STUDIES ON BIODIVERSITY AND ABUNDANCE OF BEETLES AND BUGS IN AND AROUND UMRED AREA, DISTRICT NAGPUR, MAHARASHTRA, INDIA

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Abstract:

The present study has been done to find out biodiversity of bugs and beetle in Umred area district Nagpur. Umred is located at a distance of around 45 km from Nagpur. The area is surrounded by forest, farms, garden, lake, etc. More species were recorded during winter and monsoon season than in summer season. The observation of bugs and beetles was carried out at morning and evening hours. From these 35 species 7 bugs and 28were beetlespecies respectively. These 7 species of bugs belonging to 5 families and 7 genera were identified. Nearly 28 species of beetles belonging to13 families and 27 genera were identified.

Following suggestions are proposed by the main author: (a) establish in India the central and regional "Bug-Beetle gardenor park" and research stations in their natural habitats like social forest, general forest, mangrove forest, aquatic ecosystems, etc. (b) carry out model based experimental research on economically important species-specific mutualism between plants-bugs, plants - beetles that influences their life-cycles, survival, co-evolution, etc. (c) carry out research on interaction behaviour of phytohormones-pheromones of plants-bugs, plants - beetles and pheromones - pheromones of bugs-bugs, beetles-beetles and bugs-beetle on breeding cycle, population abundance, population stability and population-disruption that may lead to their extinction due to climate changes and other anthropogenic reasons (d) set up laboratories to preserve bug and beetle germplasm (terrestrial, arboreal and aquatic species respectively that are predatory, parasitic/parasitoid and coprophagous) (e) beetles are biological indicators of minor fluctuations of abiotic and biotic factors in specific habitats. They indicate ecological health of habitats.Spontaneous drastic fluctuations in environment due to climate changes may trigger topographical catastrophes and localized losses to agriculture, aquaculture, animal husbandry, etc. Captive breeding of beetle species under artificially controlled conditions for above monitoring purpose is proposed (f) carry research on roles of coprophagous beetles in spread and prevention of zoonotic diseases as well as plant diseases; also role in maintenance of sanitation and hygiene (g) unravel mysterious roles of bugs and beetles as flagship species, initiate investment services to preserve and promote environment for their future generations to survive; conserve their specific genotypes, adapt to co-evolve new genotypes to cope up with evolution in their specific host plants that will be necessary to survive in altered climatic conditions to overcome the threat of extinction. The authors suspect that Xylocopa violacea (apidae) may be a transitional evolutionary link between ‘bumble bees’ and ‘beetles’. Genetic studies are needed to confirm the above statement.

Key words: Umred, Bugs, Beetle, Biodiversity, Conservation, Necrophagous.

Introduction:

Coleoptera is an order of insect commonly called as beetles, in Greek Keleos, means 'sheath' and pteron, meaning 'Wing', they have two pairs of wings, the front pair, the elytra. The diversity of beetles is very wide, they are distributed in all habitats, except marine and polar regions. Some species are adapted to practically every kind of diet. Coleopteran are found in nearly all natural habitats, that is, vegetative foliage, from trees and their bark to flowers, leaves, and underground near roots, even inside plants like galls, tissue including dead or decaying ones. About more than 50% of beetle species are phytophagous in both the larval and adult stages, living in or on plants, wood, fungi and a variety of stored products including cereals, tobacco, and dried fruits, the beetle are pest but can also be beneficial, usually by controlling the population of pest.

Prior to the termination of cretaceous period more than 95% of beetle families originated and radiated parallel with hemimetabolous insects to overcome three of the five huge phanerozoic mass extinctions.After evolving the Coleopterans (order polyphaga) experienced in late carboniferous period a total accelerated diversification.Research work indicate PCWDEs encoded into the genomes had rapidly initiated adaptive radiations in about 50 % of extant beetle species to digest the plant food material leading to development of diverse herbivorous feeding habit that was responsible for low extinction rate of the beetles.

