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### Case Report

# Documentation of the toxic flora from the Navi Mumbai region of Maharashtra

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## Abstract

A field research extensive survey was undertaken during the years 2020–2021. This kind of study to make people aware among public and school kids, and provide various solutions for protecting family members and animals from these harmful and toxic plants. A total of 16 toxic (poisonous) plant species from 13 families were recorded, identified, and discussed in this study. Araceae family lead with three each, followed by Apocynaceae, Euphorbiaceae, and Leguminosae with two each and the remaining one to each. According to the findings, several plants are poisonous and cause a variety of diseases in humans and animals. As a result, they were generally ignored by the public. Poisonous substances can be found in a variety of plant parts including the bark, stem, leaves, fruits, latex, and tubers.

**Keywords:** Toxic, Poisonous, Toxin, Consumption, Navi Mumbai

## INTRODUCTION

Plants have been used by the indigenous people for food, clothing, and shelter because of an ancient civilization. They are also one of the principal sources of various types of traditional medicine. Ancient people extracted numerous chemical compounds in primitive ways and used them to treat a variety of ailments. Herbal medications derived from various sections of plants are frequently used in modern medicine to treat a variety of diseases. The pharmaceutical industry is dependent on various chemical ingredients derived from plants. Some of these plants have also been observed to be harmful to man and his domestic animals in specific circumstances. They were also found to be to blame for the deaths of consumers, including humans. Poisonous plants are defined as plants that, when consumed or brought into contact with a living thing in any way, produce harmful effects or even death, either immediately or through the cumulative action of the toxic property due to the presence of known or unknown chemical substances in them and not through mechanical action (Chopra et al., 1984).

A poison is any substance that, when ingested, causes harm in a nonthermal or mechanical manner, causing death or serious health consequences. While it is common to think of toxic chemicals as being eaten whole, this is not always the case. Some compounds are not poisons at all, but break down into distinct substances during digestion, one or more of which could be poisonous (Gates, 1930).

Plants with glucosides, acids, or alkaloids are utilised to make treatments. When consumed in excess, they might have negative consequences. If used in excess, the latex, white or coloured sap found in the Apocynaceae, Asclepiadaceae, Sapotaceae, Euphorbiaceae, and Papaveraceae families is poisonous. Plants of the Araceae family contain calcium carbonate or oxalate crystals, which induce significant mouth and throat irritation, as well as enlargement of the throat and intestinal walls. This might result in suffocation or death. When certain plants containing orthophosphoric acids come into touch with the skin or mucous membrane, they induce severe irritation and eruption.

Several toxic plants, such as *Nerium oleander*, *Digitalis purpurea* (Foxglove), *Cestrum diurnum* (Jasmine berries),

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common decorative plants; *Calotropis* and *Datura*, commonly recognized weed species, can be found in our surroundings. These plants have the potential to be harmful to cattle and people (Nelson et al., 2007).

These potentially poisonous plants include physiologically active chemicals that cause systemic and local toxicity in cardiac, nervous, muscular, and vascular tissues. These poisonous compounds have been found in intact plant parts such as seeds (*Abrus precatorius* and *Datura stramonium*), roots (*Aconitum napellus*), and leaves (*Calotropis gigantea*), among others. The degree of plant toxicity is affected by plant shapes and growing conditions (Chippendale & Murray, 1963).

Young kids tend to be particularly sensitive to deadly plants ingested by accident. Deaths from poisonous plant intake are documented in pieces of information, but a consistent pattern of such occurrences, particularly in India, is hard to come by. Poisonous plants are the third most common type of toxin in the world. Plant toxicoses exist everywhere, but the rich flora of India places the location high on the list of possible exposure to deadly plants. Accidental plant ingestion resulting in acute poisoning is more common in pre-school children and is believed to be more prevalent in countries where plant-based traditional remedies are widely utilised.

The main concern in phytomedicine and other situations where potentially toxic plants are consumed is phytotoxicity. Plants, in addition to their medicinal properties, produce harmful by-products such as tannins, glycosides, toxalbumin, and alkaloids, among others, which can have antagonistic toxic effects in humans (Yuan et al., 2016).

