



A Study on the Colour Pattern of Painted Grasshopper in Taranagar Region of Churu District of Rajasthan (India)

Hans Raj Parihar¹

Assistant Professor

Department of Zoology

MJD Govt. College, Taranagar (Churu) Raj.

Rajani²

Research Scholar

MGSU, Bikaner (Raj.)

ABSTRACT: As we know that insects are very colorful creatures that look very attractive and beautiful. Color present in insect's bodies assists them in signaling, physiological adaptation, protection from predators, etc. Color also works as multiple channels of information and species identification. The present study gives special information about the color pattern of painted grasshoppers in Taranagar region. Taranagar is a block located in the Churu district in the north-western direction of Rajasthan (India). The insect diversity of this region is very rich. Different insects have different color patterns on their body. In the animal kingdom painted grasshoppers are put in order Orthoptera of class Insecta. Painted grasshoppers have a different color on their body by which they look attractive and beautiful. For this study data are collected by direct observation, field study, using hand picking method and insects collection net. Colors are identified by using a hand lens and microscope in the laboratory.

KEYWORDS: Color pattern, painted grasshoppers, Churu, Rajasthan, India.

INTRODUCTION: Many different types of organisms present on earth have different colors on their body parts. In the whole Animal kingdom, insects are placed under the class Insecta of the Arthropoda phylum. Grasshoppers are belonging to the Orthoptera order of class Insecta.

The term Orthoptera is simply derived from the words - Orthos; straight and ptera; winged, which refers to as straight forewings. Grasshoppers bear large and straight forewings in the mesothorax region. The scientific name of the painted grasshopper is *Poekilocerus pictus*. They are also known as 'Aak' grasshoppers because of their finding on the Aak plant. In the local language, it is named 'Ram ji ka ghoda'. A painted grasshopper is used as a model organism to study the morphology and physiology of a typical insect.

Their body is made up of three segments- the head, thorax and abdomen. Head is further segmented but their segments are fused and not seen clearly. The head bears two compound eyes, one pair of antennae, biting and chewing type of mouthparts, three simple eyes (ocelli), etc. In the thorax region, two pairs of wings and three pairs of legs are present. Their last two segments of the thorax are collectively referred to as 'pterothorax' because they bear two pairs of wings. Forewings of painted grasshoppers are narrow and slightly hard or leathery, also refers to as 'tegmina' whereas hind wings are transparent and membranous.

The abdomen is 11 segmented and cylindrical. They have stridulation ability by which they produce special sound. For this, they rub one of the veins of the tegmina with the femur of the hind legs. As the name suggests, they sit on green grass and eat it as food. They have a good jumping ability so when approaching them they quickly jump away. These are solitary insects. Mostly painted grasshoppers have camouflage ability. The numbers of painted grasshoppers are increases during monsoon in the study area.

Painted grasshoppers undergo incomplete metamorphosis (Hemimetabolous). There are three stages in their life cycle- Eggs, Nymph and Adult. Our research tries to identify colour patterns present on different body parts of painted Grasshoppers found in the Taranagar region of the Churu district of Rajasthan.

OBJECTIVES OF THE STUDY:

1. To know about colour patterns present on different body parts of painted grasshoppers.
2. To study the morphology of painted grasshopper.
3. To identify the current status of painted grasshoppers in the study area.
4. To enhance the scientific knowledge about painted grasshoppers.

STUDY AREA:

India is one of the mega diversity countries specified with high insect species diversity. Rajasthan, the largest state of the India located in the North-western direction of the Indian subcontinent where it contains most of the Thar Desert or Great Indian Desert. Taranagar is a block under the Churu district that is situated in the desert region in the Indian state of Rajasthan. Geographically latitude and longitude of Taranagar lie at 28°68'N and 75°03'E respectively. Due to the presence of the Thar Desert, this area has a hot, dry and arid climate. A large temperature variation can be seen here. The maximum and minimum temperature of this region is 50°C and -2°C respectively. Sand dunes, dry winds (also refers to as 'loo'), scarcity of food and water and seasonal temperature variations are the salient features of this area. The major crops of this area are Kharif (Til, Guar, Moong, Mothh, Bajra, Groundnuts, etc.) and Rabi (Mustard, Wheat, etc.). For irrigation a branch of the IGNP canal is present. Generally, humidity is 25%- 30% but during monsoon, it rises to 55%-60%. Hence the study region is an ecologically very sensitive area. In this area, grasshoppers are mostly found in grassland, garden, an agricultural area, etc.

METHODOLOGY:

MATERIALS: During the study of painted grasshoppers entomological forceps, insect collection nets, killing bottles, spreading boards, entomological pins, cotton, insect preservation box, hand lens, camera, mobile, microscopes, etc. equipments are used by the researchers.

