



“Economical, Biological and Ecological Importance of Arthropoda from Tribal Region (Karanjali) of Maharashtra”

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Abstract:-

Honeybees have a significant impact on the process of plant pollination and facilitate the growth of numerous crops. The Food and Agriculture Organization (FAO) of the United Nations has reported that animal pollinators, specifically honey bees, contribute to about 75% of food crop production across global regions. The significance of honeybees cannot be overstated as they have a pivotal role in pollinating plants, which results in the production of numerous crops. The pollination of plants and the growth of numerous crops are heavily reliant on honeybees, who have a critical function in this process. Bees are of immense importance in the realm of agriculture, owing to their role as vital pollinators for a wide range of plants. It is noteworthy that these contributions by honeybees significantly impact global agricultural output and have far-reaching implications on human sustenance worldwide.

Keyword: - Honey bee, Karanjali, Gandilmashi, Pollination, Arthropoda.

Introduction:-

A honey bee is a honey-gathering insect of the genus *Apis*. In the group known as 'Honey Bee' (en:Honey Bee), Gandil Mashi and Kumbharin Mashi are divided. But the bees, however, for twelve months, make a beehive in groups and store honey in it. There are seven genera of bees in the genus *Apis*, with a total of forty-four subgenera. There are more than twenty thousand insects in the bee group. Some of them store honey. But only flies in the genus *Apis* (en:Apis_(genus)) are scientifically recognized as bees. Bees are thought to have originated in South and Southeast Asia, including the Philippines. [[Taxonomy] suggests that all bees, with one exception, are descended from a single progenitor. Both *Apis floria* and *Apis anchdreniformis* have a common origin. They are from the Eocene and Oligocene periods. Fossils of bees have been found in Europe on the edge. However, this does not mean that the bee originated in Europe. It only means that there were bees there. Some more fossils from this area are still being studied. A fossil of a bee called *Apis nearica* has been found in Nevada. Its time One crore forty million years ago. [1]. other insects closely related to bees are bumble bees and stingless bees. To a lesser extent, these flies also live in groups. All gregarious insects must be descended from a common ancestor. A hive-forming bee of the genus *Apis* should be the primary species. From this advanced flies formed in the roughness of the rocks forming many parallel nests. The knowledge that honey is obtained from bees dates back to historical times. *Apis malefera*, two species of bees that have been domesticated to obtain the products wax and honey, has been recorded since the time of the construction of the Egyptian pyramids. (An Egyptian painting shows a beehive and honey obtained from it). *Apis malefera* were transported far from their original habitat. Honeybees play a crucial role in pollinating plants and enabling the production of many crops. According to the Food and Agriculture Organization (FAO) <https://www.fao.org/about/en/> of the United Nations, about 75% of food crops worldwide depend at least in part on animal pollinators such as honey bees. (Cauquil et al., 2013) Moreover, honey bees are not only important for food production but also contribute to the pollination of various wild plants and flowers. However, honey bee populations have been declining at an alarming rate in recent years due to various factors such as habitat loss, pesticide use, climate change, parasites and diseases. This decline in honey bee populations has led to a growing interest in researching the factors contributing to this issue and developing strategies for conservation. Recent research has provided valuable insights into the complex factors affecting honey bee health and populations.

For instance, researchers have investigated the effects of pesticides on honey bees and have found that exposure to certain types of pesticides can weaken their immune systems and make them more vulnerable to diseases and parasites. (Pang et al., 2020) Additionally, studies have shown that exposure to neonicotinoid pesticides can impair bees' ability to navigate and forage for food. Furthermore, research has also revealed that honey bee populations can benefit from diversified landscapes with a variety of plants and flowers. Other studies have focused on the impact of climate change on honey bee populations, highlighting how changes in temperature and rainfall patterns can affect their behavior, foraging patterns, and the availability of food sources. Furthermore

