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UNIVERSITY OF SINDH JOURNAL OF ANIMAL SCIENCES

(USJAS)

ISSN Print: 2521-8328
ISSN Online: 2523-6067

Volume: 05
Number: 02
June 2021

PUBLISHED BY:
OFFICE OF THE DEAN FACULTY OF NATURAL SCIENCES
& DEPARTMENT OF ZOOLOGY, UNIVERSITY OF SINDH,
JAMSHORO, SINDH, PAKISTAN

UNIVERSITY OF SINDH JOURNAL OF ANIMAL SCIENCES

(USJAS)

VOLUME 5 **JUNE 2021** **NUMBER 2**

Quarterly publications
Dean, Faculty of Natural Sciences & Department of Zoology,
University of Sindh, Jamshoro, Sindh-Pakistan

ISSN (E): 2523-6067
ISSN (P): 2521-8328

Sindh University Press.

UNIVERSITY OF SINDH JOURNAL OF ANIMAL SCIENCES
Vol. 5, Issue 2, June, 2021
Email: editor .usjas@usindh.edu.pk
Website: http://usindh.edu.pk/index.php/USJAS
ISSN (P): 2521-8328
ISSN (E): 2523-6067
Published by University of Sindh, Jamshoro
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UNIVERSITY OF SINDH JOURNAL OF ANIMAL SCIENCES
Vol. 5, Issue 2, June, 2021
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UNIVERSITY OF SINDH JOURNAL OF ANIMAL SCIENCES
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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.

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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.

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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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PUBLICATION

University of Sindh Journal of Animal Sciences (USJAS) is published quarterly i.e., 4 times a year: January, April, July and October, by the Office of Dean Faculty of Natural Sciences and Department of Zoology, University of Sindh, Jamshoro.

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- ✓ All papers submitted to the (USJAS) are first examined by an Editor for the initial review. The editor may assign to experts to review the quality and scope of the submitted manuscript. If the article fails to meet the journal criteria, the paper is rejected immediately and authors are notified.

- ✓ Once the paper is submitted, the editor ensures that the paper follows the **double-blind review policy**. If the author names are found, then the author name(s) and affiliation(s) are removed from the paper and updated version is uploaded on the system by the editor.

- ✓ Every submitted article is checked for the Similarity report by the Editor, before forwarding it to the reviewers. **Turnitin website** is used by the journal as prescribed by Higher Education Commission (HEC) Pakistan, to check the similarity of paper. As per HEC policy, in case manuscript has been found to have a similarity index of more than 19% it will be immediately either returned back to the author for correction and resubmission, or will be rejected and archived. This decision is made by the editor, based on the similarity ratio. (Please Note that the parameters for similarity check involve, Add to No Repository, Exclude Bibliography, Exclude Quoted Text).

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- ✓ Once the decision has been made, the review response - including the review form and suggestion, are sent to all authors of the article with editorial decision.

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KNOWLEDGE, ATTITUDES AND PRACTICES TOWARDS GREEN TEA (CAMELLIA SINESIS) POPULATION OF KHYBER PKHTOOKHWA

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ARTICLE INFORMATION

Article History:
Received: 30th March 2021
Accepted: 20th May 2021
Published online: 15th July 2021

Author's contribution
All authors contribute equally.

Key words:
Knowledge, participant cross sectional study, Practices, Anticancer.

ABSTRACT

Tea is the second greatest drink use all over the world. This investigation is intended to discover a survey of knowledge, attitudes, and practices towards green tea (*Camellia sinesis*) population of Khyber Pkhtookhwa. A cross sectional examination was designed. Information was gathered from 200 individual through questionnaire. Most of respondents were males having a place with various ages and like milk tea. The proportion of illiterate described high. The local population has increasingly adequate information about advantages of green tea and furthermore utilized it for various determinations.

1. INTRODUCTION

Tea (Camellia) is the most second mainstream consumable 3 drinks. After water tea is the greatest drinkable beverage in Pakistan and other nations of the world because of its great Health benefits. (Cheng) [1]. Green tea (*Camellia sinensis* L.) is a little size angio-spermic and dicotyledonous, perennial shrub having a place with the family Theaceae. Green tea plant is slow developing shrub like plant having little, , serrate and dull green leaves and it is originated from china 5000 year ago (Yanagimoto *et al.*,) [10]. Green tea contains various sorts of natural components caffeine, theanine, polyphenols, and nutrients, (Yamamoto *et al.*,) [9].The polyphenolic natural parts make up 30% of the complete green tea substance arrangement, which are flavanols, flavandiols flavonoids and phenolic acid (Cheng) [1].

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Flavonoids are the fundamental substance of polyphenol and catechins found in green tea and reliable to about 7% of their combinations. Catechins and flavonoids are referred to for their properties, for example, cancer prevention agent, hypersensitive and anticarcinogenic impacts (Dulloo *et al.*,) [8]. It has likewise been reported for that the green tea is best brew all through the country. Green tea is a non-oxidized drink green tea is prepared from fresh leaf and bud of a shrub Camellia sinensis and un-oxidized form of brew which is pale in looking with severe smell. It is set up by normal natural practices (Jazani) [3]. In this way contains high measure of bioactive natural regular compound, for example, Epigalloctocatenin gallate (EGCG), flavanols, flavadiols, and phenolic acids and the most dynamic substance which is 12% of dry weight (Yamamoto) [9]. There for Much force has been paid on its utilization because of its improving health characteristics, for example, bringing down glucose level, lessening cholesterol level, advancing oral wellbeing, keeping up body weight, skin health,

bringing down pulse, decreasing the danger of disease, keeping bone solid and battling against maturing. (Jazani) [3]. Natural part of green Tea like polyphenols reduce and prevent the development of malignant growth cell by making bonds between amino acids it inactivates the action of hurtful catalysts and inactivates the infections when they present in low concentration. Apoptosis is a cell damaged that happens normally in every life form known as modified cell death. During apoptosis various Changes morphological change and cell shrinkage, atomic discontinuity, chromatin buildup while in necrosis, the body cell and tissue experience irritation, break and swelling occur (Isemura *et al*.,) [2].

Catechins are natural part in green tea have properties to repress the anti-apoptotic Bcl-2 family proteins. Polyphenols also show anticancer action and assume an essential job in anti-apoptotic pathway, which is known as the inducer of numerous human, malignancies. The heavy tea consumer who drink more than 9 cups for every day expending around one gram of green tea catechins every daytime. in this manner , there for the constant green tea customer had low cholesterol levle, LDL, triglycerides, and an expanded proportion of HDL as contrasted and that of the less anxiously client (Imaiand and Nakachi) [4]. Chemical Compound of green tea relies upon season and atmosphere variety, place of collection of leaf, shoot and agriculture rehearses Among the impacts credited to the green tea are incorporated avoidance of malignancy and cardiovascular infection, cancer prevention agent, antibacterial, antiviral, neuroprotective impacts, cholesterol reducer, fat reducer and help with the treatment and controle obesity and related sicknesses, for example, diabetes and dyslipidemia (Cheng) [1].

The purpose of present survey to find out a survey of knowledge, attitudes, and practices towards green tea (*Camellia sinesis*) population of Khyber Pakhtunkhwa.

2. MATERIALS AND METHODS

Study area

The present survey of knowledge, attitudes, and practices towards green tea (*Camellia sinesis* population of Khyber Pkhtookhwa was performed in union council Badwan is in lower dir. on the bank of river swat toward west. It is situated from sea level at height of 2192 feet (668 meters). The total population of union council bad wan is about 27000 approximately.

Study plan

An illustrative observational investigation was plan. The participants were interrogated from 9:30 to 4:30 during day time.

Data collection

The demographic and practice of green tea information of the respondent were collected through questionnaire randomly.

Data analysis

XL stat 2015 version were used for data analysis.

3. RESULTS AND DISCUSSION

This current study was carried out on survey of knowledge, attitudes, and practices towards green tea (*Camellia sinesis*) population of Khyber Pkhtookhwa and data were collected from total of 200 respondents from the five selected villages Ramyal, Chatpat, Gadar Baghkandi and Shamli of union council Badwan Khyber Pukhtoon Khwa Pakistan.

Distribution of the participant

The distribution of respondent from different villages of said area, 30% from village Ramyal, 25% from Chat pat, 20% from village Shamli , 15% from Gadar and 10% were interweaved from local population were cross examined from the village Baghkandi as shown in Figure 1.

Demographic wise distribution

The demographic wise distribution was presented in Table 1, among the total interviewed the males 160 /80% and 40/20% were females.

The education wise ratio

The ratio of illiterate in the study area were very high. The 120/ 60 % respondent were illiterate while the 80/40% were literate as shown in Table 1.

