Garden Plants in Zimbabwe: Their ethnomedicinal uses and reported toxicity

Alfred Maroyi

Research

Abstract

The present study is aimed at documenting the toxicity and ethnomedicinal uses of garden plants in Zimbabwe. Herbarium and field studies were supplemented by a literature review. Data on ethnomedicinal uses of garden plants in Zimbabwe were assembled together with their poisonous properties. 106 popular garden plant species are regarded as poisonous in Zimbabwe and 23 of these have found various uses in traditional medicine in many parts of the country. They are distributed in 80 genera belonging to 39 families. Families with the highest number of poisonous plants include: Solanaceae (16 species); Euphorbiaceae (14 species); Apocynaceae (9 species) and Fabaceae (9 species). Of these 10.4% are indigenous and the rest are exotic. Information on these plants is presented together with their toxic and ethnomedical properties, which will serve as a basis for further studies to establish the medicinal claims.

Introduction

An inventory of introduced plants in Zimbabwe was initiated in 1996, for the purpose of documenting exotic plant species which now cover a large proportion of the country's arable land (Maroyi 2006). Garden plants are the basis of human subsistence and cultivated plants are often economically important. The present study focuses on a subset of plants growing in home gardens and houses as food and ornamental plants. Ornamental is used here in a wide sense including all decorative uses, i.e., street trees, hedging, and house plants. Documentation of all categories of plants, whether indigenous or not is important, because as time passes, the distinction between natural and man-made landscapes becomes obscure. Therefore, documentation of cultivated and naturalized plants is essential, as this will assist in the formulation of plant introduction policies. This type of knowledge is also suitable for identification of useful plants that can be targeted for domestication. Domestication of medicinal plants in East Africa, for example, has been seen as a way of increasing income and availability of the products to traditional healers and other resource users (Dery *et al*. 2000).

Apart from utilizing garden plants for a wide diversity of primary survival and aesthetic purposes, some of them are well-known for their poisonous effects on animals and men. Documentation of plant properties is important for protecting the public from the hazards of possible toxic effects of poisonous plants (Kingsbury 1961), especially food and ornamental plants that we interact with everyday. Most of the plants classified as "poisonous" contain harmful chemicals that can cause discomfort and distress, especially in small children. The term "poisonous plant" designates many kinds of plants as well as a wide range of poisonous or disturbing effects. These effects are generally dermatitis (or skin irritation caused by direct or indirect contact with a plant) and internal poisoning caused by eating plant parts (Hardin & Arena 1974). Contact der-

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matitis from irritating plants causes the greatest amount of suffering. Chief among them are *Hedera helix* L. and *Euphorbia* spp. (Lewis & Elvin-Lewis 1977). They are several plant species that cause mild contact dermatitis. Cases of plant poisoning in man may result from an overdose of medicine (Gelfand *et al*. 1985, Watt & Breyer-Brandwijk 1962) or stimulant or may be accidental. Poisonings and death from plants are rare as most poisonous plants taste unpleasant and are seldom swallowed. Most plant ingestions occur in young children and are due to berries and flowers of ornamental garden and house plants (Eddleton 2000, Fernando 2001, Joubert 1990, Van Wyk *et al*. 2002). In adults, poisoning can be either accidental or intentional. Most adult fatalities occur when poisonous plants are mistaken for food, e.g., wild tobacco leaves (*Nicotiana glauca* R.C. Graham) that are sometimes mistaken for traditional spinach and seeds of *Jatropha curcas* L. that are mistaken for edible nuts (Van Wyk *et al*. 2002). Plant poisons in Sri Lanka are commonly ingested with suicidal intent (Fernando 2001), examples include: *Nerium oleander* L. and *Thevetia peruviana* (Pers.) K. Schum., which contain numerous toxic cardiac glycosides (Van Wyk *et al*. 2002). The bulb of *Gloriosa superba* L., is often ingested accidentally (Fernando 2001), due to its erroneous identification as an edible tuber. Traditional medicines are regarded as a common cause of accidental poisoning (Joubert 1990, Kasilo & Nhachi 1992, Tagwireyi *et al*. 2002a,b). Most frequently implicated plant species are *J. curcas*, *Ricinus communis* L. and *Datura stramonium* L. (Huai *et al*. 2010, Joubert 1990, Tagwireyi *et al*. 2002a). However, poisoning through traditional medicine occurs when herbal medicine is used outside the safeguards of the traditional knowledge system and due to self-administration (Gelfand *et al*. 1985, Van Wyk *et al*. 2002). The high incidences of plant poisonings from traditional medicine are also a consequence of misidentification, incorrect preparation or inappropriate administration and dosage (Reynolds 2005, Stewart & Steenkamp 2000).

