

POISONOUS PLANTS IN GARDENS AND GRAZING LANDS

A. AGANGA, M. NSINAMWA, K. OTENG and B. MAULE

Botswana College of Agriculture, P/Bag 0027. Gaborone.

*Email: aaganga@bca.bw

ABSTRACT: *This paper is a review of poisonous plants, their toxic agents and the symptoms of poisoning. Poisonous plants are plants, which as a whole or part thereof under all or certain conditions and in amount likely to be taken or into contact with an organism will exert harmful effects or causes death either immediately or by reason of cumulative action of toxic property due to presence of known or unknown chemical action. There are different types of diseases caused by some poisonous plants. Poisonous plants can reduce livestock productivity depending on the effect they have and the amount consumed. Since poisonous plants are potential threats to the livestock industry it is important that farmers are carefully to avoid contamination of rations prepared for livestock and removal of poisonous plants from grazing lands. Prevention and precautions are the best way to avoid any economic loss.*

Keywords: *Major genes, early lay traits, crossbred local chicken, humid tropics*

INTRODUCTION

Poisonous plants are plants, which as a whole or part thereof under all or certain conditions and in amount likely to be taken or into contact with an organism will exert harmful effects or causes death either immediately or by reason of cumulative action of toxic property due to presence of known or unknown chemical action. The poisonous nature of the whole plant or any plant part may be due to production of toxic substances such as alkaloids, glucosides, amines, toxalbumins, picrotoxins, resins, sponins, tannins etc., many of which are harmful to man and animal life (Katewa, et.al, 2006).

Poisonous plants are found everywhere, in every continent and even in the deserts (Johnson, 2009). Poisonous plants have their uses for food, drugs, ornamentals and poison. Animals have adapted to survive the low doses of poisons or they do not eat the poisonous parts. There are poisonous plants that are too toxic for food and they have their uses as well. Goats and deer avoid oleander as well as foxglove and periwinkles. Plants such as yellow bells, frangipani, and poinsettias are all toxic and are used as ornamentals. Some poisonous plants are used as a source of poison for eradicating pests and rats. Poisonous plants can also be used for healing. Medicines have been created from plants at different dosages. Poisonous plants can heal as well as kill (Johnson, 2009).

Brown (2009) stated that "just because something is on the poisonous plants list doesn't mean it can't be a good food or feed, and just because it is absent from the list doesn't mean it is safe". A poisonous plant is one which, when consumed in such quantities as will be taken by animal or man over a short or prolonged periods, exerts harmful effects on the system or causes death by virtue of toxic substance(s) normally contained in the plant. There different types of poisoning by plants. Some good fodder plants may be poisonous for example grasses that produce hydrocyanic acid when in wilting stage, improper ingestion of some plants and dry grass full of cellulose can be converted into fibre balls in the gastro-intestinal tract and cause obstruction. Feeding livestock on grass deficient in minerals, proteins, lipids and vitamins cause some diseases. A plant may be poisonous to one animal species and non-poisonous to another. Some parts of a plant may be poisonous while other parts are harmless. There are different types of diseases caused by some poisonous plants. Photosensitization is caused by ingestion of photodynamic substance in the plant. This makes the animal hypersensitive to light such as *Tribulus terrestris*, *Lantana camara* and others. Table 1 shows some poisonous plants found in many parts of the world.

