. of women	%
< 16	-----	-----	< 16	-----	-----
16 – 17	11	13.09	16 – 17	05	5.95
18 - 19	23	27.38	18 - 19	14	16.67
20 – 21	19	22.62	20 – 21	25	29.76
22 – 23	15	17.86	22 – 23	19	22.62
24 – 25	11	13.09	24 – 25	15	17.86
26 – 27	03	3.57	26 – 27	02	02.38
28 – 29	01	1.19	28 – 29	02	02.38
30 - *More	01	1.19	30 - *More	02	02.38
Total	84	99.99		84	100%

*More = Women up child bearing age. Source:- Data collected by authors

Table No – 2. Present Age of Women with Mean number of ever born children.

Age group of ever married women	No. of Women	No. of Childs	Mean No. of Children Ever Born
< 16	-----	-----	-----
16 – 17	-----	-----	-----
18 - 19	01	01	01
20 – 21	06	06	01
22 – 23	06	12	2.0
24 – 25	08	15	1.88
26 – 27	06	13	2.17
28 – 29	07	17	2.43
30 – 31	11	30	2.73
32 – 33	04	13	3.3
34 – 35	09	42	4.67
36 – 37	02	06	3.0
38 – 39	02	12	6.0
40 – 41	07	27	3.86
42 – 43	02	10	5.0
44 – 45	04	18	4.5
46 - *More	09	38	4.22
Total	84	260	47.76
Mean			3.2

*More = Women up child bearing age.

Source:- Data collected by authors

Table No – 3. Knowledge and Awareness of mothers giving breast feeding to their children in the light of Holy Quran.

Name of City	Knowledge and Awareness		No Knowledge and Awareness		Grand Total
	No. of women	%	No. of women	%	
SUKKUR	36	85.71	06	14.29	42
KHAIRPUR	39	92.86	03	7.14	42
TOTAL	75	89.29	09	10.72	84

Source:- Data collected by authors.

Table No – 4. Distribution of Mothers who are literate or illiterate Holy Quran.

NAME OF CITY	LITERATE HOLY QURAN		ILLITERATE HOLY QURAN	
	No of women	%	No. of women	%
SUKKUR	33	78.57	09	21.43
KHAIRPUR	36	85.71	06	14.29
TOTAL	69	82.14	15	17.86

Source:- Data collected by authors.

Table No-5. Trend of Mothers giving Breast milk to their children according to period wise.

Name of City	SIX MONTH AGE		ONE YEAR AGE		TWO YEARS AGE	
	No. of women	%	No. of women	%	No. of women	%
SUKKUR	01	2.38	16	38.10	25	59.52
KHAIRPUR	01	2.38	14	33.33	27	64.29
TOTAL	02	2.38	30	35.71	52	61.90

Source:- Data collected by authors.

Table No – 6. Distribution of Mothers according to literacy other than Holy Quran.

NAME OF CITY	LITERATE WOMEN						Total Literate %		ILLITERATE WOMEN	
	PRIMAR		UNDER MATRIC OR MATRIC		OTHER EDUCATION				ILLITERATE	
	No of Women	%	No of Women	%	No of Women	%			No of Women	%
SUKKUR	08	19.05	08	19.05	06	14.29	22	52.38	20	47.62
KHAIRPUR	15	35.71	10	23.81	08	19.05	33	78.57	09	21.43
GRAND TOTAL	23	27.38	18	21.43	14	16.67	55	65.48	29	34.52

Other education means Higher than matric and technical/professional education

Source:- Data collected by authors.

Table No – 7. Distribution of mothers by Urban and Rural by Birth

Name of City	Urban women		Rural Women		Total
	No. of women	%	No. of women	%	
SUKKUR	21	50.0	21	50.0	42
KHAIRPUR	20	47.62	22	52.38	42
TOTAL	41	48.81	43	51.19	84

Source:- Data collected by authors.

Table No – 8. World’s Ten Most Populous Countries 2015.

S. No.	Country	Population
1	CHINA	1,371,080,000
2	INDIA	1,274,490,000
3	UNITED STATES	321,457,000
4	INDONESIA	255,461,700
5	BRAZIL	204,638,000
6	PAKISTAN	190,412,000
7	NIGERIA	183,523,000
8	BANGLADESH	15,8718,000
9	RUSSIA	146,524,812
10	JAPAN	126,890,000

Source:- US Census Bureau International Data base



ZOOPLANKTON VARIETY IN A SALINE WATER: A CASE STUDY OF CHICKAN LAKE, DISTRICT DADU, SINDH

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Author's contribution

ZAP designed the study and wrote the paper, SB, NAA performed the experiments, SM, SAB, KHL complied the data RS performed statistical analysis.

Key words:

Zooplankton, saline lake, Chickan Lake, population Rotifera, Cladocera, Copepoda, Dominant

ABSTRACT

Zooplankton is a multi-species organism that evolved to survive in a saline lake. This research aims to look at the monthly changes in a variety of Zooplankton in Chickan Lake Dadu. The research took place in the sample area for a year, from January to December 2017. The Zooplankton population at Chickan Lake was made up of 20 genera divided into three main groups: Rotifera, Cladocera, and Copepoda. Furthermore, Rotifera made up 17 percent of the Zooplankton collection, Cladocera made up 55 percent, and Copepoda made up just 28 percent. The dominant Zooplankton group included in the sample region was Rotifera.

