

Toxic effect of common poisonous plants of district Bannu, Khyber Pakhtunkhwa, Pakistan

Rehman Ullah Khan, Sultan Mehmood and Saad Ullah Khan

Department of Botany, University of Science & Technology Bannu, KPK, Pakistan

Abstract: The present paper was a part of Ph.D research work, conducted during the year 2014, in which 87 poisonous plants belonging to 54 genera, were collected, documented and preserved in the herbarium of Bannu, Department of Botany UST, Bannu Khyber Pakhtunkhwa Pakistan. The plants were identified botanically, arranged alphabetically along with their Latin name, family name, common name, poisonous parts, toxicity, affects, toxin and their effects. Aim of the study was to induce awareness in the local people of district Bannu about the poisonous effects of the commonly used plants. Data about poisonous effect were collected from the local experienced and mostly old age people through questionnaire. Some information were collected from a number of veterinary texts and literature. The most important plants genera studied in the area were Brassica 6 species (11.11%), Lathyrus 5 spp (9.26%), Astragalus, Euphorbia and Prunus were with 4 spp (7.40%). Datura, Jatropha, Ranunculus, Solanum and Sorghum were with 3 spp (5.56%) while Allium, Amaranthus, Chenopodium, Melilotus and Taxus were with 2 spp (3.70%). These 15 genera contribute 48 species (55.17 %) while the remaining 39 genera have single species each and contribute 44.83% to the total poisonous flora of the research area. Other important poisonous plants were *Anagallis arvensis* L., *Cannabis sativa*, *Datura stramonium* L., *D. metel* L., *Euphorbia species*, *Heliotropium europaeum*, *Ipomoea tricolor*, *Jatropha curcas*, *Lolium temulentum* L., *Malus domestica*, *Mangifera indica* L., *Medicago sativa* L., *Melilotus alba* Desr., *M. officinalis* (L.) Lam., *Mirabilis jalapa* L., *Narcissus tazetta*, *Nicotiana tabacum* L., *Sorghum halepense* (L) Pers., and *Xanthium strumarium*. It was concluded that the local population had poor knowledge about the poisonous effect of the plants and the present research work was anticipated for use by health care professionals, veterinarians, farmers, homeowners, as well as botanically curious individuals.

Keywords: Poisonous Plants, Toxin, Plant Parts, Distinct Bannu.

INTRODUCTION

Vegetation helps sustain life. We eat thousands of plants and herbs in our daily diet. But, we must remember to be choosy because relatively few plants, trees or shrubs and some plant constituents, when ingested, cause acute life-threatening illnesses and are potential killers of man and animals (Pittenger and Dennis, 2002). According to the "Handbook of Poisonous and Injurious Plants", deceptively attractive and seemingly innocuous, some common ornamental plants or flowers contain deadly poison and can give headaches or kill living organism. For example beautiful oleander bush-grown contains a deadly heart stimulant, similar to the drug digitalis. Children under 6 are especially vulnerable; there are present a large amount of toxicologically significant plant constituents such as proteins, amino acids, peptides, alkaloids, glycosides, oxalic acid, terpenes, phenolics, tannins, and essential oils (Tisserand and Balacs, 1995). Thorns are the means of physical defenses while some the of biologically active chemicals act as a chemical defense against insects, ruminants and other herbivorous animals. Some of these chemicals (e.g. digitoxin, colchicines and atropine) have been found to be extremely useful for

treating various diseases in human and animal (Lewis *et al.*, 1977). Many of the plant defense compounds when consumed by livestock or humans they may also experience negative effects, ranging from mild discomfort to death. It has been estimated that yearly sheep and cattle death losses due to poisonous plants are 3.5% and 1%, respectively (Nielsen *et al.*, 1988). Accumulation of potentially toxic concentrations of nitrate in forages occurs as a result of drought that varies from year to year, throughout the growing season of the plant (Pfister, 1988). The diagnosis of plant poisonings can be difficult. The number one route of poisoning in animals and human is the ingestion of a potentially toxic plant. Unfortunately, there are few antidotal therapies for treating plant poisonings (Cheeke 1998). Study on poisonous effects of different plants was conducted by Rao *et al.*, 1964; Cereda and maltos, 1996; Tilford and Gregory, 1997; Pittenger and Dennis, 2002; Lee *et al.*, 2005; Keddy 2007, Bad Bug Book., 2009). This is still an active area of research with important implications for understanding plant evolution, and for medical research.

Aim: the study was conducted to induce awareness in the local people of district Bannu about the poisonous effects of the commonly used plants.

*Corresponding author: e-mail: rehman_g4u@yahoo.com

MATERIALS AND METHODS

Area exploration

Map of Bannu was obtained from concerned office for proper guidance in the collection of plants. Trips were arranged to 20 different sites (1- Bharat, 2-Kakki, 3-Mandan, 4- Mira Khel, 5-Ismail Khel, 6- Sokari, 7- Bada Mir Abas, 8- Surani, 9-Mandew, 10- Mamash khel, 11- Bazar ahmad khan, 12- Town ship Bannu, 13- Domail, 14- Khujari, 15- Manja khel (ghoriwala), 16- Paienda Khel, 17- Fathma Khel Khurd, 18- Hati Khel Banochi, 19- Mosa Khel, 20- Ismail khani) of district Bannu to explore and collect important poisonous flora of the area during 2014-15.

Data collection

The researcher wants to assess the poisonous effect of plants through interviewing the local inhabitants of district Bannu. Therefore the respondents were divided into two groups on the basis of educational knowledge and age of the respondents. For poisonous effect causes by the plant, the local experienced and mostly old age people were interviewed personally by explaining the questionnaire. Data on poisonous plants were collected from a number of veterinary texts. The reported information is purely based on local knowledge however; there is a wealth of information available on the internet about the toxic chemicals present in the poisonous plants.