Toxic plants are the third most common type of toxin in the world (Bhatia et al., 2014). A study revealed the medicinal use of toxic plants such as *Abrus precatorius* seed paste (for joint pain relief); *Argemone mexicana* seed oil mixed with *Ricinus communis* oil (for treating skin irritation and wounds) (Bhatia et al., 2013; Devi, 2017, Praveen et al., Upadhyay et al., 2007;). Poisonous plants are those that cause a harsh problem or even death when a small number of their leaves, seeds, stem, fruits, and roots are injected, ingested, inhaled, and direct contact, etc (Khajja et al., 2011; Pillay, 2013).

According to the literature, India has approximately 700 poisonous plant species (Chopra, 1949). Plant poisoning in children is different from plant poisoning in adults because children are naturally curious and will chew on anything that is easily accessible, including attractive berries or fruit. Plants can differ in terms of toxicity, and many sources categorize plants as extremely, moderately, or minimally toxic. As a result, some cases are not generally fatal due to the low toxicity of plants, or else only vomiting occurs,

whereas other cases become serious when not managed by owners and veterinary specialists (Yipel et al., 2014).

Angiosperm plants can be toxic to humans, livestock, insects, and fish under certain conditions (Apollo, 2006). Plant poisoning is not common in India, but it is reported regularly. Toxic plant species such as *Datura*, *Calotropis*, *Croton*, *Thevetia*, *Abrus*, and *Ricinus* are common in India (Qureshi et al., 2001). According to previous research, plant poisoning is often lethal to humans, but death can occur if the MoA is too rapid and the LD50 is too low. It typically occurs when there is insufficient knowledge of potentially toxic plants (Botha et al., 2008).

This observation will contribute to the identification of toxic plants in the area. Several authors have examined poisonous plants, including Caius (1986), Chopra et al. (1965), and Jain (1991), who reported on various Indian plants and their toxicological consequences as deadly doses. Some hazardous Indian plants are described by Viswanathan et al. (1983). Siwach & Gupta (1995) worked on poisonous plants in Haryana. Singh et al. (1999) recorded some poisonous plants from the Chandigarh zone. Poisoning treatment reports were based on many kinds of literature by many authors, like Jain (1991), Katewa & Galav, (2006) etc.

Several hazardous plants can be found in Navi Mumbai. The residents of this district were unable to determine which plants were harmful. The goal of this article is to educate the normal person on how to recognize these plants so that they can prevent the unavoidable hazards of simply touching or eating them. The following are some of the plants or plant parts that have been recorded as poisonous in Navi Mumbai.

## MATERIALS AND METHOD

### Location of the study

Navi Mumbai is a planned city in Mumbai, Maharashtra, India. It is located on the west coast of the state. It began as a new urban township for Mumbai in 1972 and has since grown to become the world's largest planned metropolis. The elevation of Navi Mumbai is 29 meters above sea level. Here, the climate is tropical. There is substantially less rainfall in the winter than in the summer. The average annual temperature in Navi Mumbai is 26.6 degrees Celsius (79.9 degrees Fahrenheit). The average annual rainfall is 1,920 mm (76.4 inches).

### Identification of plants

Specimens were identified using local floras and supporting material for ethnomedical purposes as published in various works of literature, books and so on (Almeda, 2003, Cook, 1908; Jain & Rao, 1977, Jain & Srivastava, 1999; Naik, 2004; Shah, 1978). Specimens were dried and prepared as

herbarium specimens as supporting documentation and stored permanently at the herbarium of the Department of Botany, V.P.M.'S. B N Bandodkar College of Science, Thane Maharashtra.

### Survey

During 2020-2021, 10 survey visits to 07 nodes in the Navi Mumbai area were planned. The data was crosschecked with suitable and specialized applications of plants and plant components.