The Hemiptera or true bugs are an order of insects comprising some 50,000 to 80,000 species of groups such as cicadas, aphids, plant hoppers, leaf hopers and shield bugs. Hemipterans feed on plants. They live in wide variety of habitats, generally terrestrial, some species are adapted to life in or on the surface of freshwater. Some species of bug are important agricultural pests, damaging crops by the direct action of sucking sac. Other species have been used for biological control of insect pests. The majority of species are terrestrial, including a number of important agricultural pests, but some are found in freshwater habitats. The present study is intended to reveal the diversity and abundance of beetle and bug a study that was carried out annually along with vegetation and habitat of beetles and bugs in and around Umred village, Nagpur. Andrew (1929,1935) published volume on carabidae part 1 and part 2, respectively. Mitra et al., 2005 reported 3100 endemic species of coleopterans from Andaman and Nicobar islands and also 154 species from Bay islands. Ghosh and Bhunia (2016) reported from Salt Lake City, Kolkata (W.B.) 669 beetles representing 26 species of 12 genera and two sub families. 24 species of Scarabaeinae was the dominating group (71.59 %), Aphodiinae comprised of two species (27.40%). In 2006 a new species Pukupuku Muramoto was reported from Arunachal Pradesh by Gupta et al., (2017). Carabid beetles are suitable as a bioindicator (Rainio and Niemela, 2003), also according to IUCN, UNEP , EPA, WWF, FOE and Green Peace are promoting use of beetles to tackle problems of biological monitoring as well as to assess human impact on biodiversity (IUCN, 1989).

Material and Methods:

Study was conducted from January 2018 to February 2019 and 2022-23. The Umred area was surveyed from morning to evening. The geographical location is 20°51' N and 79°20 E with an altitude of 290 meters. Umred is about 45 Km from Nagpur. As beetles and

bug are reported to be the diverse group of insects, main focus of the present study is to estimate the diversity of beetles and bugs in this region. Bark of the trees was scarred to expose underneath hidden Coleopterans and Hemipterans. Sweep net was employed for catching flying beetles and bugs. All the insects thus collected were used for identification. Regular field surveys were carried out throughout the study area during morning and evening hours of the day. The photographs were captured with digital camera Sony Cyber shot DSC-WX500/B 20 MP with optical zoom 30X and other cell phone camera. The species were identified with the help of photographs by using reference books, available keys, etc.

Observation:

According to present study carried out in region of Umred, it has been observed beetles and bugs are found everywhere on trees, in field water bodies, on the ground, in human dwelling. During the study 35 species of bugs and beetles were recorded. Out of 35 species, 7 were bugs and 28were beetles. 7 species of bug belonging to order Hemiptera and 5 families were recorded. 28 species of beetle belonging to order Coleoptera and 13 families were recorded (see table 1).

Table 1. Biodiversity of bugs and beetles in and around Umred area district, Nagpur. (M.S.)

Sr. No.	Family	Scientific name	Common name	Location	Season
1	Dinidoridae	Coridiusjanus	Red Pumpking bug	Umred	Monsoon
2	Pentatomidae	Halyomorphahalys	Brown marmorated stink bug	Umred	Summer
		Eysarcorisguttiger	Two spotted sesame bug	Umred	Winter
3	Pyrrhocoridae	Chinaviahilaris	Green shield bug	Umred	Winter
		Dysdercuscingulatus	Red cotton stainer	Umred	Winter
4	Triatominae	Triatoma infestans	Kissing bug	Umred	Monsoon
5	Reduviidae	Platymerisbiguttatus	White spot assassin bug		
6	Buprestidae	Sternocerachrysis	Jewel beetle	Umred	Winter
7	Cantharidae	Rhagonycha fulva	Red soldier beetle	Umred	Winter
8	Carabidae	Chlaenius tricolour	Ground beetle	Umred	Monsoon
		Harpalusaffinis	Ground beetle	Umred	Monsoon
		Anthia sexgutata	Six spot ground beetle	Umred	Winter
9	Cerambycidae	Orthosomabrunneum	Brown prionid	Umred	Summer
		Monochamustitillator Callipogonrelictus	Southern pine sawyer	Umred	Winter
10	Cetoniidae	Oxythyreafunesta	White spotted rose beetle	Umred	Monsoon
11	Chrysomelidae	Laccopteratridecimpunctata	Tortoise beetle	Umred	Monsoon
		Platycorynus peregrine	Leaf beetle	Umred	Winter
		Leptinotarsa decelimneata	Colorado beetle	Umred	Winter