1. INTRODUCTION

Because of their filtering operations, algal and microbial processing activities, and nutrient cycling, Zooplankton plays an essential role in providing clean water [1]. Many saline water zooplankton, such as copepods, cladocerans, and rotifers, develop diapason or "resting" larvae [2]. The zooplankton population benefits from the food supply, favorable social, and environmental conditions [3]. The zooplankton population is critical to the aquatic ecosystem [4]. Zooplankton is a form of Zooplankton that transfers energy from suppliers to potential consumers, such as crustaceans, invertebrates, and fish [5].

Despite extensive research on Pakistan having been done on different aspects of zooplankton diversity, few studies are found in these regions [1].

2. MATERIALS AND METHODS

Study Area

Chickan Lake is in the Dadu district of Palh Village [6]. It is about 25 kilometers from Dadu city and is located between 26° 57'33.94 N and 67° 51'06.10 E. This lake is made up of three interconnected wetland units that, during the monsoon, merge into a single sheet of water [6].

Zooplankton Sampling

The research was carried out for a year, from January to December 2017. The site's Zooplankton was

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collected monthly using traditional methods [7]. After filtering the sample, it was placed in a Tarson (100 ml) container, filled with Lugol's solution, and placed in a perfect, dark spot [8]. The sample was taken in a department of Fresh Water Biology and Fisheries at the University of Sindh and examined under a light microscope at the necessary magnification (X 10, then X 40) to study the variety of Zooplankton. The species were described using classic literature from various researchers [7, 9-11].

3. RESULTS AND DISCUSSION

The lake yielded 20 genera of Zooplankton, divided into three groups: Cladocera, Copepoda, and Rotifera, during the current research. There are eight Cladocera genera, four Copepoda genera, and 15 Rotifera genera among the recorded genera (Table 1). Many researchers worldwide [12] made a similar discovery, reporting 26 species of Zooplankton from the Cachar Lake in Assam. Additionally, [13] researchers examined Zooplankton diversity in the chilia hatchery Thatta and found that Rotifera had the most diversity, followed by Cladocera and Copepoda, which had the least diversity. A study [14] in the Satara district of India uncovered 66 species of fish living in ponds and lakes that had previously unknown to exist there.

Figure 2 depicts the abundance status of the Zooplankton community found in Chickan Lake. Cladocera (8 genera), Copepoda (4 genera), and Rotifera (15 genera) were included in the saline water body studied, with Rotifera accounting for 55 percent of total Zooplankton, Cladocera 28 percent, and Copepoda 17 percent. Various zooplankton species were abundant depending on the optimal conditions. The zooplankton population density status reported from Chickan Lake. During the research time, for Cladocera, only *Sida* sp., *Diaphanosoma* sp., *Ceriodaphnia* sp., *Chydorus* sp., *Bosmina* sp., *Moina* sp., and *Alona* sp. and were found in the Chickan lake Dadu. Furthermore, for Copepoda, only *Neodiatomus* sp., and *Mesocyclops* sp. were recorded and in last, for Rotifera, *Plationus* sp., *Brachionus* sp., *Ascomorpha* sp., *Keratella* sp., *Lecane* sp., *Testudinella* sp., *Anuraeopsis* sp., *Asplanchna* sp., *Scardium* sp., and *Trichocerca* sp. were recorded throughout the year. The current study shows that species abundance has a high value,

indicating that the lake is suitable for the dominant species [14]. According to the results, the report shows a greater variety of Zooplankton during the monsoon season. This is how it was discovered that the Rotifer is the only class prevalent among the other Zooplankton classes in the study. The dominance of the Rotifera group in saline water lakes is a general feature; related findings have been published in studies of saline water lakes [15]. Cladocera density was highest, followed by Rotifera and Copepoda, as reported by [6] in their study of Zooplankton diversity in a Chickan lake. Cladocera was followed by Rotifera and Copepoda, with these four genera accounting for 20 percent of the total of all Zooplankton.

4. CONCLUSION

The current research on Chickan Lake revealed a diverse and rich zooplankton population. Rotifera predominated during the study period, suggesting that the lake is suitable for aquaculture, as Zooplankton, especially Rotifer, is the optimal food source for aquaculture fish larvae. This study is critical for elucidating the Zooplankton diversity of tropical floodplains in general, which, in turn, aids aquaculture in natural floodplains. As a result, considering the study's significance, measures should be taken to protect and preserve the freshwater wetland.

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6. CONFLICT OF INTEREST

All authors have declared that there is no conflict of interests regarding the publication of this article.