From a medical point of view, many toxic plants have been used for different types of complaints. *Lantana camara*, for example, has been used in many parts of the world to treat a wide variety of disorders (Morton 1994, Pour *et al*. 2009, Ross 1999, Sonibare & Effiong 2008), including cancers and tumours (Ghisalberti 2000, Pour *et al*. 2009, Sonibare & Effiong 2008). A tea prepared from the leaves and flowers are taken against fever, influenza and stomach-ache (Ghisalberti 2000, Morton 1994). It has been claimed that a steroid, lancamarone, from the leaves exhibited cardiotonic properties (Sharma & Kaul 1959) and that lantamine, an alkaloid from the stem bark and roots showed antipyretic and antispasmodic properties comparable to those of quinine (Satri 1962). *Strychnos* is another genus, not only notorious as a poison, but a well-known traditional herbal medicine. In Africa and Asia, *Strychnos* has a reputation as a remedy against snakebites and poisonings (Philippe *et al*. 2004). The reputed emetic and tonic properties play an important part in the use of *Strychnos* in stomach, abdominal and intestinal complaints as well as in the treatment of worms and parasites (Philippe *et al*. 2004). Some of these desirable properties of poisonous plants resulted in their domestication as medicinal plants. Poisonous plants, therefore, deserve to be considered important plants when governments are legislating problem plant species. They are a component of plant genetic resources that when protected in agroecosystems, have potentials of becoming useful to man. Already, some of the poisonous plants are not only valuable medicines, but also offer suitable spring boards from which to develop drugs with improved medicinal properties (Ajibesen *et al*. 2008, Bisset 1991).

However, there is scanty information in Zimbabwe on poisonous plants, particularly the home garden plants that are likely to poison both adults and children. Moreover, other than South Africa, there are only limited and isolated case studies (e.g., Nyazema 1984, Tagwireyi *et al*. 2002a,b), from the wider human toxicity. Most of the existing literature on poisonous plants in Zimbabwe deals with those plants that are poisonous to livestock (Brain 1934, Collins *et al*. 1950, Markson 1956, Philip *et al*. 1958, Shava 2004, Shone 1959, Shone & Drummond 1965, Stent & Lawrence 1932). Many of our plants are poisonous (Watt & Breyer-Brandwijk 1932) but we lack precise knowledge regarding their effects. Some of the widely utilized food plants, such as *Manihot esculenta* Crantz, *Dioscorea* spp. (Bisset 1991, Huai *et al*. 2010); *Trichilia dregeana* Sond. (Maroyi 2007a) and medicinal plants, such as *D. stramonium* (Gelfand *et al*. 1985, Huai *et al*. 2010) and *R. communis* (Huai *et al*. 2010, Maroyi 2007b), are known to be poisonous. In several tropical countries, the ripe blue-black berries of *L. camara* are eaten, but ingestion of the green berry has led to human fatalities (Ghisalberti 2000, Morton 1994, Ross 1999). This investigation provides additional information on toxicity and ethnomedicinal uses of plants in our home gardens, in some cases on plants on our tables as food and medicines.

