



STUDIES ON DIVERSITY AND RELATIVE ABUNDANCE OF DUNG BEETLES (COLEOPTERA: SCARABAEIDAE) FROM SAKRI TAHSIL, DIST-DHULIA (M.S.) INDIA

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ABSTRACT An updated checklist of 15 species (14 genera) of Scarabaeoid beetles (Coleoptera: Scarabaeidae) belonging to 5 subfamilies (Scarabaeinae, Rutelinae, Melolonthinae, Dynastinae and Cetoniinae) is provided for the first time. The survey was carried out in 2015-2017, from Sakri tahsil, Dist- Dhulia (MS). Out of total species, the subfamily Scarabaeinae contribute dominant number i.e. 6 species (40 %) followed by Dynastinae 3 species (20 %) while remaining subfamilies having 2 species (13.3 %) each. The subfamily; Scarabaeinae include the beetle which exclusively feed on dung and carrion. Whereas the beetles in the subfamilies; Rutelinae, Melolonthinae, Dynastinae and Cetoniinae are phytophagous in nature and acts as pest of various commercial crops of agricultural and forestry importance. Our observations indicate relative abundance of beetles in monsoon than in winter and summer.

KEYWORDS : Scarabaeoid, Coleoptera, Dung beetle, Carrion, Phytophagous, Crop pest

INTRODUCTION

The family Scarabaeidae is one of the largest families in order Coleoptera; these are world's most fascinating beetles noticeable due to their relatively large size, bright colors, elaborate ornamentation and interesting life histories. The family falls under super family Scarabaeoidea which currently includes approximately more than 37000 species under 2500 genera (Krajcik, 2012). The Scarabaeidae is the richest family in Scarabaeoidea which is composed of about 91 % of all the scarabaeoids and include about 27,800 species worldwide. In India about 1590 species under 203 genera are known. Scarab beetles are generally heavily build and small to large in size. They can easily be recognized by characteristic form of antennae. The group is very important economically and some of the most serious pest of agriculture, forestry and fruit trees belongs to this family. *Oryctes rhinoceros* is a well known pest of coconut plantation *Phyllognathus dionysius* feeds on the roots of paddy, rose chafers are known for their damage to forest and fruit trees. Larvae of some of the melolonthid beetles are serious pest ground nut cultivation in some parts of India. The majority of the members of this family is nocturnal in habit and come out at dusk and hides during day time, but some are diurnal. A large section of the species is foliage feeder or coprophagous in nature; larvae generally develop in soil rich in organic matters; some are root feeders and are found in dung or rotting animal matters. The family Scarabaeidae is further divided into 16 subfamilies, 82 tribes and 94 sub tribes (Smith, 2006). The beetles in the subfamily scarabainae are commonly called dung beetles while most species in the subfamilies viz., Rutelinae, Melolonthinae, Dynastinae and Cetoniinae feed on plant products and are agricultural pests of various commercial crops. The dung beetles perform a series of ecological functions such as nutrient cycling, soil aeration (Mittal, 1993), secondary seed dispersal and regulation of enteric parasites and dung breeding dipterans pests (Kailash Chandra et al., 2015).

A perusal of literature on the diversity of Scarabaeidae beetles from different state of India were reported by some earlier workers viz.,

- Aland et al (2012) surveyed and collected 59 species of scarabaeid beetles in and around Amba Reserved forest of Western ghats region Kolhapur district, Maharashtra.
- Bhawane et al (2012) reported 29 species of family scarabaeidae. Most of these are polyphagous and serious pest of agricultural, horticultural and silvicultural crops.
- Bhawane et al (2014) made survey on collection of 26 species of dung beetles of Scarabaeinae subfamily from Sindhudurg district, Maharashtra, India.
- David and Petr (2013) reported 29 species of aphodiinae tribes (Coleoptera: Scarabaeidae) from the state of Goa, Maharashtra and Rajasthan (India).
- Deanshu Gupta et al (2014) updated 61 species of scarabaeoid beetles belonging to 30 genera, 19 tribes, 3 families and 7 subfamilies from Pench Tiger Reserve, Madhya Pradesh, India.
- Hon Shashikant Trimbak (2018) a communication report on 29 species of Scarabaeidae family from Kopergaon tahsil, Dist- Maharashtra, India.
- Kailash Chandra and Ahirwar (2005a) made comprehensive survey of Bandhavgarh National Park in Madhya Pradesh revealed

44 species in 24 genera and 8 sub families.