		Lema diversa	Leaf beetle	Umred	Winter
12	Hydrophilidae	Hydrophiluspiceus	Great silver water beetle	Umred	Winter
13	Scarabaeidae	Malagoniellaastyanax	Dung beetle	Urnred	Winter
		Heliocoprisneptunus	Trident dung beetle	Umred	Monsoon
		Dichotomiuscarolinus	Carolina copris	Umred	Monsoon
		Coprisfricator	Dung beetle	Umred	Winter
		Cotinismutabilis	Green scarab beetle	Umred	Monsoon
		Cyclocephalaluridae	Southern masked chafer	Umred	Monsoon
		Cyclocephala sp.	Light yellow brown beetle with black head	Umred	Monsoon
		Helictopleurusquadripunctatus		Umred	Winter
14	Silphidae	Nicrophorusvespilloides	Sexton beetle	Umred	Monsoon
15	Coccinellidae	Coccinella transversalis	Lady beetle	Umred	Winter
		Epilachnavarivestis	Bean beetle	Umred	Winter
16	Meloidae	Epicautafabricii	Blister beetle	Umred	Winter
17	Apidae	Xylocopa violacea	violet carpenter bee	Umred	Winter
18	Curculionidae	Sitophilus granarius	Grain weevil	Umred	Winter

Result and Discussion:

During the study on bugs and beetles inhabiting Umred area 35 species were reported. From these 35 species of bugs and beetles, 7 bugs were recorded and 28 beetles were recorded. The 7 species of bugs belonging to 5 families and 7 genera were identified. The 28 species of beetles belonging to 13 families and 27 genera were identified. Among the recorded species of bugs, 1 species belongs to family Dinidoridae (see Fig. 1), 2 species belongs to family Pentatomidae (see Fig. 2 and 3), 2 species belong to family Pyrrhocoridae (see Fig. 4 and 6),1 species belongs to family Triatominae (see Fig. 5) and 1 species belongs to family Reduviidae (see Fig. 7). Among the recorded species of beetles, 1 species belong to family Buprestidae (See Fig. 8 and 9), 1 species belong to family Cantharidae(See Fig.10), 3 species belong to family Carabidae (See Fig. 11,12 and 32), 3 species belong to family Cerambycidae (See Fig. 13,14 and 27), 1 species belong to family Cetoniidae (See Fig. 15), 4 species belong to family Chrysomelidae (See Fig. 16, 29, 31 and 36), 1 species belong to family Hydrophilidae (See Fig. 17), 8 species belong to family Scarabaeidae(See Fig. 18,19, 20, 21, 22, 23, 24 and 25), 1 species belong to family Silphidae (See Fig. 26), 2 species belong to family Coccinillidae (See Fig. 28 and 30),1 species belong to family Meloidae (See Fig. 35), 1 species belong to family Apidae (See Fig. 33) and1 species belong to family Curculionidae (See Fig. 34).

According to the investigator of this work interactions like plant-plant (plant-endomycorrhizae, plant-ectomycorrhizae, plant algae, etc.), plant-animal, and animal-animal associations called mutualism may be hypothesized as evolution that may be nonintentional and accidental, some are selective also either directed toward coevolution or extinction of symbiotic organisms. Beetles and bugs like other insects favour the coevolution of self

species or their symbiotic species only or both; one way is by surviving on other plant species called "Emergency or Alternate Insect Nourishing Plant Species", when their preferred host plants are unavailable.

Moreover, dung beetles do wonderful service by consuming animal and human fecal matter in which insect vectors breed, they spread diseases and protozoan, helminth, and other parasites also. Thus, dung beetles exercise some control on these factors and maintain sanitation and hygiene that is essential for the animals and humans.All coprophagous animals can be called "Mobile Sanitary Health Inspectors Of Ecosystem".

Cleptoparasitism in superfamily Apoidea evolved many times in 4 of the 7 bee families identified by Michener (2000) that is described as cuckoo bees where bees lay eggs in nests of closely related species to exploit free pollen feeding of their larvae to avoid spending their labour and energy.

