



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

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### 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 rearing. The collected oothecae fixed in aerated cages with all required factors and after hatching the feeding behaviors of *Tenodera attenuata*, *Sphrodomantis transcaucasica* 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].

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

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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) <sup>[11]</sup>, Hurd <sup>[12]</sup>, Rivera <sup>[13]</sup>. Oothecae are often found on exposed parts of tree trunks or branches and human made structures such as fences and posts (Soomro, et al.,) <sup>[14]</sup> and tend to be on trees with unshaded trunks (Ursani, et al.,) <sup>[15]</sup>. 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.,) <sup>[15]</sup>

## 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 cades 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 cage 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 1<sup>st</sup> to 3<sup>rd</sup> instar have high mortality rate but it decreases in 4<sup>th</sup> and 5<sup>th</sup> 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 attenuata* 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	O S	O V	S E	K H	N M	S P	B S	M A	S T	S A	Z A	P I	H A	#sp
<i>Mantis religiosa religiosa</i> (Linnaeus 1758)	+	+	+	+	-	+	+	+	+	+	-	-	+	116
<i>Sphrodromantis transcaucasica</i> (Stoll 1937)	+	+	+	+	+	+	+	+	+	+	+	-	-	58
<i>Tenodera fasciata</i> (Olivier, 1792)	+	+	+	-	-	-	+	-	-	-	+	-	+	155
<b>Total specimen of praying mantids collected</b>														<b>329</b>

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	O S	O V	S E	K H	N M	S P	B S	M A	S T	S A	Z A	P I	H A	#sp
<i>Mantis religiosa religiosa</i> (Linnaeus 1758)	+	-	-	-	-	-	+	+	-	-	-	-	+	09
<i>Sphrodromantis transcaucasica</i> (Stoll 1937)	+	+	-	-	-	-	-	+	+	-	+	-	-	12
<i>Tenodera fasciata</i> (Olivier, 1792)	+	+	+	-	-	-	+	-	-	-	+	-	+	19
<b>Total oothecae of mantids collected</b>														<b>40</b>

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.**

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



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

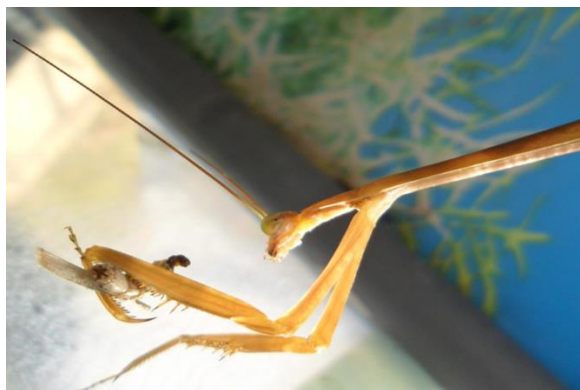




**Figure 5-8. Showing mantids found in fields of Matiari**



**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**