REVIEW OF RESEARCH
IMPACT FACTOR : 5.7631(UIF) UGC APPROVED JOURNAL NO. 48514 ISSN: 2249-894X
VOLUME - 8 | ISSUE - 2 | NOVEMBER - 2018

DOCUMENTATION OF TOXIC PLANTS IN AND AROUND SHIVAMOGGA AREA , KARNATAKA

Dr. S. Thirumala[1] and Dr. B. R. Kiran[2]
[1]Department of Environmental Science, Government First Grade College & P.G. Center, Near Anubav Mantapa, Davanagere, Karnataka.
[2]Research & Teaching Assistant in Environmental Science, DDE, Kuvempu University, Shankaraghatta , Karnataka.

ABSTRACT

The present article deals with the documentation of toxic plants in and around Shivamogga taluk of Karnataka during 2016-17. A total of 24 plants belonging to 22 genera and 16 families were recorded. The plant species with their families are also reported in this paper. Toxic properties of few plants are discussed in this paper.

KEYWORDS: *Toxic plants, Shivamogga taluk, Karnataka.*

INTRODUCTION:

Plants cannot move to escape their predators, so they must have other means of protecting themselves from herbivorous animals. Some plants have physical defenses such as thorns, spines and prickles, but by far the most common type of protection is chemical (Keddy,2007). Over millennia, through the process of natural selection, plants have evolved the means to produce a vast and complicated array of chemical compounds in order to deter herbivores. Tannin, for example, is a defensive compound that emerged relatively early in the evolutionary history of plants, while more complex molecules such as polyacetylenes are found in younger groups of plants such as the Asterales. Many of the known plant defense compounds primarily defend against consumption by insects, though other animals, including humans, that consume such plants may also experience negative effects, ranging from mild discomfort to death (https://en.wikipedia.org).

Toxic plants were perhaps bestowed with the fruit of toxin, enumerating the course of evolution and signifying parallel evolutionary pathways in plants and animals (Chopra *et.al,* 1984). Some plants toxins act as general protoplasmic poisons and affect many species of plants representing different families (Agrios, 2000).

The nutritional compounds present in plants are carbohydrates in the form of starch and sugars, protein, lipid, in the form of oil, vitamins, minerals, etc. Apart from these antioxidant, like ascorbic acid, phenols such as cholorogenic acid and its polymers are available in plant because of these component, the wild vegetable must have potential to improve physical as well as mental health, help in reduce the risk of disease (Aberoumand, A, et al, 2009 ; Atram Seema,2015 ; Thirumala and Kiran,2017). No work has been carried out on diversity of toxic plants occurring in and around Shivamogga taluk, Karnataka. Hence, the present study has been carried out and it is helpful for further scientific research.

MATERIALS AND METHODS

Study area

Shivamogga district covers an area of 8477.84 sq. km and lies in the western part of the Karnataka state between 130 27' to 140 14'39" north latitude and 740 38'to 750 45' east longitudes. The district is surrounded by Uttara-Kannada & Dharwad districts in the north, Udupi & Chikmagalur districts in the south and Davanagere district in the east (Figure 1).

The area enjoys tropical climate throughout the year. Generally, the weather is hot and humid in the eastern part and very pleasant in the remaining parts of the area. The relative humidity ranges from 27 to 88%, the wind speed recorded is between 4 and 7km/hr. The evapo-transpiration is normally high in ghat section as compared to plain in the east. Summer prevails between March to early June, the wet months start from early June to September, October and November months experience scanty rain by NE monsoon. The winter commences in mid-November and ends in the middle of February.

The main crops grown in the district are Paddy, Ragi, Jowar, Maize, Cotton, Groundnut, Pulses, Sugarcane , Coconut and Areca nut. The soils that occur in the study area are reddish to brownish clayey loam to lateritic. These cover major parts of the area. Thin strips of yellowish loamy soil are seen along the banks of major river and nallah courses. In general these soils are acidic in nature (Central ground water Board, 2012).

Collection of data

Field explorations was conducted during 2016-17 to know the variety of toxic plants occurring in Shivamogga taluk of Karnataka .The study was based on extensive and intensive field surveys undertaken in and around Shivamogga area *i.e*. Sogane, Voddinakoppa, Amruttur, Santhekadur and Kachinakatte. The plant specimens have been studied and identified by using floras (Sharma *et al*. 1984, 1988; Saldanha 1984, 1996; Kirtikar, 2003; Lewis Nelson et al., 2007; Pillay,2010; Caius,2012; Bhattacharjee and Sushmita Bhattacharjee ,2013), besides other new monographs and books.