Out of the total number of 6.90% of Arthropod species distributed in lndian subcontinent, the class Insecta include 59,353 species i.e., 6.83% of the total number of insect species found globally (ENVIS centre, ZSI).In the present investigation 19 Coleopteran beetles were documented, these are bioindicators of abiotic factors currently most important is climate change/ shift and biotic factors like transfer of matter and energy in insect food chain as well as general food chains where they non- toxic beetles nourish amphibians-mammals; they function as specific plant pollinators and by their destructive behaviour produce dry biomass powder to correct local soil composition. Model based studies may highlight bioindicator specific roles in environment like forests, agrobios-systems, mangroves, deserts, altitude ecology, etc. India is a dwelling place for 5% of beetle fauna that survives in various parts of the world (Alfred et al., 1998); the Coleopterans diversified by the end of Jurassic period about 155–160 mya (Grimaldi and Engel, 2005). Beeson and Bhatia (1939) studied biology of Cerambycidae; biotaxonomy, biology and ecology of some longhorn beetle borers was investigated by Khan and Maiti (1983); another host plant utilized by long horned beetle was reported from Tamil Nadu by Balasubrahmanian (1991). As far as sporadic work has been reported, few to be mentioned are work done by Pilo et al., (1996) for Shoolpaneshwar Wildlife Sanctuary; Parikh et al., (2001) for Gir PA and Naidu and Kumar (2011) have studied the diversity of coleopterans in Vadodara district.

Bugs and beetles are found whole year, but mostly found in monsoon and winter and very few species found in summer. Endopterygota beetles exhibit 4-stages in its life cycle, the larvae are called grubs while pupa are sometimes called chrysalis. At final instar pupa of some forms enclose in a cocoon. Hypermetamorphosis is present in Meloidae and Rhjidae that include first instar called triungulin. In China, Malawi and Africa only larger cicads (hemipterans) like other insects are relished by humans for high protein conversion ratios. Nine more hemipterans are consumed throughout the world.

Feeding behaviour is of varied types, most phytophagous hemipterans eat plant leaves, seeds, nectar, wood etc., probing with their sucking - piercing mouthparts from the early Devonian period when they evolved. Omnivorous beetles and other highly specialized diet preferring diverse beetles are found in several habitats. Ground beetles and rove beetle belonging to Staphylinidae are chiefly predatory carnivorous on snails, earthworms, caterpillars, etc. Some feed on decomposing organic matter, others are coprophagous

(scarabaeidae), necrophagous Siliphidae consume dead animals. Histeridae as well as Siliphidae prey on larvae of coprophagous and necrophagous species. Mycophagous beetles employ special structure the mycangia to transport and store fungus.

Monogamous eat preferred specific host plants (taxon), while oligophagous consume few plants. Contrary to this polyphagous devour as many plants of different species.

According to the authors the various structures of the railway and roadway bridges, lamp-post provide nesting and breeding sites for the avifauna and entomofauna (bugs and beetles), and at certain points where vegetation occur act as isolated pockets of ecotone as well as corridors for biodiversity. Adverse effects of air and sound pollution studies on hatching of eggs and further stages development cycle must be undertaken to assess the impacts of urbanization on recruitment of zero to first age group of animals to know their population trend and to formulate policies of management and conservation that is to be applied by citizen, government and NGOs. The entomofauna may become a nuisance for human inhabiting such areas and vice-versa.

Urbanization alters biodiversity of the area where bridges, roads, gardens, malls, etc., are being constructed metropolitanization) and semiurbanization of rural areas lead to partial and total destruction of herbs, shrubs and trees that are host plants of insects, bugs and beetles as well as other animals.This reduces the species of bugs and beetles by providing inappropriate habitat, food, site for breeding, etc., making conservation difficult and paving a pathway towards extinction.

According to the author to maintain the diversity, richness, and evenness a balance is to be maintained between use of agrochemicals (pesticides and insecticides) for standing crop protection and to sustain moderate populations of bugs and beetles in agrobios-systems and forest ecosystems also. Predaceous beetles destroy harmful insects that damage the economically important forest vegetation and in cropland (including social forestry).Moreover, dung beetles are biondicators (Coprophagous Sanitary Inspectors or Scavengers) of the open habitats in rural and slum-urban areas heavily polluted with animal faeces and human night soil.Fewer efforts are needed to achieve these objectives in forest - ecosystems than in agro-ecosystems.The above statements derive support from Zahoor et al., (2003) investigation who reported 8119 Coleopterans, 4927 were Coccinellids belonging to 22 species; more Coccinellids occur in forests.The authors of the present work are of the view based on field observations that some bugs can be recognized as flagship species as they eat and clear the dead tree stumps and logs from the forests, farms, gardens, parks, aquatic habitats, etc.Such beetle species can be called as "natural shredders and pulveriserfertilizer" of the inert wood that takes a long time to decompose and merge and release back the locked nutrients from dead wood into the soil.One sided and two sided mutualism (coevolution) between plant host specific beetles have evolved to perform functions other than pollination. Evolution of feeding and other body structures of beetles and insects is dictated by size, shape, scent, secretion of nectar, oil, protein fluids of the plants as a specific or generalized adaptation in these creatures. If the plants are only visibly benefited and these creatures are not they are actually-"cryptically investing their conservational services" to facilitate in future new - evolution of species (both plants and animals, transfer of matter and energy, conserved