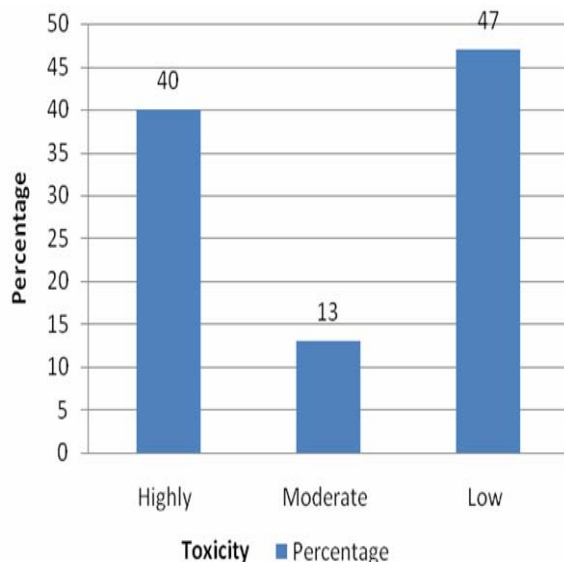


Fig. 1: Level of toxicity of collected plants

Exploration and conservation of local poisonous flora

During exploratory trips, the poisonous flora was carefully collected, when submitting plants for identification the specimens (entire plant, including the roots and flower) were collected. Newspaper was folded around the roots of the collected plant specimen and then placed chilled in a plastic bag until arrives at the laboratory. Alternatively, the plant specimens were dried,

mounted on the herbarium sheaths and identified with the help of available literature (Nasir & Ali, 1971-2007; Ahmad and Ali, 1998) and by comparing with the already preserved specimens in the Herbarium, Department of Botany, University of Peshawar, KPK. A total of 87 belonging to 54 genera of poisonous plants were collected, identified photographed and were conserved systematically in the Herbarium of Department of Botany, University of Science and Technology Bannu for further references. Such types of efforts are required to induce awareness in the local people about the poisonous effects of the common useful plants. Repeated queries were made to formulate the correct data. Outcome of the results were rechecked and compared with the available literature.

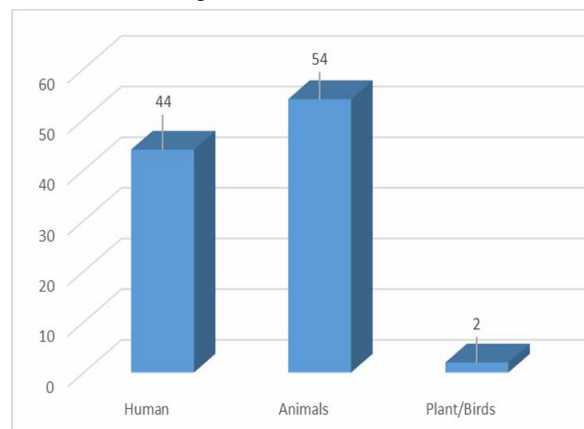


Fig. 2: Percentage of plants affecting human, animals and birds.

RESULTS

In the present study 87 poisonous plants belonging to 54 genera, were collected, documented and preserved in the herbarium of Bannu, Department of Botany UST, Bannu. The plants were identified botanically, arranged alphabetically along with their latin name, family name, common name, poisonous parts, toxicity, affects, toxins and their effects. The local population had poor knowledge and even many veterinarians are unaware of the poisonous effects of these plants because it doesn't carry a warning label. Sadly few people are aware of how dangerous these plants are. The most important plants genera studied in the area were Brassica 6 species (11.11%), Lathyrus 5 spp (9.26%), Astragalus, Euphorbia and Prunus were with 4 spp (7.40%). Datura, Jatropha, Ranunculus, Solanum and Sorghum were with 3 spp (5.56%) while Allium, Amaranthus, Chenopodium, Melilotus and Taxus were with 2 spp (3.70%). The remaining 39 genera have single species each. Underneath is a broad list of common plants containing poisonous parts that create a severe risk of injury, illness, or death to humans or animals. Each poisonous plant is listed alphabetically by scientific name family name, common name, poisonous parts, toxicity, toxins and its effects (table 1).

Table 1: Extensive list of plants containing poisonous parts that pose a serious risk of illness, injury, or death to humans or animals.