Distribution on the base of age

the population was distributed into five age groups includes group I, 12-21years10%; group II, 22-31years 22%; group III, 32-42 year 25% and group IV, 43-60 35% although group V >60 years 8%. Group 4 were 35% high in percentage then all; all groups were represented in Table 1

Occupation of the participant

Majority of the respondent occupation were famers which is about 120/60% followed by business man 50/25% , and the students ratio were 24/12% while only 6/3% were employees the data is show in Figure 2.

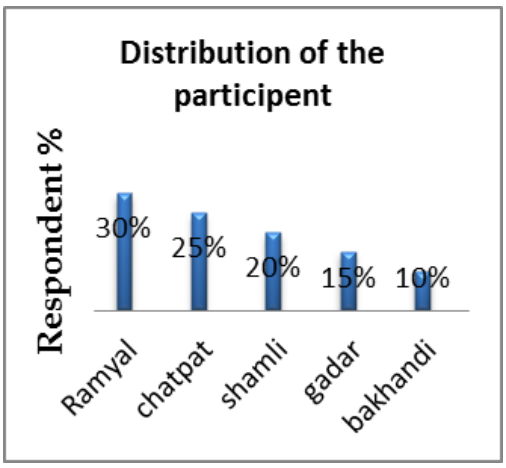

Figure 1. Distribution of the participant

Table 1. Demographic information about the Green Tea consumers

1	**Age /year**	**%**
	12-21	10
	22-31	22
	32-42	25
	43-60	35
	>60	8
2	**Sex**	**%**
	Male	80
	Female	20
3	**Education**	**%**
	Primary	22
	Matriculation	10
	Intermediate	5
	Graduate	3
	Illiterate	60

Liking of green tea the participant of local population of union council Badwan were asked about the liking of green tea among them 150/75% were give response in Yes that they like green tea while30/ 15% were answer in No and 20/10% other the data was presented bellow in Figure 3.

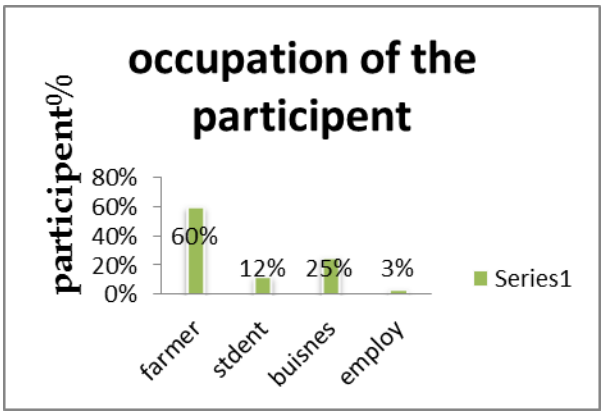

Figure 2. Occupation of the participant

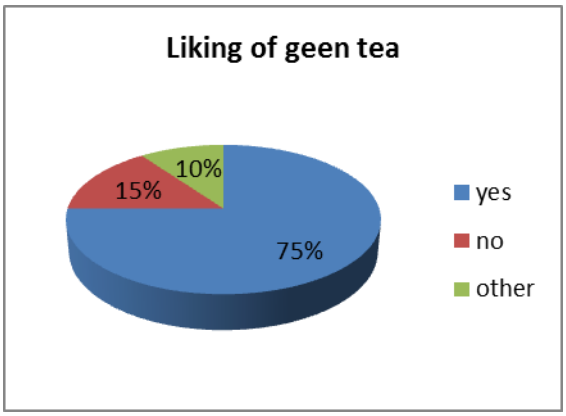

Figure 3. liking of green tea Use of green tea

The 150/75% of the participant used milk tea all time and the 34/17% of respondent green tea and the remaining 16/8% population use other types of tea (Figure 4).

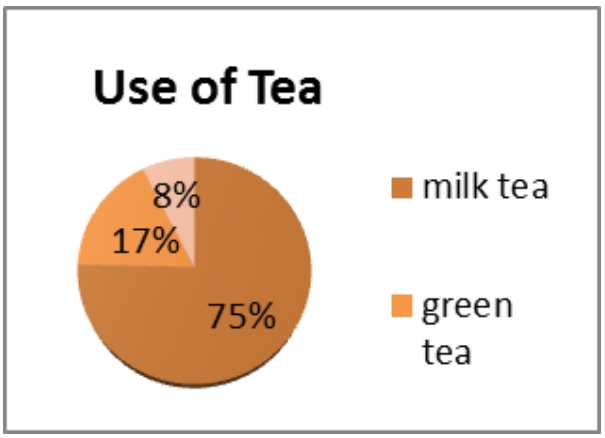

Figure 4. Use of green tea Frequency of consumption green tea

The respondent were investigate about drinking frequency of green tea among them 100/50% participant use one cup a day followed by 54/27% respondent used two cup a day and 36/18% used three cups while 10/5% of participant drink more than three cups in a day. The data is shown in following Figure 5.

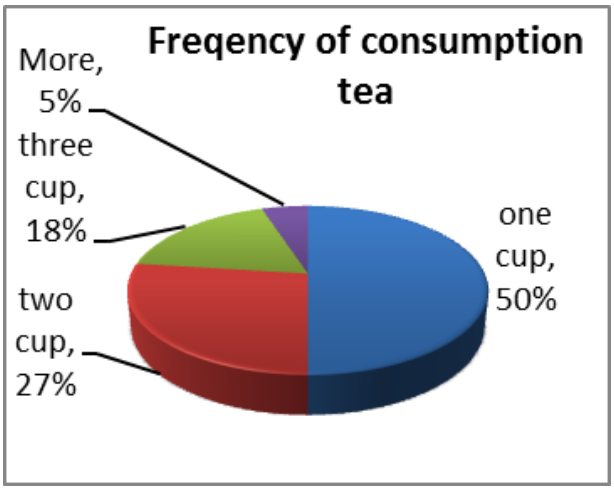

Figure 5. Frequency of consumption green tea

Season of use green tea Out of total interviewee 80/40% response that used green tea was in winter season followed by 50/25% in autumn season, 40/20% respondent consumed green tea in spring while 20/10% of interweaver consumed green tea in any time of year Show in Figure 6.

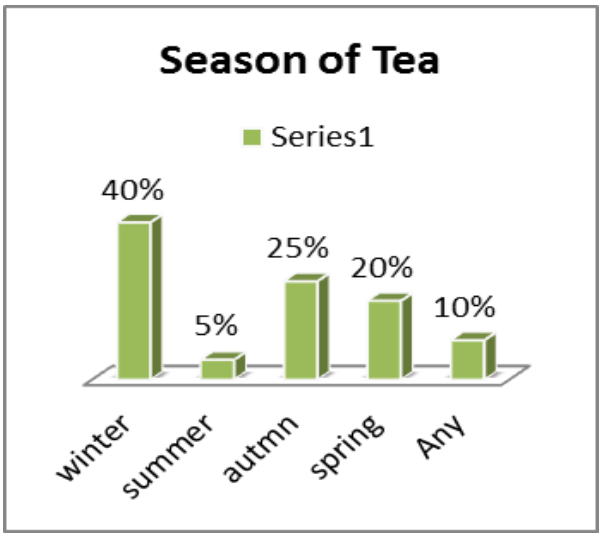

Figure 6. Season of green tea use

Knowledge about green tea.
The respondent was inquiry about the knowledge of the green tea. the present data indicate that 100/50% of respondent believed that use of green has beneficial for human health followed by 60/30% participant use green tea work anticancer agent and 30/15% consider has no side effects although only 10/5% consider use of green tae has side effects. The data has been represented bellow in Figure 7.

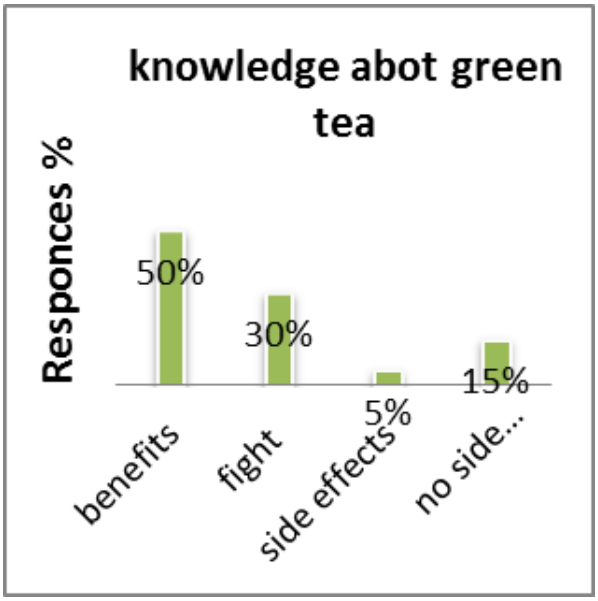

Figure 7. Knowledge, green tea Knowledge Source of green tea

The knowledge source about green tea was also asked from the people and it was Revealed that 80/40 % participant of the local population hear from other different sources, and 70/35% from print media while the 50/25% from electronic media (Figure 8).

