



The Role of Dung Roller Beetle (*Scarabaeus viettei*) in Sustainable Environment in Agricultural Areas of Taranagar Region (Rajasthan)

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Abstract- This study examines the role of dung roller beetles to sustain agricultural area of Taranagar Tehsil of Churu district. Dung roller beetles are belonging from order Coleoptera of class Insecta of Arthropoda phylum. Dung beetles' feed on cattle's feces. They burrow the cattle's dung entering through tunnels and make round shape rolls, so that these are namely refer to as dung roller beetle. In this study authors are conclude that dung roller beetles play its crucial role to make sustainable environment of agriculture area in several ways such as- nutrient recyclers, decomposers, secondary pollinators, cattle's disease controllers, soil health indicators, etc.

Keywords- Dung, beetles, ecosystem, health, seed, dispersal, biodiversity, recycler, nutrient, pollinators, Taranagar, Rajasthan.

Introduction – All the insects are kept in the class Insecta of Coleoptera order of Arthropoda phylum. The special feature of the beetles is to carrying sheathed forewings that are also refer to as Elytra. They also have one pair of membranous hind wings which are completely covered by forewings. Insects are found in all ecological habitats such as terrestrial, areal, aquatic and polar also. Out of which dung beetles are ecologically found in terrestrial ecosystem. Mostly coleopterans contain biting and chewing type of mouthparts. Dung roller beetle is belonging from the Scarabaeidae family of the order coleopteran of class Insecta. It is the largest Family of the beetle and it is ecologically very important. The special feature of them is to burying and rolling the cattle's dung as dung balls that's why these are known as dung roller beetle. These are Coprophagous in their feeding behavior. They eat on dung of herbivorous mammals. For this work researchers select agricultural

area of Taranagar region. In this reason dung roller beetles are found in abundance number. There is cattle's dung easily available as food and other activity for dung roller beetle.

Review of Literature–

A study on Experimental evidence for the effects of dung beetle functional group richness and composition on ecosystem function in a tropical forest has been provided by Slade *et al.*, (2007). This study height lights the importance of both functional group identity and species composition in determining the ecosystem consequences of extinctions or altered patterns in the relative abundance of species.

Nichols *et al.*, (2008) has been study about ecological function and ecosystem services provided by Scarabaeinae dung beetle. The study was concluded that dung beetle plays important role in maintaining ecosystem integrity by working as a secondary seed dispersal and nutrient recycling, etc. This study also reveals that an improved understanding of the ecological importance of dung beetles is one contribution to understanding the consequences of diversity loss in natural and human dominant ecosystem.

Sewak's (2009) has studied about the species of Dung Beetles (Coleoptera: Sacarabaeidae: Coprinae) of Rajasthan. The study was based on the collection of the dung beetles collected from the 32 districts of Rajasthan by the differently parties of desert Regional Station, Zoological Survey of India, Jodhpur from 1963 to 2005. So far 102 species belonging to 14 genera of tribe Coprini under family Scarabaeidae have been identified. The study mentions that 66 species have been recorded for the first time from Rajasthan.

Cloud forest dung beetles (Coleoptera: Scarabaeinae) in the Western Ghats, a global biodiversity hotspot in Southwestern India was account by Sabu *et al.*, (2011). They studied that flightless species show a high level of fidelity to their preferred habitat and are efficient indicators of historical changes in their habitats, dominance and local endemism of flightless species *Oc. Devagiriensis*. It is an ideal indicator species and effective forecaster of habitat modifications of the unique cloud forest study region in the Western Ghats.

Decline of ecological functions performed by dung beetles in area of Atlantic Forest and contribution of rollers & tunnellers in organic matter removed was studied by Filho *et al.*, (2017). They conclude that necrophagous dung beetles were more sensitive to environmental disturbance. Owing to a lower richness and changes in species dominance, that resulted in a lower removal in the areas with greater disturbance and lower environmental quality in relation to less disturbance areas. These results highlight the implication of environmental disturbances on the functions of dung beetles, which respond differently according to the resource they use.

