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Research Article

Diversity and morphological identification of grasshoppers nearby Kannad tahesil, Gautala forest region district Aurangabad (MS) India

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ABSTRACT

Grasshoppers are insects that found very commonly and therefore, grasshopper's habitat can be varied, ranging from moist rain forests to hot deserts. These insects are funnily shaped and are distinguishable by their long legs and the surprisingly loud noise they make. Grasshoppers are herbivorous insects, which can jump, walk and fly. Grasshoppers have a typical 3 - part insect body, which includes the head, thorax and abdomen. They also have 2 antennae, 2 pairs of wings and 6 legs. Keep observation to learn more about grasshopper's habitat and facts about grasshoppers. The present study reveals that the diversity and morphological identification of grasshoppers can be studied on the basis of size, shape and color of the species, e.g. male grasshoppers are smaller than females, and size varies greatly between species from a length of 1 cm to more than 15 cm. Colors range from the plain shades of the field dwellers to the brilliant hues of some rainforest species. In some instances, males and females are colored which helps to differentiate the species.

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1. Introduction

Grasshoppers are observed in all kinds of habitats. Some examples of grasshopper's habitat are grasslands, rain forests, pastures, fields, swamps and tropics. Most surprisingly they are also found in deserts. In case of adverse conditions, grasshoppers are known to migrate in large numbers. Areas with dense vegetation like scrubs are home to some rare and interesting species of grasshopper. Common: Grasshopper habitats are generally concentrated in areas that have low growing plants, since they like to eat grass, leaves, and cereal crops. But, if there is depletion of these foods they start eating other favorable food for survival. Habitat Manipulation of Grasshoppers: Grasshoppers feed on crops like barley, corn, oats, etc., which are why they are regarded as pests by farmers.

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Key Identification of Grasshopper species- A wealth of knowledge concerning grasshopper biology and ecology, damage potential and control practices is available to anyone with the interest and the ability to search through entomological literature. The searcher will quickly note, however, that grasshoppers differ significantly in their biological attributes, damage potential and susceptibility to management. Hence, field workers must be able to identify grasshoppers, or the abundance of specific information on grasshoppers is practically useless Capinera *et al.*, (1982b). Believing that grasshopper identification are the key to knowledge concerning grasshoppers, Researcher Provide a dichotomous key to the adult grasshoppers known or thought to occur in Colorado. The illustrated key presented here is adapted from Alexander (1941); it is revised extensively although the original format is retained. Metamorphosis gradual (paurometabolous), nymphs resemble adults, typically develop external wing buds, and live in the same habitat as adults, typically taking the same food. In most crickets and katydids, the female mounts the male for mating -- apparently the primitive (original) behavior in Orthoptera. Short-horned Grasshoppers (Acridities) have a contorted mating posture with the male mounting the female, but the abdomen twisted eccentrically, Arnett (2004).

Materials and methods

Taxonomic Character

The treatment here follows primarily Orthoptera Species File. In this and related orders, some authors tend to elevate categories such as tribes, subfamilies, etc. to higher ranks, while others do the opposite or remain more conservative. Explanation of Names Greek *orthos* 'straight' + *pteron* wing. Ander (1939). Numbers of Species- 1200 spp. in 256 genera in our area, over 20,000 spp. Of Grasshoppers found in worldwide distribution.

General Identifying Characters of Grasshoppers-

- Hind legs long, modified for jumping
- Forewings (tegmina) hardened, leathery, spread in flight, covering membranous hind wings at rest
- Cerci (appendages at tip of abdomen) unsegmented
- Pronotum usually with large descending lobes on sides
- Hind coxae small and well-separated
- Hind tibiae with two dorsal rows of teeth

Morphological Appearance-

- Brown, with some darker markings
- Herringbone pattern on hind femur
- Big hind legs for jumping
- 2 pairs of wings: forewings narrow and relatively hard; hind wings large, membranous
- Antennae not very long, 20-24 segments
- Conspicuous eyes
- Cerci (pair of appendages at end of abdomen) unjointed
- Adult Males and Females

Males have a single unpaired plate at the end of abdomen. Female has two pairs of valves (triangle shapes) at end of abdomen used to dig in sand when egg lying.

- Immature (different stages)
- In very young stage, the grasshopper has no wings. In later stages, wings are visible as small pads at end of thorax.

Collecting Live Grasshoppers:

Where to find- The regions of study were selected, where the density of green farms and field is more was selected to collect young and active Grasshoppers for the study of their diversity among the size, shape and coloration. Grasshoppers are found in the spring and summer, but are most noticeable in the autumn. Areas with many grasses, small "vacant" lots and gardens are good places to start looking. Searching Grasshopper, during the middle of the day provide best results. At the night, a flashlight to find grasshoppers resting on the leaves

was used. In the summer and autumn, some grasshoppers fly into porch lights and therefore such porches were screened for grasshoppers, **Otte (1976)**.

