



ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; 10(3): 114-118
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www.thepharmajournal.com
Received: 13-01-2021
Accepted: 19-02-2021

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Status of poisonous plants and their toxic importance for general people awareness in South-eastern Rajasthan

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DOI: <https://doi.org/10.22271/tpi.2021.v10.i3b.5932>

Abstract

Present study conducted on poisonous or toxic plants abundance in south-eastern Rajasthan which are not identified by the local people, particularly preschool children are prone to be victimized by eating poisonous plants accidentally. Sometimes due to confusion or ignorance human beings use poisonous plants for daily needs like wild edible plants, infectivity of food with noxious plants, or by the use of plants use as remedies for some ailments. All these plants can affect either whole body spectrum or slightest quantity. The poisonous plants recorded from the study area are arranged alphabetically, each by its botanical name, followed by family and local names with their toxic principles and toxicity. Total 45 poisonous plant species were recorded belonging to 30 different families from the study area. Maximum poisonous plants species were recorded from Euphorbiaceae family and followed by Poaceae family. The traditional uses are described with details of toxic plant parts used, toxic principles and notes on toxic effects on humans and livestock. This paper provides valuable information for local people to be aware of poisonous or harmful plants available to their surroundings.

Keywords: Poisonous plants, local people, toxic plants

Introduction

Poisonous plants are in abundance in south-eastern Rajasthan which are not identified by the local people, particularly preschool children are prone to be victimized by eating poisonous plants accidentally. In humans and poisoning ingredients enter in the body either accidentally or intentionally. Among animals, poisoning is usually accidental and sometimes it occurs during unfavorable conditions like pasture scarcity, drought and over grazing but in most of the cases toxic ingredients enter in animal system through grazing. Sometimes due to confusion or ignorance human beings use poisonous plants for daily needs like wild edible plants, infectivity of food with noxious plants, or by the use of plants use as remedies for some ailments. All these plants can affect either whole body spectrum or slightest quantity. Because plant contain a variety of toxic compounds commonly called “secondary compounds” that affect the behavior and productivity of wild and domestic animals. Vigorous effects of a toxic chemical may depend upon the growth and flowering status, amount consumed by the plants, vulnerability of plants against this fatality. The toxic chemicals found inside the plants are following kinds such as glucosides, glycosides, milky-juice (latex), alkaloids, proteins, enzyme inhibitors, tannins, oxalates, antivitamin, volatile etheric layers, phytoestrogens, photo sensitizing substances resin and acid juice; many of which are classified on the basis of their structural and chemical properties^[8].

- Alkaloids includes - indole alkaloids, pyrrolizidine alkaloids, tropane alkaloids, opium alkaloids
- Glycosidal toxins includes - cardiac glycosides, saponin glycosides, cyanogenetic glycosides
- Tannins - pyrogallol
- Proteins - lectin, abrin, ricin, cicutoxin, anisatin, gelonin, falcarinol, oenothatoxin etc. photo sensitizing substances including hypericin
- Enzyme inhibitors - Protease inhibitors, Amylase inhibitors, Avidin

Plant Toxins

- Abrin, Anacardiac, Anemonin, Azadiractin
- Berberine, Brucine

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- Calcium oxalate, Calotropin, Cannabinol, Cardol, Carpine, Clematine, Colchine, Colosynthin, Curacasin, Curcine, Cuscutin
- Dioscorine
- Echitamine, Euphorbon
- Hydrogen cyanide, Hyoscine
- Karabin
- Levropa
- Neriodorin
- Oduvin
- Parthenin, Plumbagin, Plumeric, Protopine, Prunassin
- Ricin
- Sangurinin, Saponin, Serotonin, Sesquiterpen, Sikkimianine, Strychnine, Superbine
- Thevetin, Trichosanthin, Tylophorine
- Ushcharin, Ushuriol
- Zanthoplanin

Such toxic constituents present in the whole plant or concentrated in one or more parts. This amount varies in a given species according to habitat, weather and type of soil, season and age. Some reports indicate that mycotoxin synthesizing fungi, mineral imbalance and some insects, helminths and bacteria also interact with plants for the formation of harmful poison [7].