RESULTS AND DISCUSSION

Table 1 depicted list of toxic plants of Shivamogga taluk. In this study 24 toxic plants belonging to 22 genera and 16 families were recorded. Figure 1 shows the number of toxic plants in each family.

The plants toxic to pet animals include Ricinus communis, Jatropha curcas, Lantana camera, Chrysanthemum, Nerium oleander, Cascabela thevetia and Solanum tuberosum.

In Phaseolus vulgaris, the toxic compound phytohaemagglutinin, a lectin, is present in many varieties of common bean but is especially concentrated in red kidney beans. The lectin has a number of effects on cell metabolism; it induces mitosis, and affects the cell membrane in regard to transport and permeability to proteins. It agglutinates most mammalian red blood cell types. ("Foodborne Pathogenic Microorganisms and Natural Toxins Handbook: Phytohaemagglutinin". Bad Bug Book. United States Food and Drug Administration. July 2009 ; https://en.wikipedia.org).

Citrus fruits are known to contain aromatic oils and compounds of Psoralen which is toxic to dogs, cats, and some animals. The acid is found all over the entire plant. Symptoms include vomiting, diarrhoea, depression and photosensitivity.

Mangifera indica peel and sap contain urushiol, the allergen in poison ivy and poison sumac that can cause urushiol-induced contact dermatitis in susceptible people. Cross-reactions between mango contact allergens and urushiol have been observed. Urushiol is also present in mango leaves and stems. During mango's primary ripening season, it is the most common source of plant dermatitis. Many members of the Allium genus contain thiosulphate, which in high doses is toxic to dogs, cats and some types of livestock. Cats are more sensitive to Allium (https://en.wikipedia.org).

Solanum tuberosum contain toxic compounds known as glycoalkaloids, of which the most prevalent are solanine and chaconine. The concentration of glycol alkaloid in wild potatoes is sufficient to produce

toxic effects in humans. The toxin affects the nervous system, causing headaches, diarrhea and intense digestive disturbances, cramps, weakness and confusion, and in severe cases coma and death. Poisoning from cultivated potatoes occurs very rarely, however, as toxic compounds in the potato plant are generally concentrated in the green portions of the plant and in the fruits, and cultivated varieties contain smaller concentrations than wild plants ("Tomato-like Fruit on Potato Plants". Iowa State University, 2009 ; Glycoalkaloid and calystegine contents of eight potato cultivars, 2003). Solanum lycopersicum leaves and stems contain solanine that is toxic if ingested, causing digestive upset and nervous excitement. In Solanum nigrum- all parts of the plant except the ripe fruit contain the toxic glycoalkaloid solanine. Solanine poisoning is primarily displayed by gastrointestinal and neurological disorders. Symptoms include nausea, diarrhea, vomiting, stomach cramps, burning of the throat, cardiac dysrhythmia, headache and dizziness. In more severe cases, hallucinations, loss of sensation, paralysis, fever, jaundice, dilated pupils and hypothermia can result. In large quantities, solanine poisoning can be fatal (https://en.wikipedia.org).

Ricinus communis seeds contain water-soluble ribosome-inactivating protein; it is also present in lower concentrations in other parts of the plant. Also present are ricinine, an alkaloid, and an irritant oil (https://en.wikipedia.org).

Nerium oleander parts are toxic, the leaves and woody stems in particular. Contains nerioside, oleandroside, saponins and cardiac glycosides. Causes severe digestive upset, heart trouble and contact dermatitis. The smoke of burning oleander can cause reactions in the lungs, and can be fatal. Datura species containing the tropane alkaloids scopolamine, hyoscyamine, and atropine, all parts of these plants are toxic, especially the seeds and flowers. Ingestion causes abnormal thirst, hyperthermia, severe delirium and incoherence, visual distortions, bizarre and possibly violent behavior, memory loss, coma, and often death (https://en.wikipedia.org).

Kiran and Nagaraj Parisara (2016) carried out the preliminary survey of poisonous plants in and around Bhadravathi taluk of Karnataka during 2013-14. They recorded a total of 30 plants belonging to 27 genera and 18 families . The plant species with their families are also reported in their article.

The toxic principles and properties of analysed plants were compared with previous works of Siddiqui *et.al.* (1997), Bernard-Smith (1988) and Al Yohya *et.al.* (2000). The latex of *calotropis gigantean* is used as abortifacient but at times ignorantly experiencing fatal results.