REVIEW ARTICLE

Table 1 - List of Scientific and Common Name Equivalents

| | |
|---|---|
| A. muscaria: Fly Agaric | Lantana |
| A. pantherina: Panther | Lathyrus spp.: Sweet Pea, Tangier Pea, Everlasting Pea, Caley Pea and Singletary Pea |
| A. verna: Destroying Angels | Leucothoe axillaris and Leucothoe davisi: Drooping Leucothoe and Sierra Laurel |
| Abrus precatorius: Rosary Pea | Linum usitatissimum: Flax |
| Acer rubrum: Red maple, Swamp maple, Soft maple | Lobelia spp.: Great Lobelia, Cardinal Flower, and Indian Tobacco |
| Acer saccharinum: Silver maple, Soft maple, White maple | Lotus corniculatus: Birdsfoot Trefoil |
| Acer saccharum: Sugar maple, Rock maple, Hard maple | Lupinus spp.: Lupine |
| Aconitum spp.: Monkshood, Aconite, or Wolfsbane | Medicago sativa: Alfalfa or Lucerne |
| Actaea spp.: Baneberry, Dolls Eyes, White Cohosh, Snakeberry | Menispermum canadense: Moonseed |
| Aesculus spp.: Horse Chestnut, Buckeye | Metilolus alba and Mellilotus officinalis: White and Yellow Sweetclover |
| Agrostemma githago: Corn Cockle | Nerium oleander: Oleander |
| Aleurites fordii: Tung Oil Tree | Nicotiana spp.: Tobacco and Tree Tobacco |
| Allium spp.: Commercial Onions, Wild Onions, Swamp Onions, and Chives | Onoclea sensibilis: Sensitive Fern |
| Amanita spp.: Monkey Agaric, Panther Cap, Death Cap, and Death Angel Mushrooms | Ornithogalum umbellatum: Star of Bethlehem |
| Amaranthus spp.: Pigweed | Papaver spp.: Various Poppies including Opium Poppy |
| Amsinckia intermedia: Fiddleneck | Phytolacca americana: Pokeweed |
| Apocynum spp.: Dogbane | Pieris japonica and other spp.: Japanese Pieris, Mountain Fetterbrush |
| Argemone mexicana: Prickly Poppy or Mexican Poppy | Pinus ponderosa: Ponderosa Pine |
| Arisaema spp.: Jack in the Pulpit | Podophyllum peltatum: Mayapple and Mandrake |
| Asclepias spp.: Milkweed | Prunus spp.: Wild Cherries, Black Cherry, Bitter Cherry, Choke Cherry, Pin Cherry |
| Astragalus and Oxytropis spp.: Locoweed | Pteridium aquilinum: Bracken Fern |
| Atropa belladonna: Belladonna or Deadly Nightshade | Quercus spp.: Oak Trees |
| Brassica spp. : Rape, Cabbage, Turnips, Broccoli, Mustard | Ranunculus spp.: Buttercups or Crowfoot |
| Caltha palustris: Marsh Marigold or Cowslip | Rheum raphaniticum: Rhubarb |
| Cannabis sativa: Marijuana | Ricinus communis: Castor Bean |
| Centaurea solstitialis: Yellow Star Thistle | Robinia pseudoacacia: Black Locust |
| Chelidonium majus: Celandine | Rumex spp.: Dock |
| Chenopodium album: Lambs Quarters | Sambucus canadensis: Elderberry |
| Cicuta spp.: Water Hemlock or Cowbane | Sanquinaria canadensis: Bloodroot |
| Claviceps spp.: Ergot | Saponaria spp.: Bouncing Bet and Cow Cockle |
| Conium maculatum: Poison Hemlock | Senecio spp.: Senecio, Groundsels, and Ragworts |
| Convallaria majalis: Lily of the Valley | Solanum spp.: Common Nightshade, Black Nightshade, Horse Nettle, Buffalo Bur, Potato |
| Coronilla varia: Crown Vetch | Sorghum spp.: Sorghum or Milo, Sudan Grass, and Johnson Grass |
| Daphne spp.: Daphne | Symplocarpus foetidus: Eastern Skunk Cabbage |
| Datura spp.: Jimsonweed, Downy Thornapple, Devils Trumpet, Angels Trumpet | Taxus cuspidata: Yew |
| Delphinium spp.: Delphiniums and Larkspurs | Tetradymia spp.: Horsebrush |
| Dicentra spp.: Bleeding Heart, Squirrel Corn, Dutchmans Breeches | Toxicodendron diversiloba: Poison oak |
| Digitalls purpurea: Foxglove | Toxicodendron radicans: Poison ivy |
| Equisetum arvense and other spp.: Horsetail | Toxicodendron vernix: Poison Sumac |
| Eupatorium rugosum: White Snakeroot | Trifolium spp.: Alsike Clover, Red Clover, White Clover |
| Euphorbia spp.: Poinsettia, Spurges, Snow on the Mountain | Triglochin maritima: Arrowgrass |
| Fagopyrum esculentum: Buckwheat | Urtica spp.: Stinging Nettle |
| Festuca arundinacea: Tall Fescue | Veratrum californicum: Corn Lily, False Hellbore |
| Gelsemium sempervirens: Jessamine | Vicia spp.: Common Vetch, Hairy Vetch, Narrow leaved Vetch, Purple Vetch and Broad Beans |
| Glechoma spp.: Ground Ivy, Creeping Charlie, and Gill over the Ground | Wisteria spp.: Wisteria |
| Halogeton glomeratus: Halogeton | Xanthum strumarium: Cocklebur |
| Helleborus niger: Christmas Rose | Zigadenus spp.: Death Camas |
| Hyoscyamus niger: Henbane | |
| Hypericum perforatum: St. Johns Wort, Klamath Weed | |
| Iris spp.: Irises | |
| Laburnum anagyroides: Golden Chain or Laburnum | |
| Lantana camara: Lantana, Red Sage, Yellow Sage, or West Indian | |

Source: Brown, 2011.