Materials and Methods

In order to initiate a study into the ethnomedicine and toxicology of garden plants in Zimbabwe, an online literature search was conducted using BioMed Central (www.biomedcentral.com), Blackwell Synergy (www.blackwell-synergy.com), CAB Abstracts (www.cabi.org), Elsevier ScienceDirect (www.sciencedirect.com), Ingenta Connect (www.ingentaconnect.com), ISI Web of knowledge (www.isiknowledge.com), intute (www.intute.ac.uk) and JSTOR (www.jstor.org) for scientific articles published before November 2010. References were also identified by searching the extensive library collections of Wageningen University, Rhodes University and the National Herbarium, Harare. These libraries were consulted for books on poisonous plants and ethnomedicinal uses of garden and ornamental plants. Sources of information included: Watt & Breyer-Brandwijk (1932, 1962); Shone & Drum-

mond (1965); Verdcourt & Trump (1969); Hardin & Arena (1974); Alpin (1976); Biegel (1977, 1980); Gelfand *et al*. (1985); Van Wyk *et al*. 2002; Shava (2004) and Maroyi (2006). Some of the information included here was taken from documents that have accompanied specimens sent to the National Herbarium, Harare, SRGH (abbreviation according to Thiers 2009); for identification over the years. Copies of these documents are filed alphabetically under the name of the plants causing the poisoning and the file is referred to as the "National Herbarium Poisonous Substance File". Specimens of the reported plants were collected in the field. For each species, a voucher specimen is cited and all these specimens are housed at the National Herbarium, Harare (SRGH).

Results

The results of the survey are presented in Table 1. The plant species are arranged alphabetically according to family, genus and species. The correct identities and names of all the taxa listed were checked and where names have changed, the currently accepted name was applied. Principal common names are also included (En - English; Sh - Shona and Nd - Ndebele) and these have been included only where the names have been in common use in Zimbabwe. A total of 39 families, 80 genera and 106 plant species are listed. Of these, 11 species are indigenous to Zimbabwe (10.4%), while 95 species are exotic (89.6%), with 35 being naturalized while 60 are confined to home gardens as cultivated plants. The majority of these exotics are found around the homes, offices and in parks either as ornamentals, food plants or weeds of cultivation. Table 1 shows a widespread local knowledge and use of plants by the local people. Out of 106 recorded species, 87 (82%) have an English, Shona or Ndebele name, although some names are generic and applied to members of the same genus. This may be taken as an indication of local importance, otherwise, there is no need for giving the plants local names if they are not useful to the local community.

Discussion

Plant toxicity

While some of the plants in Table 1 are generally recognized as food plants, they may cause a digestive upset and discomfort if eaten, for example, *Colocasia esculenta* (L.) Schott (Van Wyk *et al*. 2002); insufficient boiling of hyacinth bean, *Lablab purpureus* (L.) Sweet (Verdcourt & Trump 1969), unripe and raw fruits of several garden plants. Some have chemicals called allergens, which may result in dermatitis in some individuals. Of the assessed poisonous plants, 78 species are found in 7 families, rep-

Table 1. Toxic properties of garden plants in Zimbabwe. An asterisk (*) indicates that the taxon is known, or believed, to be naturalized while (**) indicates that the taxon is indigenous in Zimbabwe. Language abbreviations: Shona (Sh) and Ndebele (Nd).

Plant species	Voucher specimen	Local name	Toxicity
ANACARDIACEAE			
Anacardium occidentale L.	Ngoni 51	Cashew nut	Oily juice from shell irritant to skin (Senchina 2005)
**Mangifera indica* L.	Noel 224	Mango	Toxic principle is allergen urushiol which cause dermatitis (Senchina 2005)
Schinus molle L.	Chipawarasha 400	California pepper tree	Plant causes skin irritation (Van Wyk *et al*. 2002)
Schinus terebinthifolius Raddi	Black 317	Brazilian pepper tree	Plant causes skin irritation (Van Wyk *et al*. 2002)
Smodingium argutum E. Mey ex Sond.	Biegel 4463		Allergen urushiol which cause dermatitis (Senchina 2005)
APIACEAE			
**Conium maculatum* L.	Biegel 4559	Hemlock	γ-coniceine causes paralysis of motor nerve endings (Van Wyk *et al*. 2002)
Daucus carota L.	Best 1819	Carrot	Falcarinol causes skin irritation (Van Wyk *et al*. 2002)
APOCYNACEAE			
Allamanda cathartica L.	Maroyi 272	Yellow allamanda	All parts of the plant cause dermatitis (Lewis & Elvin-Lewis 1977)