METHODS: Nymphs and adults are different in size so for the study of the painted grasshoppers specialized technique and apparatus are required. Painted grasshoppers are

collected by using an insect net, hand-picking method, etc. The hand-picking method is a very common and easiest way to collect the painted grasshoppers at all time. Direct observation method and photography also be used by researchers for this study.

RESULT AND DISCUSSION:

As the name suggests painted grasshoppers bears many colours on their body. The colour pattern in this insect is different in nymphs and adult stages. The colour pattern on the body of the painted grasshopper is seen by researchers as follows:

Colour Pattern of the Nymph stage-

The antennae of nymphs are alternative blue and white in colour. The compound eyes of nymphs are blue with light yellow ventral line. On the dorsal surface, red dots are present in a row on each segment of the nymph's body. There are three rows of red dots are present by which two rows are on the lateral side and one middle row is also present in between them. The entire body of the nymph of the painted grasshopper is dotted with black and yellow dots.

Colour Pattern of the Adult stage-

1. **Antennae** – Blue and white colour bands are found on the antennae. Basal few segments of antennae are blue in colour. After it white and blue colours in one or two segments alternate from proximal to distal part.
2. **Pronotum** – On the dorsal surface of the thorax pronotum is present. Yellowish, bluish and greenish lines in the alternative form are present in this region. From the top view of the head and thorax, two yellow lines are present laterally and a greenish-bluish line is present in between them.
3. **Eyes** – Both the compound eyes are bluish in colour with a yellow line on the ventral side.
4. **Legs** – All the segments of the legs are yellow with light blue colour bands on nodes except- the femur. The femur segment of all 6 legs has a yellow and blue line in an alternate form. On the tibia, black spines are present.

5. **Wings** – Forewings or tegmina bears yellow, green, red and pink colour. At the basal surface where attach to the mesothorax, these are green coloured. The distal part of the tegmina is pink in colour. Wing venation can be seen clearly. At the dorsal surface, the veins from the proximal to the distal part of the forewings are yellow whereas at the ventral surface forewings are pinkish in colour. Hind wings are membranous with light greenish and reddish-orange from proximal to the distal end.
6. **Abdomen**- All the segments of the abdomen bear yellow and bluish-greenish bands dorso-laterally. These bands are present in an alternative form. On the ventral side yellow colour with a light blue line is present.

CONCLUSION: From the above study researchers concluded that painted grasshoppers bear different types of colours on their body surface which are different in nymphs and adults.

This research provides special information about the colour pattern of painted grasshoppers in the study area. In nymphs, blue and white bands on antennae, red dots on each segment of the body, and black and yellow dots on the entire body are present whereas in adults, blue and white alternate band on antennae, blue compound eyes with yellow lateral line and a yellowish-greenish pronotum is present.

The forewings of adults are green on the proximal and pink on the distal end whereas the hind wings are membranous with light green and light pink in colour. On the abdominal part of the adult yellow and greenish- the blue bands are present.

However, the presence of these coloured grasshoppers is looking very colourful and attractive. These colours assist them in signalling, physiological adaptation, protection from predators, species identification and information etc.

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REFERENCE:

1. Forsman, A., Ringblom, K., Civantos, E., & Ahnesjö, J. (2002). Coevolution of color pattern and thermoregulatory behavior in polymorphic pygmy grasshoppers *Tetrix undulata*. *Evolution*, 56(2), 349-360.
2. Forsman, A., & Appelqvist, S. (1998). Visual predators impose correlational selection on prey color pattern and behavior. *Behavioral Ecology*, 9(4), 409-413.
3. Civantos, E., Ahnesjö, J., Forsman, A., Martín, J., & López, P. (2004). Indirect effects of prey coloration on predation risk: pygmy grasshoppers versus lizards. *Evolutionary Ecology Research*, 6(2), 201-213.
4. Forsman, A., & Appelqvist, S. (1999). Experimental manipulation reveals differential effects of colour pattern on survival in male and female pygmy grasshoppers. *Journal of Evolutionary Biology*, 12(2), 391-401.
5. Gillis, J. E. (1982). Substrate colour-matching cues in the cryptic grasshopper *Circotettix rabula rabula* (Rehn & Hebard). *Animal Behaviour*, 30(1), 113-116.
6. Forsman, A., & Appelqvist, S. (1999). Experimental manipulation reveals differential effects of colour pattern on survival in male and female pygmy grasshoppers. *Journal of Evolutionary Biology*, 12(2), 391-401.
7. Karpestam, E., Merilaita, S., & Forsman, A. (2013). Detection experiments with humans implicate visual predation as a driver of colour polymorphism dynamics in pygmy grasshoppers. *BMC ecology*, 13(1), 1-12.
8. Forsman, A., Karlsson, M., Wennersten, L., Johansson, J., & Karpestam, E. (2011). Rapid evolution of fire melanism in replicated populations of pygmy grasshoppers. *Evolution: International Journal of Organic Evolution*, 65(9), 2530-2540.