All plants described in the present study are also used as an ethnobotanically but the enhanced dose creates harmful effects in human as well as in animals. So, the inter-relationship between pharmacology and toxicology is very important as lower dose provides therapeutic efficacy, while over dose can induce poisoning. However, poisonous plants may contain active compounds with useful biological activities [10]. The objective of this research to spread this valuable information in hand of all the people so that people became aware about the poisonous effects of plants in man and livestock. The researchers are encouraged to search literature for known toxic properties of plants and developed a procedure against the toxic effect [15, 2, 11, 3].

The Hadoti region (Kota, Bundi, Baran and Jhalawar districts) dominates the south-eastern part of Rajasthan. The climate of Hadoti region is on the whole fairly dry and healthy, is one of the rainiest parts of the state of Rajasthan. The main tribes of this region are Bheel, Meena, Sahariya, Sansi, Kanjar, Nomadic Tribes – Kalbeliya, Baldias, Gadiya Lohar, etc. [13]. These tribes are mainly or partially depended on their surrounding forests as a source of livelihood. Diversity also prevails in plant communities used by them. Inter-relationship of human and nature from time immemorial is expressed either through massive exploitation of natural resources for the benefit of the mankind, or conservation and management

of natural resources through religious and cultural beliefs. The poisonous plants and its constituents are described by few researchers [12, 1]. A lot of research has been done on the vegetation of South-eastern Rajasthan and traditional uses of plants but no work has been published specifically on poisonous plants of South-eastern Rajasthan [4, 13].

Materials and methods

South-Eastern Rajasthan or Hadoti plateau is situated at the edge of Malwa plateau at 23°45' to 25°53' North Latitudes and 75°9' to 77°26' East Longitude in South Eastern corner of the state. The total area is 24156.6 sq km and includes Kota, Bundi, Baran, Jhalawar district. Extensive survey was conducted in Hadoti region or South-eastern Rajasthan during 2013-15 and we had gathered information on poisonous plants from local people of various age groups from different localities. Voucher specimens were also collected to authenticate the gathered information and properly identified with the help of floras and deposited in well preserved condition in the herbarium of the Department of Botany, Government P.G. College, Jhalawar, Rajasthan.

Results and Discussion

The poisonous plants recorded from the study area are arranged alphabetically, each by its botanical name, followed by family and local names with their toxic principles and toxicity (Plate – 1). Total 45 plant species were recorded belonging to 30 families from the study area. Maximum poisonous plants species were recorded from Euphorbiaceae family and followed by Poaceae family. The traditional uses are described with details of toxic plant parts used, toxic principles and notes on toxic effects on humans and livestock (Table 1). Similarly, Katewa *et al.*, recorded 28 poisonous plants species belonging to 14 families from the Southern Aravalli Hills of Rajasthan [8]. Poison includes both naturally produced compounds and chemically manufactured by humans [14]. These natural products if used in limited dose, some may use as a medicine. Some plants parts are used by Indian people in food purpose after cooking, if used as raw it may cause irritation or problem in breathing or may cause death also. Earlier work done by Dadhich *et al.*, reported 35 Geophytes plants species belonging to 15 different families and concluded their ethnomedicine uses from Jhalawar district of Rajasthan [4]. Several sacred groves or community conserved areas are still conserved and have importance in preserving a diverse gene pool of ethnobotanically important species [13]. Local communities play important role in protecting these plant and other elements of nature through their ethnic, social and religious practices also.

Table 1: List of Poisonous Plants with their Toxic Principle and Toxicity of South-eastern Rajasthan