## RESULTS AND DISCUSSION

Several poisonous plant species have been found growing along roadsides and near homes. Exposure-related effects varied from skin rashes to death. Common suggestions about reducing toxic effects after intake included consuming milk or warm water. Some claim that boiling plant components reduces the toxicity. Many of the deadly plants were also employed in traditional medicine.

According to the findings of this study, the Navi Mumbai region is rich in toxic flora with a significant effect on human and animal health. It has 16 toxic (poisonous) plant species divided into 16 genera and 13 families. Botanical names and local names for plant species as well as toxic parts were recorded, identified, and discussed in this study. Araceae family lead with three each, followed by Apocynaceae, Euphorbiaceae, and Leguminosae with two each and the remaining one to each.

The principal purpose of this research is to identify the toxic plants in the Navi Mumbai region, make people aware among the public and school kids and provide various solutions for protecting family members and animals from these harmful and toxic plants. To raise awareness of poisonous plants among school pupils and advise them on the necessary precautions to take such as avoiding touching, smelling, or ingesting deadly portions of these toxic plants. Raise awareness of the consequences and seriousness of poisonous plants in the Navi Mumbai area. Some of the plants studied, such as Oleander, *Calotropis*, *Gloria*, *Ricinus*, etc., were shown to be extremely harmful to humans.

This study covers thorough scientific and clinical toxicological information, as well as information on their adverse effects on humans. This insight allows us to quickly identify the toxin(s) and harmful portions of the plants. These details will undoubtedly aid in the identification of poisonous plants in this area. The primary goal of this study is to give accurate and reliable information in order to lessen the anxiety associated with hazardous plants and to enable you to estimate the danger of these plants. This study shows that the harmful chemical, toxic portions and the risk of plants are all lethal.

Toxic plants are the plants when touched or ingested in a sufficient quantity, can be harmful or fatal to human beings and other animals. When used in small amounts and in correct proportions, products from these plants can be utilized as drugs and toxins. The beauty of these plants hides the toxicity within them. The toxicity may differ from plant to plant and it depends on several factors, especially on the different chemicals that characterize it. Moreover, it depends on the part of the plant ingested with respect to its concentration and stage of growth.

The easiest way to reduce unintentional toxicity from hazardous plants is to raise knowledge about them. In the event of an unintentional intake, the leftover plant should be removed from the mouth and washed with water. The plant must be preserved for identification so that the best treatment may be given. It is critical to avoid producing vomiting since it might cause glottic obstruction and suffocation.

1. ***Abrus precatorius* L., Common Names: Bead Vine Family: Leguminosae, (Fabaceae).**

**Harmful effects:** Toxin Abrin is found in the seeds' hard, water-resistant outer covering. Unless the seed is chewed and digested, or the seed coat is otherwise damaged, the poison is not released (for example, when the seeds are pierced and threaded on a string as in a necklace). Toxalbumin, a plant lectin related to ricin, inhibits cellular protein synthesis and is potentially hazardous. Seeds that have been ingested usually pass through the gastrointestinal tract unharmed, releasing no poison and producing no toxicity. The toxin is absorbed by intestinal cells if the seeds are chewed, crushed, or digested (i.e., if passage through the gastrointestinal tract is delayed), producing mild to severe gastrointestinal toxicity. Symptoms include nausea, vomiting, stomach cramping, diarrhea, and dehydration, depending on the quantity of toxin exposure. The degree to which the seeds are ground or chewed before intake may influence the level of poisoning. Even with tiny exposures, parenteral delivery (such as by injection or inhalation) or even significant ingestion might result in life-threatening systemic results, including multisystem organ failure (Benson, et al., 1975, Davies, 1978, Dickens et al., 2003).

2. ***Caladium bicolor* L.Vent, common name: Heart of Jesus, "Family." Araceae**

**Harmful effects-** It produces acute mouth burning, vomiting, and other gastrointestinal irritations when consumed. Its sap causes temporary blindness when it comes into touch with the eyes. Calcium oxalate crystals are the substance that causes inflammation (Franceschi, 2005).