Latin Name	Common Name	Poisonous Parts	Toxicity	Affects	Toxins	Effects
<i>Aconitum napellus</i>	Aconite wolfsbane and monkshood	All	Highly Toxic	Horses, People	Aconitine	Lower blood pressure, tingling numbness and burning, in the mouth, followed by Nausea, (vomiting), Disables nerves, cardiac irregularity.
<i>Agave Americana</i>	Aloe	juice	Moderately poisonous	Human	homo-iso-flavanoid	Sharp contact dermatitis, with long-term blistering and chronic itching.
<i>Allium cepa</i> L. <i>Allium sativum</i> L.	Onions and garlic	bulbs leaves	Fatal	dogs, cats and some other livestock including cattle, horses	thiosulphate. N- propyl disulphide oxalate, SMCO (S-methyl- L-cysteine sulfoxide)	Hemolytic anemia in livestock cattle, death Horses: weight loss rapid breathing, anemia, icterus and death (Cope 2005)
<i>Aloe barbadensis</i>	Aloe Vera	Leaves and stems contain the latex.	low	Horses, children or those seeking a herbal cure.	The sticky latex contains several glycosides.	The glycosides are generally cathartic (purgative, laxative). Cause Diaorrhoea
<i>Amaranthus</i> spp. <i>A. retroflexus</i> , <i>A. hybridus</i> .	Pigweed; redroot	The foliage	low	Livestock especially Sheep, hogs, and young calves	Oxalates, nitrates toxicity.	Affect kidneys, perirenal, interstitial, rectal and abdominal wall edema;
<i>Anagallis arvensis</i> L	Scarlet pimpernel; pimpernel; poor man's weather- glass	All parts	High. death in 2 days at conc; of 2% of the animal's weight;	Sheep, Loss of 6 calves was once reported.	The toxin(s) remains unknown	Diarrhea, anorexia, depression; lesions included a pale, crumbling liver, congestion of lungs; kidney, heart and rumen hemorrhaging, and Leaves can cause contact dermatitis
<i>Artemisia absinthium</i>	wormwood	All	Low toxic	Human and animals	thujone	Abnormal respiration, and foaming at the mouth, renal failure, convulsions, evacuations, involuntary
<i>Asparagus officinalis</i> L.	Asparagus	The berries are poisonous.	low	human	Steroidal saponins, sapogenins	Dermatological effect, effect liver, allergy, dyspnea and dysphagia.
<i>Astragalus</i> spp <i>A. lentiginosus</i> <i>A. miser</i> <i>A. bisulcatus</i> <i>A. lusitanicus</i>	Locoweed or crazy weed, milk vetch	All	Low toxic	Animals	indolizidine alkaloid swainsonine, nitropropanol bearing glycoside miserotoxin, toxic levels of selenium metabolites.	Animals (grazing at higher altitudes) show, subcutaneous and pulmonary edema under the jaw/brisket, congestive heart failure. The usual symptoms of HMD are unwillingness to move, a bounding jugular pulse, profuse dark fluid diarrhea, labored breathing, weakness and depression.
<i>Avena sativa</i> L.	Oats	leaves stems, Oat hay	Low toxic	livestock	Poisoning by nitrates.	Oats cause nitrate toxicity in livestock. Cattle: weakness trembling, gait, , staggering, cyanosis, death
<i>Begonia semperflorens-cultorum</i>	Begonia	Rhizomes tubers, and roots.	Low toxic	Human	Oxalates	Nausea, vomiting, Burning and swelling of mouth, throat, lips, and tongue, , difficulty with speech and swallowing.

Continue...

Latin Name	Common Name	Poisonous Parts	Toxicity	Affects	Toxins	Effects
<i>Brassica campestris</i> L.	Bird rape	flowers leaves stems	Low toxic	Cattle	S-methyl-L-cysteine sulfoxide (SMCO)	Cause goiter in humans, livestock. reduction in performance of young livestock reduced weight gain, hemoglobinuria,
<i>Brassica napus</i>	Rapeseed	leaves seeds	Low toxic	Poultry:	S-methyl-L-cysteine sulfoxide (SMCO) Glucosinolate erucic acid	Poultry: reduced weight gain, enlarged thyroid, congestion of liver, hemoglobinuria, goiter in humans, livestock. reduced weight gain, reduction in performance of young livestock,
<i>Brassica oleracea</i> L.	wild cabbage	all parts flowers leaves	Low toxic	humans livestock.	S-methyl-L-cysteine sulfoxide (SMCO) Glucosinolate erucic acid	Cause goiter in humans, livestock. reduction in performance of young livestock reduced weight gain, hemoglobinuria,
<i>B.hirta</i> Moench. <i>B. kaber</i> (DC) L. <i>B. rapa</i> L.	Mustards (Rape) white mustard (charlock; wild mustard)	Seeds and plants with seed capsules are poisonous.	Low toxic	Goiter formation in lambs (ewes) and rabbits cattle and sheep	Sinigrin Goitrogenic substances (LS-vinyl-2-thioaxazolidone)	<i>Brassica</i> cause upper digestive tract disturbances, gastroenteritis, pain, salivation, mild toxic hepatitis, diarrhea, and. hemolytic anemia alimentary tract inactivity causing gallbladder distension with viscid bile, hemoglobinuria, congestion and edema of lungs.
<i>Cannabis sativa</i>	Marijuana	flowers leaves	Low toxic	Human: & companion animals	tetrahydrocannabinol	Human: increased heart rate, diarrhea, vomiting, drooling, seizures, coma, incoordination and depression of the central nervous system. Dogs: vomiting, unconsciousness, staggering gait, drowsiness, agitation
<i>Chenopodium album</i>	Lamb's Quarters	Dried forages	low	ruminants	nitrate. nitrite NO ₃ → NO ₂	"Muddy" mucous membranes, dyspnea, sudden death, single oral dose of 0.5 g/kg nitrate is toxic for ruminants
<i>Chenopodium ambrosioides</i> L	Mexican tea, wormseed	Oil	low	human	Oil contains ascaridol,	Depression, impaired vision, dizziness, vomiting, nausea, headache and abdominal pain,
<i>Chrysanthemum Indicum</i> L	Indian Chrysanthemum	All	Fatal.	Animals	pyrethrins	Depression, loss of coordination gastrointestinal upset, including diarrhea, drooling, and vomiting
<i>Cuscuta reflexa</i>	Dodder	Whole	Low	Plants	α,α-trehalose	Parasite of ziziphus plant.
<i>Cycas revoluta</i>	Sago Palm	All parts seeds or "nuts"	Low toxic	Human	cycasin	The ingestion of just one or two seeds can result in seizures depression, diarrhea, vomiting, and permanent liver damage as well as neurological damage.
<i>Datura stramonium</i> L. <i>Datura meteloides</i> DC., <i>D. metel</i> L.,	thorn apple, stinkweed and moon-lily; Jamestown	leaves and seeds	4-5 g are fatal to a child.	Human grazing livestock chickens	alkaloids scopolamine and atropine. hyosyamine	Abnormal thirst, vision distortions, delirium, incoherence,. flushed skin, rapid Heart beat with high temperature. Hyperirritability of CNS, convulsions, coma, and death.
<i>Digitalis purpurea</i> L.	Foxgloves	Leaves The herbage, both fresh and dried,	May be fatal	Human and animals	Digitoxin, digoxin. digitonin, digitalin, antirrhinic acid, digitalosmin, digitoflavone	Severe headache, abdominal pain, gastric upset, nausea, diarrhea, dangerously irregular heartbeat and pulse, mental confusion, convulsions, tremors, drowsiness, and death. Livestock: similar as above, including lack of appetite, the urge to urinate and bloody stools.