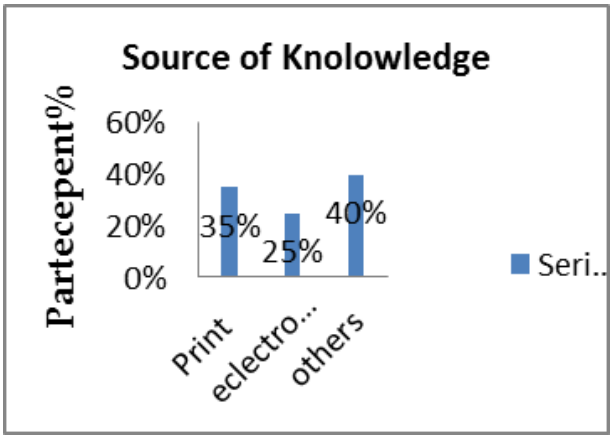

Figure 8. Source of knowledge of green tea

4. DISCUSSION

The current results of our present study clearly signposted that the green tea consumption is very low as associate to milk tea in population. The common participant likes milk or mix tea. They only utilized green tea for cure and prevention of numerous sicknesses which includes body weight reduction, anticancer activity is also reported.

Beside these numerous investigations revealed that the green tea has malignant growth protective activity. The cancer proportion in the inhabitants in japan is very low as compared to other nation due to regularly drinking of green tea.

The organic substances EGCG which is present in green tea plays a significant important character in the control of malignancy r. EGCG with catechins likewise repress the declaration of tumor necrosis alpha factor outcomes destroy tumor development (Qin, *et al.*,) [7].

Previous studies prescribe that the oral utilization of green tea polyphenols repress harmful radiation initiated skin cancer-causing agents in various experimental animals (Kada, *et al.*,) [5]. An exploratory research was completed in japan university (Kyushu) revealed that Epigalloctocatenin gallate (EGCG) green tea worked against malignancy like prostate and lung disease (Dulloo *et al.*,) [8]. Normal utilization of green tea ensures and lower 36% hazard against heart disorder (Chacko, *et al.*,) [6]. It is observable from previous literature that the green tea has potential against numerous diseases.

Recommendation Further advance research, required to search the anticancer competency of green tea.

5. CONCLUSION

It is established that participant of Union Council Badwan has sufficient knowledge about green tea.

6. ACKNOWLEDGEMENT

We acknowledge the participant of Union Council Badwan Khyber Pukhtoonkhwa.

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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UNIVERSITY OF SINDH JOURNAL OF ANIMAL SCIENCES
Vol. 5, Issue 2, Pp: (7-12), June, 2021
Email: editor.usjas@usindh.edu.pk
Website: http://usindh.edu.pk/index.php/USJAS
ISSN (P): 2521-8328
ISSN (E): 2523-6067
Published by University of Sindh, Jamshoro
(USJAS)

PHEIDOLE SOESILAE MAKHAN, 2007 AS DISTINCT SPECIES (HYMENOPTERA: FORMICIDAE)

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ARTICLE INFORMATION

Article History:
Received: 25th March 2021
Accepted: 20th May 2021
Published online: 15th July 2021

Key words:
Hymenoptera, Formicidae, *Pheidole soesilae*, distinct species, Suriname.

ABSTRACT

In this paper *Pheidole soesilae* Makhan, 2007 of Formicidae, is reinstated as distinct species from Suriname (Hymenoptera: Formicidae).

1. INTRODUCTION

Longino [1] published an article about the Pheidole (Hymenoptera, Formicidae) of Middle American Wet Forest. Putting *Pheidole soesilae* Makhan [3] into synonym and without seeing the type. *Pheidole fimbriata* Roger, 1863 is another species and shape of the body is different. The holotype is in the collection of the Naturalis Biodiversity Center in Leiden, Netherlands.

***Pheidole soesilae* Makhan, 1999, stat. rev. (Figures 1-5).**

Longino [1] wrote *Pheidole fimbriata* Roger, 1863: 196. Holotype major worker: "Rio Paraguay" (not examined). Full synonymy not listed. *Pheidole soesilae* Makhan [2]: 1, figs. 1, 2. Holotype major worker: Suriname (not examined). New Synonym. Longino [1].

Comments: *Pheidole fimbriata* is a widespread species, occurring from Mexico to Paraguay and Argentina. The images of the holotype major in Makhan's publication are of this highly distinctive species.

Comments: Longino [1] synonymised this species with Pheidole fimbriata Roger, 1863, stated that I see differences in the shape of the head, petiole & alitrunk.

Pheidole soesilae Makhan, 1999 shows an oval head, with short carinae around the eyes, longer carinae on the dorsal view & *Pheidole fimbriata* Roger, 1863 an elongated head, with long carinae around the eyes, longer carinae on the dorsal and lateral view.

Petiole & alitrunk is different in both species.

To reiterate and to further highlight the differences between these two species I have their photo's here in the present paper.

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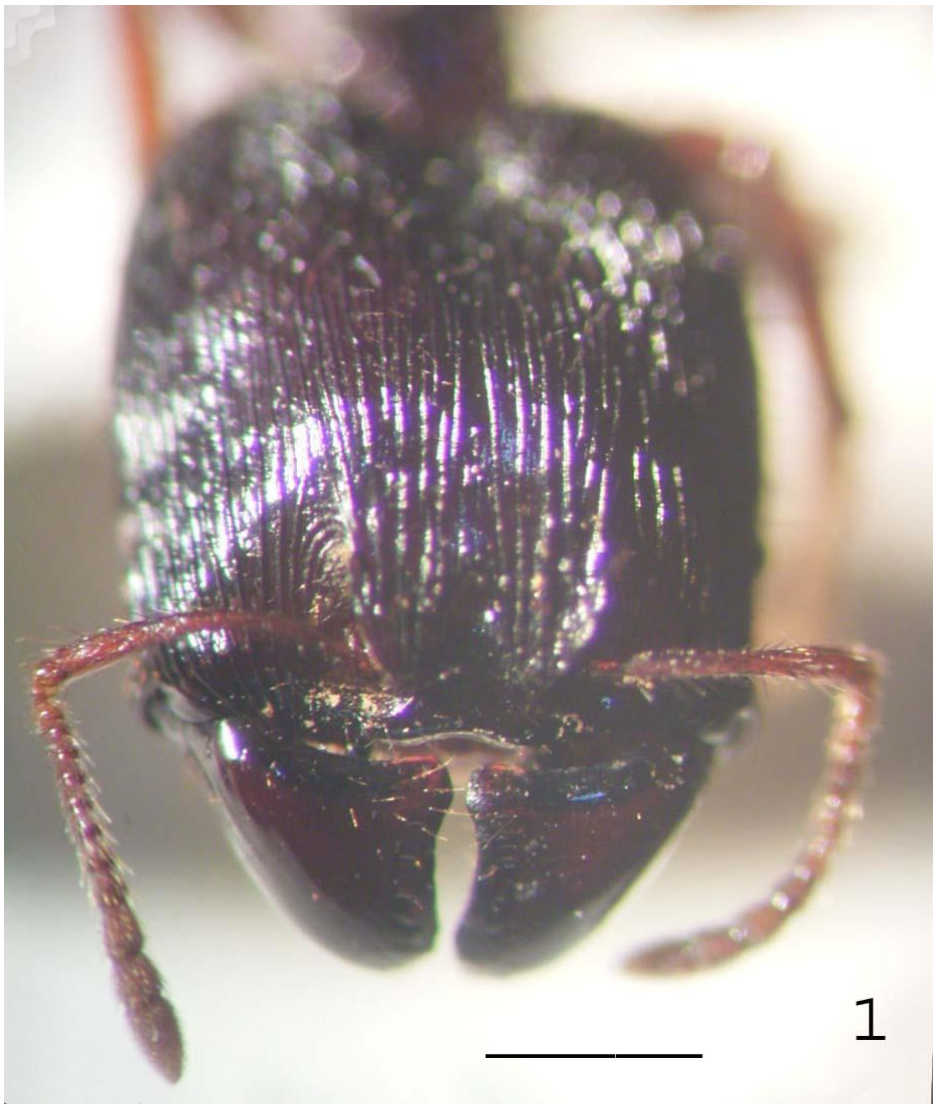

Figure 1. Major worker holotype *Pheidole soesilae* Makhan, 2007
Head dorsal view (scale line = 0.7 mm)