Table 2 - Some poisonous plants and their symptoms in poisoned animals.

| PLANT | TOXIC PART | SYMPTOMS |
|---|---|--|
| HOUSE PLANTS | | |
| Hyacinth, Narcissus, Daffodil | Bulbs | Nausea, vomiting, diarrhea. May be fatal. |
| Oleander | Leaves, branches | Extremely poisonous. Affects the heart, produces severe digestive upset and has caused death. |
| Dieffenbachia (Dumb Cane), Elephant Ear | All parts | Intense burning and irritation of the mouth and tongue. Death can occur if base of the tongue swells enough to block the air passage of the throat. |
| Rosary Pea, Castor Bean | Seeds | Fatal. A single Rosary Pea seed has caused death. One or two Castor Bean seeds are near the lethal dose for adults. |
| FLOWER GARDEN PLANTS | | |
| Larkspur | Young plant, seeds | Digestive upset, nervous excitement, depression. May be fatal. |
| Monkshood | Fleshy roots | Digestive upset and nervous excitement. |
| Autumn Crocus, Star of Bethlehem | Bulbs | Vomiting and nervous excitement. |
| Lily-of-the-Valley | Leaves, flowers | Irregular heart beat and pulse, usually accompanied by digestive upset and mental confusion. |
| Iris | Underground stems | Severe-but not usually serious-digestive upset. |
| Foxglove | Leaves | Large amounts cause dangerously irregular heartbeat and pulse, usually digestive upset and mental confusion. May be fatal. |
| Bleeding Heart | Foliage, roots | May be poisonous in large amounts. Has proved fatal to cattle. |
| VEGETABLE GARDEN PLANTS | | |
| Rhubarb | Leaf blade | Fatal. Large amounts of raw or cooked leaves can cause convulsions, coma, followed rapidly by death. |
| ORNAMENTAL PLANTS | | |
| Daphne | Berries | Fatal. A few berries can kill a child. |
| Wisteria | Seeds, pods | Mild to severe digestive upset. Many children are poisoned by this plant. |
| Golden Chain | Bean-like capsules in which the seeds are suspended | Severe poisoning. Excitement, staggering, convulsions and coma. May be fatal. |
| Laurels, Rhododendrons, Azaleas | All parts | Fatal. Produces nausea and vomiting, depression, difficult breathing, prostration and coma. |
| Jasmine | Berries | Fatal. Digestive disturbance and nervous symptoms. |
| Lantana Camara (Red Sage) | Green berries | Fatal. Affects lungs, kidneys, heart and nervous system. Grows in the southern U.S. And in moderate climates. |
| Yew | Berries, foliage | Fatal. Foliage more toxic than berries. Death is usually sudden without warning symptoms. |
| TREES AND SHRUBS | | |
| Wild and cultivated cherries | Twigs, foliage | Fatal. Contains a compound that releases cyanide when eaten. Gasping, excitement and prostration are common symptoms. |
| Oaks | Foliage, acorns | Affects kidneys gradually. Symptoms appear only after several days or weeks. Takes a large amount for poisoning. |
| Elderberry | All parts, especially roots | Children have been poisoned by using pieces of the pithy stems for blowguns. Nausea and digestive upset. |
| Black Locust | Bark, sprouts, foliage | Children have suffered nausea, weakness and depression after chewing the bark and seeds. |
| PLANTS IN WOODED AREAS | | |
| Jack-in-the-Pulpit | All parts, especially roots | Like Dumb Cane, contains small needle-like crystals of calcium oxalate that cause intense irritation and burning of the mouth and tongue. |
| Moonseed | Berries | Blue, purple color, resembling wild grapes. May be fatal. |
| May apple | Apple, foliage, roots | Contains at least 16 active toxic principles, primarily in the roots. Children often eat the apple with no ill effects, but several apples may cause diarrhea. |
| Mistletoe | Berries | Fatal. Both children and adults have died from eating the berries. |
| PLANTS IN SWAMP OR MOIST AREAS | | |
| Water Hemlock | All parts | Fatal. Violent and painful convulsions. A number of people have died from hemlock. |
| PLANTS IN FIELDS | | |
| Buttercups | All parts | Irritant juices may severely injure the digestive system. |
| Nightshade | All parts, especially the unripened berry | Fatal. Intense digestive disturbance and nervous symptoms. |
| Poison Hemlock | All parts | Fatal. Resembles a large wild carrot. |
| Jimson Weed (Thorn Apple) | All parts | Abnormal thirst, distorted sight, delirium, incoherence and coma. Common cause of poisoning. Has proved fatal. |