3. ***Calotropis gigantea* (L.), also known as Giant Milkweed, belongs to the Asclepiadaceae family**

**Harmful effects-** Chemical constituents found in the leaves and stalk include voruscharin, calotoxin, calotropin,

uscharidin, trypsin, calactin, uzarigenin, syriogenin, and proper side isolated from latex, benzoyllineolone and benzoylisolineolone isolated from root bark, and cyanidin-3-rhamnoglucoside isolated from flowers. Many toxic components are created by latex, trypsin, calotoxin, and calotropin, which appear to be collectively responsible for plant toxicity (Adams, 1963). The latex of the plant causes blindness and skin and mucous membrane irritation. Latex can be fatal at doses of 4 - 5 ml. The milky liquid is a poisonous material (Handa et al., 1984).

4. ***Caryota urens* L. Fishtail Palm, Family: Palmae (Arecaceae)**

**Harmful effects:** The pulp of the fruit is toxic. Unverified proteinaceous toxin and raphides of water-insoluble calcium oxalate. Ingestion causes a painful burning sensation in the lips and oral cavity. There is an inflammatory response, which is commonly accompanied by edoema and blistering. Hoarseness, dysphonia, and dysphagia are possible side effects (Snyder et al., 1997).

5. ***Cassia fistula* L., Common name -Golden shower, Family: Leguminosae (Fabaceae)**

**Harmful effects:** The sticky fruit pulp is hazardous. The leaves and bark are not as poisonous. Anthraquinone cathartic toxin Emodin glycoside (senna). Nausea, vomiting, abdominal discomfort, diarrhoea, and dehydration can all result after ingestion. Emodin can also induce mild urine discoloration (yellowish-brown urine in acid urine, red or violet urine in basic urine) (Barthakur, 1995).

6. ***Catharanthus roseus* (L.) G. Don., common name- Periwinkle, family: Apocynaceae**

**Harmful effects:** The most serious adverse effect is diarrhea, which is caused by an imbalance in the secretory function of the gastrointestinal tract. The principal alkaloids detected in the leaves are theirotine (vincristine) and vincalcalcin (Duffin, 2002).

7. ***Dieffenbachia seguine* (Jacq.) Schott, Dumbcane, Family: Araceae**

**Harmful effects:** The entire plant is toxic. Unverified proteinaceous toxins and raphides of water-insoluble calcium oxalate. Chewing on the leaf creates severe discomfort right away (Mrvos et al., 1991).

8. ***Ficus elastica* ex Hornem, Common name: -Rubber tree, Family- Moraceae**

**Harmful effects:** Ingesting latex can cause a range of stomach problems, and large dosages can be fatal (Kitajima et al, 2000).

9. ***Gloriosa superba* L., Common name-Climbing Lily, Family: Liliaceae**

**Harmful effects:** The entire plant, especially the tubers, is poisonous. Colchicine is a medication that is used to treat

(*Colchicum autumnale* is a commercial source of this drug.) It may induce oropharyngeal pain at first, followed by severe gastrointestinal symptoms after a few hours. Abdominal pain and severe, frequent, and chronic diarrhea may occur, resulting in severe fluid depletion and accompanying complications. Colchicine may cause peripheral neuropathy, bone marrow suppression, and cardiovascular collapse because of its use (Aleem, 1992, Mendis, 1989).

10. ***Heliotropium indicum* L., Common name- Scorpion's Tail, Family: Boraginaceae**

**Harmful effects:** The plant as a whole is poisonous. Alkaloids of pyrrolizidine acute hepatitis can result from significant short-term exposure, whereas chronic exposure to lesser doses can result in hepatic venous-occlusive disease (Budd-Chiari syndrome) and, in some cases, pulmonary hypertension (Chauvin et al., 1993).