Continue...

Latin Name	Common Name	Poisonous Parts	Toxicity	Affects	Toxins	Effects
<i>Dryopteris filix-mas</i>	Male fern	Juice	Large doses of the extract potentially are toxic.	Human and animals	Cleoresin. albaspidin, filicic (filixic) acid, filicin, margaspidin, filmarone	Headache, dyspnea, coma, nausea, diarrhea, vertigo, muscular weakness, tremors, convulsions, cardiac and respiratory failure. and temporary or permanent blindness.
<i>Equisetum arvense</i> L.	Horsetails, mare's tails, scouring rush	All parts, green and dried, can be toxic.	generally not fatal	Animals	enzyme thiaminase	Early signs: general weakening, Appetite loss, and difficulty in turning. In later stages: muscles rigid, weakens Pulse rate increases, cornea of the eye become opaque the animals become constipated, calm, comatose and death,
<i>Euphorbia cyparissias</i> L.	Cypress-spurge	latex	Fatal	Cattle	Diterpene esters in milky latex.	Collapse, Diarrhea, vomiting, Nausea, diarrhea when ingested. Redness, swelling, blisters after contact with skin.
<i>Euphorbia helioscopia</i> L.	Sun spurge	latex	Fatal	Human, animals	deoxyphorbol jatrophone-type diterpenoids euphoheliosnoid and other toxic diterpenes	The latex causes, irritation, burning and swelling in animals that ingest it. Human child died after ingesting the plant. Sheep show: vomiting, salivation, congestion of lungs, irritation of mouth, salivation, abdominal pains diarrhea, coma and death
<i>Euphorbia marginata</i>	spurge	latex	Fatal	Human, animals	cocarcinogenic diterpenoids	Inflammation of the upper digestive tract, diarrhea, irritation, blistering. In an effort to abort, death of a young woman is reported, from decoction of <i>E. marginata</i> . Sap cause contact dermatitis on face and legs of horses.
<i>Euphorbia milii</i> Ch. des Moulins	crown-of-thorns	The sap/ latex is moderately poisonous	Fatal	Human, Family pets	deoxyingenol	Family pets should not be allowed to ingest this plant. In Humans symptoms of poisoning includes irritation of mouth, abdominal pains and blistering
<i>Helianthus annuus</i> L.	sunflower	hairs	Low	Human and Cattle	sesquiterpene lactones, dihydroniveusin A nitrate toxicity	human eczema, erythema, allergic contact dermatitis in sensitive individuals. Cattle have been poisoned as a result of nitrate toxicity, which has caused congestion of lungs, collapse, agitation, sickness and death
<i>Heliotropium europaeum</i>	Heliotropes	Leaves	Fatal.	Human	pyrrolizidine alkaloids	Vomiting, nausea, cirrhosis of liver, diarrhea, abdominal pains ascites, anorexia, death
<i>Ipomoea tricolor</i>	Morning-glory	leaves stems seeds	Fatal	Humans, goats, sheep and cattle	ergot alkaloids and D-lysergic acid amide (ergine).	Frequent urination, Explosive diarrhea, depressed reflexes, purgation and gastrointestinal distress. Prolonged consumption results in coma, depression, psychotic reactions, hallucination, dyspnea, anorexia, wasting-away, and in severe cases, death.
<i>Jasminum officinale</i> L.	Jasmine	Berries	Fatal	Human	benzyl acetate, jaspolyoside,	Digestive disturbance and nervous symptoms.
<i>Jatropha curcas</i> <i>Jatropha multifida</i>	Jatropha	Seeds and sap	Moderately poisonous	children and adults	lectin, saponin, carcinogenic phorbol, toxalbumin curcin. and a trypsin inhibitor	Vomiting and diarrhoea Within fifteen minutes after the ingestion of seeds, and after 30 mints violent illness severe abdominal pain was experienced. No death reported.
<i>J. curcas</i>	Jatropharens	Latex, leaf has irritating, stinging hairs	High	children and adults	lectin, saponin, phorbol, toxalbumin curcin.	If touched with body it produces Burning, itching, local irritation, but if taken orally then it causes vomiting, swelling of the lips, redness of the face, dizziness and even collapse.

Continue...

Toxic effect of common poisonous plants of district Bannu, Khyber Pakhtunkhwa, Pakistan