As per the study done by toxic exposures surveillance system by poison centres in USA, out of 123,378 exposures to plants were reported to the American Association of Poison Control Centres (Litority *et.al.,* 1999). None of these reported exposures were fatal.

REFERENCES

1. Agrios, G.N. 2000. Plants pathology, 4th edition, Academic Press, USA, 9.638.
2. Al-Yohya, M.A., Farhn. And A.H. Adam. 2000. Preliminary Toxicity Study on the Individual and Combined Effects of *Citrullus cologynth* is and *Nerium oleander*. Fitoteropia 71: 385-391.
3. Aberoumand, A, 2009.Studies on nutritional value of some wild edible plants from Iran and India. Pakistan J. of Nut 8, 26-31.
4. Atram Seema.2015.Medicinal properties of wild leafy vegetables available in Maharashtra state in Rainy season. International Journal of Recent Scientific Research Vol. 6, Issue, 8, pp.5875-5879, August, 2015.
5. Bernard-Smith, A. 1988. Toxic Plants of All Countries. 2nd ed. Soni reprints Agency, New Delhi, India.
6. Bhattacharjee, S.K and Sushmita Bhattacharjee.2013. Toxic plants-their botany, properties and uses. Pointer publishers, Jaipur.
7. Caius, J.F.2012. The medicinal and Toxic plants of India. Scientific publishers, Jodhpur.
8. Census of India 2001: Data from the 2001 Census, including cities, villages and towns (Provisional)". Census Commission of India. Archived from the original on 2004-06-16. Retrieved 2008-11-01.
9. Chopra, R.N., Badwar, R.N. and S.Ghosh. 1984. Poisonous Plants of India, Academic Publishers, Jaipur, India.

10. Foodborne Pathogenic Microorganisms and Natural Toxins Handbook: Phytohaemagglutinin". *Bad Bug Book*. United States Food and Drug Administration. Retrieved11 July 2009.
11. Glyco alkaloid and calystegine contents of eight potato cultivars. J-Agric-Food-Chem. 2003 May 7; 51(10): 2964–73.
12. https://en.wikipedia.org/wiki/List_of_Toxic_plants.
13. Keddy, P.A. 2007. Plants and Vegetation: Origins, Processes, Consequences. Cambridge University Press, Cambridge, UK. 666 p. Chapter 7.
14. Kiran B.R and Nagaraj Parisara.2016. A preliminary survey of poisonous plants in and around Bhadravathi, Karnataka. International Journal of Sciences & Applied Research 3(4) : 49-52.
15. Kirtikar, K.R. 2003.The Toxic plants of Bombay. Scientific publishers, Jodhpur.
16. Lewis S Nelson, Richard D Shih and Michael J.Balick. 2007. Handbook of Toxic and injurious plants. Springer Verlag U S. CBS Publishers, New Delhi.
17. Pillay, V.V.2010. Common Indian Toxic plants. 5 th Edition. Oxford University Press.
18. Saldanha, C.J. 1984. *Flora of Karnataka*, vol. 1. New Delhi: Oxford and IBH. 535 p.
19. Saldanha, C.J. 1996. *Flora of Karnataka*, vols. 2. New Delhi: Oxford and IBH. 304 p.
20. Sharma, B.D., N.P. Singh, R. Sundararaghavan and U.R. Deshpande. 1984. *Flora of Karnataka Analysis*. Calcutta: Botanical Survey of India. 395 p.
21. Sharma, B.D., S. Karthikeyan, S.K. Mudaliar, B.G. Kulkarni and S. Moorthy. 1987 (1988). Additions to the Flora of Karnataka Analysis. *Journal of Economic and Taxonomic Botany* 11: 51-55.
22. Siddiqui, B.S., R. Uatana, S.Begum and A. Zia-A Sunia. 1997. Cardinolides from the menthanolic extract of *Nerium oleander* leaves possessing central nervous depressant activity in mice. Journal of Natural Products 60. 540-544.
23. Thirumala ,S & B. R. Kiran, 2017. Preliminary Survey of Edible and Wild Leafy Vegetables of Bhadra Reservoir Project Area, Karnataka", International Journal of Current Research and Modern Education, Volume 2, Issue 2, Page Number 4-6.
24. Thirumala,S & B.R.Kiran.2017.Medicinal importance of some weed flora of B.R.project area, Karnataka. International Journal of Advanced Trends in Engineering and Technology, Volume 2, Issue 1.
25. Tomato-like Fruit on Potato Plants". Iowa State University. Retrieved 8 January 2009.
26. Vishnamurthy K.A., Kiran, B.R. Puttaiah, E.T. and B.Rajappa. 2008. Diversity of Toxic Plants in Bhadravathi taluk of Karnataka and their properties. Plant Archives Vol.8(2): 793-795.