- Kailash Chandra and Ahirwar Gupta (2005 b) made comprehensive list of total 61 species of scarabaeidae beetles pertaining to 27 genera under 8 sub families from Kanha Tiger Reserve, Madhya Pradesh, India.
- Kailash Chandra and Devanshu Gupta (2012 a) reported taxonomic account of 4 species of genus *Bolbohamatum* and one species of genus *Bolbogonium* from Central India (Madhya Pradesh and Chhattisgarh).
- Kailash Chandra and Devanshu Gupta (2012 b)) diversity and relative abundance of Pleurostict scarabaeidae were studied and analyzed in Achanakmar-Amarkantak Biosphere Reserve, Chhattisgarh.
- Kailash Chandra and Devanshu Gupta (2012 c) made survey of 52 scarab beetles belonging to 24 genera and 5 sub families of family scarabaeidae from Achanakmar-Amarkantak Biosphere Reserve, Chhattisgarh, India.
- Kailash Chandra et al (2012) reported faunal account of scarab beetles from Govind wildlife sanctuary, Uttarakhand, comprising 11 species belonging to 2 families of superfamily Scarabaeoidea.
- Kailash Chandra and Devanshu Gupta (2013) represent taxonomic account of 52 species of dung beetles belonging to 22 genera, 12 tribes and 3 families from Chhattisgarh.
- Kailash Chandra et al (2015) reported scarab beetles belonging to 53 species, 27 genera and 6 sub families from Sidhi district of Madhya Pradesh, India.
- Patole (2018) represent taxonomic account of 33 coleopteran beetles belonging to 8 families from Sakri region, Dist- Dhulia (M.S.).
- Pawara et al (2014) recorded 35 species belonging to 28 genera under 13 families of order Coleoptera from Jalgaon district of Maharashtra, India.
- Sarkar, S. K., Suman Saha and Raychaudhari, D. (2014) reported taxonomic account of 8 dynastinae fauna (coleoptera: Scarabaeidae) of Buxa tiger reserve (West Bengal, India).
- Thakare et al (2012) accounted 32 species of scarab beetles belonging to 22 genera, 8 subfamilies and 3 families under superfamily Scarabaeoidea from Melghat Tiger Reserve, Vidarbha, Maharashtra (India).

Scarabaeid beetles already have attracted attention of researchers in other parts of Maharashtra State, where considerable work has been done on various aspects. However, no research work has been undertaken in this region on any of its aspect. Therefore, attempt has been made for first time to study diversity and relative abundance of dung beetles (Coleoptera: Scarabaeidae) from Sakri taluka which is the adjoining part of Western Ghat, Maharashtra.

MATERIALS AND METHODS

STUDY AREA-

Sakri is a largest tahsil in Dhule district of Maharashtra State, India. It belongs to Khandesh and Northern Maharashtra region of Nashik division. It is located 70 Km towards west from District head quarters Dhule and 307 Km from State capital Mumbai towards South. Study

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area has; altitude: 215 meters above Sea level; Latitude: 21.08715 and Longitude: 74.3601. Sakri taluka is bounded by Baglan taluka towards South, Navapur taluka towards west, Nandurbar taluka towards North, Uchchhal taluka towards west. Nandurbar City, Satana City, Dhule City, Malegaon City are the nearby Cities to Sakri.

Both extensive and intensive surveys were conducted during 2015-2017 in different villages of study area. Field visits were made on holiday during the period of survey. For collection of beetles, sweep nets, bush beating and collection in inverted umbrella and hand picking techniques were used. Decaying vegetable matter and dung of various animals was also examined to make collection. In evening hours light trap was used to collect nocturnal beetles. Sample after collection were killed in chloroform and preserved in 70% ethyl alcohol in glass vials. Necessary data regarding locality, date of collection etc noted in notebook. They were then brought to the laboratory, where stretching, pinning, labeling, and drying and photograph is done as per the guidelines laid by zoological survey of India. For authentication, the preserved samples were periodically send to Zoological Survey of India, Western Regional Station, Akurdi, Pune (M.S.), India.

RESULTS AND DISCUSSION

In first attempt, Scarabaeid beetles were collected through extensive survey from in and around Sakri tahsil, district- Dhulia (MS). The study revealed total 15 species of Scarabaeid beetles belonging to 5 subfamilies viz., Scarabaeinae, Dynastinae, Rutelinae, Melolonthinae and Cetoniinae are presented in table-1. Of these Scarabaeinae were found to be dominant (40%) over the other subfamilies. Beetles of this subfamily exclusively feed on dung and carrion and are commonly called 'dung beetles' whereas the beetles in the subfamilies like Dynastinae, Rutelinae, Melolonthinae and Cetoniinae are pests of various commercial crops and usually called 'Chafers'.