S. No.	Name of Species	Family	Local Name	Toxic Plant Part	Toxic Principles	Toxicity
1.	<i>Abrus precatorius</i> L	Fabaceae	Chirmi	Seeds	SB-cholanic acid	Purgative
2.	<i>Acorus calamus</i> L.	Araceae	Bach	Rhizome, leaf	Asarone, essential oil	Purgative, vomatic
3.	<i>Aegle marmelos</i> L. Correa.	Rutaceae	Bel	bark	Coumarin	Purgative
4.	<i>Agave americana</i> L.	Amaryllidaceae	Hathi-sengar	Leaf, root	Saponin, acrid volatile oil	Emetic for livestock
5.	<i>Albizia lebbek</i> (L.) Willd Benth	Mimosaceae	Siris	bark	Methionine	Purgative
6.	<i>Aloe vera</i> (L.) Burm. F.	Liliaceae	Gawarpatha	Plant juice	Barbaloin	Purgative, emetic
7.	<i>Andrographis paniculata</i> Nees	Acanthaceae	Kalmegh	Whole plant	Andrographolide	Emetic, vomatic acrid
8.	<i>Neolamarckia cadamba</i> (Roxb.) Bosser	Rubiaceae	Kadam	Bark, seed	Anthocephalin	Purgative, abortifacient
9.	<i>Aristolochia indica</i> L.	Aristolochiaceae	Ishwarmul	Root	Aristolochine, essential oil	Purgative, abortifacient
10.	<i>Argemone mexicana</i> L.	Papaveraceae	Satyansi	Seed	Sanguinarine	Stomachic

11.	<i>Balanites aegyptiaca</i> Planch	Balanitaceae	Hingota	bark	Tigmasterol	Purgative,
12.	<i>Brassica campestris</i> L.	Brassicaceae	Sarson	Arial parts	Tennin	Livestock poison
13.	<i>Bridelia retusa</i> L. Spreng.	Euphourbiaceae	Kalamjhar	Seed	Tannin	Abortifacient
14.	<i>Cannabis sativa</i> (Tourn). L	Cannabinaceae	Bhang	Leaf, seed	Terpene, cannabinal	Deadly narcotic poison
15.	<i>Capsicum annum</i> L.	Solanaceae	Lal-Mirich	Seed, fruit	Capsicum, Capsaicin	Irritant, poison
16.	<i>Colocasia esculenta</i> (L.) Schott	Araceae	Arbi	Root stock	Dihydroxysterols	Purgative,
17.	<i>Cassia fistula</i> L.	Caesalpinaceae	Amaltas	Seed, root	Tannin	Emetic, purgative
18.	<i>Celastrus paniculatus</i> Wild.	Celastraceae	Malkangni	Bark seed	Celastrine, paniculatine	Abortifacient, emetic
19.	<i>Croton tiglium</i> L.	Euphorbiaceae	Jamalgota	seed	Alkaloid, tiglic acid	Very purgative
20.	<i>Daucus carota</i> L.	Apiaceae	Gajar	Seed	Daucol, daucine	Abortifacient
21.	<i>Dendrocalamus strictus</i> Nees	Poaceae	Lathi bans	Leaves, young shoot	Hydrocyanic acid	Abortifacient
22.	<i>Dioscorea bulbifera</i> L.	Dioscoriaceae	Anghetha	Tuber	Histamine	Emetic, irritant