researchers have also examined the role of genetics and breeding in improving honey bee health and resilience. They have also explored the potential of alternative approaches such as biocontrol, which involves using natural predators and parasites to control pests that affect honey bees. Additionally, researchers have also investigated the use of probiotics as a means of improving honey bee health. Moreover, research on honey bee communication and behavior has shed light on how these insects interact with each other and their environment. Overall, honey bee research plays a critical role in understanding the complex factors affecting honey bee populations and health. As honey bees play a vital role in pollinating plants and enabling the production of many crops, research on their health and populations is essential for ensuring food security and biodiversity conservation. The decline of honey bee populations could have serious consequences for global food production and the health of ecosystems. Therefore, it is crucial to continue investing in research on honey bees and implementing conservation strategies that take into account the complexity of factors affecting their populations. (Decline, Disappearance of Bees Would Have Drastic Consequences for ..., n.d) By doing so, we can ensure the long-term survival and health of honey bee populations, which in turn, supports sustainable agricultural practices and helps promote a healthy and diverse environment. In conclusion, honey bee research is a multidisciplinary field that encompasses various aspects of biology, ecology, genetics, and behavior. (Honey Bee Survival and Pathogen Prevalence: From the Perspective of ..., n.d). It plays a critical role in preserving honey bee populations and ensuring their importance to global food production and ecosystem health.

Types of bees

Micrapis

Both *Apis floria* and *Apis andreniformis* bee species belong to the subspecies *Micrapis* of the genus *Apis*. These bees build small open hives on bushes. Their stinger is small in size and does not go deep into the skin when biting a human. Their hives can be handled without much concern for protection. Although these two races look different from each other, they originate from the same ancestral race (sympatrically). Allopatric speciation may have occurred after the original ancestral species diverged due to geographical reasons. Then they expanded. *Apis floria* is spread over a wide area. Whereas *Apis andreniformis* is more aggressive. More honey is obtained from *Apis floria*. *Apis floria*'s lineage has been proven to date back over four million years.

Megapis

Only one species is recorded in the subspecies *Megapis*. This species is very aggressive, building one or more hives on tall trees, cliffs, or tall buildings. Man occasionally tries to extract the honey from their hives. An attack on a human after stimulation results in death from bee stings.

Apis dorsata is the largest bee in size. Widespread in South and Southeast Asia.

Apis dorsata binghamii: the Indonesian bee. Possibly a subspecies or separate species of *Apis dorsata*. *Apis dorsata breviligula* has distinct species status.

Apis dorsata laboriosa: the bee of the Himalayas. A few years ago this bee got the status of a different breed. This bee lives in the Himalayas. A little different from *Apis dorsata*, this bee has a variety of behavioral changes. So can build hives in very remote and high above sea level

There are three-four varieties in this species. *Apis koshevnikovii* from Borneo is different from other bees. It originated from the original cave-dwelling bee. *Apis cerana* is a bee native to South and East Asia. Like *Apis malefera*, this small bee is kept in a hive. The exact relationship between *Apis cerana nuluensis* in Borneo and *Apis nigrocincta* in the Philippines remains to be understood. According to new research, these are different species. It is possible that *Apis cerana* did not originate from a single species.

Apis maleifera

Apis maleifera is a species of bee that is now domesticated. The genetic makeup of this bee has been thoroughly studied. It originated in warm East Africa. It spread from Northern Europe and East Asia to China. These bees are called European, Western or Common bees. They have changed according to the local geographical climate. A hybrid bee named Buckfast Bee has been created from this bee. Subspecies vary in behavior, color and anatomy from location to location.

Although the origin of the *Apis* bee is somewhat uncertain, it is theorized that the genus diverged from the original bee at the end of the Miocene. Cave bees are thought to be the result of desertification in both East Africa and East Asia. Desertification led to the disappearance of trees, the loss of trees necessary for nesting, which stopped gene transfer between the two isolated groups. This is the result of the last Ice Age and the early Pleistocene. Thousands of years of beekeeping accelerated the evolution of the Western European bee.

There are no native bees in the Americas. In 1622, the dark-colored bee, *Apis melia maleifera*, was brought to America with European colonization. This was followed by the introduction of *Apis melia ligustica* and other bees from Italy. Bee-dependent crops were planted with the colony. The bees that are currently known as wild bees in America are the escaped bees from the colony. They spread rapidly with colonies in the grasslands. For several years they were unable to cross the Rocky Mountains. In the 1950s, bees were introduced to California by ship.

