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Most Common Poisonous Plants of Afghanistan and its Related Clinical Signs in Domestic Animals

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Abstract


Afghanistan is a landlocked country, having high mountains and high percentage (46%) of permanent pastures. Many types of plants including different species of poisonous grow in the country. Many species of wild and domestic animals have free access to these poisonous plants. In developed countries, poisoning is counted as one of the most important problem for animals, but in Afghanistan it is remained among inconsiderable illness as compared to infectious or metabolic diseases. Yearly, several outbreaks of unknown diseases occur in those areas which are rich of poisonous plants and cause serious economic consequences and human health concerns. The effects of poisonous plants on animals in Afghanistan and its common clinical signs have been remained unrecognized. In this review, we investigate the most common poisonous plants to animals present in Afghanistan and its related clinical signs for early diagnosis of plant poisoning in domestic animals. This review will help readers to distinguish poisonous plants, toxic parts, poisoning signs and the areas where they grow.

Keywords: Domestic animals, Poisonous plants, Clinical signs, Outbreaks.

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Ethical: This study follows all ethical practices during writing.

1. Introduction

Afghanistan is a landlocked mountainous country encircled by Pakistan to the east and south, Iran to the west, Turkmenistan, Uzbekistan, and Tajikistan to the north, and China to the northeast [1]. In Afghanistan, most of the people are engaged in agriculture and animal husbandry. Among the total areas of Afghanistan; the arable area is 12 %, 3 % forest, 46 % is permanent pasture and the remaining is counted for mountains. Mostly, all the people who are engaged in agriculture keep animals for their daily expenses. The wide areas of permanent pasture provide good sources for animal husbandry [2]. Afghanistan is home of 5.3 million cattle, 13.2 million sheep, 7.7 million goats, 0.17 million camels, 0.171 million horse, 1.45

million donkeys and 11.9 million of chicken. Different species of wild animals are also reported in Afghanistan that play key role in economy [2].

Different kinds of plants have been recognized in Afghanistan [3], including several species of poisonous plants. Poisonous plants cause severe economic losses to farmers as well as its consequences concerns for human health [4]. Poisoning counted as one of the serious problem for animals; but in Afghanistan it has remained among inconsiderable illness as compared to infectious or metabolic diseases. Several factors can be counted for this hypothesis such as lack of information regarding poisonous plants and their effects. However, most of the poisonous plants are bitter and unpalatable, but sometimes like lack of food or drought or mixed into forage and eaten by animals, cause poisoning. In Afghanistan, most of the animals especially sheep, goats, and camels are kept by nomads who travel in different seasons of the year to the different parts of the country. Such animals graze and eat different types of plants including poisonous one. The purpose of this review is to introduce the most common toxic plants existed in Afghanistan which can cause severe mortalities among animals and human health concerns. Common clinical signs of poisoned animals have also been covered. The plants which have been introduced in this article, had been searched from many different reliable sources such as books and articles published nationally or internationally.

2. Most Common Toxic Plants

2.1. Bracken fern

Bracken (*Pteridium aquilinum*) is one of the most common poisonous plants [Figure1, A](#) which is widely distributed in the world including Europe, South, and Central America and Southeast Asia. Poisoning by bracken has been reported in ruminant, non-ruminant as well as human [5-7]. Bracken is a fern belonging to the *Dennstaedtiaceae* family and consists of subspecies [8, 9], that has been recognized in several parts of Afghanistan [4]. Eating of this plant or its extract can cause poisoning in animals. Fern contains toxic materials like cyanogenetic glycoside, thiaminase and other important chemical compounds that can cause anemia, hematuria, and neoplasia that leads severe production losses [10]. The toxin in the fern named *Pataquiloside* is carcinogenic and cause bladder neoplasia, aplastic anemia, and hemorrhage. In non-ruminant like horses, it causes thiaminase depletion [11]. Carcinoma of digestive and urinary systems reported due to ingestion of fern by cattle [12, 13]. Chronic ingestion of fern leads to Enzootic hematuria [14], anemia, and increased body temperature, blindness [15], decreased bodyweight, ataxia, and recumbency. The untreated animal dies within a few days from showing clinical signs [16].