Table 1: Check list of toxic plants and their chemical constituents in Shivamogga taluk, Karnataka

Scientific Name	Family	Chemical Compounds
Phaseolus vulgaris	Fabaceae	Phytohaemagylutinin
Citrus limon	Rutaceae	Psoralen
Mangifera indica	Anacardiaceae	Urushiol
Allium sp.	Amaryllidaceae	Thiosulphate
Solanum tuberosum	Solanaceae	Glycoalkaloids
Adonis sp	Ranunculaceae	Adonidin & aconitic acid
Agave sp	Asparagaceae	
Anthurium sp	Araceae	Calcium oxalate
Argemone mexicana	Papaveraceae	Alkaloids Sanguinarine dihydrosanguinarine
Brugmansia sp	Solanaceae	Tropane alkaloids Scopolamine atropine
Caladium sp	Araceae	
Cascabela thevetia	Apocynaceae	Cariac glycosides
Datura sp	Solanaceae	Tropane alkaloids Scopolamine hyoscyamine atropine
Dieffenbachia	Araceae	Calcium oxalate raphides

Euphorbia pulcherrima	Euphorbiaceae	
Gloriosa superba	Colchicaceae	Colchicines, alkaloid
Lantana camara	Verbenaceae	Pentacyclic triterpenoids
Nerium oleander	Apocynaceae	Nerioside Oleandroside Saponins (cardiac glycosides)
Ricinus communis	Euphorbiaceae	Ricinine, alkaloid
Solanum lycopersicum	Solanaceae	Solanine
Parthenium hysterophorus	Asteraceae	Parthenin
Calotropis gigantea	Asclepiadaceae	Calactin
Cassia occidentalis	Caesalpiniaceae	Toxalbumins
Euphorbia tirucalli	Euphorbiaceae	4-Deoxy phorbol`

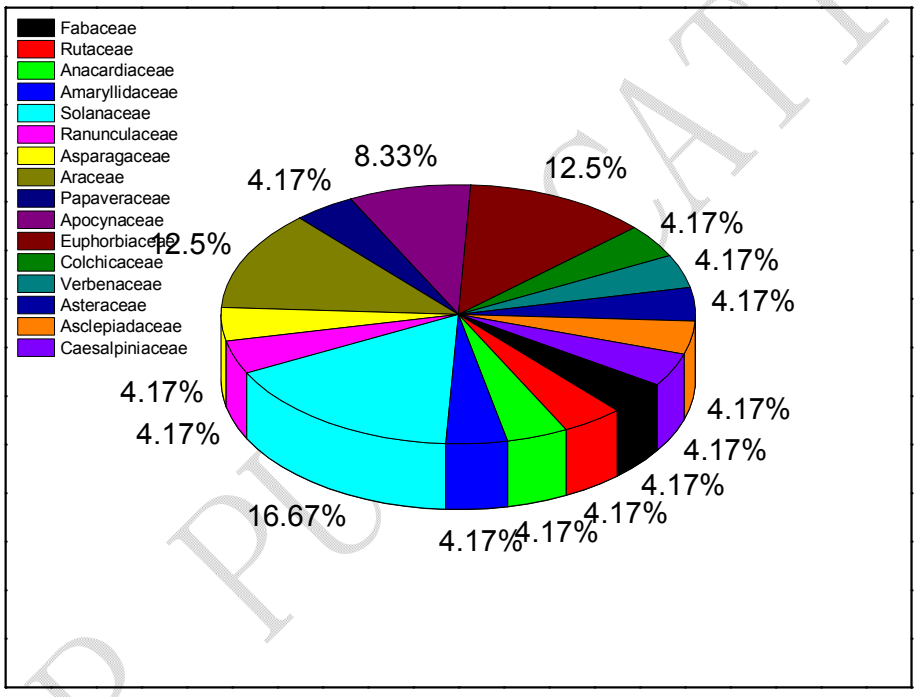

Figure 1: Each family with number of toxic plants in Shivamogga taluk