Anto and Vinod (2017), studied on succession of dung beetles (Scarabaeinae: Coleoptera) in the cow dung pats of a tropical Agro habitat in Kerala, South India. They conclude that the dung beetle in cow dung pats involved a short stay of 14 days. Fifteen species of dung beetles representing 8 Genera and 4 tribes were recorded in this study. They also said that beetles play an important role as ecological indicators, declining population of dung beetles in agricultural habitats, should be taken seriously.

A detailed study on Ecosystem services provided by dung beetles in Australia was done by Doube (2018). In this study author found that the dung roller beetle transforming the soil profile, buffering water and nutrient transfer through the landscape and increasing pasture production.

A detailed account on dung burial by roller dung beetles (Coleoptera-Scarabaeidae): An individual and specific level study was done by Carvalho *et al.*, (2018). This study results the need for further research considering that distinct species, even from the same genus, may perform different rates of ecological process, as well as about the importance for considering the beetle biomass when measuring their ecological functions.

A study on Ecological role of dung beetles (Coleoptera :Scarabaeidae) and their diversity in India by Yadav *et al.*, (2023). According to their estimates, there are over 600 genera & 30,000 species of beetles in the family Scarabaeidae. Which is the largest, most diversified, & most extensively dispersed group of beetles.

Aims of Study-

1. To provide a special information about dung beetles.
2. To know the scientific importance of the dung beetles.
3. To enhance the knowledge about dung beetle in agricultural field.
4. To know about the beetle importance in agriculture.

Study Area—In north western region of India, Rajasthan is situated from 23.3-30.12 N to 69.30-78.17 E of its geographical range. Taranagar is situated in the eastern part of India, in Rajasthan. Rajasthan is significantly well known for its deserted areas and hot & dry conditions. When we talk about Taranagar, it is located in the north-eastern part of Rajasthan, in Churu district. From the standpoint of vegetation, it is not very much rich, as most of the vegetation rich areas are near Aravalli mountain range, that bring a better monsoon effect. That's why it is considered as a short part of India's infamous Thar Desert.

Taranagar has a semi-humid, hot and dry climate. The conditions are predominately hot throughout the year because the summer period is very long and ranges from April to August till mid September sometimes. The landforms are quite variable including mainly sand dunes. Sand storms are often common during this season. But at the time of winter season we can also experience a pretty cold climate, when the temperature can also

touches zero degree Celsius sometimes. Many shrubs and unwanted plants & trees can be seen everywhere like a local tree named 'kinkar'.

Many people here are agriculture dependent. The farmers are primarily dependent on monsoon for the growth of their crops. The main Kharif crops are bajra & pulses (moong & moth) and main Rabi crops are gram, wheat, mustard, groundnut etc. Irrigational facilities are not much good and developed here till now. Here we can see a vast variety of animal and insect which may be either beneficial or harmful for the crops. There are so many worms and arthropods which play a negative role for the crops. To get rid of them, the farmers use insecticides and other chemical supplements by spraying them in the crops. These insects develop independently in rainy & humid environment and start to feed the leaves of the plants and they found the plants very identical for egg laying. This type of agricultural area is very suitable for dung roller beetles.

Methodology-

Method: For this study researchers were going for field survey in agricultural areas at early in the morning and at evening after sunset. Researchers collect data from direct observation of yard of cattle and through questionnaires from the people living in agricultural areas. Trap method, Photography method, acoustic monitoring method, etc. were also used by the researchers for collecting data and analysis.

Material: For collecting the data researchers used cannon camera, binocular, hand lens, light trap, mobile phone, reference books and researcher papers, etc. as material. Researchers also use insect collecting net for catching the beetles, killing bottle, insect collection box for preserving the beetle, etc.