23.	<i>Duranta plumieri</i> L.	Verbenaceae	Duranta	Leaves	Saponin	Vomatic, purgative, for livestock
24.	<i>Eucalyptus lanceolata</i> L.	Myrtaceae	Eucalyptus	Seed, leaf	Eucalyptol	Emetic purgative
25.	<i>Euphorbia antiquorum</i> L.	Euphorbiaceae	Thour	Milky juice	Euphorbin	Eye poison, purgative
26.	<i>Euphorbia hirta</i> L.	Euphorbiaceae	Dudhi (snake seed)	Flower juice	Phytosterolin, essential	Oil irritant
27.	<i>Gloriosa superba</i> L.	Colchicaceae	Kalihari	Whole Plant	Colchicine	Nausia, Vomiting, Numbness and death
28.	<i>Gossypium herbaceum</i> L.	Malvaceae	Cotton	Seed	Gossypol	Abortifacient
29.	<i>Hemidesmus indicus</i> L.	Asclepidaceae	Hindisalsa	Root	Saponin	Purgative
30.	<i>Jatropha gossypifolia</i> L.	Euhorbiaceae	Mayala	Seed bark	Jatrophine	Purgative, emetic
31.	<i>Lantana camara</i> L.	Verbenaceae	Vantulsi	Leaves, flower	Lantanin, essential oil	Irritant, purgative for livestock
32.	<i>Mirabilis jalapa</i> L.	Nyctaginaceae	Gulabbas	Fruit		Purgative,
33.	<i>Mucuna pruriens</i> L. DC.	Fabaceae	Karench	Fruit, hair	Mucunine	Irritant poison
34.	<i>Murraya paniculata</i> L.	Rutaceae	Jawanti	Leaves, flower	Murrayin	Livestock poison
35.	<i>Parthenium hysterophorus</i> L.	Astraceae	Gajar gass	Aerial part	Parthenin, coranoplilin	Lung poison, Livestock poison
36.	<i>Paspalum scrobiculatum</i> L.	Poaceae	Koda	Whole plant	Unknown	Narcotic, purgative
37.	<i>Physalis minima</i> L.	Solanaceae	Chirpoti	Fruit (Plant Juice)	Solanine	Purgative
38.	<i>Plumbago zeylanica</i> L.	Plumbaginaceae	Chitrak	Root juice	Plumbagin	Blister on skine
39.	<i>Psoralea corylifolia</i> L.	Fabaceae	Babchi	Leaf, seed	Psoralen, psoralidin	Purgative livestock poison
40.	<i>Sorghum vulgare</i> L.	Poaceae	Juar, Jowar	Seed, root	Hydrocyanic acid	Livestock poison
41.	<i>Tinospora cordifolia</i> (Wild.) Miers	Menispermaceae	Gulancha, Giloy	Seed	Tinosporic acid	Purgative,
42.	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Combretaceae	Bahaira	Seed	Ellagic acid	Purgative,
43.	<i>Urginea indica</i> Kunth.	Liliaceae	Kolianda	Root, bulb juice	Urginosides, urginonine	Purgative narcotic
44.	<i>Withania somnifera</i> L. Dunal.	Solanaceae	Asgand	Root	Somniferine, withanine	Abortifacient
45.	<i>Zea mays</i> L.	Poaceae	Makka	Stalk, root	Hydrocyanic acid	Livestock fatal poison