For the process of dung burial and relocation, the dung beetles play significant roles in nutrient cycling, soil aeration, secondary seed dispersal and regulation of enteric parasites as well as dung breeding dipterans pests (Mittal, 2005). They are classified into three categories like tunnellers, dwellers and rollers. The tunnellers species bury brood balls in vertical chambers in close proximity to the original deposition site and the roller species carry the dung balls to some horizontal distance away before burial beneath the soil surface. Whereas the dweller species brood their young ones inside the dung mass itself. The dung beetles reported in present work from Scarabaeinae family, the species *Gymnopleurus cyaneus* F. and *Gymnopleurus gemmata* H. were dung rollers while the species *Catharsius pithecius* F., *Onitis philemon* F., *Onthophagus hindu* Arrow and *Heliocopris gigas* L. were tunnellers. Earlier researchers estimated that about eighty thousand tons of excrement is daily carried into the soil by these dung beetles in India at different depth in the ground. But this activity going to be decreasing every year might be due to loss of beetle habitat, altered food quality due to pollutants, decrease in amount of dung or number of cattle and increased cattle antibiotics as well as other environmental changes. Same observations were reported from study area.

The scarab beetles collected from study area in subfamilies like Rutelinae, Melolonthinae, Cetoniinae and Dynastinae feed on plant products and are acts as agricultural pests of various commercial crops. Nine species were recorded from the study area with most of them widely distributed. The adults are phytophagous, they feed on foliage of different trees whereas their grubs causes extensive damages to the roots of cereals, legumes and many other small trees cause extensive damage to field crops and fruits particularly growing during rainy season. Hence, they are appeared as serious pests of economically important crops like sugarcane, groundnut, pearl, millet, sorghum, paddy, chilies and number of leguminous plants (Kailash Chandra et al., 2015).

CONCLUSION

From study area, first time author reporting Scarabaeid beetles collected through extensive survey. The study revealed 15 species of beetles belonging to 14 genera scattered in 5 subfamilies viz., Scarabaeinae, Dynastinae, Rutelinae, Melolonthinae and Cetoniinae. Among these Scarabaeinae was dominant in number (40%) and these are tunnellers or rollers; plays significant role in nutrient cycling. Whereas beetles from other subfamilies are phytophagous and acts as pests of different trees and economically important crops. It is further observed that the density of dung beetles was going to be decreased

due to decrease in number of cattle, increased human interference as well as altered environmental conditions.

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Table-1: List of dung beetles (Coleoptera: Scarabaeidae) from Sakri tahsil (Dist- Dhulia) Maharashtra.

| Sr. No. | Name of Subfamily | Species- Scientific name | Feeding habits |
|---------|-------------------|--|----------------|
| 01 | Scarabaeinae | <i>Catharsius pithecius</i> Fabricius 1775 | Tunnellar |
| 02 | | <i>Gymnopleurus cyaneus</i> Fabricius 1798 | Roller |
| 03 | | <i>Gymnopleurus gemmata</i> Harold 1871 | Roller |
| 04 | | <i>Onitis philemon</i> Fabricius 1801 | Tunnellar |
| 05 | | <i>Onthophagus hindu</i> Arrow 1931 | Tunnellar |
| 06 | | <i>Heliocopris gigas</i> Linnaeus | Tunneller |
| 07 | Dynastinae | <i>Phyllognathus dionysius</i> Fabricius | Phytophagus |
| 08 | | <i>Oryctes rhinoceros</i> Linnaeus | Phytophagus |
| 09 | | <i>Eophileurus platypterus</i> Wood 1823 | Phytophagus |
| 10 | Rutelinae | <i>Anomala ruficapilla</i> Burmeister 1855 | Phytophagus |
| 11 | | <i>Adoretus lasiopygus</i> Burmeister 1855 | Phytophagus |
| 12 | Melolonthinae | <i>Maladera amboliensis</i> Ahrens & Silvia 2016 | Phytophagus |
| 13 | | <i>Holotrichia</i> Spp. | Phytophagus |
| 14 | Cetoniinae | <i>Chiloloba acuta</i> Wood | Phytophagus |
| 15 | | <i>Oxycetonia versicolor</i> Fabricius | Phytophagus |



1. Phyllognathus Dionysius F

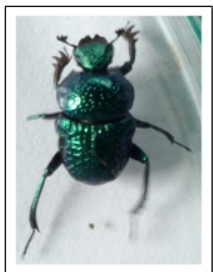


2. Anomalla ruficapilla B.

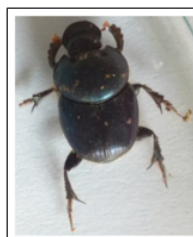
8. *Adoretus lasiopygus* B



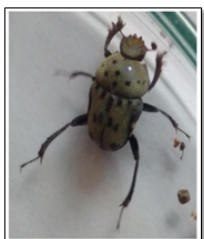
3. *Catharsius pithecius* F.



9. *Oxycetonia versicolor* F



4. *Gymnopleurus cyaneus* F



10. *Onthophagus hindu* A.



5. *Gymnopleurus gemmata* H



11. *Heliocopris gigas* L



6. *Onitis philemon* F



12. *Oryctes rhinoceros* L



7. *Chiloloba acuta* W



13. *Eophileurus platypterus* W.



14. *Maladera amboliensis*



Photo plates of Scarabaeidae beetles from Sakri tahsil Dist- Dhulia (M.S.).

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