Latin Name	Common Name	Poisonous Parts	Toxicity	Affects	Toxins	Effects
<i>Lathyrus</i> Spp <i>L. aphaca</i> L. <i>L. tuberosa</i> L. <i>L. latifolius</i> L.	Pea	pea-like seed & foliage	Low	Both humans and livestock	L-alpha, gamma-diaminobutyric acid	Symptoms in Human and Horses include loss of bladder or bowel control (paralysis) muscle tremors sensory disturbances, weak puls, convulsions and death. In Rats: nervous symptoms of hyper-excitability, convulsions and death.
<i>Lathyrus odoratus</i> L	sweet pea	The pods and seeds	mildly poisonous	Horses & Rodents:	beta-aminopropionitrile	Horses: aneurysm, gait, rigid, scoliosis BAPN causes osteolathyrism, a syndrome characterized by skeletal deformities and aortic rupture. (Selye 1957, Cheeke and Schull 1985). Rodents: abortion, aneurysm, bones, fragile
<i>Lathyrus sativus</i>	grass pea	mature fruit seeds	Low	Human and Livestock	ODAP (β -N-Oxalyl-L- α , β -diaminopropionic acid), beta-N-oxalyl amino-L-alanine	Disease neurolethyrism. emaciation of gluteal muscle, wasting and paralysis lower body.
<i>Lilium spp.</i>	Lilies	All	highly toxic	Cats	yet been identified	Severe kidney damage due to ingestions plant parts.
<i>Lolium temulentum</i> L	poison ryegrass or darnel	seed heads & seeds	It is rarely fatal.	humans, Grazing cattle	Cynoid, alkaloids temuline and loline.	Diarrhea, gastroenteritis, vomiting, sensation of intoxication, various abnormal sensations, ataxia, nausea, giddiness, apathy and mydriasis,
<i>Malus domestica</i>	Apple	Seeds	mildly poisonous	humans Horses	amygdalin,	If ingested enough seeds to provide a fatal dose that causes abdominal pain but not enough to be dangerous to humans.
<i>Mangifera indica</i> L	Mango tree	Leaves stems Mango peel & sap	low	Human	urushiol,	Dermatitis allergic reaction
<i>Medicago sativa</i> L.	alfalfa	leaves stems	Moderate	human, Cattle, Chicken Sheep.	coumestan coumestrol medicagenic acid	Human infertility, Cattle: infertility and bloat, Chickens: weight gain reduced Sheep: bloat, infertility, erythema, skin peeling off.
<i>Melilotus alba</i> Desr.	white Sweet clover	Whole	Low	Cattle & Horses	dicoumarol melilotoside	Elevated heart rate, hemorrhage, anemia and abortion
<i>Melilotus officinalis</i> (L.) Lam.	yellow sweet-clover	leaves stems	Low	Cattle horses	dicoumarol melilotoside	Cattle and horses show anemia and hemorrhage
<i>Mirabilis jalapa</i> L	Four o'clock	Roots seeds. Herbage suspect.	Low	Human and animals	The toxic principles are unknown	Gastroenteritis, abdominal pain, vomiting and diarrhea
<i>Narcissus tazetta</i>	daffodil	swollen underground stems Bulbs Leaves, berries, and roots	Extremely poisonous. Can be fatal	Human, Cats and dogs.	an alkaloid (lycorine)	Nausea, vomiting, headaches and diarrhea, vomiting, and blurred vision. Intense gastrointestinal irritation, Irritant dermatitis, stomach cramps in children, Dizziness, drooling, trembling, loss of appetite, convulsions, depression of the CNS, cardiac abnormalities, nausea and death can result from bulb consumption.
<i>Nerium oleander</i> L.	oleander	All parts especially the leaves and woody stems, branches	Extremely poisonous.	Humans and animals	Oleandrin nerioside, oleandroside, saponins and cardiac glycosides	Humans: abdominal pains, coma nausea, diarrhea, irritation of mouth, dyspnea, dizziness, drowsiness, gastrointestinal tract irritation, harsh digestive upset abnormal heart function, heart trouble, contact dermatitis, hypothermia and even death. Horses and Cattle: breathing rapid, elevated heart rate, irritation of mouth, pupil dilation and death

Continue...

Latin Name	Common Name	Poisonous Parts	Toxicity	Affects	Toxins	Effects
<i>Nicotiana tabacum</i> L.	Tobacco	leaves stems	Fatal	Human	Anabasine anatabine	Vomiting, unconsciousness nervousness,
<i>Papaver somniferum</i> L.	opium poppy	all parts immature fruit, plant juices	Fatal	Cattle and Humans	Codine morphine protopine	Cattle: nervousness, ataxia gastroenteritis, rapid breathing, Humans: eczema, cyanosis, sweating, pinpoint pupils, headache, death by asphyxiation
<i>Phaseolus vulgaris</i>	common bean	Whole	Low	humans and livestock	phytohaem agglutinin, a lectin	Diarrhea, vomiting, nausea and effects on cell metabolism.
<i>Physalis peruviana</i> L.	ground-cherry or Japanese lanterns,	immature fruit	low	Humans	solanine	Gastroenteritis, fever and diarrhea
Prunus spp, <i>Prunus domestica</i> <i>P. armeniaca</i> <i>Prunus serotina</i> Ehrh. <i>Prunus virginiana</i> L.	Cherry plum apricot Wild black cherry Choke cherry	Twigs, leaf seeds Kernel	Deadly Fatal	Human Children, Horses	Cyanide. cyanogenic glycosides (prunasin, amygdalin, release hydrocyanic acid (HCN)	Gasping, excitement and prostration. Anxiety, convulsions, dyspnea, staggering, falling down, loss of sensation dilated pupils, tongue hanging out of mouth, rolling of eyes, bloats, the animal becomes quiet and death occur.
<i>Pteridium aquilinum</i> (L) Kuhn	Bracken fern; brake fern	Entire fresh or dried plant latex. Fronds are not harmful.	mildly poisonous	Horses ruminants (sheep and cattle)	Glycosides , enzyme thiaminase	The glycosides are generally cathartic (purgative, laxative). Horses show incoordination bradycardia, anorexia, swelling in the neck region, Crouch with feet apart, death. In ruminants; lazy attitude, rough coat, an elevated temperature, blood in excreta, mucous nasal and oral bloody discharges. In young cattle, there is edematous with difficult breathing and death.
<i>Quercus prinoides</i>	Oak	leaves and acorns	Rarely fatal	humans and livestock	tannic acid	Lack of appetite, Gastroenteritis, blood in urine, bloody diarrhea, depression, constipation, colic, heart trouble, contact dermatitis and kidney damage.
<i>Ranunculus abortivus</i> L. <i>Ranunculus scleretus</i> L. <i>Ranunculus septentrionalis</i> Poir.	crowfoot Buttercups cursed buttercup Northern buttercup	Fresh leaves and the inflorescence	most toxic at time of flowering	Cow, Horses, goats	unstable irritant oil protoanemonin.	Irritated tissues of the oral cavity, decreased appetite, slow pulse, diarrhea, colic, sinking of eyes harsh gastrointestinal irritation specified by salivation, bitter & reddish Milk of affected cows, hematuria, and blindness are seen in severe cases. Convulsions may end in death.
<i>Raphanus sativus</i> L.	radish	leaves seeds	Low	humans and livestock	Glucosinolates S-methyl-L-cysteine sulfoxide (SMCO)	Cause upper digestive tract disturbances, gastroenteritis, pain, salivation, mild toxic hepatitis, diarrhea, and. hemolytic anemia alimentary tract inactivity causing gallbladder distension with viscid bile, hemoglobinuria, congestion and edema of lungs.
<i>Ricinus communis</i>	castor oil plant or Palma Christi	Broken seeds and foliage are toxic	most poisonous in the world	humans and livestock	glycoprotein ricin (highly toxic protein) ricinine (an irritant oil)	2-4 seeds may be fatal to an adult while 1-3 seeds, to a child. Symptoms includes Prostration, gastrointestinal distress, dullness, excessive thirst. decrease in urine, a drop in blood pressure, severe dehydration, abdominal pain, a burning sensation in mouth and throat, dullness of vision, anorexia, nausea, vomiting, loss of appetite, weakness, muscle twitching, cramps, seizures, tremors, coma and death occur within 3-5 days. In horses trembling, sweating, and incoordination, vigorous heart contractions and rapid pulse. In poultry egg production ends, birds appear depressed.