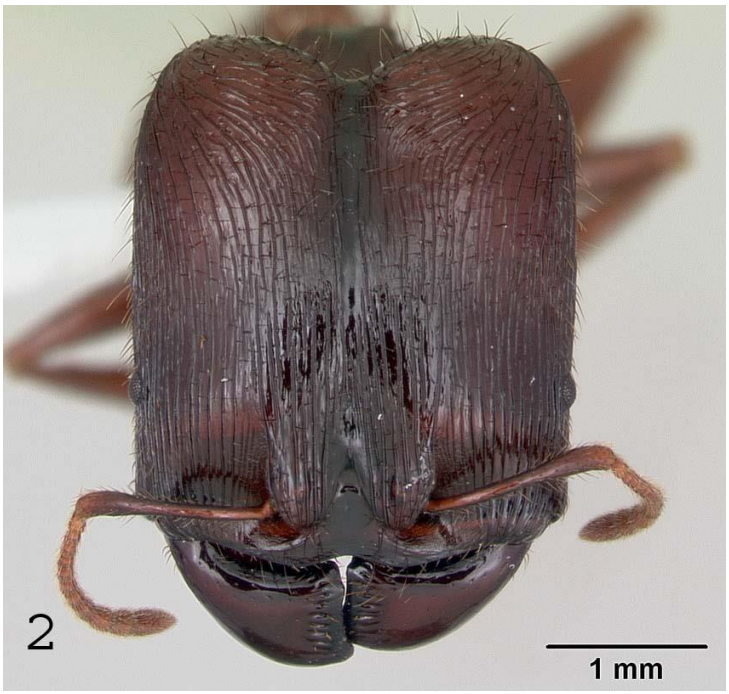

Figure 2. Major worker *Pheidole fimbriata* Roger, 1863
Head dorsal view

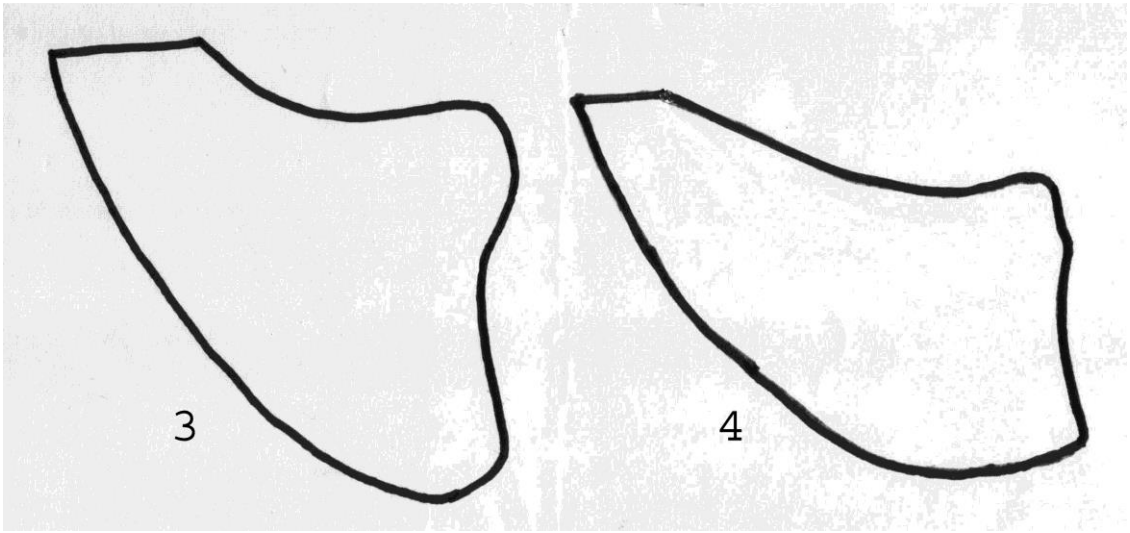

Figure 3. major worker holotype *Pheidole soesilae* Makhan, 2007
mandible dorsal view (not to scalescale)

Figure 4. major worker *Pheidole fimbriata* Roger,1863
mandible dorsal view (not to scale)

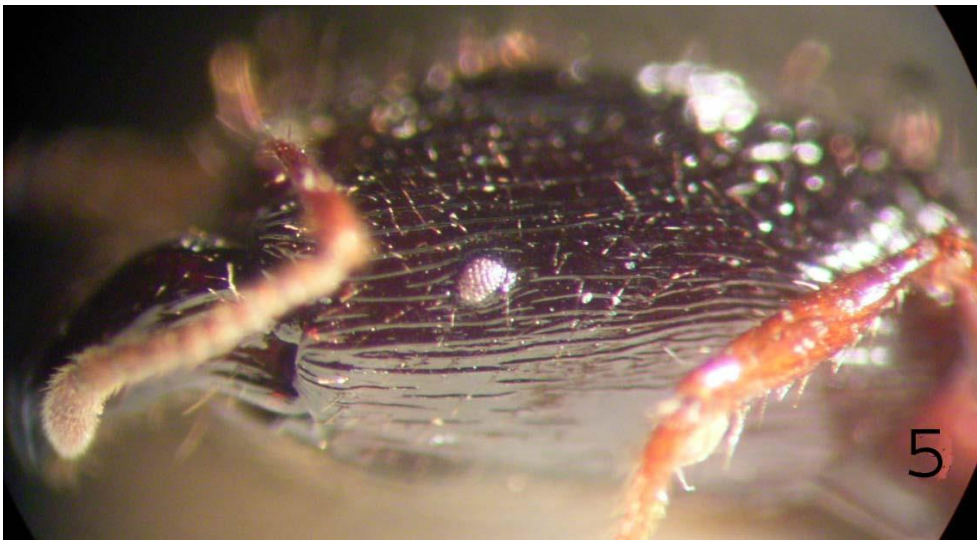

Figure 5. Major worker holotype *Pheidole soesilae* Makhan, 2007
Head lateral view (not to scale)

Figure 6. Major worker *Pheidole fimbriata* Roger, 1863
Head lateral view

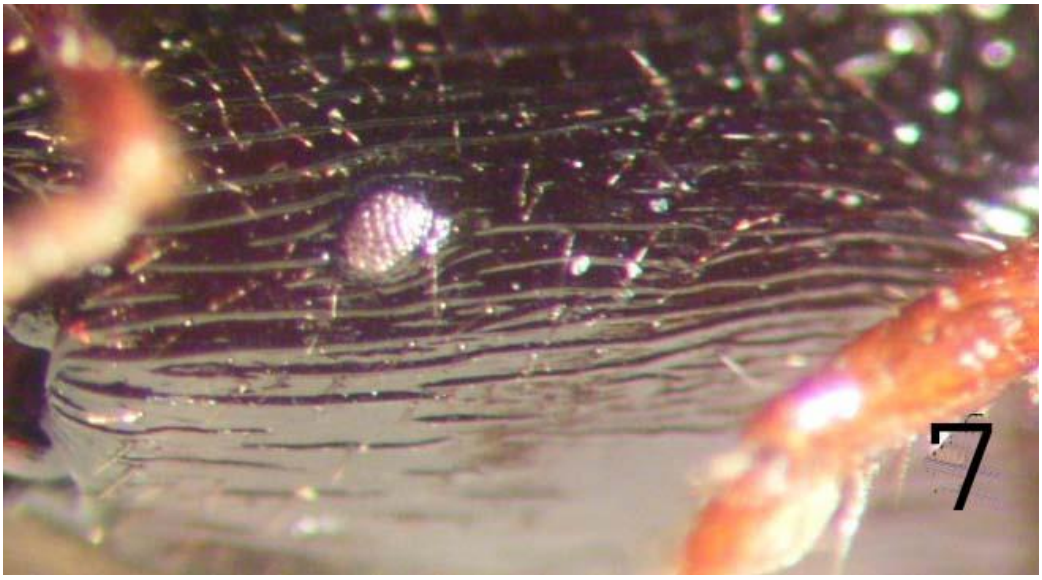

Figure 7. Major worker holotype *Pheidole soesilae* Makhan, 2007
Head lateral view (not to scale)

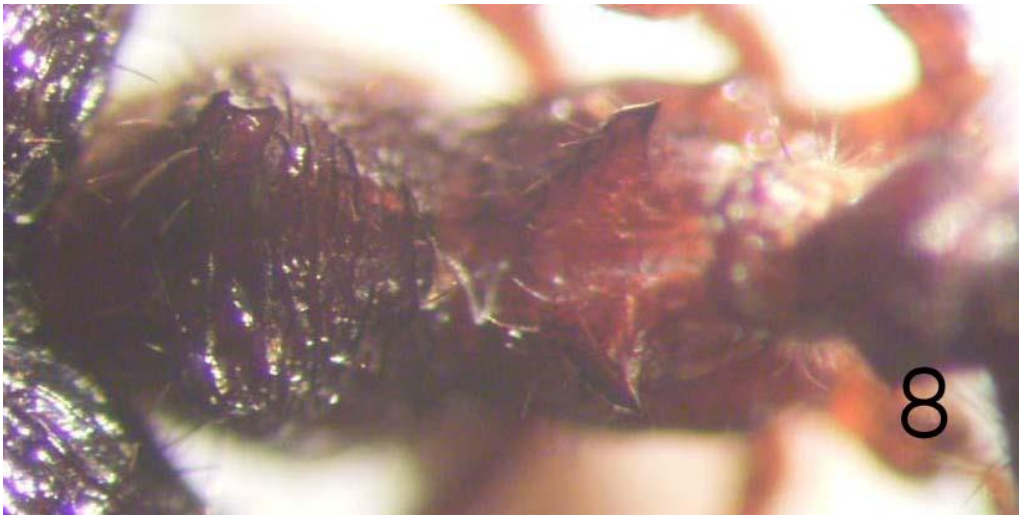

Figure 8. Major worker holotype *Pheidole soesilae* Makhan, 2007
Head, petiole & alitrunk dorsal view (not to scale)

