

STUDIES ON THE INSECTS ASSOCIATED WITH CALOTROPIS GIGANTEAN IN AKOLA CITY OF MAHARASHTRA INDIA

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ABSTRACT

Calotropis gigantea, also known as milkweed or swallow-wort, is a prevalent weed found in wastelands, belonging to the Asclepiadaceae family. It's referred to as Milkweed, Ak (in Hindi), or Akon (in Assamese). Originating from India, it thrives in various climates and soils, often in areas where little else grows. Traditionally, it has been utilized for treating common ailments, with its leaves and flowers employed in remedying various human disorders. A recent investigation delved into the ecology and biology of insects that harm the medicinal plant *Calotropis gigantea* in the Akola Katepurna area during 2021-2022. The study aimed to assess the insect population damaging the plant in its natural habitat and estimate the density of nine insect species, focusing on the biology of the two major ones. Field observations documented the insects' activities and their habitats, highlighting the influence of climatic conditions on their population dynamics in the Katepurna region.

Keywords: Insects, *Calotropis Gigantea*, Damage, Katepurna, Assame.

Introduction

Insects play vital roles in pollination, predation, and parasitism in ecosystems. *Calotropis gigantea*, a plant belonging to the Asclepiadaceae family, is known for its abundant growth in the wild. It has been documented to have various medicinal qualities and has been historically utilized to treat toothaches, earaches, sprains, anxiety, pain, epilepsy, and mental disorders. Studies have indicated that the aerial parts of the plant contain compounds with anti-diarrheal properties. (ChitmeHR *et al.*, 2004) Flowers are recognized for their pain-relieving effects. The roots of the plant have demonstrated activity in the central nervous system, as well as properties that can intercept pregnancy. (Schowalter TD *et al.*, 1991) The outer bark of the *Calotropis gigantea* plant's stem produces resin and wax. This wax contains various compounds such as β -amyirin and its isovalerate, α -calotropeols and β -calotropeols, a mixture of tetracyclic triterpenes, small amounts of sterols, hydrocarbons with 31 and 33 carbon atoms, fatty acids, and giganteol. Additionally, the stem of *Calotropis gigantea* produces latex. (Shojiri K 2002). The latex includes substances like cardiac glycosides, calotropin, uscharin, calotoxin, uscharidin, and gigantinin. A proteolytic enzyme called calotropain has been extracted from the latex. (Karban R 1933) Calotropain exhibits strong anti-blood clotting effects. The insects that infest *Calotropis gigantea* plants can cause significant harm to the host plant. (Stoekeler, 1957). *Corynodesperegrinus* Researchers noticed that pupae enter a state of diapause during the dry season, which typically lasts from October to April. Certain species use the onset of dry conditions as a signal to enter diapause, while they use the return of wet conditions as a signal to end diapause.

Material Method: Study Area

Akola is a town located in the Vidarbha region of Maharashtra. It is positioned at a latitude of 20.70 degrees North and a longitude of 77.07 degrees East. The town's elevation ranges from 925 feet

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(287 meters) to 1036.745 feet (316 meters) above sea level. Akola experiences a tropical savanna climate with annual temperatures ranging from a high of 47.6 degrees Celsius to a low of 2.2 degrees Celsius. The average annual rainfall is around 800mm. Katepurna Sanctuary is situated in the Akola district, which falls within the Vidarbha region. The sanctuary covers a significant portion of the catchment area of the Katepurna reservoir. Due to the presence of ample water, the area attracts a variety of bird species. The best time to visit is from October to June. Flora: The sanctuary boasts rich vegetation, primarily consisting of southern tropical deciduous forests. There are over 115 species of plants and trees such as Bahada, Aola, Tendu, Dhawada, Salai, Moha, Teude, and more. Fauna: The sanctuary is home to a diverse range of animals including Blackbuck, Hyena, Wolf, Nilgai, Leopard, Jungle cat, Hare, Wild boar, Monkey, etc. The main attractions are the Barking deer and the Four-horned Antelope. Visitors can also spot various bird species like Peafowl, eagles, woodpeckers, etc. Katepurna Wildlife Sanctuary spans across 73.69 square kilometers.



Map showing Forested area Inside Akola City

At the time of survey we observed and studied insects harming the medicinal plant *Calotropis gigantea* was from April 2021 to March 2022. We focused on months ranging from March to November, which includes the extended monsoon season, throughout this survey period.

Pre-Monsoon	March to May
Monsoon	June to August
Post-Monsoon	September to November
Winter	December to February

Survey was conducted in all the seasons from morning 7am to 10am, during sunny days and upto 11 am during rainy days. In the afternoon 4pm to 6pm time period for survey was commonly reserved fixed but in winter season the time period were changed consequently – morning 6 am to 9 am and evening 2 pm to 4 pm for both sunny as well as cloudy days Kirtikar KR(1609)

The insects that were discovered to invade and harm *Calotropis gigantea* were observed repeatedly during the infestation season for several years in a row. Once the infestation was confirmed, the insects were collected and stored for later identification. The process of collecting and identifying the insects followed the methods outlined in Murdoch MM (1996) and the instruction manual of the Commonwealth Institute of Entomology in London.