2.2. *Calotropis procera*

Calotropis procera ([Figure1](#)) is found in some parts of Afghanistan [4]. *Calotropis* is an organic irritant and poisonous contains active principles such as *Uscharin*, *Calacatin* and *Calotoxin* [17]. *Calotropis gigantea* and *calotropis procera* are the subspecies of *calotropis* which belong to the family of *Asclepiadaceae*. The milky juice of *calotropis procera* is more toxic than *calotropis gigantea*. All parts of this plant including the root, stem, and leaves are toxic [18]. The animal can be affected by different ways like ingestion of plants or direct injection of its products. Affected animals shows the clinical signs inflammation of the gastrointestinal tract, diarrhea, dehydration, and cardiac arrhythmias. The cardiac arrest also seen in animals due to the ingestion of *calotropis* [14].

2.3. *Datura*

Datura commonly known as thorn apple is the plant belongs to the family of *Solanaceae*. *Datura* has different species, all of them are poisonous to animals. Different species of *Datura* (*Datura stramonium*, *Datura metaloides*, *Datura arborea*, and other species) have been recognized [19]. Some species of *datura* are present in Afghanistan such as *Datura fastuosa*, *Datura innoxia* ([Figure1](#)) and *Datura stramonium* ([Figure1](#)) [4]. *Datura* is regarded to be toxic to different species of animals especially horses. *Datura* is also toxic to humans and contains tropane alkaloids like hyoscyamine, scopolamine, and atropine [20]. *Datura* alkaloid's work as anticholinergic and cause parasympatholytic action in animal, because they are counted as antagonists of acetylcholine receptors. After ingestion of feed by animals the *Datura* alkaloids are absorbed and as a result, gastrointestinal complications or death may occur [20]. Animals poisoned by *Datura* commonly show clinical signs like thirst, mydriasis and visual disorders such as blindness. Respiratory paralysis, ataxia, and dry mucus membranes are other clinical signs in animals [21].

2.4. *Ricinus communis*

Ricinus communis ([Figure1](#)) poisoning caused by toxic principles of castor beans which is mostly found in temperate countries. The product of this plant (oil) is mostly used as antihelmintic and laxative. The castor oil itself is not toxic, because it does not have ricin. The cake of *ricinus communis* contains lectins like ricin 1 and ricin 2, which is the most powerful phytotoxin. Ricin 2 is more toxic. Wide variation in the lethal dose of ricin in different species of animals have been reported [22]. After ingestion of cake or beans of castor, poisoning occur. All animals are susceptible to ricin toxicity, the horse is more than all [4]. *Ricinus communis* is found in some parts of Afghanistan that animal has free access to them [4]. Affected animals commonly show the clinical signs weakness, profuse watery diarrhea, dehydration with sunken eyes, and dilation of pupils,

depression, tachycardia, dyspnoea, and colic, that develop within 6–24 h after ingestion of ricin [23]. Vomiting, diarrhea, bloody diarrhea and abdominal pain can also be seen [24].

2.5. *Locoweed*

Locoweed poisoning is one of the major concerns in the Western United States and mostly widespread plant in that region. Poisoning is caused by the ingestion of some poisonous species of this plant called *Astragalus* and *Oxytropis* [25]. Several hundred species of these plants are existed. The toxic species is divided into three categories such as selenium-containing, nitrotoxin containing and locoism containing plants. The existed toxin in these plants is named Swinsonine that was recognized in Australia. Swainsonine interferes with the activities of a cellular enzyme called mannosidases, which help in the processing of oligosaccharides and glycoproteins [26]. Several species (toxic and non-toxic) of *Astragalus* and *Oxytropis* that cause locoweed poisoning in animals have been recognized in different parts of Afghanistan [4] (Table 1). Animals that poisoned by locoweed mostly show subclinical and chronic signs of diseases like anorexia, emaciation, fertility disorders, changing of animal behavior, depression, cardiovascular disorders, and nervous signs, variation in the clinical signs among animals can also be seen [27].

2.6. *Nerium Oleander*

Nerium oleander (*Nerium indicum*) is a poisonous plant (Figure 1) belonging to the family of Apocynaceae with narrow and long leaves. This plant is found in many countries including USA, Mediterranean areas [28] as well as in some parts of Afghanistan [4]. All parts of the plant are poisonous to humans and animals. *Nerium indicum* contains cardiac glycosides named oleandrin, digitoxigenin, neriin, folinerin, and rosagenin [19, 29]. Inhalation smoke of burned plant or ingestion of this plant or its extract can cause severe effects on the body [29, 30]. Poisoned animals show clinical signs of severe inflammation of the digestive system, abdominal pain, sweating, and weakness. These signs occur immediately after ingestion of the plant. Cardiac disorder like arrhythmias is another sign of *Nerium indicum* poisoning [19].