Figure 9. Major worker holotype Pheidole fimbriata Roger, 1863
Head, petiole & alitrunk dorsal view (not to scale)

UNIVERSITY OF SINDH JOURNAL OF ANIMAL SCIENCES
Vol. 5, Issue 2, Pp: (13-17), June, 2021
Email: editor .usjas@usindh.edu.pk
Website: http://usindh.edu.pk/index.php/USJAS
ISSN (P): 2521-8328
ISSN (E): 2523-6067
Published by University of Sindh, Jamshoro
(USJAS)

COMPARATIVE BIOLOGY OF FRUIT FLIES BACTROCERA CUCURBITAE, AND BACTROCERA ZONATA ON INDIAN ROUND GOURD (PRAECITRULLUS FISTULOSUS)

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ARTICLE INFORMATION

Article History:
Received: 24th April 2021
Accepted: 28th May 2021
Published online: 15th July 2021

Author's contribution
NB designed the study S & Z collected the data and performed the experiment.

Key words:
Fruit flies, fruits, vegetables, polyphagous pests, *Bactrocera cucurbitae*, *Bactrocera zonata*

ABSTRACT

Fruit flies are the noxious pests of fruits and vegetables throughout out the Tropical and subtropical regions of the world. The melon fruit fly *Bactrocera cucurbitae* Peach fruit fly *Bactrocera zonata* are polyphagous pests of vegetables and fruits. We evaluated the effect of Indian round gourd (*Praecitrullus jistulosus*) on the biology of *B. cucubitae* and *B. zonata* under lab conditions. Results revealed that lowest incubation. O± 0.44) was observed on eggs of *B. cucurbitae* whereas; lowest hatching (33.3 ±7.63) was observed on eggs of *B. zonata*. Furthermore, reduced larval duration (5.6± 0.24) was observed when maggots of *B. cucurbitae* were provided with Indian round ground as compared with maggots of *B. zonata* (6.6± 0.24). Moreover, higher pupal recovery, and adult emergence were recorded on maggots of *B. cucurbitae* (79.33± 7.02, 75.33±3.51). In addition to number of deformed adults was higher when *B. cucurbitae* was provided with Indian round gourd as compared to *B. zonata* eggs. These findings could be helpful in defining more optimum conditions for the mass rearing of *B. cucurbitae* and *B. zonata* for use in Sterile Insect Technique (SIT), programmes for various orchards.

1. INTRODUCTION

The fruit flies *Bactrocera cucurbitae* (Coquillett) and *Bactrocera zonata* (Saunders) commonly, known as melon fruit fly and peach or guava fruit flies. *B. cucurbitae* and *B. zonata* are economical pests of vegetables and fruits. It has been reported to damage over 125 fruit species and 81 host plants of *cuccarbita* (Sapkota *et al.*,) [9]. Fruit flies cause most of the damage to fruits and vegetables in the Indo-Pak subcontinent. The members of the sub-family Dacinae infest almost all kinds of fleshy fruits, including solanaceous and cucurbitaceous plants. Many species are specialized, and host specific in their feeding habits, while others are generalists and attack a wide range of fruits and vegetables.

Both fruit flies native to Asia as well as in Southeast Asia and widely distributed in Pakistan, India, Sri Lanka, and Thailand. At present it is a significant horticultural pest in India and Pakistan. The scope of damage reported by the fruit flies species, *B. zonata* and *B. cucurbitae* were 5% to 100% loss in Pakistan. Damage caused by fruit flies to fruit and vegetable growers in Pakistan is about 200 million US dollars annually at farm level with added losses to traders, retailers, and exporters (Rauf *et al.*,) [7].

DESCRIPTION:
Adult Melon fruit flies are about 6-8 mm long. Their body is light brown to a honey color in appearance. There are several prominent bright yellow markings on the thorax (upper body) and a distinctive black 'T' pattern at the base of the abdomen (lower body). The

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wings are clear with a dark coastal vein and "melon seed" shaped spot at the tip. Adults generally live for 10 months in a year. Melon fly damage occurs when adult female flies lay their eggs into fruits. An indentation often occurs at oviposition and the fruit mayor may not become curved. Laid eggs later hatch into maggots where they feed and live within the fruit. Infested fruit frequently become rotted, either in the field or after harvest. Attacks are severe on young developing fruits, especially under high humidity conditions. (USAID-Inma Agribusiness Program).

LIFE CYCLE:
The life cycle from egg to adult emergence requires 14-27 days. Females have a slender pointed ovipositor which they use to lay eggs under the skin of the host fruit. Oviposition occurs about 10 days after emergence and continues at intervals. One female may deposit up to 1,000 eggs, although 300 eggs total are estimated in natural conditions. Eggs are slender, white, and inserted into fruit in bunches. Eggs hatch in 2 to 4 days.
(Actual size 0.8mm long x 0.2mm wide). There are 3 larval stages for this insect. The larvae, or maggots, are cylindrical, elongated, narrowed, and somewhat curved downward at the end and mouth hooks at the head. These maggots reach approximately 1.27 em in length upon maturity. The larval period lasts from 6 to 11 days, with each stage lasting 2 or more days. Duration of larval development is strongly affected by host. Larvae (maggots) are white and legless, growing to a length of 10 mm inside the host fruit. Pupae occur in the soil beneath the host plant. They are 5 - 6 mm long, elliptical, and dull white to yellowish brown in color. They are distinctly ringed by narrow yellow bands around each segment. During warm weather, the pupal stage lasts 9 to 11 days. (USAIDInma Agribusiness Program)

DESCRIPTION:
The adult peach fruit fly is about size of a housefly 5-6 mm in length the peach fruit fly reddish brown, with yellow patches on the top of sides of thorax. Two black spots on the face, a faint T shaped mark on the abdomen and transparent wings with a small brown spot at the tip. Eggs are laid below the skin of the host fruit. These hatch within 1-3 days and the larvae feed for another 4-5 days. Pupations in the soil under the host plant and adults emerge after 1-2 weeks. Adults occur throughout the year (Foote *at al.,*) [4].

LIFE CYCLE:
The female has a pointed slender ovipositor to deposit eggs under the skin of host fruits vegetables. The white eggs are 1.1 mm long and 0.2 mm wide the maggots are (larva) creamy-white legless and may attain a Length of 7-lOmm. The pupa is encased in a dark brown cylindrical pupariaum about 5mm in length. These hatch within 1-3 days and the larvae feed for another 4-5 days. Pupation is in the soil under the host plant. Adults emerge after 1-2 weeks (longer in cool conditions). (USAID-Inma Agribusiness Program)

2. MATERIALS AND METHODS

An experiment on "comparative biology of fruit flies *Bactrocera cucurbitae, and Bactrocera zonata* on Indian round gourd (*Praecitrullus fistulosus*) " was carried out in the Department of Zoology University of Sindh, Jamshoro under laboratory conditions. The studies were conducted at the temperature 30±2°C, and relative humidity 65-70%. Eggs of *B. cucurbitae* and *B. zonata* were collected from the Adult fruit flies and their Parasitoid Laboratory Plant Protection Division, Nuclear Institute of Agriculture (NIA), Tandojam. Eggs were collected through egg laying receptacles and were removed from the receptacles very gently with the help of camel hairbrush and seeded inside the young fruits to assess the effect of young fruit on biological parameters of *B.cucurbitae* and *B. zonata.*

Fresh Indian round gourds (*Praecitrullus jistulosus*) were brought from the local market of Jamshoro city. Each piece of Indian round gourds was weighed ~ 125 grams. 100 eggs of *B. cucurbitae* and *B. zonata* were transferred on each piece. Seeded pumpkins were kept in beaker (1000 ml) and slight layer of saw dust was kept as pupation substrate inside the beaker. Afterwards, beakers were covered with muslin cloth. This part of experiment was repeated three times. After 3rd day of larval emergence, an additional amount of fresh Indian round gourds was provided to maggots. Full grown larvae popped out from the Indian vegetables and pupated in pupal substrate. Observation on incubation period and hatching percentage was recorded. Pupae were sieved with iron mesh (18 mesh) and collected. Emerged adults of *B. cucurbitae* and *B. zonata* were shifted into plastic cages (30 x 25 x 11cm). Adults Fruit Flies were supplied with protein hydrolysate, casein, sugar and 1: 3 soaked cotton to observe the sex ratio (Male & Female) Half Emerged adults and Deformity.