Source: Texas AgriLife Extension Service, Texas A&M System.

Table 2 shows some diseases caused by poisonous plants to animals and humans. Laminitis is caused by ingestion of *Crotolaria burkeana* by grazing ruminants. Prussic acid poisoning is one of the common forms of plant

poisoning. The glucosides in the plant break up producing prussic acid which is highly toxic to animals. Treatment involves moving the animals away to a different part of the grazing lands where the animals cannot access such plants. Treatment is not always successful, prevention is the best approach. Table 3 shows the different types of toxic agents in poisonous plants.

| Table 3,a - Toxic agents in poisonous plants | |
|--|---|
| <p>ALKALOIDS</p> <p>Indole Alkaloids (Beta-carbolines etc.) Indolizidine Piperidine Polycyclic Diterpene Pyridine Pyrrolizidine Quinolizidine Steroids Tropane Tryptamine</p> <p>ALCOHOLS AND KETONES</p> <p>Alcohols Diacetone alcohol Diethylene glycol Ethanol Ethylene glycol Methanol Propylene glycol</p> <p>Ketones Cicutoxin Tremetone Treratol</p> | <p>LIPIDS</p> <ul style="list-style-type: none"> • Fatty Acids <ul style="list-style-type: none"> ○ Cyclopropenoid fatty acids ○ Erucic acid ○ Fluoroacetate • Glycolipids <p>METALS</p> <ul style="list-style-type: none"> • Heavy Metals <ul style="list-style-type: none"> ○ Copper ○ Mercury ○ Selenium ○ Arsenic ○ Lead • Iron |
| <p>CARBOHYDRATES</p> <p>Oligosaccharides Beta-glucans Pectins Raffinose Simple Sugars Favism Fructose Galactose Lactose Sucrose Xylose</p> | <p>MYCOTOXINS</p> <p>Aflatoxins Citrinin Fungal Tremorgens Lupinosis Ochratoxins Patulin Rubratoxins Sporidesmin Stachybotryotoxins Trichothecenes Zearalenone</p> |
| Table 3, b - Toxic agents in poisonous plants | |

| | |
|---|---|
| <p>CHELATING POISONS</p> <p>Nitrates Nitrites Oxalates Phytates</p> | <p>OLIC TOXICANTS</p> <p>Cinnamic Acid Fagopyricin Gossypol Hypericin Pterocin Resorcinol Urushiol Tannins</p> |
| <p>GLYCOSIDES</p> <p>Calcinogenic Glycosides Carboxyatractylosides Cardiac Glycosides Coumarins Furocormarins Glucosinolates (Goitrogenic Glycosides) Isoflavones and Coumestans Nitroglycosides (Nitropropanol Glycosides) Ranoculins Saponins Vicine/Covicine</p> | <p>PROTEINS AND AMINO ACIDS</p> <p>Allergens Amylase Inhibitors Enzymes Lipoxidases Thiaminases Tocopheroxidase</p> <p>Lectins Abris Concanavalin Ricin Robin</p> <p>Plant Cytoplasmic Proteins Polypeptides Amino Acids</p> |
| <p>VITAMINS</p> <p>Vitamin A Vitamin D metabolites</p> <p>MISCELLANEOUS</p> <p>Ipomemaron - mycotoxin? Alsike Poisoning - mycotoxin? Red Maple Poisoning (similar to Brassica induced anemia) Plant Carcinogens n-Propyl Disulfide (similar to Brassica induced anemia)</p> | <ul style="list-style-type: none"> ○ Nutrient <ul style="list-style-type: none"> ▪ Leucine ▪ Methionine ▪ SMCO ▪ Tryptophan ○ Non-nutrient <ul style="list-style-type: none"> ▪ Arginine analogs ▪ Canavanine ▪ Indospecine ▪ I amino D proline ▪ dihydroxyphenylalanine ▪ Lathyrogens ▪ Mimosine <p>RESINS</p> <p>SESQUITERPENE LACTONES</p> |

Source: Brown, 2009.