and consensus genes, etc.) in the current climate change phenomenon.These aspects need to be scientifically unravelled by model-experiments by combined efforts of subject specialists.

Severely dry habitat serve as either transitional or permanent homes for insects and reptiles possessing specific and generalized adaptations.The consumed plant materials are metabolized and the resultant plant metabolites are detoxified by specialized cells, tissues and organs in invertebrates and vertebrates.The semiochemicals are converted to pheromones in insects.Some are converted to entomotoxins.Similar pathway may exist in wetland underwater predatory and terrestrial birds that are predatory or omnivore as well as in the terrestrial apex predatory aves. Insect pheromones may deflect or attract insectivorous, omnivorous and raptor avifauna.Human, animal faeces and avian droppings are "biomatrix" for coprophagous insect (including bugs and beetles) to breed.Squamatan lizards are "Dry or Arid Zone Superpredators" to control insect populations where frogs, toads and birds are absent or rare visitors.Conservation of both is necessary for sustenance of ecosystems.

Conclusion:

A systematic study of bugs and beetles survey revealed 5 families of bugs comprising 7 species and; 13 families of beetles containing 28 species that have several biological diverse roles in their specific habitat as either bioindicator alone or as flagship species alone or both status respectively. Scarabaeidae being the dominant with 8 identified species, followed by Chrysomelidae, Carabidae, Cerambycidae and Coccinellidae respectively.Captive breeding may be necessary to conserve bugs and beetles due to global warming, climate change, etc.Some species of beetle have evolved immunity to insecticides. We can use it as a pest. Beetles can be beneficial to human economics by controlling the populations of pests.We can use beetles as a food material. The mealworm (the larva of the darkling beetle) and the rhinoceros beetle are among the species commonly eaten.A wide range of species is also used in folk medicine to treat those suffering from a variety of disorders and illnesses, though this is done without clinical studies supporting the efficacy of such treatments.Many species of bugs are significant pests of crops and garden plants. Some larger hemipterans such as cicadas are used as food in Asian countries such as China.Other hemipterans have positive uses for humans.The authors suspect that Xylocopa violacea (apidae) may be a transitional evolutionary link between ‘bumble bees’ and ‘beetles’. Genetic studies are needed to confirm the above statement.

Reference:

1. Aland SR, Mamlayya AB, Bhawane GP. Diversity of beetles (Insecta: Coleoptera) in and around Amba Reserve Forest, Western Ghat, Kolhapur. Avishkar – Solapur University Research Journal. 2012; 12:31-41.
2. Alfred JRB, Das AK and Sanyal AK. Faunal Diversity of India, ENVIS Centre, Zoological Survey of India, Calcutta, 1998, 259-268.
3. Bal, Animesh and Basu, R.C. 2003. Insecta: Hemiptera: Water-Bugs. Fauna of Sikkim, State Fauna Series, 9 (Part-2): 541-557. (Published by the Director, Zool. Surv. India, Kolkata).
4. Balasubhramanian P. Excoecariaagallocha: An additional host to the long horned beetle Sthaniasgrisator Fb (Cerembycidae: Coleoptera) from Point Calimere

Sanctuary, Tamil Nadu. Journal Bombay Natural History Society, 1991; 88(2):299-300