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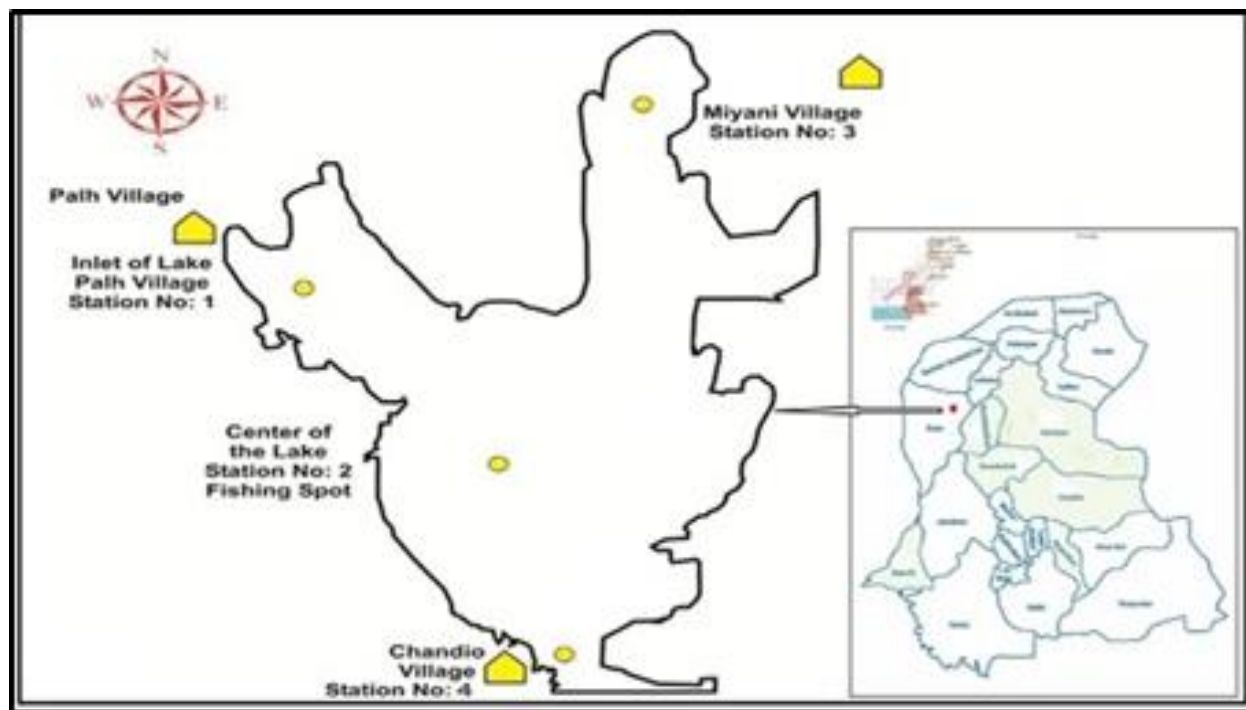


Fig.1. Study Area Map

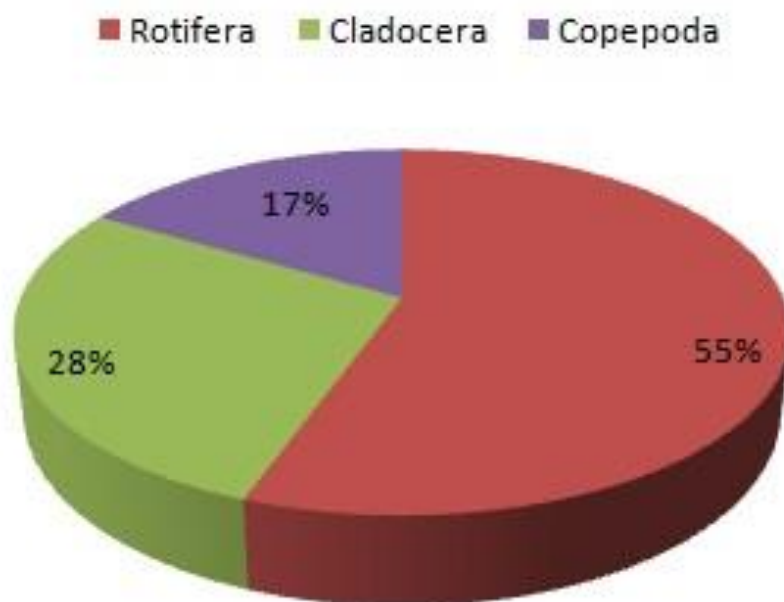


Fig.2. The abundance of Zooplankton of Chicken Lake

Table 1: Abundance of Zooplankton species of

ZOOPLANKTON	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
CLADOCERA												
<i>Diaphanosoma</i> sp.	+	+	+	+	+	+	+	+	+	+	+	+
<i>Scapholeberis</i> sp.	+	-	-	+	+	+	+	+	+	+	+	+
<i>Macrothrix</i> sp.	-	+	-	-	+	-	-	+	+	+	+	+
<i>Chydorus</i> sp.	+	+	+	+	+	+	+	+	+	+	+	+
<i>Ceriodaphnia</i> sp.	+	+	+	+	+	+	+	+	+	+	+	+
<i>Bosmina</i> sp.	+	+	+	+	+	+	+	+	+	+	+	+
<i>Bosminopsis</i> sp.	-	-	-	+	-	-	-	-	+	-	+	-
<i>Alona</i> sp.	+	+	+	+	+	+	+	+	+	+	+	+
COPEPODA												
<i>Mesocyclops</i> sp.	+	+	+	+	+	+	+	+	+	+	+	+
<i>Thermocyclops</i> sp.	+	+	+	+	+	+	-	+	-	+	+	+
<i>Neodiaptomus</i> sp.	+	+	+	+	+	+	+	+	+	+	+	+
<i>Heliodiaptomus</i> sp.	+	+	+	-	+	+	-	+	+	+	+	+
ROTIFERA												
<i>Brachionus</i> sp.	+	+	+	+	+	+	+	+	+	+	+	+
<i>Polyarthra</i> sp.	-	+	-	+	-	-	-	-	+	-	-	+
<i>Plationus</i> sp.	+	+	+	+	+	+	+	+	+	+	+	+
<i>Lecane</i> sp.	+	+	+	+	+	+	+	+	+	+	+	+
<i>Lepadella</i> sp.	+	-	-	-	+	-	-	-	-	+	-	-
<i>Keratella</i> sp.	+	+	+	+	+	+	+	+	+	+	+	+
<i>Trichocerca</i> sp.	+	+	+	+	+	+	+	+	+	+	+	+
<i>Cephalodella</i> sp.	+	-	+	+	-	-	+	-	+	+	+	+



STUDIES ON WOOD BORING INSECTS OF MALABAR REGION OF KERALA

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GK complied all the results and performed the experiments, SMS designed the study and wrote the paper.