Continue...

Latin Name	Common Name	Poisonous Parts	Toxicity	Affects	Toxins	Effects
<i>Solanum nigrum</i> L	Black/ deadly nightshade	All parts especially unrip berry but not the ripe fruit	Not always fatal (fatalities are due to paralysis).	humans, sheep	glycoalkaloid solanine	In humans, loss of sensation, paralysis, fever, anorexia, nausea, colic, vomiting, constipation or bloody diarrhea, jaundice, dilated pupils, headache, hypothermia, gastrointestinal and neurological disorders, dizziness, stomach cramps, cardiac dysrhythmia, burning of the throat, and In sheep; severe intestinal lesions, progressive weakness or paralysis, drowsiness, apathy, dyspnea, trembling inflammation of the mouth and esophagus in calves. Prostration, salivation and unconsciousness.
<i>Solanum tuberosum</i>	Potato	Whole	low	Human and animals	glycoalkaloid (solanine and chaconine)	Causing headaches, cramps, diarrhea, weakness, powerful digestive disturbances, confusion, affect nervous system and in severe cases coma and death.
<i>Sorghum bicolor</i> (L) Moench <i>Sorghum drummondii</i> (Steud) de Wet <i>Sorghum halepense</i> (L) Pers.	Cultivated sorghum Shattercane Johnson grass	Aerial green parts, leaves and stems, canes	High	livestock	Dhurrin, a cyanogenic glycoside, toxic levels of nitrates	Cyanide poisoning: congested Mucuous membranes of eyes and mouth, benzaldehyde odor, Rapid Respiration, convulsions, paralysis, prostration, dyspnea, gasping. staggering, excitation, coma and death. Nitrite toxicosis Symptoms includes discoloration of the blood, weakness, trembling, cyanosis and severe dyspnea
<i>Taraxacum officinale</i>	Dandelion	All	low	Horses	Toxicodendron	outbreaks of stringhalt in horses
<i>Taxus baccata</i>	English yew. graveyard tree	Nearly all parts leaves and seeds	Fatal.	Human and animals	taxanes or taxine	Cause convulsions, incoordination, and difficulty breathing, trembling, gastrointestinal irritation, cardiac failure coma, followed rapidly by death. People have committed suicide by ingesting it.
<i>Taxus canadensis</i> Marsh	American yew	The entire plant	most poisonous	Human and animals	alkaloid mixture taxine I, II	Collapse, fatigue, weakness, tremors, circulatory failure, vomiting, diarrhea, respiratory difficulties, dilated pupils, bradycardia, dyspnea, Gastric distress, convulsions, coma and death. survival after poisoning is rare.
<i>Trifolium hybridum</i> L.	Alsike Clover	All green parts.	Minimal	All grazing animals, Horses	nitrate	Cattle: labored breathing, cyanosis staggering gait, Female organs swell, infertility gastrointestinal trouble, photodermatitis. Horses: blindness severe nephrosis, depression, cirrhosis of liver, staggering gait
<i>Xanthium strumarium</i>	Cocklebur	seedlings and seeds	Fatal.	livestock,	carboxyatryloside	Depression, nausea, vomiting unsteadiness, weakness, twisting of muscles in neck, difficulty breathing, rapid pulse, and ultimately death.

DISCUSSION

In the preceding paragraphs the modes of action of the most important toxins have been discussed. In table 1, poisonous plants of district Bannu are tabulated, with some details of their toxins and toxicology. It is not only important to know these plants in order to avoid intoxication of children, pets or livestock, but these plants or their compounds might be used as natural pesticides against insects, slugs or rodents (Wink 2007). A number

of strong plant toxins inhibit ribosomal protein biosynthesis, such as the alkaloid emetine from *Psychotria ipecacuanha*, amanitins from *Amanita phalloides* or a class of polypeptides, the lectins. Famous are ricin from seeds of *Ricinus communis* or abrin from *Abrus precatorius* (Alberts *et al.*, 2008; Mutschler *et al.*, 2008). These lectins are extremely poisonous and an oral dose of 1 mg/kg body weight is enough to kill a human; injected even 0.1 µg and less per kg body weight can be lethal (Wink and van Wyk, 2008).