2.7. *Aconitum*

Different species of *Aconitum* plant have been recognized in the world [29]. Among them, *Aconitum rotundifolium* (Figure 1) have been observed in different parts of Afghanistan (Table-1) [4]. All parts of *Aconitum* especially the roots and leaves are toxic [31]. Animals poisoned by *Aconitum* show clinical signs of central nervous systems disorders, abnormalities in digestive systems like gastroenteritis and abdominal pain, the animal may die due to the development of cardiac abnormalities [32]. Hypotension, depression, conduction disturbance, tachycardia are other signs that are observed in poisoned animals [33].

2.8. *Adonis*

Different species of *Adonis* like *Adonis Aestivalis*, *A. scrobiculata* and *A. Turkestanica* (Figure 1) are existed in different parts of Afghanistan Table 1 [4], belonging to *Ranunculaceae* family, which is unpalatable. Poisoning of animals by this plant has been reported in horses [34], pigs [35] and sheep [36]. *Adonis* species contain glycosides resembling digitalis and other toxins present in oleander [37]. Clinical signs of *Adonis* poisoning in animals, especially in horses include disorders of the gastrointestinal tract, abdominal pain, bloody diarrhea and decreased gut motility [37]. The severity of clinical signs depends on the amount of ingested plant [29].

Several other toxic plants which are not very common are also exist in different parts of Afghanistan. Their names, family names, local names, toxic parts, toxic materials, clinical signs and places which grow in Afghanistan are listed in Table 1.