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Wood boring insect, survey, Taliparamba, Wildlife Sanctuary, Cerambycidae, Curculionidae, Brentidae

ABSTRACT

The present study of wood boring insect was carried out during the period from February 2019 to January 2020. A Field survey was conducted in different areas -Taliparamba, Kannadiparamba, Thottada, Aralam Wildlife Sanctuary (Pookkundu, Thullal, Valayamchal) and Elayavoor of Kannur District. This short-term study recorded 38 species of wood borers. The collected specimens were under 7 Families named Cerambycidae, Curculionidae, Brentidae, Bostrychidae, Platypodidae, Buprestidae and Lyctidae. Cerambycidae was the dominant family followed by Bostrychidae and least was Brentidae. The collected specimens were pinned, dried and stored in insect cabinets and kept in Forest Entomology and GIS Research Laboratory.

1. INTRODUCTION

In Kerala about 53 species of beetles were recorded as pest of one or more of 46 species of stored timber (Mathew, 1982). Studies on the timber beetles found in the Indian subcontinent were primarily made by Stebbing (1914). Beeson (1941) summarized subsequent works on timber beetles. Further works include studies by Beaver and Browne (1975, 1978). Gnanaharan *et al.*, (1985) and Mathew (1982) studied timber beetles associated with commercially important stored timber in Kerala and their control. No intensive studies have been carried out on wood boring insects of Kerala. So this study is significant in filling the gap that exists in terms of wood boring insects.

2. MATERIALS AND METHODS

The present study of wood boring insect was carried out during the period from February 2019 to January 2020. Different locations in Malabar region were selected for the investigation. Sampling of insects was done by walking along diagonal transect and extracting the insect from infested logs lying on the forest floor using a field knife or chisel. The data on borers infesting trees were recorded in the data sheet. Intensity of damages were recorded based on qualitative estimation of damage into low (up to 15% damage), moderate (up to 50% damage) and high (above 50% damage) (Mathew, 2004). The insect collected were later sorted out, pinned, labeled and stored in insect boxes. Identification of wood boring insect was done by referring to literature.

3. RESULTS AND DISCUSSION

The collected individual specimens (501) were sorted out under 7 Families namely, Lyctidae

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Cerambycidae, Curculionidae, Brentidae, Bostrichidae and Platypodidae. Majority of the species collected belongs to Cerambycidae and least number of species belongs to Brentidae. A major portion of dead wood observed in the study area showed signs of varying intensity of borer attack. Data gathered on the incidence pattern of various wood inhabiting organisms indicated higher incidence of timber beetles in dead wood compared to live tree. As far as the infestation intensity of affected logs was concerned, majority of the logs (62.35%) showed only mild infestation although a small proportion (5.88%) was with medium or high (4.56%) infestation intensity

4. CONCLUSION

The collected specimens were under 7 families and Cerambycidae was the dominant family followed by Bostrychidae and least was Brentidae.

5. ACKNOWLEDGEMENTS

We are thankful to CSIR, India, for funding this project work. We are also thankful to Principal Chief wildlife warden, Kerala, wildlife warden, AWLS, for permission to work in the Sanctuary. Acknowledgement for College Management and Principal, Sir Syed College for providing laboratory facilities.

6. CONFLICT OF INTEREST

All authors have declared that there is no conflict of interests regarding the publication of this article.