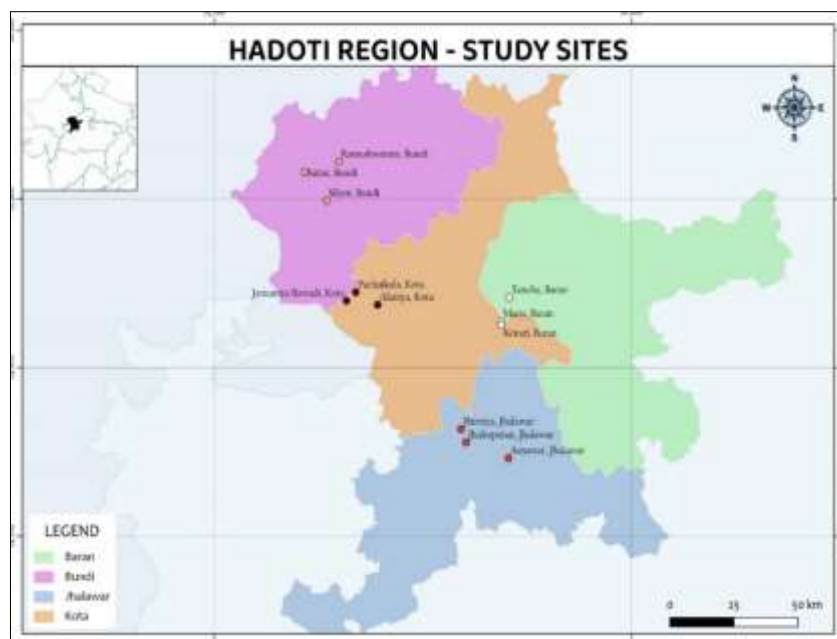


Fig 1: Map of the study area – South-eastern Rajasthan

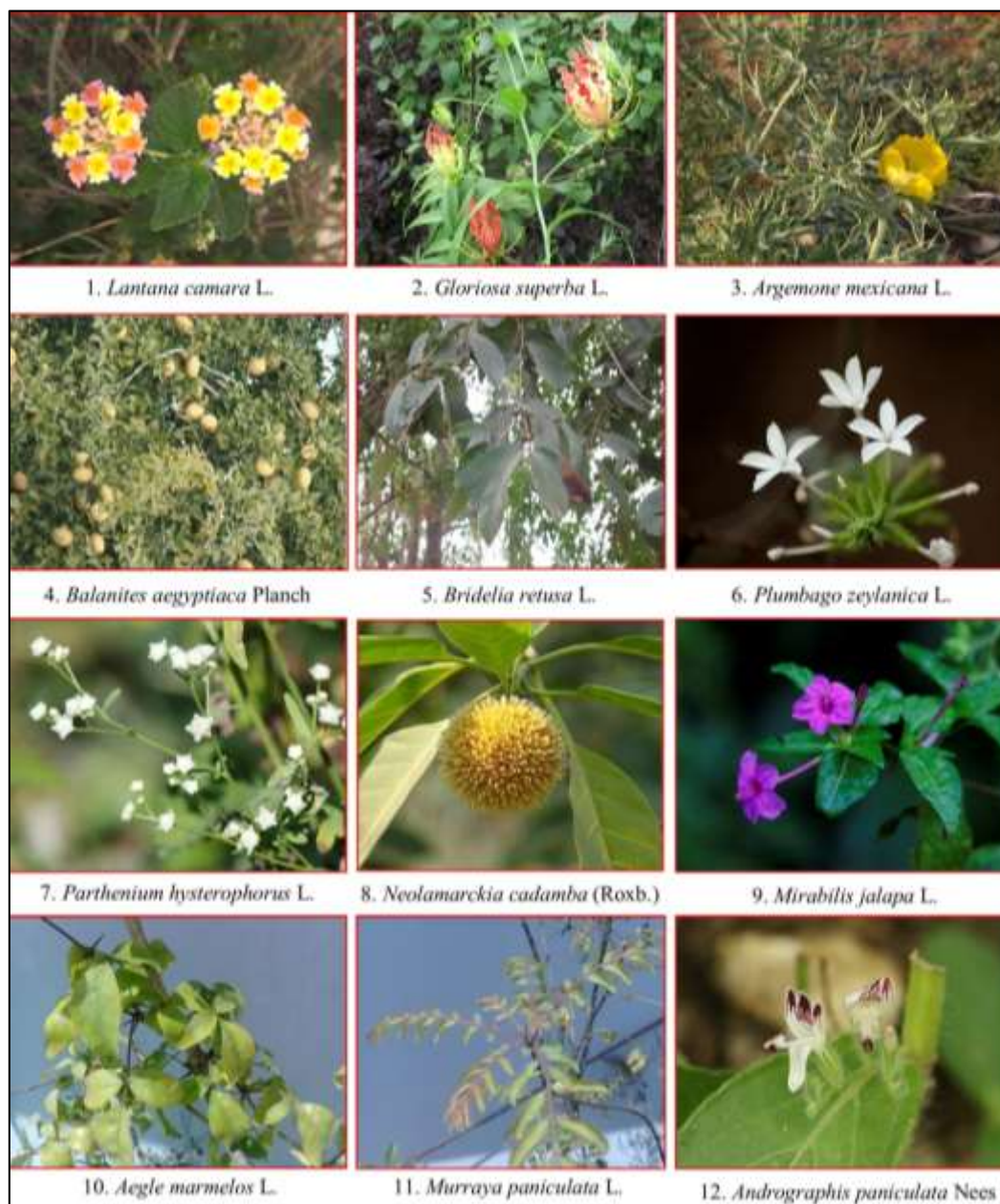


Plate 1: Some important poisonous plants from South-eastern Rajasthan (Photo credit – P.S. Chauhan and V.K. Yadav)

Conclusion

The significance of wild toxic or poisonous plants shows their economic, toxicological and therapeutical values since Vedic Period^[9, 7]. On the basis of these findings, we have reported those plants from of south-eastern Rajasthan or Hadoti Region which are having medicinal as well as toxic potential. For phytochemical investigation and biological screening of above-mentioned chemicals found in the plants, proper guidelines and essential requirements of Pharmacological industries is needed. This paper provides valuable information for local people to be aware of poisonous or harmful plants available to their surroundings.

Acknowledgement

We thank to the Forests Department of Jhalawar, Government of Rajasthan (India), for giving permission and help rendered by the Range Officers of Jhalawar Forest Department to carry out this study. We also thank to local community or people of Jhalawar district for their valuable comments in questionnaire survey.

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