STATISTICAL ANALYSIS:
All statistical analyses were done with the help of Statistix" Version 8.1, Analytical Software, Inc., and Tallahassee, FL, USA.

3. RESULTS

Results of present study confirmed that the eggs of *Bactrocera zonata* which were kept on natural host took longer time to hatch (5.0±0.51). However, lowest incubation period was observed when eggs of *Bactrocera cucurbitae* were kept on the same natural host (4.0± 0.44). Whereas 30% - 90% hatchling was observed between eggs of both species on the same natural host. (Table 1).

Likewise, reduced larval period (5.6± 0.24 days) was recorded when eggs of *B. cucurbitae* kept on Indian round gourd whereas; increased larval period (6.6± 0.24) days was recorded when eggs of *B. zonata* were kept on the same host. Nevertheless, maximum larval survival (79.33±7.02) was observed of *B. cucurbitae* eggs and minimum larval survival (19.33±5.13) was recorded of *B. zonata* eggs on the similar natural host. (Table 2).

Furthermore, results revealed that reduced pupal duration (8.8± 0.37) was observed when eggs of *B. cucurbitae* were kept on natural diet and increased pupal period (10.6±0.24) was recorded when the eggs of *B. zonata* were provided with same natural host. Moreover, results depicts that maggots of *B. zonata* provided with Indian round gourd their pupal survival, (15.66±4.04) were significantly affected as it was compared with the maggots of *B. cucurbitae* provided with same natural diet (75.33 ±3.51) respectively. (Table 3).
Likewise, Indian round gourd also negatively affected on sex ratio (7.33 ± 3.05, 5.33 ± 2.30) male and female of *B. zonata* respectively, as compared with the male and female of *B. cucurbitae* (32.33 ± 2.51, 36.00 ± 5.29) respectively. Moreover same natural host also affected half emergence and deformed emergence of *B. zonata* eggs (1.66± 0.57, 1.33±0.57) as compared to the eggs of *B. cucurbitae* (2.66±0.57, 4.33±1.52) respectively. (Table 4)

4. DISCUSSION

It has been widely documented that food is positively correlated with the biological parameters of the insects. Similarly, in our study Indian round gourd significantly affected the pupal duration, pupal survival and adult emergence of *Bactrocera zonata*. Our results are similar with the studies carried out by (Hollingsworth *et al.*,) [6]. In our study *Bactrocera cucurbitae* showed maximum growth ratio on Indian round gourd as compared to *Bactrocera zonata* (Chiou *et al.*,) [2] who reported substantial difference in the pupal period and their survival and also adult emergence, when they provided them different diets. Similarly, on same cucurbit host pupal duration and pupal survival fluctuated, (Gupta and Verma) [5]. Interestingly, cucurbit host affected negatively we found the less deformity of *B. cucurbitae* as compared to *B. zonata*. Similar with results were reported by (Rauf *et al.*,) [7]. Furthermore, in this experiment, reduced larval duration was recorded when the maggots of *B. cucurbitae* were provided with natural diet compared to *B. zonata*. Reduced larval growth was reported by (Abro *et al.*,) [1], who provided maggots with natural host. Similarly lowest incubation period was demonstrated by (Manzar and Srivastava) [8], who provided *B. cucurbitae* eggs with Momordica charantia in comparison with *B. zonata* eggs.

Our results are in line with the studies carried out by (Dohrey) [3], who reported lowest incubation period and reduced larval growth when they provided *B. cucurbitae* with Indian round gourd. Similarly, Egg viability of *B. cucurbitae* was not affected when provided with Indian round gourd. Correspondingly, higher survival and egg viability was recorded by (Samalo *et al.*,) [10] when they fed *B. cucurbitae* with Indian Squash. However, egg hatchability of *B.zonata* was significantly affected when they were kept on Indian round gourd, might be suggesting the physiological effects emitted by fruit odor as *B. zonata* is not the regular host of Indian round gourd.

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. Showing incubation duration and Eggs hatching ratio, of *B. cucurbitae* and *B. zonata* eggs reared on Indian round gourd.

Fruit flies	Incubation duration (days)	Hatched Eggs (number of Hatchlings)
Eggs of *B. cucurbitae*	4.0± OA4	91.6 ± 1.52
Eggs of *B. zonata*	5.0±0.51	33.3 ± 7.63

Table 2. Showing larval duration and larval survival (Pupal recovery) of *B. cucurbitae* and *B. zonata* eggs reared on Indian round gourd.

Fruit flies	Incubation duration (days)	Larval survival (Pupal recovery)
Eggs of *B. cucurbitae*	5.6 ± 0.24	79.33± 7.02
Eggs of *B. zonata*	6.6± 0.24	19.33± 5.13

Table 3. Showing pupal duration and pupal survival (No of adult emergence) of *B. cucurbitae* and *B. zonata* eggs reared on Indian round gourd.

Fruit flies	Pupal duration (days)	Pupal survival/No of adult emergence
Eggs of *B. cucurbitae*	8.8± 0.37	75.33 ± 3.51
Eggs of *B. zonata*	10.6±0.24	15.66 ± 4.04

Table 4. Showing effect of Indian round gourd on the on total adult emergence of *B. cucurbitae* and *B. zonata* eggs.

Fruit Flies	Male	Female	Half emergence	Deformed emergence
Eggs of *B. cucurbitae*	32.33±2.51	36.00±S.29	2.66±O.57	4.33±l.52
Eggs of *B. zonata*	7.33±3.05	S.33±2.30	1.66±O.57	1.33±O.57

UNIVERSITY OF SINDH JOURNAL OF ANIMAL SCIENCES
Vol. 5, Issue 2, Pp: (18-24), June, 2021
Email: editor .usjas@usindh.edu.pk
Website: http://usindh.edu.pk/index.php/USJAS
ISSN (P): 2521-8328
ISSN (E): 2523-6067
Published by University of Sindh, Jamshoro
(USJAS)

FEEDING BEHAVIOR OF MANTIDAE SPECIES (MANTODEA) FROM SINDH, PAKISTAN

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ARTICLE INFORMATION

Article History:
Received: 25th April 2021
Accepted: 20th June 2021
Published online: 15th July 2021

Author's contribution
All authors contributed equally.

Key words:
Feeding; Behavior; Mantidae; Mantodea; Sindh.

ABSTRACT

The sum of activities of animals that is directed towards the procurement of nutrients is collectively called as feeding behavior. The same food or the prey is procured differently by different predators with the help of special capabilities i.e Mantidae and Mantodea. Mantodea is a group of mostly large and conspicuous predatory insects with versatile, unique, and special capabilities. They prey upon a wide array of animals, ranging from springtails to small vertebrates hence are the best biological pest control agent. Observing the feeding behavior of praying mantids under natural conditions is difficult due to their speed, camouflage, low lying-in vegetation etc. That's why this study was undertaken to see feeding behaviors of three diverse occurring species in Laboratory conditions. Consequently, their oothecae (egg case) were collected sorted out for raring. The collected oothecae fixed in aerated cadges with all required factors and after hatching the feeding behaviors of *Tenodera attenuata*, *Sphrodomantis transcausica* and *Mantis religiosa* was recorded.

1. INTRODUCTION

Praying mantids (PMs) belongs to class insect and suborder mantodea. PMs obtain their name for their raptorial prothoracic legs which twist and held together at an angle that suggest the position of prayer. PMs are very efficient and deadly predators that catch and eat a variety of insect pest and other small prey. They are regarded as tremendous pest controller. They decrease the population of various insects that are threat to our farming. These are regarded as master of camouflage; the MPs can be an able to assistant to formers and gardeners. They occur mainly in warmer parts of the world (Beier) [1]. They are exclusively carnivorous feeding both in their nymph and adult stages on a variety of insect pest (Gangwere) [2].

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They are exclusively carnivorous feeding both in their nymph and adult stages on a variety of insect pest (Richards) [3], (Khokhar) [4]. MPs belong to top predator group of arthropod community (Yager) [5], Ehrmann [6]. The male especially fly during the dusk at the night to find the mating partner. (Walsby) [7]. Females, on the other hand tend to stay constantly in one area (Suckling) [8]. The "Mantodea" is a Greek word Mantis meaning "prophet" and odea meaning "form or kind" given by the German entomologist (Bowie) [9], (Ehrmann) [10]. In insect's world PMs are regarded as lions because mantids are robust and cruel alike and female mantids are doing most of the hunting alike lioness and after prey they used to clean their mouthparts like cats. However, they are cruel predators because they never wait for the death of victim. Males and females have elongated bodies and divided into three parts head, thorax with two pair of

wings and abdomen. Easily diagnostic characteristics of praying mantis are: Figure 1. (a & b), Triangular head, Forelegs and oothecae. They can rotate their head 180 angle to examine their surroundings with two large compound eyes and three ocelli or simple eyes located between them. They use their front legs to trap their prey with reflexes so fast that they are difficult to see with naked eye. Their front legs contain sharp projections for grasping prey and spinning it in place. Ootheca is a hard brown honeycomb like egg case which protects the eggs until they hatch.