Plant species	Voucher specimen	Local name	Toxicity
**Calotropis procera* (Aiton) W.T. Aiton	Pope 1650	Giant milkwood	Milk latex produces skin inflammation (Sehgal & Kumar 2005)
**Catharanthus roseus* (L.) G. Don	Pope 1364	Periwinkle	Indole alkaloids (Van Wyk *et al*. 2002)
Cryptostegia grandiflora R.Br.	Maroyi 284	Cryptostegia	Cardiac glycosides interfere with heart operation (Lewis & Elvin-Lewis 1977)
***Holarrhena pubescens* Wall. ex G. Don	Maroyi 273	Fever pod; **Muhatsu** (Sh)	Alkaloid conessine (Maroyi 2008)
Nerium oleander L.	Maroyi 260	Ceylon rose / Oleander	Main cardiac glycoside is oleandrin (Van Wyk *et al*. 2002)
Ochrosia elliptica Labill.	Biegel 5551		Fruits are considered poisonous (Lewis & Elvin-Lewis 1977)
Plumeria rubra L.	Biegel 4468		Sap causes dermatitis (Van Wyk *et al*. 2002).
Thevetia peruviana (Pers.) K. Schum.	Mundy 898	Yellow oleander	Cardiac glycosides (Van Wyk *et al*. 2002)
AQUIFOLIACEAE			
Ilex aquifolium L.	Biegel 4469	Holly	The berry is reputedly harmful (Van Wyk *et al*. 2002)
ARACEAE			
Alocasia macrorrhizos (L.) G. Don	Maroyi 300	Giant Elephant's Ear	Oxalates (Van Wyk *et al*. 2002)
Alocasia odora (Roxb.) C.Koch	Biegel 3398	Elephant's ear	Causes skin irritation (Lewis & Elvin-Lewis 1977)
**Colocasia esculenta* (L.) Schott	Mavi 900	Taro; **Mudhumbe** (Sh)	Calcium oxalates cause skin irritation of the mouth and throat (Van Wyk *et al*. 2002)
Xanthosoma mafaffa Schott	Goldsmith & Müller 6663	**Yerera** (Sh)	Leaves contain irritant juice rendering them poisonous (Lewis & Elvin-Lewis 1977)
Zantedeschia aethiopica (L.) Spreng.	Biegel 5558	White arum	Oxalate crystals may cause distress if eaten (Van Wyk *et al*. 2002)
ARALIACEAE			
Hedera helix L.	Biegel 4387	Ivy	Contains large amounts of saponins and skin irritant activity is due to falcarinol (Van Wyk *et al*. 2002)
ASPARAGACEAE			
**Agave americana* L.	Maroyi 287	Agave; **Mukonje** (Sh); **Isikutsha** (Nd)	Sap causes severe skin irritation (Watt & Breyer-Brandwijk 1932)
ASTERACEAE			
Tanacetum vulgare L.	Hopkins s.n.	Tansy	Tinacetin (Van Wyk *et al*. 2002)
**Xanthium spinosum* L.	Brain 5630	Spiny cocklebur	Carboxyatractyloside (Van Wyk *et al*. 2002)
**Xanthium strumarium* L.	Ngoni 384	Giant cocklebur	Carboxyatractyloside (Van Wyk *et al*. 2002)