Some common poisonous plants in Botswana

An Act to provide for the eradication and destruction of noxious weeds commenced in 1916 in Botswana and it is cited as Noxious Weeds Act (Government of Botswana,1916). The Act made provision for the destruction of poisonous plants such as burweed (*Xanthium spinosum*).

Xanthiums spp

The common name is Cocklebur belonging to family composite with a local name of “Motlhabakolobe “or “Khonkhorose”. The genus *Xanthium* has four species in Southern Africa and all have characteristic burs. Burs are the fruits, which develop from composite flowers on the leaf axis. The four commonest species in Botswana are *Xanthium accdentale* L., *Xanthium pungens* Wall, *Xanthium spinosum* L., and *Xanthium strumarium* L.

The bur causes mechanical injury to cattle, sheep and goats. The bur may cause partial and even complete obstruction of the orifice of the sheath in bulls or oxen grazing on lands overgrown with *Xanthium* weed. The most susceptible animal to *Xanthium* poisoning is the pig, and great numbers may be lost through eating the plant at the cotyledon stage, namely the seedling with two leaves. The symptoms of poisoning by *Xanthium* include depression; nausea accompanied by vomiting; weakness; unsteady gait; twisting of neck muscles; rapid and weak pulse and low body temperature.

Poisoning by *Xanthium* arises from the ingestion of the immature plant and not the bur. During this cotyledon stage, the first leaves are dependent on the bur for energy, and it would appear that the toxic principle is in the seeds which are then transferred to the pair of temporary leaves. The toxic compounds that have been isolated in *Xanthium* are the glucoside xanthostrumarin and choline.

Like most toxic and undesirable species, *Xanthium* will invade disturbed areas around boreholes, farmsteads, villages, kraals, cultivated fields etc. It is a poisonous annual plant, which indicates misuse of the land. The burs stick to the animal and can be carried long distances. This way, the seeds get easily dispersed. *Xanthium* plants should be destroyed before the development of the seeds. On cultivated fields the soil should be ploughed before the plant matures. On rangelands, it is worth the effort to make sure that the *Xanthium* plants are grubbed before flowering.

Argemone Mexicana

Argemone Mexicana of local names either sekgarakgara or lopero is an herb of up to 60 cm tall. Stem spiny, bluish green with a sticky yellowish latex. Leaves simple, alternate, deeply lobed. Its seed and stem are poisonous when eaten in large quantities especially in early springs, in the tropics *Argemone Mexicana* flowers and fruits throughout the year. The flowers open early in the morning and last for two to three days. In most cases it pollinates itself though small bees usually do.

A. Mexicana is poisonous to both human and domestic animals (Sharma et al., 1999). It is common in disturbed areas throughout the country of Botswana, hence it is very important that it is identified and know and even studied as it pose an economical threat to the farming world. Cattle do not graze the plant as it is spiny but they can be poisoned if they consume it in hay or the chuff, sheep and goats can eat it when the vegetation is short of supply, while ostrich relish it.

The alkaloids sanguinare and dihydrosangunairine found in the seed and the rots are the primary toxins. The physiological active iso quinoline alkaloids berberine, protopine, coptisine, allocryptopine and dehydrochelcrythrine are found in all plants parts. According to Sharma et al., (1999) the total alkaloids toxicity has been tested on rats and mouce, the results extrapolated to man would indicate a lethal alkaloid dose for a 100kg (220 lb) would be 0,1g.as a result of testing on monkeys it has been recommended that maximum allowed contamination of oil should be less than 0, 01%.

Livestock has been poisoned by inclusion of this poisonous plant in hay but the more common route of intoxication is when the seed is being included as contaminant of other grains. Experimentally sangunarine alone fail to induce symptoms produced by oil, oil produced by pressing the seed is highly toxic (vearrier, 2009). A toxic amount of the alkaloid or its degradation products may be transmitted in the milk of animals not showing toxic symptoms. The yellow sap is slightly corrosive and produces dermatitis in sensitive individual. The prickly leaves and folds produce minor mechanical injuries to the mouths and skin of livestock.