11. ***Jatropha curcas*, Common name-Physic Nut, Family: Euphorbiaceae**

**Harmful effects:** Poisonous seeds are present. Jatrophin (curcin) is a toxalbumin (lectin) found in plants that are linked to ricin. Unlike poisoning from other plants containing poisonous lectins, symptoms (nausea, vomiting, and diarrhoea) frequently appear quickly. The loss of fluid and electrolytes, as well as the reduction of intestinal function, are likely to cause other symptoms. Ingestion of a single seed might result in severe poisoning (Abdu et al., 1986).

12. ***Lantana camera* L., Common name- Lantana, Family- Verbenaceae**

**Harmful effects:** Poisonous pentacyclic triterpenes Lantadene A, B, and C cause prolonged cholestasis in grazing animals. Poisonous are immature berries. The consumption of mature fruit has been linked to intoxication. Wolfson & Solomons (1964) claim that the leaves are hazardous to cattle.

13. ***Melia azedarach* L." Common name-Persian Lilac" Family- Meliaceae**

**Harmful effects:** Toxin-melatonin, *Melia azedarach*'s blooms, and berries are poisonous to humans. It produces severe colic, nausea, and vomiting. It produces nervousness and limb trembling in animals. By both oral and parenteral methods, the increased concentration of the extracts depresses the respiratory center significantly. This may be due to the direct effect on the respiratory centers. It was noted that death occurs owing to the stoppage of respiration in doses where mortality was seen (Badar, 1991).

14. ***Parthenium hysterophorus* L., Common name-Carrot grass, Family-Asteraceae**

**Harmful effects:** Contact with the plant causes dermatitis and respiratory difficulties in people, as well as dermatitis

in cattle and domesticated animals. The main cause is parthenin, a highly dangerous toxin. Bitter milk disease is caused when cattle feed becomes polluted with *Parthenium* leaves (Rajbhoj & Kagne, 2019).

15. ***Ricinus communis* L., Common name-Castor-Oil Plant, Family: Euphorbiaceae**

**Harmful effects:** Ricine and ricinin (more poisonous) are water-soluble glycoproteins present in the seed. The seed coat, leaves, and stem all contain ricin. The seed's oil is not nearly as deadly as the seed itself. The seed contains glycerides and ricinolic acid. When you ingest the seed, you will get a burning feeling in your throat and tongue, followed by exhaustion, thirst, dizziness, and a faster heartbeat. In the end, it leads to unconsciousness. The oil cake cannot be used as animal feed because it contains more ricin than usual. Death occurs swiftly if the oil is administered directly into the bloodstream. Allergies may be triggered by the seed extract (Audi et al., 2005).

16. ***Thevetia nerifolia* L., Common name-Yellow Oleander, Family-Apocynaceae**

**Harmful effects:** The fruit is the most poisonous part. It's chewing dries up the tongue and throat, causing muscle strain and dilatation of the eyes. The heartbeat rises and falls, and the blood supply is cut off, ending in death. Poisonous glucosides thevetin and theveresin, as well as cardiotoxic crystal particles phytosterolin, ahoenin, and cocliphin, are present in the seeds (Chopra et al., 1965).

Among the poisonous plant parts seed is the most poisonous part followed by fruits and root. The findings of recent studies supported the findings of the previous researchers by Prashant and Shiddamallayya, 2016 from Hassan district, Karnataka, Rajbhoj and Kagne 2019 from Poladpur, Maharashtra, Banerjee and Sinhababu 2016 from West Bengal and Vishwanathan and Joshi 1983 from Mumbai, Maharashtra (Kumar & Shiddamallayya, 2016).

## CONCLUSION

According to the findings, several plants are poisonous and cause a variety of diseases in humans and animals. As a result, they were generally ignored by the public. Poisonous substances can be found in a variety of plant parts, including the bark, stem, leaves, fruits, latex, and tubers. The degree of the disease caused by these plants is mostly determined by the dose consumed by the affected organisms or the level of skin contact. Poisoning by plants is considered a public health issue. Educating and raising awareness among the public about these deadly plants and their parts will be a significant long-term issue. The local database of hazardous plants undoubtedly aids in public awareness and serves as a doorway for study in the fields of botany, pharmaceuticals, and other related fields.

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