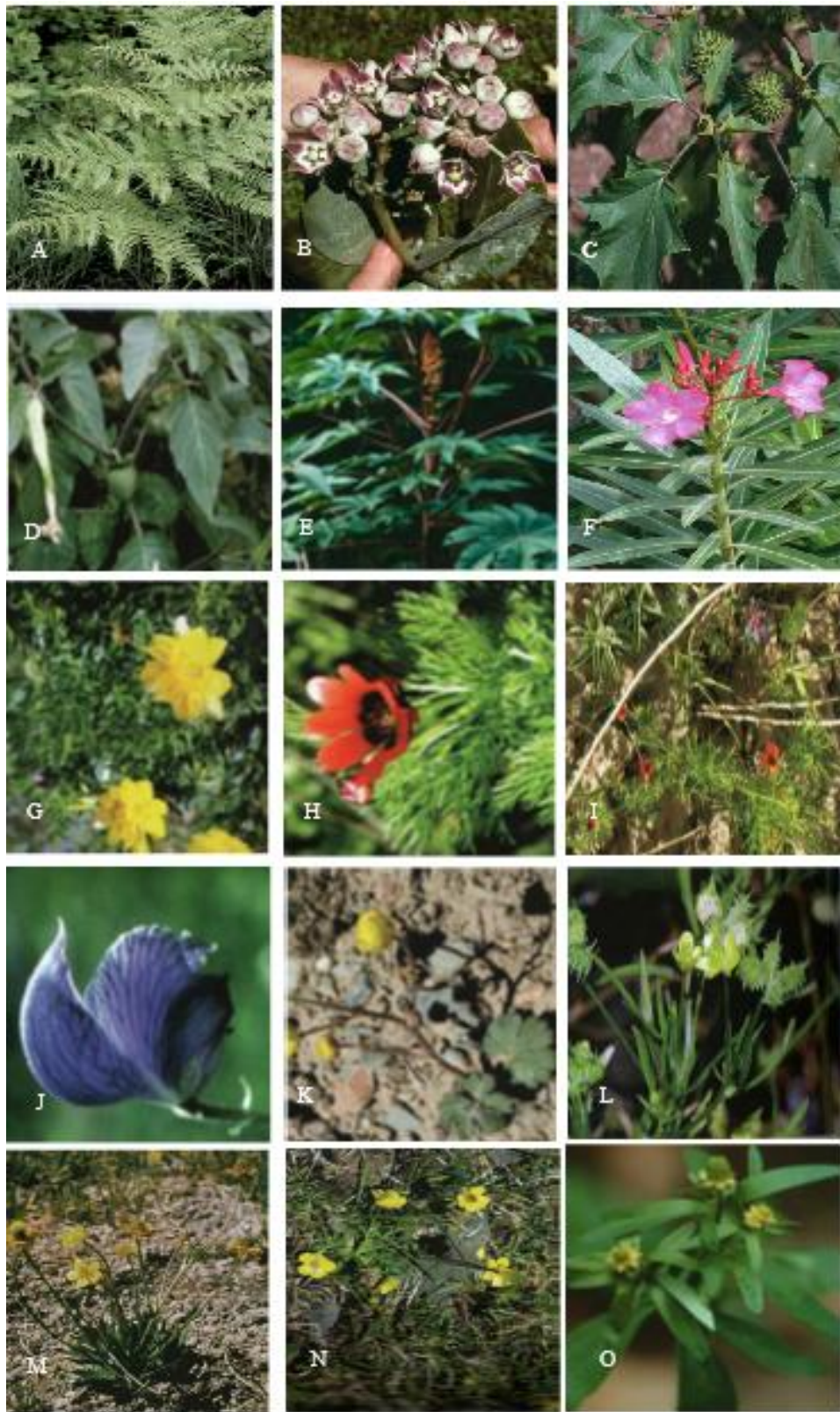




Figure-1.

Photos of the poisonous plants that can be found in Afghanistan. A: *Pteridium aquilinum*, B: *Calotropis procera*, C: *Datura innoxia*, D: *D. stramonium*, E: *Ricinus communis*, F: *Nerium indicum*, G: *Aconitum rotundifolium*, H: *Adonis aestivalis*, I: *A. scrobiculata*. J: *A. turkestanicus*, K: *Ranunculus afghanicus*, L: *R. arvensis*, M: *R. longicaulis*, N: *R. pulchellus*, O: *R. sceleratus*, P: *Catharanthus roseus*, Q: *Asclepias curassavica*, R: *Cynanchum acutum*, S: *Periploca aphylla*, T: *Senecio glaucus*, U: *S. vulgaris*, V: *Sambucus wightiana*, W: *Citrullus colocynthis*, X: *Euphorbia boissieriana*, Y: *E. cyrtophylla*, Z: *E. helioscopia*, AA: *Atropa acuminata*, AB: *Hyoscyamus niger*, AC: *Solanum nigrum* [4, 29, 38, 39].

Table-1.

List of poisonous plants present in Afghanistan, their places they grown, its toxins present in the plant, toxic parts of the plant and their local names[4].

No	Toxic plants*	Family	Places *	Local name*	Toxins	Toxic part	Common clinical signs
1	<i>Pteridium aquilinum</i> (Figure1)	<i>Polypodiaceae</i>	NUR	NA	Ptaquiloside	All parts [40]	Anemia, hematuria, neoplasia, hemorrhage, decreased body weight, ataxia, enzootic hematuria and blindness [10-16].
2	<i>Calotropis procera</i> (Figure1)	<i>Asclepiadaceae</i>	E, SE	Spelmai	Alkaloids	All parts [41]	Dehydration, diarrhea, cardiac arrhythmias and inflammation of gastrointestinal tract, [14].
3	<i>Datura innoxia</i> (Figure1) <i>D. stramonium</i> (Figure1)	<i>Solanaceae</i>	NE, C NW, SE, E,	Datura	Alkaloids	All parts [20]	Thirst, mydriasis, blindness, respiratory paralysis, ataxia, and dry mucus membranes [21].
4	<i>Ricinus communis</i> (Figure1)	<i>Euphorbiaceae</i>	SW, Hari Rud, JLB	Nabat-e Kastror oil	Ricin	Seeds [42, 43]	Weakness, sunken eye, watery diarrhea, depression, tachycardia and vomiting [24].
5	<i>Nerium indicum</i> (Figure1)	<i>Apocynaceae</i>	E	Gul-e Gandiri	Oleandrin	All parts[44]	Bradycardia and ventricular fibrillation [45].
6	<i>Aconitum rotundifolium</i> (Figure1)	<i>Ranunculaceae</i>	E, NE	NA	Alkaloids	Root [46]	Weakness, ataxia, respiratory distress and diarrhea[47].
7	<i>Adonis aestivalis</i> (Figure1) <i>A. scrobiculata</i> (Figure1) <i>A. turkestanicus</i> (Figure1)	<i>Ranunculaceae</i>	SW, SE, E, NE All Parts of AFG NE	NA	Cardiac glycosides	All part [48]	Abdominal pain, bloody diarrhea, decrease gut motility and cardiac arrhythmias [29, 37].
8	<i>Ranunculus afghanicus</i> (Figure1) <i>R. arvensis</i> (Figure1) <i>R. longicaulis</i> (Figure1) <i>R. pulchellus</i> (Figure1) <i>R. sceleratus</i> (Figure1)	<i>Ranunculaceae</i>	NW, E, SE, NE, C NW, SE, NE, SW E, NE Wakhan NW, E, NE	NA	Protoanemonin	Sap [49]	Colic, depression, salivation, blindness, blood stain urine, muscle trembling, twitching and discoloration of cow's milk [50].
9	<i>Catharanthus roseus</i> (Figure1)	<i>Apocynaceae</i>	Cultural	NA	Alkaloids	All parts[51]	Electrolytes imbalance, dehydration, severe abdominal pain, profuse diarrhea and cardiovascular collapse[52].
10	<i>Asclepias curassavica</i> (Figure1)	<i>Asclepiadaceae</i>	All part of AFG	NA	Cardenolides	All parts[53]	Vertigo, headache, vomiting, diarrhea, stomach cramps, and arrhythmia [54].
11	<i>Cynanchum acutum</i> (Figure1)	<i>Asclepiadaceae</i>	Most part of AFG	NA	Alkaloids	All part [55]	Hypersensitivity, incoordination and central nervous system disorders have been reported [56].