5. Basu, R.C. and Mitra, S.C., 2003. Insecta Hemiptera: Heteroptera: Coreoides. (Published by the Director, Zool. Surv. India, Kolkata).
6. Beeson CFC and Bhatia BM. On the biology of the Cerambycidae (Coleopt). Indian Forest Records, (N.S.), 1939; 5 (1):1-235.
7. Cameron M. The Fauna of British India including Ceylon and Burma (Coleoptera: Staphylinidae) Taylor & Francis, London, 1930, 2:111-257.
8. Chandra K, Gupta D. Scarab beetles (Coleoptera: Scarabaeoidea) of Barnawapara Wildlife Sanctuary, Chhattisgarh, Indía. Journal of Threatened Taxa. 2013;5(12):4660-4671.
9. Chandra, K., 2000. Inventory of scarab beetles (Coleoptera) from Madhya Pradesh, India. ZOOS'Print J., 15(11): 359-362.
10. Director ZSI. Fauna of Maharashtra State Fauna Series, Invertebrtaes. 2012; 20(2):1-673.
11. Ghost, Bhunia. Scarab beetle (Coleoptera : Scarabidae) from salt Lake City, Kolkata, West Bangal. Journal of Entomology and Zoology studies, 2016; 4 (1): 269- 273.
12. Grimaldi D and Engel MS. Evolution of the Insects, Chapter 10. Cambridge University Press, New York, USA, 2005, 306.
13. IUCN From strategy to action: The IUCN response to the Report of the World Commission on Environment & Development. IUCN Gland and Cambridge, UK, 1989.
14. Kakkar, N. and S.K. Gupta, 2009. Temporal variationsin dung beetle (Coleoptera: Scarabaeidae) assemblages in Kurukshetra, Haryana, India. J.Threatened Taxa, 1(9): 481-483.
15. Kazmi SI, Ramamurthy VV. Coleoptera (Insects) fauna from the Indian Thar Desert, Rajasthan. ZOOS' Print Journal. 2004; 19(4):1447-1448.
16. Khan TN, Maiti PK. Studies on the biotaxonomy, biology and ecology of some longicorn beetle borers (Coleoptera: Cerambycidae) of the islands of Andaman, India. Records of the Zoological Survey of India, 1983; 45:1- 100.
17. Mitra B, Chaudhury S, Chaudhury D, Banerjee D, Sharma RM. Insect diversity of Andaman & Nicobar Islands. Bionotes, 2005; 7(3):82-83
18. Priyanka Dutta S, Jadhav MJ, Sharma RM. Insecta: Coleoptera: Chrysomelidae. Zool. Surv. India Fauna of Maharashtra, State Fauna. 2012; 20(Part-2):517-522.
19. Rainio J, Niemela J. Ground Beetles (Coleoptera: Carabidae) as bio indicators. Biodiversity and Conservation, 2003; 12:487-506.
20. Thakare VG, Zade VS, Hegde VD. Darkling Beetles (Coleoptera: Tenebrionidae) of Melghat Tiger Reserve, Central India. Journal on New Biological Reports. 2012; 1(1):29-32.
21. Thakare VG. Ground beetles (Coleoptera: Carabidae) of Melghat Tiger Reserve, Central India, Journal on New Biological Reports. 2013; 2(2):173-