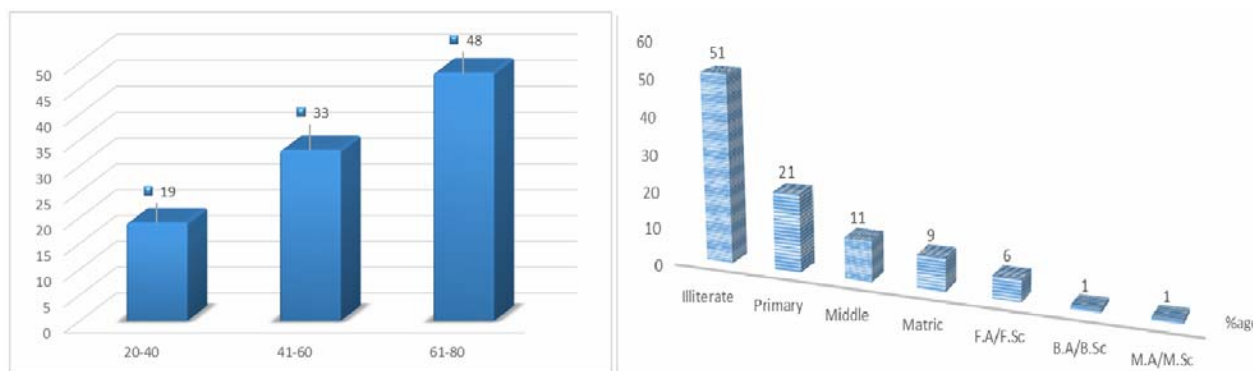


Fig. 3: Level of knowledge (% knowledgeable respondents) in different age groups and educational groups in the area.

Table 2: Distributions of species among common poisonous genera of District Bannu.

S. No	Genus	Species	% age in total Genera	% age in top 15 Genera
1.	Brassica	6	11.11	40.00
2.	Lathyrus	5	9.26	33.33
3.	Astragalus	4	7.40	26.67
4.	Euphorbia	4	7.40	26.67
5.	Prunus	4	7.40	26.67
6.	Datura	3	5.56	20.00
7.	Jatropha	3	5.56	20.00
8.	Ranunculus	3	5.56	20.00
9.	Solanum	3	5.56	20.00
10.	Sorghum	3	5.56	20.00
11.	Allium	2	3.70	13.33
12.	Amaranthus	2	3.70	13.33
13.	Chenopodium	2	3.70	13.33
14.	Melilotus	2	3.70	13.33
15.	Taxus	2	3.70	13.33

Criteria for measuring the level of toxicity of plant: Toxins and poisons are classified in four categories according to their oral toxicity. Class I: highly poisonous (1 to 50 mg/kg body weight); class II: moderately poisonous (50 to 500 mg/kg body weight) and class III: slightly hazardous (500 mg and more per kg body weight). It is important to recall that the dose is very important; already Paracelsus (1493-1541) had postulated in 1537 “*sola dosis facit venenum*” (it is the dose that makes a poison) besides inherent toxic properties (Mutschler *et al.*, 2008; Wink and van Wyk, 2008). Toxins, which fall into the classes I and II interfere with central functions in an animal. The most poisonous substances are neurotoxins which affect the nervous system, followed by cytotoxins and metabolic poisons that disturb liver, heart, kidneys, respiration, muscles and reproduction. Apart from internal organs, also the skin and mucosal tissues of animals can be affected by several toxins. Common toxin in members of the Euphorbiaceae and Thymelaeaceae are diterpenes, when in contact to skin, mucosal tissues or the eye they cause severe and painful inflammation, with ulcers and blister formation (Alberts *et al.*, 2008; Mutschler *et al.*, 2008).

Furanocoumarins, which are common in Apiaceae, can penetrate the skin and intercalate dermal cells. (Alberts *et al.*, 2008; Wink 1999). Many species of the Ranunculaceae accumulate the glycoside ranunculin causes skin and mucosal irritation, followed by a severe inflammation (Wink and van Wyk, 2008). Similarly in several members of the Araceae, such as *Arum maculatum* produce Calcium-oxalate needles (so-called raphides) in their leaves and stems. When a herbivore tries to ingest these plants, the raphides penetrate skin and mucosa and pierce small holes into the cells (Wink and van Wyk, 2008). Herbivores had to find solutions to avoid extremely toxic plants or to detoxify their poison cocktails. Apparently, a cautious herbivore ingests only small amounts of unknown plants and if negative symptoms occur, will avoid it in the future. Plants which are less toxic are eaten at least by some herbivores (Wink and Sodhi 2001). It is well known from pharmacology, that the liver of animals, especially of herbivores or omnivores, has an active set of detoxification enzymes (Alberts *et al.*, 2008; Mutschler *et al.*, 2008). Some herbivores have a rapid digestion, which would decrease the rate of toxin absorption. A few toxin eaters (e.g.

parrots) are known to ingest clay (so-called geophagy), which can bind most toxins, similar to charcoal (Aufreiter *et al.*, 2001; Mahaney *et al.*, 1999).

Table 3: Common poisonous part of the collected plants.