Results and Discussion -

1. **Nutrient Recyclers** – Dung roller beetle plays an important role in recycling of nutrients because of their unique behavior for rolling and burying dung and creating a nutrient rich substance. This substance is uptake by plants roots and again these are available for animal consumption through plants.
2. **Decomposers**–Dung roller beetle break down the dead organic matter found by animals as well as plants by use them as a food source. It converts the dead organic matter into simpler matter and releases the gases and nutrient to the soil.
3. **Ecosystem Health Indicators** – Dung beetles are very sensitive to environmental changes so these are act as an important indicator of environmental health. Threat of climate change is face by dung beetle. As the number of dung roller beetles is increases, it means the population of other harmful pest and animal that feeds on dung is decreases.
4. **As Seed Dispersers** – To promote diversity and growth of plants, dung roller beetles disperse seeds so that these are also known as biodiversity increasers.

5. **Livestock Productivity Increases** – Dung roller beetles decrease the parasitic load and increases nutrient availability for livestock. By which animals becomes healthier and healthier animals produces healthier progeny.
6. **Natural Fertilizer Makers** – Dung roller beetles act as a living fertilizer in environment. It makes tunnel in the soil and fill them with cattle's dung. The nutrients present in the dung mix with soil and soil becomes healthier for plants growth.
7. **Secondary Pollinators** – Plants that are located just above the earth surface can be pollinated by dung beetles. They can be pollinating plants through their legs, antennae and their mouth parts, etc.
8. **Reduced Green-House gases** – Dung roller beetles reduce 14.5% of methane emission and 2.0% of Nitrous oxide emissions. The overall reduction of these gases is equivalent to 7% of carbon dioxide. This reduction of green- house gases is done 0.5% annually and 12% in grazing season.
9. **Regulate Ecosystem Service** –A lot of functions of ecosystem are carried out by dung roller beetle so that, it regulates a lot of ecosystem services such as- plant growth, seed dispersal, pest control, parasite control, etc.
10. **Increaser Soil Health** – Dung roller beetle degrades the dung and mixed the nutrients of dung into the soil, so that soil health becomes enriched and the fertility & structure of soil is improved. The activities of dung roller beetles help in carbon separation from soil so that climatic changes can become reduced.
11. **Reduce the Chances of Disease in Cattle's** – Dung roller beetle reduces the chances of parasitic infection in cattle because of their degradation role on dung. Due to the degradation, dung converted into fertilizer and the parasitic animals are not to be emerged from the dung and parasitic load of cattle's is reduces.
12. **Pest Controllers** – Dung beetles spreads faces so that the natural breeding procedure of dung flies is disrupt. Dung flies can't reproduce and lays eggs without dung surface. Therefore, Dung roller beetle controls the population of dung flies as pest controllers.
13. **Biodiversity Increases** – Dung beetles increase soil health by increasing their nutrient availability. Dung beetles reduce the parasites of livestock. They increase the plants growth by seed dispersal and soil enrichment. Therefore, the dung roller beetles also act as biodiversity increasers of such areas.

Dung roller beetles play very important role to sustain agriculture area. They do nutrient recycling, decomposers of dead organic matter of animals and plants, seed disperser, increase the productivity and reduce the chances of disease in livestock's by reducing their parasitic load. These are capable to making natural fertilizer. Dung roller beetle acts as the secondary pollinators of plants. They increase the biodiversity by controlling the population of pests and regulate the ecosystem service. Dung roller beetles are very sensitive for the changes in ecosystem so, they also act as ecosystem health indicator.

Conclusion—It is concluded that the role of dung roller beetle being positively related to the environment of agriculture areas. This research provides special information about the key role of dung beetle to sustain the environment in agriculture field of Taranagar region. In agricultural area, dung roller beetles burrow the dung and making dung balls. These balls are spread by dung beetle as natural fertilizer without gases and any type of chemical. By the decomposition of dung, they help to reduce parasitic load and infection to livestock. They provide nutrient to soil that's why the fertility of soil is increases. So, the role of dung roller beetle is very important to sustain the agricultural area.

Acknowledgement - Authors are appreciating very much to the contributors for research and very grateful to the Laboratory of Environmental Biology of P.G. Department of Zoology, GovernmentDungar College, Bikaner.

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