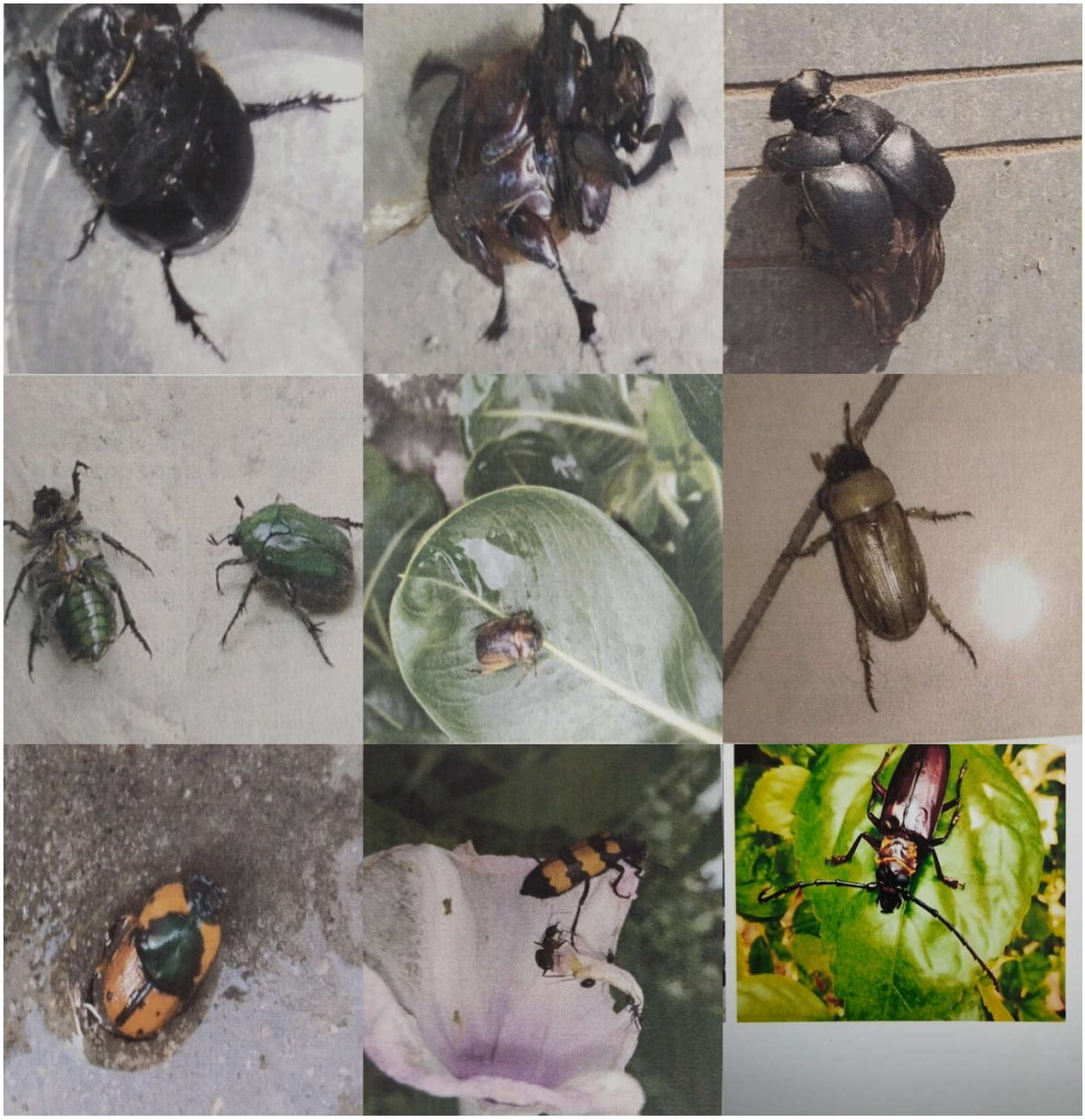
22. Wankhade V, Manwar N, Malu A. Preliminary Studies on Diversity of Order Coleoptera at Sawanga-Vithoba Lake Region, District Amravati, Maharashtra, India. Journal of Entomology. 2014; 11:170-175.
23. Zahoor, M.K, Suhail, A, lqbal, J, Zulfaqar, Z, Anwar, M. (2003). Biodiversity of predaceous Coccinellids and their role as bionficators in an agro- ecosystem. International Journal of Agricultural and Biology, 2003, 1560 - 8530/ 05-4-555-559.

1. Coridiusjanus
2. Halyomorphahalys
3. Eysarcorisguttiger
4. Chinaviahilaris
5. Triatoma infestans
6. Dysdercuscingulatus
7. Platymerisbiguttatus
8. Sternocerra Chrysis (Male)
9. Sternocerra Chrysis (Female)

10. Rhagonycha fulva 11. Chlaenius tricolour 12. Harpalusaffinis

13. Orthosomabrunneum 14. Monochamustitillator 15. Oxythyreafunesta

16. Laccopteratridecimpunctata 17. Hydrophiluspiceus 18. Malagoniellaastyanax



19. Helicoprisneptunus 20. Dichotomiuscarolinus 21. Coprisfricator

22. Cotinismutabilis 23. Cyclocephalaluridae 24. Cyclocephala sp.

25. Helictopleurusquadripunctatus 26. Nicrophorousvespilloides 27. Callipogonrelictus

28. Coccinella transversalis
29. Lema diversa
30. Epilachnavarivestis
31. Platycorynus peregrine
32. Anthia sexgutata
33. Xylocopa violacea
34. Sitophilus granaries
35. Epicautafabricii
36. Leptinotarsa decelimneata