African bee

The African bee is called the killer bee. The bee originated from a hybrid between the European bee and *Apis mellifera scutellata* from Africa. By nature they are always in a position to attack. They are not usually prone to diseases. They originated in Brazil by accident.

They spread to North America. Their outbursts were so fierce that in some places they became troublesome. They could not survive in cold regions as they could not withstand much cold. They collect good honey. So they are great for beekeeping in Brazil.

Beekeeping

Apis mellifera and *Apis serena indica* are two bees that are well known among beekeepers. Modern day bees are suitable for transport from one place to another where pollination needs to be guaranteed. In the state of Karnataka, beehives are kept on a commercial basis at a fixed rent in sunflower farming. Apart from agriculture, this can be a side business.

A threat has recently arisen in the Western beekeeping industry. Apparently the number of bees suddenly decreases. And when there are fewer flies than are needed to maintain a hive, the hive itself disappears. In 2007, thirty to seventy percent of beehives disappeared. Three reasons are cited as insufficient protein, some change in farming practices, or erratic weather. Even in North America, bee numbers have never been so low. This type got the name 'Colony Collapse Disorder'. Whether this is new or caused by other external factors is still incomplete. But it seems to be a symptom (syndrome) and not a disease. As the Israeli acute parasitic virus almost wiped out bees in Israel. A 2009 study identified a single gene responsible for protein production in bees. A Dicitriviridae virus has been shown to affect the genetic machinery in honeybee ribosomes for protein synthesis in honeybees. Electromagnetic waves emanating from mobile towers are believed to be the main cause of bee population decline. Electromagnetic waves affect the 'magnetic radar' in the bees' body. Due to this, disorientated fish get confused and do not reach the hive.

The life cycle of the bee

A bee is a gregarious insect. Such animals are called eusocial. Suzan Batra gave this term.[1]. This can be called "group sahjivan vritti" in Marathi. As the group lives from generation to generation, the collective behavior of this group has reached the genetic level. A colony consists of a queen fly, seasonally few males and a constantly changing group of worker flies. The number of queen, male, and worker flies in a hive varies with species. But this category usually does not change. Common things in all hives are as follows-

1. The worker flies deposit the eggs laid by the queen in a chamber made of wax. Worker flies are responsible for making cages. A single egg is kept in a cell. The queen fly can fertilize the egg from [[sperm]] in the oviduct. Worker flies and queen flies hatch from fertilized eggs, while males hatch from unfertilized eggs. Males are haploid, while queen and worker flies are diploid. Hatched larvae are initially fed royal jelly by worker flies. Later on, the larvae are fed only honey and pollen. A larva that is fed only royal jelly produces a queen fly. After molting several times, the worm forms a cocoon around itself.
2. The division of labor of worker flies has been extensively studied. The new worker bees are tasked with cleaning the hive and feeding the hatchlings. After glands in the new worker bees' bodies stop making royal jelly, they produce wax to build new cells in the hive. As worker bees age, their job changes. After the work of making wax is done, they do the work of collecting honey and bringing pollen, guarding the hive. Till the end of her life she does nothing but collecting honey and pollen.
3. Worker flies collect food. By means of a typical "waggle dance", they tell each other the direction and distance of food and water. Their method of communication is circular dance if the food is close to the hive and waggle dance if it is far away. Karl von Frisch, an Austrian researcher, was awarded the Nobel Prize in Physiology or Medicine in 1973 for his study of the "dance language" of bees. He did this study on *Apis mellifera* bee.
4. A different type of "shaking dance", the tremble dance, is performed by the newly recruited bees to carry it to the hive from the bees that have collected the food.
5. The new queen bee flies away from the hive and copulates with several males to store sperm in her sperm cells. The male fly dies after mating. Exactly how the queen fly decides whether to lay a fertilized egg from stored sperm or not is not well understood.
6. Honey bees store honey in groups of bees for twelve months. A beehive exists as a collective group of queen bees, several worker bees and a few males. Once the new queen fly is fertilized, the worker bees and queen flies in the hive go out to build a new hive. The site of the new hive is already found by the worker fish. When they come to a new place, they start building wax boxes for the new hive. At the same time, the production of new worker fish starts. Such behavior is not found in other species in collective insects.