How to collect- Catching grasshoppers requires patience and determination. The grasshoppers have wings; many species can fly faster than we can run. Those without wings are easier to chase. Grasshoppers are perceptive and can sense us when we are several feet away. An insect net can be swung or placed over the plant while holding up the bottom of the net. With hands grasshoppers are gently coax into the net. They can walk or jump up into the net. Once in the net, they gently picked up and placed in a container. It is also possible to collect grasshoppers by very slowly moving a glass or plastic vial towards the grasshopper's head and they will jump into it.

Equipments Used For Collection- Before proceeding to collecting the Grasshoppers the equipments used for collection was assembled. The equipments used were simple and inexpensive. The collecting kit include following items. Collecting net, plastic jar, Foresep, Thermacool sheath, Pins, Notebook, Pencils, Camera, Adhesive solution etc.

Methodology for Collection- The Grasshoppers were collected with the help of collecting nets. The net was made-up of nylon wire, which have loop of about 60 cm diameter. Over the nylon net the muslin cloth bags were hanging. The loops of net were attached to the stick of one meter length. Once a Grasshopper seen it is collected with the help of net and stored in the plastic jar immediately. The Grasshopper were collected and knocked into an open plastic jar. The Naphthalene balls were already kept into the plastic jar. Once the Grasshopper is entered into the jar, the lid is closed and Grasshopper got anesthesia due to Naphthalene balls. After few hours it get die. The Naphthalene balls also help to make the jar pest proof.

Preservation, Pasting and Photography- The collected Grasshopper are now picked up with the help of forceps; and pasted over the thermocol sheet. The pasting of the insects is done immediately after the death; otherwise body of insect gets rigid and breaking of delicate body parts takes place. The pasting of Grasshopper is done with the help of adhesive solution. Sometime the pins were also used. Naphthalene balls and camphor *etc.* were also used to make the sheath pest proof. The Grasshoppers were pest over the sheath within the boxes sketched by marker pen. The distance between two specimens was 3-4 inches; which were essential for the separate photography of insects for their morphological identification and separate from bulk species of Orthoptera or simply differentiate from cricket and katydids **Robert (1994)**.

Grasshopper's external manifestation on the basis of their color, size, shape and arrangement of hind limb and fore limb along with wing was done. The digital camera was used for photography and to analyze the external appearance of Grasshoppers and similar species which were found around the Talai gram of Dharni region of Melghat.

Results and discussion

This study reveals that the diversity and morphological identification of Grasshoppers, keys like strong hind legs for jumping, coloration for defensive function from predators as well as to attract the females when mating is required, size, shape plays an very important role. They belong to the order *Orthoptera* which means "straight wings", Grasshoppers can be divided into three categories: those with colorful wings, with a slanted head and with a spur or peg between the first pair of legs. The different species of grasshoppers allocated from Kannad tahasil gram of Gautala forest region, and then pasted on thermocol sheet for identification on the basis of size, shape and colour of male and female grasshoppers species.

Following is the chart given on the basis of which further identification is carried out.

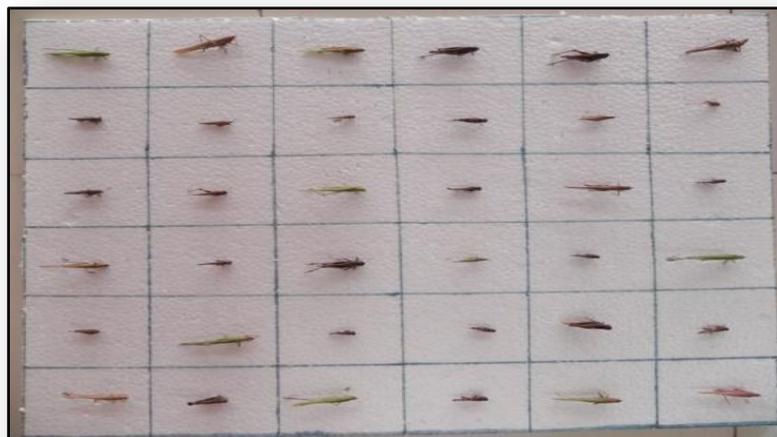


Chart of all collected grasshoppers species.



Fig.-1. Band-winged (broadly rounded head) Grasshopper (Female).



Fig.-2. Band-winged (broadly rounded head) Grasshopper (Male).

The present study reveals that the diversity and morphological identification of grasshoppers can be studied on the basis of size, shape and colour of the species, *e.g.* male grasshoppers are smaller than females, and size varies greatly between species from a length of 1 cm to more than 15 cm. Colors range from the plain shades of the field dwellers to the brilliant hues of some rainforest species. In some instances, males and females are colored which helps to differentiate the species.

Conclusion

Grasshoppers and the Environment- Abundant grasshoppers are extremely destructive to green vegetation by acting as pest on crop and reduce the yielding capacity in the field. So it can be controlled by integrated pest management (IPM). It is concluded that before destroying the ecology of grasshoppers it is necessary to check the food chain, their population or their diversity in the environment, it feasible to understand the species-specificity without destroying them.

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