12	<i>Periploca aphylla</i> (Figure1)	<i>Asclepiadaceae</i>	SW, SE, E	NA	Alkaloids		No reports about its clinical signs of this plant are available
13	<i>Senecio glaucus</i> (Figure1) <i>Senecio vulgaris</i> (Figure1)	<i>Asteraceae</i>	All regions of S-Afg- E	Pir Kah	Alkaloids	All parts[57]	Diarrhea, depression, ill thrift, prolapsed rectum, edema, ascites and head pressing [58].
14	<i>Sambucus wightiana</i> (Figure1)	<i>Caprifoliaceae</i>	E, NUR	NA	Glycosides	All parts[29]	Abdominal pain, lethargy, sweating and in severe cases coma and collapse of cardiovascular occur[29].
15	<i>Citrullus colocynthis</i> (Figure1)	<i>Cucurbitaceae</i>	SW, S, SE, E	Tarbooze Abujehl	Alkaloids	All parts[59]	Dullness, ruffled hair, decreased body weight gains and feed efficiency reported in rodent [60].
16	<i>Euphorbia boissieriana</i> (Figure1) <i>E. cyrtophylla</i> (Figure1) <i>E. helioscopia</i> (Figure1)	<i>Euphorbiaceae</i>	N, NE, E, C E (Nuristan) In most regions, weed	NA	Alkaloids	All parts[59]	Irritation of the skin and mucous membranes, visual disorders and digestive problems [61].
17	<i>Atropa acuminata</i> (Figure1)	<i>Solanaceae</i>	E	NA	Alkaloids	All parts[62]	Dry mouth, dysphagia, dysphonia, tachycardia and urinary retention [29].
18	<i>Hyoscyamus niger</i> (Figure1)	<i>Solanaceae</i>	N, NE, E	NA	Alkaloids	All parts [63]	Anorexia, dry muzzle, meiosis and tenesmus [64].
19	<i>Solanum nigrum</i> (Figure1)	<i>Solanaceae</i>	NW, SE, E, NE, C	NA	Alkaloids	All parts [30]	Vomiting, abdominal pain, nausea and diarrhea [29].

3. Conclusion

In conclusion, poisoning is counted as one of the most critical problem in animals that can causes severe mortalities. Besides keeping the animals by farmers, most of the animals are kept by nomads in Afghanistan who travel to different parts of the country and access to all kinds of plants that grow in pastures. In this review, we have introduced many types of poisonous plants grow in different parts of Afghanistan, there local names, photos, toxins they have, and toxic parts of the plants. Besides, the clinical signs of poisoned animals which are very important for the veterinarian to diagnose poisoning have been discussed too.

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