The number of eggs in each oothecae varies, being as high as 70 and as low as 5, with 20-40 most common (34 average) (Otte) [11], Hurd [12], Rivera [13]. Oothecae are often found on exposed parts of tree trunks or branches and human made structures such as fences and posts (Soomro, *et al.,*) [14] and tend to be on trees with unshaded trunks (Ursani, *et al.,*) [15]. Oothecae are most notably found in the orders Blattodea (Cockroaches)
and Mantodea (*Praying mantids*) as well as in the subfamilies Cassidinae (Coleoptera) and Korinninae (Phasmatodea) (Ursani, *et al.,*) [15]

2. MATERIALS AND METHODS

The present study was conducted at different localities of District Matiari of Sindh province, Pakistan to found out the praying mantis species.

Collection of Mantids: In May to October of year 2017-2018, 329 specimens of praying mantids along with 40 ootheca were collected from several localities of District Matiari. Specimens were collected by hand picking, insects collecting net and using light traps from crops, bushes, grasses, open grounds, bark of trees, and semi deserts (Fig 5-8). The fields choose where no tillage, no sprays, and no chemical.

Feeding Behaviors: Observations on the feeding behaviors were determine on live mantids early in the morning in open fields, in glass house cadges in the lab and green house at Institute of Biotechnology and Genetic Engineering. After detecting the species and silently watching their feeding for about two to four hours. Photographs were captured by digital camera 14.5 megapixel.

3. RESULTS AND DISCUSSION

During present-day study, the survey was completed by visiting different localities of Matiari and large number of praying mantis and oothecae were collected during the year 2017-2018. Total 329 specimens and 40 oothecae of PMs were recorded. From this part of Sindh, no satisfactory work has been reported this is the first time a comprehensive work is being done. Some of the species could not be identified as few of them were nymph and few were adults. Collection was made where there is natural habitat, where no tillage no pesticides sprays were used and also where is no bi-annual cultivation on the other hand the species richness were decreased in cultivated areas and almost half number of earlier reported species vanished from previously reported habitats. It was clearly observed during research work that each PM has possession of micro habitat for instance some live in grasses, while other found on the trees, bark of trees etc., where they can easily prey on the insects and other small animals, mating, survive successfully due their camouflaging nature and lay eggs in protective places.

Throughout the world, 2300 species belonging to 436 genera and eight families known to occur of which, 38 species in 23 genera and 5 families exist in Pakistan. After the assortment and identification of specimen and ootheca of three species collected from different localities of district Matiari during the months May to October in 2017-2018, were kept for the study of feeding at Institute of Biotechnology and genetic engineering, Sindh University Jamshoro.

Specimen were processed according to standard entomological methods and ootheca measured in mm. These were kept at 25 °C - 30 °C day and night temperature and relative humidity 65% - 85% in an aerated transparent glass house above covered with fine mesh nylon cloths. The glass houses were famished muddy and bushy as compared with natural habitats of praying mantis fig 4.7. After hatching the Nymph were transferred in other glass cadge in the same way (4 feet in length, 2 feet in width & height) where parameters of hatching and feeding was recorded.

Nymphs were looked famished and like red ants get an experience of the outside air for the first time, they will hang around the egg case for a little while as with spiderlings where a few cases of cannibalism also eyewitness (Figure). After hatching nymph were transferred in other glass cadge to prevent cannibalism and provide space, where the measurement of nymphs after each molt, time and feeding behavior documented as in table. Nymphs were appropriately supplied their prey which was collected by insect net. After each molt, each molt nymphs become sluggish and stop feeding. As the nymph increases in size, the consumption of the prey also increases. Period between 1st to 3rd instar have high mortality rate but it decreases in 4th and 5th instars. Adult females have long longevity having six broad abdominal segments while male have eight thin abdominal segments. Females were more pitiless eager prey feeder, spend more time in hunting and eating anything which come to into their approach but males become lazy and rarely hunting. The nymph pursue and capture the prey and prefer small and soft parts of the prey have variety of feeding behavior including cannibalism.

Adult females of *Tenodera attenuatta* and *Sphrodomantis transcaucasica* stay and wait for prey, when prey approaches near they strive with the part of second and start eat and rarely chase the prey.

While females of Mantis *religiosa religiosa* often chase the nearby prey. Adult males mostly moving and randomly catch the prey.

4. 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. Collection of mantids from thirteen (13) site of District Matiari

Name of Species	OS	OV	SE	KH	NM	SP	BS	MA	ST	SA	ZA	PI	HA	#sp
Mantis religiosa religiosa (Linnaeus 1758)	+	+	+	+	-	+	+	+	+	+	-	-	+	**116**
Sphrodromantis transcaucasica (Stoll 1937)	+	+	+	+	+	+	+	+	+	+	+	-	-	**58**
Tenodera fasciata (Olivier, 1792)	+	+	+	-	-	-	+	-	-	-	+	-	+	**155**
Total specimen of praying mantids collected														**329**

Note: (+) sign indicates the presence of species while (-) sign indicates absence of the species.
OS= Oderolal Station, OV= Oderola Village, SE= Sekhat, KH= Khyber, NM= Nobat Mari,
SP= Sultan Pur, BS= Bhitshah, MA= Matiari, ST= Sheer M. Thora, SA= Saeedabad, ZA= Zairpir, PI= Pingharo, HA= Hala

Table 2. Collection of ootheca of mantids from thirteen (13) sites of District Matiari

Species	OS	OV	SE	KH	NM	SP	BS	MA	ST	SA	ZA	PI	HA	#sp
Mantis religiosa religiosa (Linnaeus 1758)	+	-	-	-	-	-	+	+	-	-	-	-	+	09
Sphrodromantis transcaucasica (Stoll 1937)	+	+	-	-	-	-	-	+	+	-	+	-	-	12
Tenodera fasciata (Olivier, 1792)	+	+	+	-	-	-	+	-	-	-	+	-	+	19
Total oothecae of mantids collected														40

Note: (+) sign indicates the presence of species while (-) sign indicates absence of the species.
OS= Oderolal Station, OV= Oderola Village, SE= Sekhat, KH= Khyber, NM= Nobat Mari,
SP= Sultan Pur, BS= Bhitshah, MA= Matiari, ST= Sheer M. Thora, SA= Saeedabad, ZA= Zairpir, PI= Pingharo, HA= Hala

Table 3. Measurement of ootheca and hatching status of Mantids.

Ootheca studies	Date of hatching	No. of hatching	No.of compartment/ eggs	Hatching birth rate %
1st	17 October, 2017	209	350	59.714
2nd	22 October, 2017	255	347	74.344
3rd	27 October, 2017	220	312	70.512

Figure 1-4. Easily Diagnostic characters of PMs: Triangular head, front legs, Ootheca and hatching of Ootheca

Figure 5-8. Showing mantids found in fields of Matiari

Figure 9. Showing a sample, Glass house made bushy and muddy as observed during survey of natural habitat of praying mantids

Figure 10-11. Showing praying mantis capture its prey

Figure 12-13. Showing the Nymphs of praying mantids

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Vol. 5, Issue 1, Pp: (25-28), June, 2021
Email: editor .usjas@usindh.edu.pk
Website: http://usindh.edu.pk/index.php/USJAS
ISSN (P): 2521-8328
ISSN (E): 2523-6067
Published by University of Sindh, Jamshoro
(USJAS)

ENSIFERA (ORTHOPTERA) FAUNA FROM BAHAWALPUR DIVISION

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ARTICLE INFORMATION

Article History:
Received: 20th February 2021
Accepted: 20th June 2021
Published online: 15th July 2021

Author's contribution
MY & MJS collected the data and performed the experiment. AW, MS & MR designed the study and wrote the paper.

Key words:
Ensifera: Orthoptera, Cholistan, Identification

ABSTRACT

A preliminary survey was conducted in the Cholistan University Campus. About 908 samples of Ensifera were collected and sorted out in to Tettigonioidea. Majority of samples were collected from Noshera i-e 195 followed by 187 from Basti Yar Muhammad and 153 from Mari Shakh sujra while least percentage was reported from Jageer Bhatti Dahri i-e 54. Identification is now up to family and generic level.