Gastro-intestinal tract irritation is common, and toxic ingestions almost invariably result in emesis. Onset of symptoms is rapid. GI upset and vomiting start 45 minutes to 4 hours after ingestion. CNS effects include drowsiness, weakness, loss of coordination, muscle fasciculation, seizures.

In humans and chickens, widespread edema (dropsy) is the main finding. Chickens exhibit a swelling of the wattles and darkening of the tips of the comb and also a decrease in egg production, weakness, hemorrhagic enteritis and death. Affected animals will show:

- Severe jaundice and photosensitization in the form of severe dermatitis on the light colored areas of the skin.

- Death from hemorrhagic gastroenteritis may occur if animals consume it in large quantities.

Sanguinarice has been shown to possess pro-oxidant property in invitro towards the production of free radicals including singlet oxygen and hydrogen peroxide. Prior invitro status have shown that reactive oxygen species are involved in induced toxicity causing peroxidative damage of lipids in various hepatic sub cellular fraction including microsomes and mitochondria. In acute cases intra venous injection of a sodium thiosulfate and sodium nitrate can bring dramatic change *Dichapetalum cymosum*

This is one of the most important poisonous plants in Botswana with local name "mogau". *Dichapetalum cymosum* (common name *gifblaar* or occasionally the English translation, poison leaf) is a small dwarf shrub occurring mostly in the Western parts of Botswana i.e Tsabong, Ghanzi. The poison leaf plant or mogau as widely known in the local communities has since been spread to many other parts of the country like Maun, Kgatleng and Kweneng even though it is not heavily populated. It is notable as a common cause of lethal cattle poisoning in these areas and is considered to be among the most toxic plants in Botswana. The chemical monofluoroacetate occurs in all parts of the plant and is responsible for the toxic effect. The monofluoroacetate affects the heart and nervous system reported by (Kellerman and Naude, 1996)

According to (Balinsky and Scheiderman, 1964) above the ground the plant is seen as a clump of small, woody shrub of about 15cm high. Such a clump is typically 1 plant as *gifblaar* has a huge underground root system – likened to an underground tree- and sends numerous shoots above ground in favourable conditions. The most obvious above ground parts are the leaves – simple, alternative with initially fine hairs later becoming glabrous. The leaves are bright green in colour in both sides. The secondary veins forms loops and do not reach the margins. Flowers are small, white and occur as dense clumps in the early spring. Fruit formations are rare; the fruit are orange and leathery.

Identification of *Dichapetalum cymosum* in the rangelands is important in prevention of toxicity and also in assigning it as a cause of toxicity in an outbreak. It is a small, low-growing, non-descriptive shrub and thus easily confused with other species. There are four principal "confusers" in its habitat. These are *Ochna pulchra* saplings, *Parinari capensis*, *Pygmaeothamnus* spp and the various genera and species of the family Rubiaceae. *Dichapetalum cymosum* occurs in dry, sandy areas in acidic soils, as well as the northern slopes of rocky hills in the southern parts of Africa. In Botswana it is widely distributed in the western veld with few plants other areas across the country. *Dichapetalum cymosum* also occurs in Namibia, South Africa, Zimbabwe as well as southern Angola.

The toxic compound isolated as the cause of *Dichapetalum cymosum* poisoning is monofluoroacetate. It was first isolated by Marais, (1943); the LD50 of this compound is 0,5mg/kg which translates to about 200g of dry plant material to kill a 500kg cow. The compound in itself is not toxic. However, it undergoes lethal synthesis in the body reacting with Coenymes A to make Fluoroacetyl-Coenymes A. This compound reacts with oxaloacetate to form fluorocitrate, which is toxic; being an alternate substrate for aconitase (normal substrate citrate.) it binds to the aconitase but cannot be released, irreversibly binding the aconitase. This causes the Krebs cycle to shut down, leading to massive energy shortages. Furthermore, fluorocitrate stops citrate from crossing from the cytoplasm into the mitochondrion, where it is needed. In the cytoplasm it gets degraded.

Louw et al., (1970) reported that in cattle, acute death by cardiac arrest is seen following drinking or some kind of exertion. Affected animals will show dyspnoea and arrhythmias prior to this. There may occasionally be nervous signs such as trembling, twitching and convulsions. Death occurs 4 – 24hours after ingestion. In rare cases, an animal will survive the initial period only to drop dead months later of a heart failure – so called chronic *Dichapetalum cymosum* poisoning. On post-mortem, leaves may be found in the rumen, cyanosis may be seen, as well as signs of heart failure – congestion, haemorrhage, and myocardial necrosis (on histopathology.) diagnosis is based on these as well as the presence of *Dichapetalum cymosum* in the camp, particularly if signs of consumption are seen. Laboratory tests can be done for monofluoroacetate in the rumen fluid, kidneys and the liver.