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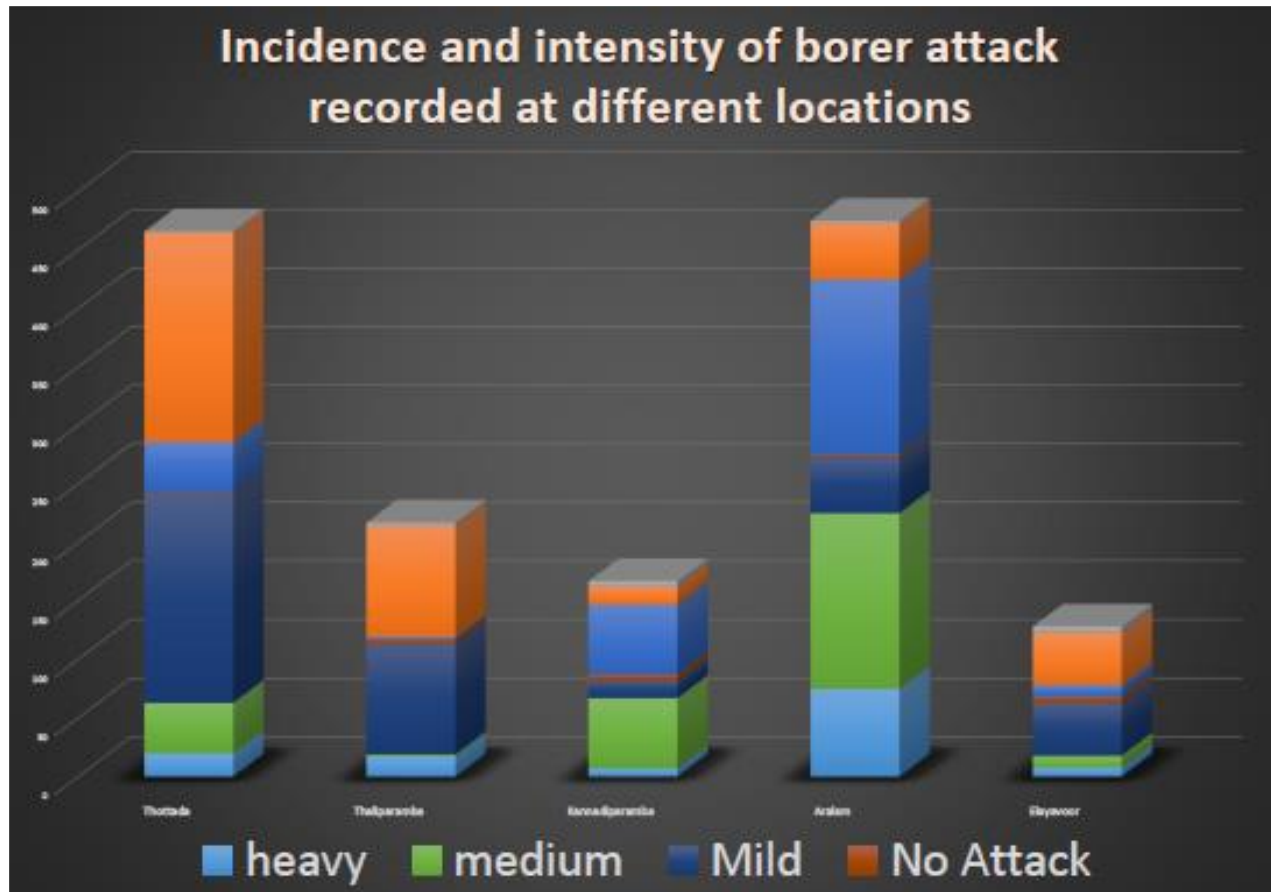