Poisonous parts	No of plants
Whole plant	21
Leaves	29
Juice/ Latex / sap	13
Stem/Branches	14
Seed	17
Barriers/ fruits	8
Flower/ inflorescence	4
Root	2
Hair	2

It was reported that under drought conditions many weed (Amaranthus, Chenopodium, Rumex and Solanum spp.) and some potentially troublesome crop plants (barley, oats, sorghum, corn, beet tops and wheat) accumulate nitrate to potentially toxic concentrations. Many plants in the family Euphorbiaceae contain euphorbon (dangerous poison). If the white, milky latex touches a cut or sore or squirts into your eyes, you are courting trouble of major proportions and even just one drop of latex on skin can cause a rash. Similar research on poisonous effects of different plants was carried out (Krenzelok and Mrvos, 2011; Keddy 2007; Lee *et al.*, 2005; Pittenger and Dennis, 2002; Tilford and Gregory 1997; Cereda and maltos, 1996; and Rao *et al.*, 1964). The present research work was anticipated for use by health care professionals, veterinarians, farmers, homeowners, as well as botanically curious individuals.

CONCLUSION

It was concluded that toxic plants can adversely affect every organ system and pose a risk to animal health and production. There are potentially dozens of plant species in field and sometimes in hay that can cause toxicity problems to livestock. It is important to be aware of these plants and their toxicity symptoms. Hay and feed should be carefully inspected for contamination with potentially toxic weeds before the first feeding

REFERENCES

Alberts B, Johnson A, Lewis J, Raff M, Roberts K and Walter P (2008): Molecular biology of the cell. 5th edit. Garland Science, NY.
 Aufreiter S, Mahaney WC, Milner MW, Hancock RGV, Ketch L, Malloch D, Huffman MA, Reich M and Bad

Bug Book (2009). Foodborne Pathogenic Microorganisms and Natural Toxins Handbook: Phytohaemagglutinin. United States Food and Drug Administration (FDA). Retrieved 2009-07-11.
 Cereda MP and Mattos MCY (1996). Linamarin: The Toxic Compound of Cassava. *J. Venom Anim Toxins*, **2**: 10-15.
 Cheeke PR (1998). Natural Toxicants in Feeds, Forages, and Poisonous Plants, Interstate Publishers, Danville, IL, pp.330-331.
 Cope RB (2005). Allium species poisoning in dogs and cats. *Vet Med*. 100 (8):562-6.
 Keddy PA (2007). Plants and Vegetation: Origins, Processes, Consequences. Cambridge University Press, Cambridge, UK Chapter 7: 666.
 Krenzelok EP and Mrvos R (2011). Friends and foes in the plant world: A profile of plant ingestions and fatalities. *Clin. Toxicol. (Phila.)*, **49**(3): 142-149.
 Lee BK, Kim JH, Jung JW, Choi JW, Han ES, Lee SH, Ko KH and Ryu JH (2005). Myristicin-induced neurotoxicity in human neuroblastoma SK-N-SH cells. *Toxicol. Lett.*, **157**(1): 49-56.
 Lewis WH and MPF Elvin-Lewis (1977). Plants Affecting Man's Health. Wiley, New York. *Medical Botany*, **515**: 123-124.
 Mahaney WC, Zippin J, Milner MW, Sanmugadas K, Hancock RGV, Aufreiter S, Campbell S, Huffman MA, Wink M and Malloch D (1999). Chemistry, mineralogy and microbiology of termite mound soil eaten by the chimpanzees of the Mahale Mountains, Western Tanzania. *J. Tropical Ecology*, **15**: 565-588.
 Mutschler E, Geisslinger H, Kroemer HK, Ruth P, Schäfer-Korting M (2008). Mutschler-Arzneimittelwirkungen. Lehrbuch der Pharmakologie und Toxikologie. 9th edit., WVG, Stuttgart.
 Nielson DB, Rimbey NR and James LF (1988). Economic Considerations of Poisonous Plants on Livestock. In: (James, L.F., Ralphs, M.H., Nielson, eds.), The Ecology and Economic Impact of Poisonous Plants on Livestock Production, Westview Press, Boulder, CO, pp.5-16.
 Pfister JA (1988). Nitrate intoxication of ruminant livestock. In: (James, LF, Ralphs MH, and Nielson, eds.), The Ecology and Economic Impact of Poisonous Plants on Livestock Production, Westview Press, Boulder, CO, pp.233-260.
 Pittenger, Dennis, R., 2002. Vegetables That Contain Natural Toxins". California Master Gardener Handbook. ANR Publications. pp.643-644. ISBN 978-1-879906-54-9. Retrieved 2009-07-21.
 Rao SLN, Adiga RP and Sarma PS (1964). The Isolation and Characterization of β -N-Oxalyl-L- α,β -diaminopropionic acid: A Neurotoxin from the Seeds of *Lathyrus sativus*. *Biochemistry* 3 (3): 432-436.
 Tilford and Gregory L (1997). Edible and Medicinal Plants of the West. Mountain Press Pub., Missoula, Montana. ISBN 0-87842-359-1

- Tisserand R and Balacs T (1995). *Essential Oil Safety: A Guide for Health Care Professionals*, Churchill and Livingstone, Edinburgh, UK, pp.159-160.
- Wink, M. (1999): Function of plant secondary metabolites and their exploitation in biotechnology. Sheffield Academic Press, *Annual Plant Reviews*, Vol. 3.
- Wink M and Sodhi R (2001). Mineralogical and chemical interactions of soils eaten by chimpanzees of the Mahale Mountains and Gombe Stream National Parks, Tanzania. *J. Chemical Ecology*, **27**: 285-311.
- Wink M (2007). Molecular modes of action of cytotoxic alkaloids- From DNA intercalation, spindle poisoning, topoisomerase inhibition to apoptosis and multiple drug resistance. *In: The Alkaloids*, G. Cordell, (ed.), Elsevier. **64**: 1-48.
- Wink M and Van Wyk BE (2008): *Mind-altering and poisonous plants of the world*. BRIZA, Pretoria (SA).