1. INTRODUCTION

Orthoptera includes two suborders, Caelifera (short-horned grasshoppers and locusts) and Ensifera (crickets, katydids, and weta). The Ensifera, sometimes collectively known as "long-horned grasshoppers are typified by antennae longer than the body, while the Caelifera have antennae shorter than the body. Grasshoppers are the largest and most diverse group of insects. Grasshoppers have several advantages for such studies, relating to its great body size easy catch ability and high dominance so, that it became a main invertebrate group for biological indication in its wider sense. They are often the main invertebrate consumer in grasslands and are to be important food source for many groups of predators e.g., birds, lizards etc. The grasshopper insect fauna generally are grouped as short-horned grasshopper (Caelifera) and long-horned grasshopper (Ensifera).

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"Ensifera" means "sword bearer" in Latin and refers to the typically elongated and blade-like ovipositor of the females, although several taxa have a reduced or absent ovipositor. There are more than 11,000 described species in Ensifera.

Members of Ensifera are sometimes collectively known as "long-horned grasshoppers" although this designation often is limited to members of the family Tettigoniidae (the katydids, also called bush crickets in some countries) and not the crickets or weta. More commonly, the designation grasshopper itself refers to members of the orthopteran suborder Caelifera, also known as "short-horned grasshoppers. As members of the insect order Orthoptera, ensiferans are characterized by chewing/biting mouthparts, incomplete metamorphosis (hemimetabolism), saltorial hind limbs (modified for leaping), and two pairs of wings that are held overlapping the abdomen at rest.

The forewings are narrower than the hindwings and hardened at the base, while the hindwings are membranous and folded fan-like under the forewings when at rest. Ensifera include fine and threadlike antennae with well over 30 segments (except the fossorial Cooloolidae); a sword-like, sickle-shaped, or needle-like six-valved ovipositor (when present); and elongate mandibles with a prominent incisor. While the ovipositor of ensiferans tends to be well-developed, female caeliferans usually lack a long, external ovipositor. Ensiferans inhabit terrestrial habitats, such as meadows, savannas, and tropical forests, although many are found in marshes and other wetland environments, including various conehead katydids on reef beds. Riffat, & Wagan [9], [10] & [11].

Members of both Caelifera and Ensifera are primarily herbivorous, but range from herbivorous, to omnivorous, to exclusively predaceous species. Some ensiferans feed exclusively on pollen and nectar of flowers (among them, *Zaprochilus spp*.) and some specialize on seeds of grasses (for example, *Neoconocephalus spp.* and *Ruspolia spp*.) or pine trees and other conifers (for example, Barbitistes constrictus). Behaviorally, members of Ensifera tend to be largely nocturnal, versus the more diurnal Caelifera, which tend to feed and mate in the daytime and molt and egg lay at night. Male ensiferans produce sounds to attract mates, as well as for defense of territory and to spread an alarm if seized by a predator. Females of some katydid species also can make short calls to signal a response to a male, although their means of sound production is different. Reproduction involves the transfer of a sperm sac, or spermatophore. Hopefully, this work will be first of its kind and will be great help to agencies dealing with pest control in Cholistan desert of Bahawalpur Pakistan. Many workers i-e Ahmed [1], [2], Bei Bienko [3], Bei Bienko, & Mishchenko [4], Bolívar [5], Eichwald [6]. Khalid *et al.*, [7], Kumar & Usmani [8] carried some taxonomic work but this selected area it was untouched therefore present attempt has been made.

2. MATERIALS AND METHODS

Collection of grasshoppers

The adults of Tettigonioidea were collected from the agriculture fields of rice, forests, fruit orchards, berry shrubs, semi desert & desert areas, trees, shrubs, herbs and grasses with the help of traditional insect hand-net (8.89 cms in diameter and 50.8 cms in length) as well as by hand catching. The collection was made during the year 2021 in the months of March to June from various area of Bahawalpur desert (Map. I).

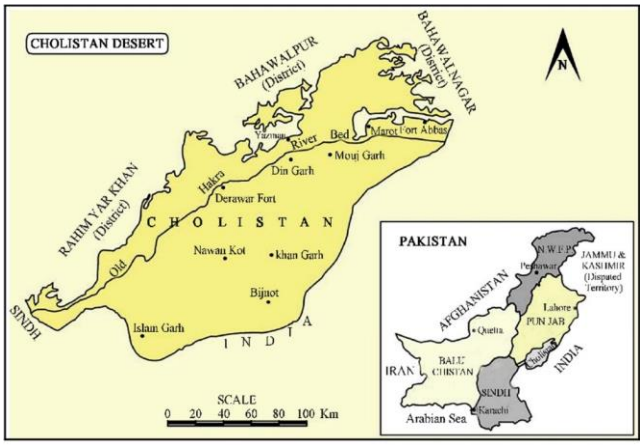

Figure 1. Map of Cholistan Desert

Killing and preservation of grasshoppers

The following method has been adapted from killing and preservation of grasshoppers. Collected material brought into the laboratory was killed by means of potassium cyanide in standard entomological killing bottles. The specimens were not left too long (½ hours) in cyanide because the color changed particularly that of green specimens all collected specimens were thoroughly examined under the stereoscopic dissecting binocular microscope and sorted out according to sub-families and species wise. Pinning of the specimens was made within few hours. As the specimens were flexible there was a little danger of losing any part through the necessary manipulation, further the parts could be stretched as desired. Mounting was done according to the following standard procedure. The insect pins were inserted on the pronotum posterior to transverse sulcus slightly to the right of median dorsal carina. The left wings were set with the long axis of the body nearly at right angle to the pin and the head was directed slightly downwards. The posterior legs were bent beneath the body to minimize the possibility of breaking and to occupy the least amount of storage space. The abdomen was so set that it dropped below the wings and not obscured by the hind legs as several taxonomic characters are found on the terminal end and these were not to be hidden till the

specimens were dried thoroughly. The body parts had to be supported with extra pins so that it can dry in the desired position and special attention was paid to the antennae, wings and legs in order to display important taxonomic characters. Dust and other extraneous matter were removed with the help of a dry camel hairbrush. The fully dried specimens were removed from stretching boards and were stored in standard entomological boxes with labels showing locality, date of collection and collector name. Napthalene balls were placed in boxes to prevent the attack of ants and other insect.

Identification of the specimens

Identification of specimen was carried out under the Stereoscopic Dissecting Binocular Microscope with the help of keys and description available in literature and on the "web site (http://www.orthoptera.org) Orthoptera Species File Online".

3. RESULTS AND DISCUSSION

Table 1. March to May 2021 form Bahawalpur Division Family Tettigoniinae

S. No.	Locality	Specimens
01.	Noshera	195
02.	Janu Wala	102
03.	Mubarkpur	75
04.	Hatheji	45
05.	Basti Yar Muhammad	187
06.	Basti Chachran	153
07.	Mari Shakh sujra	97
08.	Jageer Bhatti Dahri	54
	Total	908

It has been seen from Table 1 that significant numbers were reported from Noshera i-e 195 folowed by 187 from Basti Yar Muhammad and least numbers were captured from Mubarkpur i-e 75 followed by Hatheji i-e 45 these dissimilarities amongst the insect numbers just because of availability of host plants occur in that region. Earlier, Riffat & Wagan [9] also reported the species diversity difference in various region. Overall, it was noted that availability of host plant effect the diversity of any insect. If there is good environmental condition insect gave preference to that region.

Figure 2. Field Survey

Figure 3. Male

Figure 4. Female

4. CONFLICT OF INTEREST

The authors declares that there is no conflict of interests regarding the publication of this article.

5. ACKNOWLEDGMENT

We are highly thankful to our teacher Dr. Santosh Kumar (Assistant Professor, Department of Zoology, Cholistan University of Veterinary and animal Sciences, Bahawalpur) for his kind help regarding this manuscript.

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Vol. 5, Issue 2, June, 2021
Email: editor .usjas@usindh.edu.pk
Website: http://usindh.edu.pk/index.php/USJAS
ISSN (P): 2521-8328
ISSN (E): 2523-6067
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Vol. 5, Issue 2, June, 2021
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ISSN (P): 2521-8328
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REFERENCES:

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Vol. 5, Issue 2, June, 2021
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Website: http://usindh.edu.pk/index.php/USJAS
ISSN (P): 2521-8328
ISSN (E): 2523-6067
Published by University of Sindh, Jamshoro
(USJAS)

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ISSN (E)	**:**	2531-6067
ISSN (P)	**:**	2521-8328
Forthcoming Issue	**:**	Volume 5, Number 3, 2021
Submission By	**:**	August, 2021

UNIVERSITY OF SINDH JOURNAL OF ANIMAL SCIENCES
Vol. 5, Issue 2, June, 2021
Email: editor .usjas@usindh.edu.pk
Website: http://usindh.edu.pk/index.php/USJAS
ISSN (P): 2521-8328
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