Fig.1 Intensity of borer attack

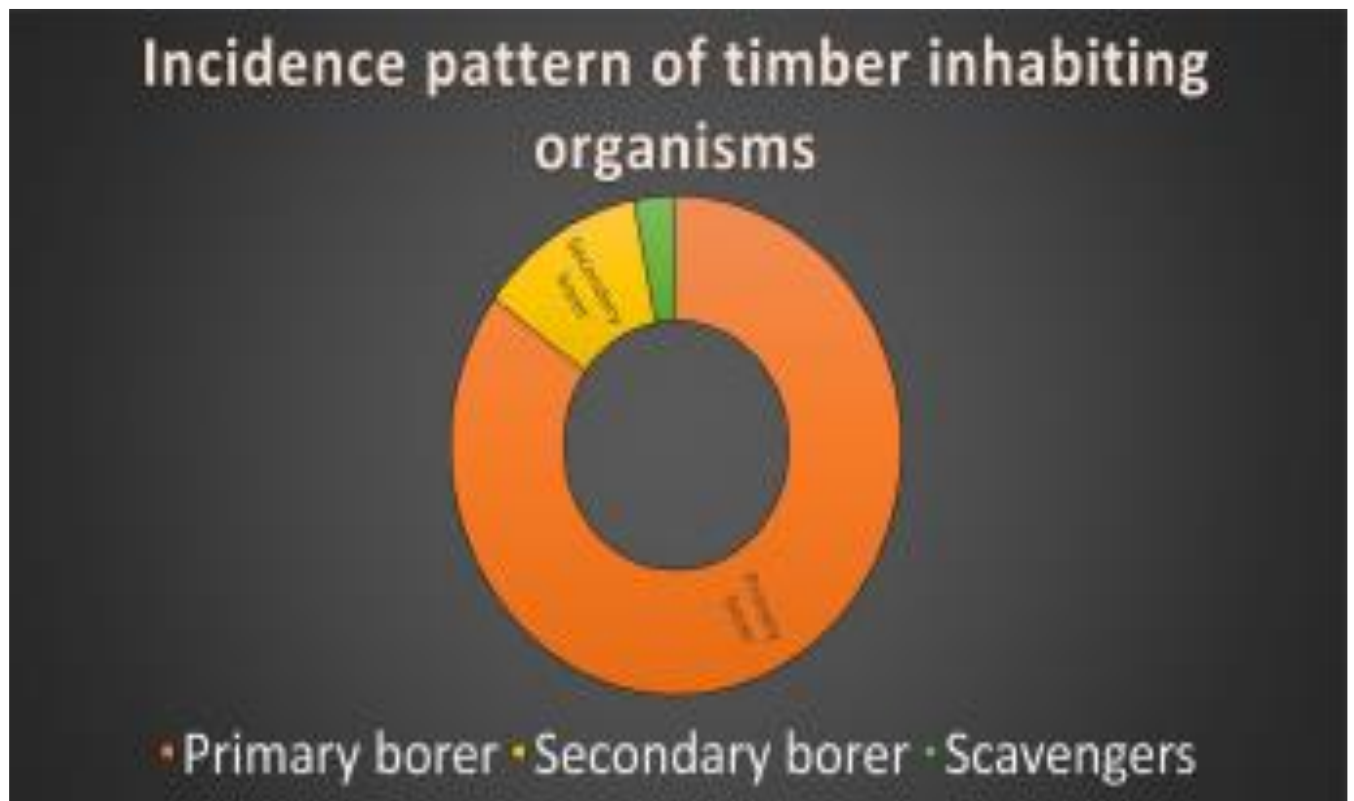


Fig.2 Incidence pattern of timber inhabiting organism

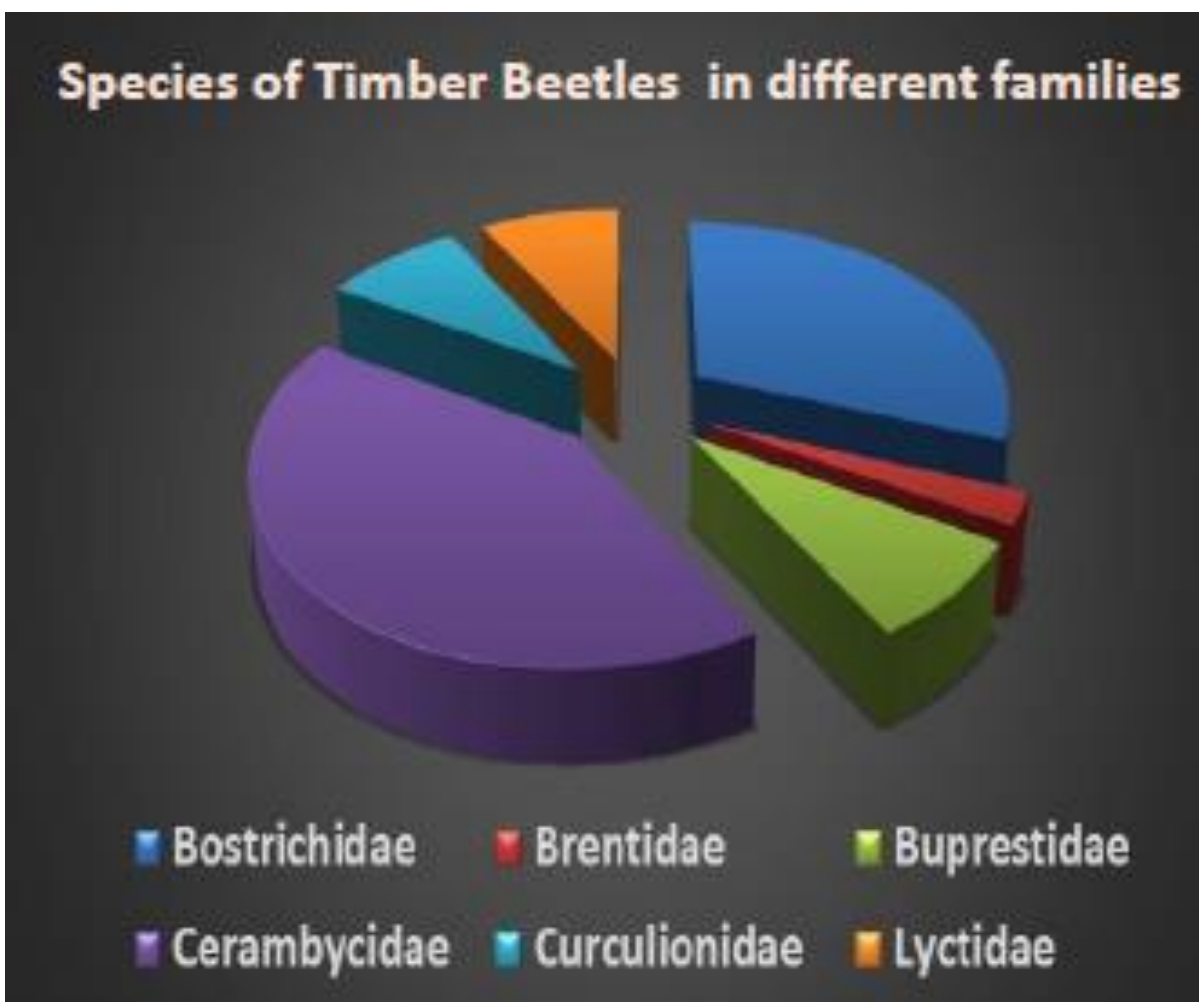


Fig. 3. Species assemblage

TABLE.1 INCIDENCE AND INTENSITY OF BORER ATTACK

S. No.	Name of the species	Family	Place of collection	Host	Damage
1	<i>Apate terebrans</i> Pallas	Bostrichidae	Thottada, Thaliparamba, Aralam	<i>Anacardium occidentale</i>	45%
2	<i>Dinoderus bifoveolatus</i> Woll.		Thottada	<i>Albizia procera</i> , <i>Bombax ceiba</i> , <i>Ficus hispida</i>	40%
3	<i>Dinoderus brevis</i> Horn.		Kannadiparamba		-
4	<i>Dinoderus minutus</i> Fb.		Aralam	<i>Ochlandra</i> sp., <i>Bambusa</i> sp., <i>Paraserianthes falcataria</i>	45%
5	<i>Dinoderus ocellaris</i> Stephens		Kannadiparamba	<i>Ochlandra travancorica</i> , <i>Bambusa</i> sp.	-
6	<i>Heterobostrychus aequalis</i> Wat		Aralam	<i>Bombax ceiba</i> , <i>Bambusa</i> sp., <i>Ochlandra</i> sp.	50%
7	<i>Sinoxylon anale</i> Les.		Thottada, Thaliparamba, Aralam	<i>Paraserianthes falcataria</i> , <i>A.odoratissima</i>	40%
8	<i>Sinoxylon atratum</i> Les.		Thottada, Thaliparamba, Aralam	<i>Paraserianthes falcataria</i> , <i>Bombax ceiba</i>	20%
9	<i>Sinoxylon crassum</i> Les.		Thottada, Thaliparamba	<i>Albizia odoratissima</i>	20%
10	<i>Sinoxylon pygmaeum</i> Les.		Aralam	<i>Grewia tiliaefolia</i>	20%
11	<i>Xylothrips flavipes</i> Illiger		Kannadiparamba, Thottada	<i>Albizia odoratissima</i>	-
12	<i>Hormocerus reticulatus</i> (Fb.)	Brentidae	Aralam	<i>Artocarpus heterophyllus</i>	40%
13	<i>Belionota prasina</i> Thunberg.	Buprestidae	Kannadiparamba	<i>Anacardium occidentale</i>	-
14	<i>Lampetis fastuosa</i> Fb.		Aralam	<i>Anacardium occidentale</i>	30%
15	<i>Sphenoptera indica</i> Lap. et Gory		Kannadiparamba	<i>Pteocarpus marsupium</i>	-
16	<i>Acalolepta rusticatrix</i> Fb.	Cerambycidae	Thottada	<i>Gmelina arborea</i>	-
17	<i>Acanthophorus serraticornis</i> Oliv.		Aralam	<i>Erythrina indica</i> , <i>Ficus hispida</i> , <i>Ficus indica</i>	30%
18	<i>Batocera rufomaculata</i> De Geer		Kannadiparamba	<i>Anacardium occidentale</i> , <i>Bombax ceiba</i>	-
19	<i>Batocera rubus</i> Lin.		Aralam	<i>Careya arborea</i>	20%
20	<i>Celosterna scabrator</i> (Fb.)		Kannadiparamba	<i>Accacia Arabica</i> , <i>A.catechu</i> , <i>Cassia siamea</i>	-
21	<i>Coptops aedificator</i> Fb.		Aralam	<i>Anacardium occidentale</i>	30%
22	<i>Dihammus cervinus</i> Hope.		Kannadiparamba	<i>Acacia</i> sp., <i>Clerodendron</i> sp., <i>Anthocephalus</i>	-

Wood boring insects of Malabar Region

				<i>chinensis</i>	
23	<i>Epepeotes uncinatus</i> var. <i>salvazai</i>		Aralam	<i>Ficus religiosa</i> , <i>Ficus elastica</i>	30%
24	<i>Glenea multiguttata</i> Guer.		Kannadiparamba		-