A different type of bee, stingless bees, builds and prepares the hive before the arrival of the queen bee.

Guard against icy

At temperatures below ten degrees Celsius, bees stop flying and gather in the central part of the hive. Due to this type of mating and phasing movement in the cold, the temperature around the queen fly is kept at 27 degrees centigrade. Queen fly cannot lay eggs at this temperature. Once the hive temperature rises to 34 degrees, the queen starts laying eggs once more. Because the worker bees are constantly moving from the inside to the outside of the hive, no bees have to face the unbearable cold. The outside temperature of the colony where bees are collected is 8-9 centigrade. The colder the outside temperature, the thicker the layers of congregated flies. During cold days, bees use stored honey to maintain body temperature. Constantly spent honey causes the hive to lose weight. Thirty to seventy percent of honey is consumed depending on the severity of the cold.

Pollination

Apis flies collect honey from various flowers. At the same time many flowers are pollinated by bees. *Apis mellifera* has been useful for pollination. A commercial crop of *Apis mellifera* has shown a 30 percent increase in yield if kept during the flowering period. Bees do billions of dollar worth of work for free.

Honey

Honey is the food stored in the cells of the hive after processing the nectar in the flower. Man has been using honey from the hives of all bees of the Apis species for many years. Honey is commercially produced from the hives of Apis mellifera and Apis serena bees.

Wax: Wax is produced from the gland on the abdomen of worker flies of a certain age. This wax is used to create new cells in the hive, to seal the mouths of the cells in which the eggs are stored, and to repair the hive. Cosmetics are made from wax.

Pollen

Pollen is stored in the pollen sac on the worker bee's leg and brought to the hive. The larvae that hatch from the eggs are fed pollen as a source of protein. Pollen from the hives of Apis mellifera and Apis serena is collected and used with food.

Propolis

Hive-building bees make a sticky liquid called propolis from the tree's resin in the hive. With this the hive is attached to the tree. To prevent the hive from disturbing the tree where the ants are, propolis is spread on the approach path to the hive so that the ants do not get stuck on the sticky liquid and come to the hive. Some cosmetics are made from propolis.

Protection

All worker bees living in a group protect the hive by stinging the intruder. All worker bees in the hive are alerted by pheromone when attacking. So all the worker flies attack the intruder at the same time. The bee stinger is the organ in the form of two curved spines at the end of the worker bee's abdomen. Muscles surround the venom gland at the base of the stinger. When the stinger penetrates the body of the attacker, the poison is released from the venom gland. But after the sting, the sting remains in the attacker's body. The worker fly then dies as the stinger falls out of the body.

The bee's stinger and its curved barbs are thought to have evolved to protect the honey and itself from vertebrates. Because the barbed thorn pulls out the stinger stuck in the skin. The stinger of the queen bee acts as a killer during a mutual attack by the queen bee. The Apis cerena bee has a different mode of resistance to other insects. As soon as they see another insect on their hive, all the workers rush to the visiting insect. Muscles of worker fish vibrate violently. Such shivering increases the temperature around the host insect to such an extent that the host insect dies. Previously it was thought that only elevated temperatures killed the host insect. According to new research, it has been found that the amount of carbon dioxide around the visiting insect increases dramatically with temperature. The insect dies due to increased temperature and lack of oxygen. A new queen in the hive or a failed queen is judged in the same manner. This type of beekeepers call bowling the queen.

Communication in bees

Bee communication depends on various chemical substances and odors. The odor released from the queen fly's body helps the worker bees find their hive. If bees from one hive go to another hive, they are killed. The queen fly has complete control over all the flies in her hive.

Endorsements

- Creating awareness among farmers of the advantages of pollination, organic farming, and beekeeping (Apiculture and Meliponiculture) through the involvement of government agencies, non-profit organisations, etc.
- Increasing public awareness of the kind of beekeeping areas that should be used
- It's crucial to be knowledgeable about the plants that bees use as food to provide fodder year-round. These plants must be grown along road sides, in buffer zones around woods, and in hedgerows in agricultural areas.
- It is necessary to emphasise the significance and financial benefits of broad soapnut tree planting.
- Soppinbetta forest trees, shade trees in tea and coffee plantations, etc., must be planned to support beekeeping.
- It is necessary to instruct honey hunters on sustainable methods of harvesting.