Treatment

- It is thought withholding water for 48hours can help.
- Ensure animals remain calm and rested.
- Remove the animals from the infected rangelands, but without exciting them.

Grobbelaar and Mario-Meyer, (1990) reported that cattle are mostly affected; with sheep, goats and game rarely being poisoned even though compound is equally poisonous to these species. An explanation is that the bulk grazing style of cattle, which is by nature less selective lends itself to the ingestion of the plant. Young sprouts have more monofluoroacetate, but all parts are lethal. The plants sprouts in late winter, before the spring rains, the cue for most plants – including grasses – to shoot. This makes it the predominant greenery during that period. Cases of poisoning are

most frequent during that period. Later in the season, *Dichapetalum cymosum* poisoning is far less common, presumably enough other grazing occurs that *Dichapetalum cymosum* is not eaten. Autumn (late season) poisoning also occurs. Poisoning of carnivores, including dogs, has been reported after consumption of ruminal contents of poisoned animal stated by (Marais, 1944). Caution should be taken and animals should only be grazed later in the season, and the camps or rangelands should not be overgrazed.

CONCLUSION

Poisonous plants can reduce livestock productivity depending on the effect they have and the amount taken. Since poisonous plants are potential threats to the livestock industry it is important that farmers are carefully to avoid contamination of rations prepared for livestock and removal of poisonous plants from grazing lands. Prevention and precautions are the best way to avoid any economic loss.

REFERENCES

- Balinsky JB and Scheiderman ER (1964). Histo-chemical studies on *gifblaar*, *Dichapetalum cymosum*. South African Journal of Medical Science 29: 96 – 97.
- Brown D (2009). Toxic agents in plants. http://www.ansi.Cornell.edu/plants/toxic_agents/index.html. accessed 11-02-2011.
- Brown D (2011). List of scientific and common name equivalent. http://www.ansi.Cornell.edu/plants/toxic_agents/index.html. accessed 11-02-2011.
- Government of Botswana (1916). Noxious weeds. Chapter 35:04. In. Laws of Botswana. www.laws.gov.bw. Accessed 14-04-2011.
- Grobbelaar N and Mario Meyer JJ(1990). Fluoroacetate production by *Dichapetalum cymosum*. Journal of Plant Physiology. 135: 550 – 553.
- Johnson J (2009). Uses of poisonous plants. <http://www.helium.com/items/1439771-poisonous-plants-and-their-uses-the-value-of-plant>. Accessed 14-04-2011.
- Kellerman TS and Naude TM(1996). “The Distribution, diagnoses and estimated economic impact of plant poisonings and mycotoxicosis in South Africa”. Onderstepoort Journal of Veterinary Research 63: 65 - 90.
- Louw N De Villers OT and Grobbelaar N (1970). The inhibition of aconitase activity from *Dichapetalum cymosum* by fluorocitrate. South African Journal of Animal Sciences. 66: 9 – 11.
- Marais JCS (1943). “The isolation of the toxic principle “K cymonate” from “Gifblaar”, *Dichapetalum cymosum*”. Onderstepoort Journal of Veterinary Sciences Ind. 18: 203.
- Marais JCS (1944). “Monofluoroacetic acid, the toxic principle of “Gifblaar”, *Dichapetalum cymosum*”. Onderstepoort Journal of Veterinary Sciences Animal Ind. 20: 67.
- Sharma B, Malhatra S, Bhatia V and Rathe M (1999). Epidemic dropsy in india, Post grad medical journal, 75 : 657-661
- Ketewa SS, Galav PK, Ambika NAG and Anitaja IN (2008). Poisonous plants of Southern aravalli hills of Rajasthan. Indian journal of traditional knowledge. 7:269-272
- Vaarrie D and Hamilton RJ (2009). Plant poisoning, alkaloids-quinolizidine and isoquinoline. <http://emedicine.medscape.com/article/816548-overview>. accessed 16-02-2011.
- Texas AgriLife Extension Service, Texas A&M System. (Undated) Some poisonous plants and their symptoms . accessed. 15-02-2011.