25	<i>Mesosa rosa</i> Karsch		Thaliparamba	<i>Mallotus philippinensis</i>	-
26	<i>Morimus inaequalis</i> Waterh.		Aralam	<i>Ficus</i> sp.	25%
27	<i>Olenecamptus bilobus</i> Fb.		Aralam	<i>Artocarpus hirsutus</i> <i>A. incisus</i> , <i>A. lachoocha</i>	30%
28	<i>Sthenias grisator</i> Fb.		Thaliparamba	<i>Anacardium occidentale</i>	-
29	<i>Xystrocera festiva</i> J. Thoms.		Thottada, Aralam	<i>Albizia odoratissima</i>	40%
30	<i>Xystrocera globosa</i> Oliv.		Aralam	<i>Albizia odoratissima</i>	40%
31	<i>Cossonus canarensis</i> Fst.	Curculionidae	Thottada, Elayavoor	<i>Paraserianthes falcataria</i>	-
32	<i>Acicnemis</i> sp.		Elayavoor, Thottada		-
33	<i>Rhynchophorus ferrugineus</i> Mishra		Aralam	<i>Cocos nucifera</i>	40%
34	<i>Lyctus africanus</i> Les.	Lyctidae	Aralam		50%
35	<i>Lyctus brunneus</i> Steph.		Thaliparamba	<i>Hevea brasiliensis</i>	60%
36	<i>Minthea rugicollis</i> Wlk.		Aralam, Elayavoor	<i>Albizia odoratissima</i>	40%
37	<i>Platypus cupulatus</i> Chap.	Platypodidae	Thottada, Elayavoor	<i>Bischofia javanica</i>	60%
38	<i>Platypus cylindrus</i> Fb.		Thottada, Aralam	<i>Palaquium ellipticum</i>	60%



STUDIES ON THE IMMATURE STAGES OF ACRIDINAE (ORTHOPTERA: ACRIDIDAE) FROM SINDH

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ABSTRACT

Grasshoppers belong to Acridinae are polyphagous insects and cause severe Damage to agricultural crops of these *Acrida exaltata*, were reported as severe pest of cash crops in Sindh. During present study it was noted that immature stages of these species were more injurious to the crops than adults. It was therefore felt necessary, and attempt has been made to study the biology of these pests. Moreover, identification of instars. And measurement of different body parts was also taken for easily identification of instars. The present study might be helpful for taking possible control measure at early stage against the species of economic concern.

1. INTRODUCTION

Grasshoppers' insect fauna belong to sub-family *Acridinae* are of great economic importance in Sindh. The representative of this sub-family is considered as pest many crops including cereals, vegetables, orchards, pastures, and rain field areas. They are widely distributed throughout the world (Riffat *et al.* 2012). Majority of them are active during sunshine can cause heavy damage in cultivated crops when their population may be increased at dynasties. The hoppers are seen to be more epidemic than the adults, because they have no functional wings, so are unable to fly and all the time they are going to eat, hence causes more damage than the adults. Although many species are not out break potential it is important to be able to identify nymphs at any early stage so that proper diagnosis of economic problems could be made.