Results and Discussion

Table 1: Insects and their Feeding Site

S. No.	Name	Stage	Parts feed	Approximate no. of insects perplant
1.	<i>Corynodes peregrinus</i>	Larvae 1 st to 4 th	Stem	11-13
		Adult	Leaves	5-11
2.	<i>Danaus chrysippus</i>	1 st instar	Tender leave	16-21
		2 nd instar	Young leave	11-14
		3 rd instar	Young leave	9-12
		4 th instar	Mature leave	7-9
		5 th instar	Mature leave	5-7

3.	<i>Poeciloceris pictus</i>	Adult	Mature leaf	3-4
4.	<i>Phygasia silacea</i>	Adult	Young leave and mature leave	3-4
5.	<i>Aphis nerii boyr</i>	Nymph	Tender leave and flower	numerous
6.	<i>Abidma refula</i>	Adult	Basal, middle stem apical shoot	5-6
7.	<i>Lygaeus millitaris</i>	Adult	Young leave and mature leave	2-3
8.	<i>Hylobiinae paramecops</i>	Adult	Young leave and mature leave	3-6
9.	<i>Spilostethus hospe</i>	Adult	Young leave and mature leave	3-4



Fig 1: *Corynodes Peregrinus*

Order – Coleoptera
 Family – Chrysomelidae
 Colour – Metallic, Blue

The harm caused by the insects includes feeding on the leaves by adult insects and burrowing into the stems by larvae.



Fig 2: *Danaus Chrysippus*

Order – Danaiidae
 Family – Papilionidae
 Colour – Orange brown with black spots on wings

The damage involves larvae that voraciously feed on the leaves of *Calotropis gigantea* during their growth stage.



Fig 3: *Poecilotherpes pictus*

Order – Orthoptera
Family – Pyrgomorphilidae
Colour - Greenish yellow

The damage consists of larvae feeding on the leaves, while adult insects extract nectar from the flowers by sucking it.



Fig 4: *Phygasia silacea*

Order – Coleoptera
Family – Chrysomelidae
Colour – Brown in colour

The damage occurred as groups of insects fed on the leaves, starting from the edges and consuming them entirely. Larvae primarily feed on the outer layer of the leaves. They feed in groups, with around 30-40 insects feeding on a single leaf simultaneously. During the infestation period, these insects consume approximately 50-60% of the leaves



Fig 5: *Aphis nerii*

Order – Hemiptera
Family – Aphidae
Colour – Yellow

The damage is caused by insects sucking on the flowers and shoots of the plants.



Fig 6: *Abidma Refula*

Order – Homoptera
 Family – cercopidae
 Colour – Brown to Black insect

The damage is inflicted on the host plant as the insect sucks sap from the stem. During the infestation period, the insect is observed to excrete a noticeable amount of honeydew onto the stem while feeding.



Fig 7: *Lygaeus mi litaris*

Order – Hemiptera
 Family – Fabaceae
 Colour – Red with black stripes

The damage occurs when they deposit eggs on the leaves of the host plant.



Fig 8: *Hylobiina Paramecops*

Order – Coleoptera
 Family – Curculionidae
 Colour – Greyish

The damage is typically caused by the weevil, which is commonly found on AK (*Calotropis* sp.) plants.

The weevil appears grayish but is coated with a white powdery substance. Eggs are laid in the fruit's rind, and the larvae grow to about half an inch in length before pupating in a cocoon made of delicate fibers, known commercially as kapok, around 10 days after the adult emerges. Once mature, they feed on the plant's leaves. These weevils are abundant and widely distributed wherever this plant is found.



Fig 9: *Spilostethus Hospes*

Order – Hemiptera

Family – Lygaeidae

Colour – Yellowish brown with black markings on wing

The damage pattern involves both the larvae and adults sucking the sap from the leaves of the host plant. As a result of their infestation, the leaves turn yellowish and dry up. The nymphs are also highly active in sucking the sap from the young leaves.

Conclusion

Calotropis gigantea, commonly known as giant milkweed, is a weed plant belonging to the Apocynaceae family, which includes latex-bearing plants. This plant is renowned for its various medicinal properties in traditional medicine and has been used to treat a wide range of ailments. Over the past few decades, extensive scientific research has been conducted on *C. gigantea*, leading to the isolation and analysis of numerous bioactive compounds found in different parts of the plant. These compounds have shown pharmacological activities such as analgesic, antimicrobial, antioxidant, anti-pyretic, insecticidal, cytotoxic, hepatoprotective, pregnancy-interceptive, purgative, procoagulant, and wound-healing properties. The medicinal properties of *C. gigantea* make it a valuable source of medicinal compounds. Therefore, studies on the insects associated with *Calotropis gigantea* hold equal importance both commercially and economically. This study aimed to determine the number of insects damaging the plant and estimate the population density of nine insects, focusing on the biology of two major insects. Field activities of the insects and their habitats were recorded, highlighting the role of climatic factors on their population dynamics under the field conditions of Akola.

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