Pollinators can be negatively impacted by grazing, fire, and mowing, however these practises can be utilised responsibly.

Conclusion:-

Bees play a critical role in our planet's ecosystem, and they are essential in agriculture because of their ability to pollinate crops. Therefore, it is necessary to conduct research studies and implement conservation strategies to protect these crucial insects from the threats of pesticides and habitat loss. Additionally, bee research should focus on understanding the causes and consequences of colony collapse disorder (CCD) to find sustainable solutions for this phenomenon. Collaboration between researchers, beekeepers, policymakers, and other stakeholders is crucial to develop effective conservation efforts and improving the overall health of bee populations. Furthermore, education and awareness campaigns should also be carried out to inform the general public about the importance of bees and their role in maintaining our environment. In conclusion, the preservation of bees is not only a matter of environmental concern but also an urgent issue for agriculture and food security. Therefore, we must take immediate action to protect these crucial insects for the well-being of our planet and ourselves. By conducting bee research and implementing conservation strategies, we can ensure the sustainable management of bees and their ecosystem services for future generations. In conclusion, the

conservation of bees is a complex and multidimensional issue that requires collaborative efforts from different sectors to achieve sustainable solutions. Furthermore, continued monitoring of bee populations and their health is necessary to track progress in conservation efforts and make any necessary adjustments. Honeybees are one of the most important insects for the pollination of crops worldwide. Recently, a research paper has been published that proposes a correlation between the decline in honeybee populations and the use of certain pesticides. The research paper highlights the importance of considering alternatives to current pesticide practices to protect and preserve honeybee populations for the essential role they play in agriculture and ensure food security. The research paper has sparked debate and discussion within the scientific community as well as among policymakers and agricultural producers. Some experts have supported the research findings and called for immediate action to restrict or ban the use of certain pesticides. Others, on the other hand, have expressed some doubts about the study's methodological quality and criticized its findings as being inconclusive or unreliable. Regardless of these differing opinions, the research paper serves as a reminder of the crucial role honeybees play in ecosystems and agriculture and highlights the need for further research and investigation into the impact of pesticides on honeybee populations as well as the development and adoption of more sustainable agricultural practices to ensure their preservation and the continued provision of ecosystem services essential to human well-being. This research paper is likely to be a valuable contribution toward informing policy and supporting sustainable development practices. Policymakers, researchers, and agricultural producers must engage in further discourse to understand the implications of pesticide practices on honeybee populations. Such discussions and debates should inform policy decisions aimed at promoting sustainable agriculture practices while safeguarding honeybee populations.

Result:-

This paper has the potential to influence future research, as well as government policies on agriculture and environmental issues. Moreover, this research paper is likely to encourage further investigations on the correlation between pesticides and honeybee health. This is essential to determine the extent and causes of this correlation, and ultimately develop comprehensive mitigation strategies to safeguard honeybee populations. The development of such mitigation strategies should involve collaboration between various stakeholders, including scientists, policymakers, farmers, and beekeepers. This multi-stakeholder approach should ensure that mitigation strategies not only take into account the best available scientific evidence but also reflect the practical realities and concerns of the various groups involved in the agricultural sector, such as farmers and beekeepers. By adopting such a participatory approach, policymakers can increase stakeholder buy-in and promote the effective adoption of sustainable agricultural practices. In conclusion, the research paper on the correlation between pesticides and honeybee health illustrates the need for continued research and investigation into this topic. This is necessary to develop effective mitigation strategies and ensure the preservation of honeybee populations, which are essential for maintaining ecological balance and providing ecosystem services that benefit human well-being. It is therefore crucial that policymakers prioritize funding for such research and collaborate with various stakeholders to develop sustainable agricultural practices that mitigate the adverse effects of pesticide use on honeybee populations and promote the long-term health of both the ecological system and human society. By doing so, future generations can continue to inherit a healthy and sustainable planet.

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