This study makes distribution and identification of nymphs possible hence control measures against the economic species may be initiated at early stage. Although there is a lot of work has been done on taxonomic status of *Acridinae* by Kirby. But there are several aspects regarding the biology of *Acrida exaltata* species are less known. It is therefore felt necessary to examine the immature stages of this pest. The basic knowledge about the biology of pest species provides authentic information for its control. The result of such study will be instrumental in understanding and devising the population management strategies to adopt control measure at the appropriate.

2. MATERIALS AND METHODS

The nymphs of *Acrida exaltata* were collected from agricultural fields fodder crops and their surroundings vegetation of grasses with the help of

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traditional insect net (8.89 cm in diameter and 50.8 cm in length) as well as by hand picking. The collection was made during 2017 in the months of May to October from various localities of Sindh. (MAP OF SINDH) The collected material was transferred into plastic jars and carried to laboratory for further study.

3. RESULTS

Description of Immature stages of *Acrida exaltata* Walker, 1899

1st Instar

Body light green in colour. Antennae ensiform with 10 -11 segments. Fastigium of vertex parallel, pronotum shorter than head, posterior margin flat, Wing-pads not appeared.

2nd Instar

Body elongated stick like. Antennae ensiform with 12 -13 segments, Wing-pads directed downwards rounded margin, thicker. Fastigium of vertex parallel, pronotum elongated posterior margin produced, Femur cylindrical.

3rd Instar

Body light green in colour. Antennae ensiform with 13-14 segments. Head longer than pronotum, pronotum elongated, prozona longer than metazona, Wing-pads reaches up to half of the 1st abdominal segment, femur cylindrical, Tibia having 20 outer and 23 inner black tipped spines.

4th Instar

Antennae with 15-16 segments. Fastigium of vertex parallel sides, median carina indicated towards apical half, Pronotum slightly divergent towards metazona, outer margin acute angular. Wing-pads directed upwards and reaches up to middle 2nd abdominal segment. Tibia shorter than the femur possess 22 outer and 24 inner spines.

5th Instar

Antennae with 17-18 segments. Pronotum parallel sided, median carina distinct toward apical half, Wing-pads extending up to margin or cross 2nd abdominal segment having dark brown scattered spots. Femur green in colour, Tibia with 25-outer and 29 inner black tipped spines.

4. DISCUSSION

Acrida exaltata considered as one of the most common species of this region and are found throughout the year showing the biannual life span (Uvarov, 1977). *Acrida exaltata* completes its life cycle within three months. *Acrida exaltata* was found from Maize (*Zea mays*), rice (*Oryza sativa*) jowar (*Sorghum vulgare*) Gram (*Cicer arietinum*) Sugarcane (*Saccharum of ficinarum*) Paddy (*Oryza sativa*) Wheat (*Triticuma estivum*). The instars *Acrida exaltata* appears in moth of late April to July and September to November. So adults are found throughout the year due to their biannual life cycle. At the present huge number of hoppers were collected.

5. CONCLUSION

The instars *Acrida exaltata* appears in moth of late April to July and September to November. It is best time to adopt control measured against this pest in field. Further, adults are found throughout the year due to their biannual life cycle.

6. CONFLICT OF INTEREST

All authors have declared that there is no conflict of interests regarding the publication of this article.

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Table -1. Showing the Morphometric of various developmental Stages *Acrida exaltata*

Body parameters (mm)	Developmental stages (n=10)				
	1 st instars	2 nd Instars	3 rd instar	4 th instar	5 th instar
	Mean± SD	Mean± SD	Mean± SD	Mean± SD	(Mean± SD
Antennal segments	9.0±0.12	14.21±2.0	16.32±0.72	19.3±0.21	21.5±0.5
Antennal length	2.23±0.12	3.21±0.10	4.25±0.42	7.23±0.63	10.03±0.72
Length of Pronotum	9.2±0.10	1.23±0.12	2.01±0.12	3.24±0.13	3.0±0.12
Length of Femur	7.2±0.82	8.3±0.25	9.23±0.3	10.12±0.62	11.1±0.5
Length of Tibia	6.42±0.86	7.23±1.6	7.0±0.2	9.3±0.2	10.04±0.23
Length of supra-anal plate	0.9±0.20	1.25±0.12	1.50±0.12	1.82±0.12	2.12±0.1
Total body length	12.0±0.32	14.6±0.21	16.5±0.23	18.2±0.3	20.5±1.15

Table -2. Identification key to various instars of *Acrida exaltata*

1.	Antennae ensiform with 10 -11 segments. Wing-pads not appeared.....	1st Instar
—.	Antennae ensiform with 12 -13 segments, Wing-pads a thick line appeared.....	2nd Instar
2.	Antennae ensiform with 13-14 segments. prozona longer than metazona, Wing-pads directed downwards with sharp lines Tibia having 20 outer and 23 inner black tipped spines.....	3rd Instar
—.	Not as above.....	3
3.	Antennae with 15-16 segments. Wing-pads directed upwards and reaches up to middle 2 nd abdominal segment. Tibia shorter than the femur possess 22 outer and 24 black tipped inner spines.....	4th Instar
—.	Antennae with 17-18 segments. Wing-pads extending up to margin or cross 2 nd abdominal segment having dark brown scattered spots. Tibia with 25-outer and 29 inner black tipped spines.....	5th Instar



Fig.1 Immature stages of *Acrida exaltata* (1st Instar -5th Instar)



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