Plant species	Voucher specimen	Local name	Toxicity
BIGNONIACEAE			
Campsis radicans (L.) Seem. ex Bureau	Biegel 3698	Trumpet creeper	Contact with leaves or flowers cause dermatitis (Lewis & Elvin-Lewis 1977)
BUXACEAE			
Buxus sempervirens L.	Biegel 3479	Box	Buxine (Lewis & Elvin-Lewis 1977)
CANNABACEAE			
**Cannabis sativa* L.	Clark 479	Dagga; **Mbanje** (Sh)	An illegal "narcotic" plant, causes hallucinations, poor coordination, stupor and coma (Gray 1975)
CAPRIFOLIACEAE			
Sambucus canadensis L.	Simon 2363	Elderberry	Leaves, flowers and roots poisonous (Lewis & Elvin-Lewis 1977)
CARICACEAE			
Carica papaya L.	Biegel 3490	Paw paw; **Mupopo** (Sh)	Sap causes skin irritation in some individuals (Lewis & Elvin-Lewis 1977)
CARYOPHYLLACEAE			
Agrostemma githago L.	Nicholls s.n.	Corn – cockle	Seeds contain toxic githagenin (Hebestreit & Melzig 2003)
COLCHICACEAE			
***Gloriosa superba* L.	Maroyi 243	Flame lily; **Kajongwe** (Sh); **Amakukhulume** (Nd)	Extremely poisonous due to colchicine (Van Wyk *et al*. 2002)
CUCURBITACEAE			
**Cucumis hirsutus* Sond.	Rand 30	**Muchacha** (Sh)	Cucurbitacin and saponin (Van Wyk *et al*. 2002)
CUPPRESSACEAE			
Juniperus virginiana L.	Maroyi 280	Pencil cedar	Causes allergic rhinitis (Lewis & Elvin-Lewis 1977)
EUPHORBIACEAE			
Aleurites moluccanus (L.) Willd.	Hodgson 13/55	Candlenut tree	Raw seeds are poisonous (Harborne *et al*. 1997)
***Croton megalobotrys* Müll. Arg.	Maroyi 259	Fever-berry croton; **Mushape** (Sh)	Seed oil has poisonous diterpenes (Lewis & Elvin-Lewis 1977)
***Euphorbia ingens* E. Mey. ex Boiss.	Maroy 279	Candelabra tree; **Mukonde** (Sh); **Umhlonhlo** (Nd)	The plant has irritant and toxic latex, irritant compound is diterpenoids (Van Wyk *et al*. 2002)
**Euphorbia peplus* L.	Drummond 5524		Latex irritant with diterpenoids (Van Wyk *et al*. 2002)
Euphorbia pulcherrima Willd. ex Klotzsch	Maroyi 288		Latex irritant with diterpenoids (Van Wyk *et al*. 2002)
**Euphorbia tulearensis* (Rauh) Rauh	Phipps 2415	Rubber hedge; **Rusungwe** (Sh); **Ingotsha** (Nd)	Latex irritant with diterpenoids (Van Wyk *et al*. 2002)
Hura crepitans L.	Chase 8111	Sand box tree	Milky juice poisonous (Macmillan 1989)
**Jatropha curcas* L.	Maroyi 356	Physic nut; **Mupfuta** (Sh)	Curcin (Van Wyk *et al*. 2002)
Jatropha gossypifolia L.	Chase 5680		Curcin (Van Wyk *et al*. 2002)
Jatropha integerrima Jacq.	Maroyi 311		Curcin (Van Wyk *et al*. 2002)

Plant species	Voucher specimen	Local name	Toxicity
Jatropha multifida L.	Biegel 4763	Coral tree	Curcin (Van Wyk *et al*. 2002)
Jatropha podagrica Hook.	Martin 6	Bottle plant / White rhubard	Curcin (Lewis & Elvin-Lewis 1977)
Manihot esculenta Crantz	Biegel 2138	Cassava; **Mufaringa** (Sh)	Cyanogenic glycosides (Van Wyk *et al*. 2002)
**Ricinus communis* L.	Ward 39	Castor oil plant; **Mupfuta** (Sh); **Umhlafutho** (Nd)	Ricin and ricinine (Van Wyk *et al*. 2002)
FABACEAE			
Caesalpinia gilliesii (Wall. ex Hook.) D. Dietr.	Biegel 3665	Bird-of Paradise	Poisonous (Van Wyk *et al*. 2002)
***Erythrina abyssinica* Lam.	Maroyi 320	Lucky bean tree; **Mutiti** (Sh); **Umgqogqogqo** (Nd)	Seed poisonous if seed coat is broken (Shava 2004)
**Lablab purpureus* (L.) Sweet	Biegel 3975	Hyacinth bean; **Chizembera** (Sh)	Insufficient boiling of pods may cause poisoning (Verdcourt & Trump 1969)
Laburnum anagyroides Medik.	Biegel 3476		Cytosine (Knight & Walter 2001)
Lathyrus odoratus L.	James s.n.	Sweet pea	Seeds cause lathyrism which is due to beta - gamma–L–glutamyl, aminopropionitrile (Dasler 1954)
Leucaena leucocephala (Lam). De Wit	Smith 14	White popinac	Toxic amino acids (Van Wyk *et al*. 2002)
***Mundulea sericea* (Willd.) A. Chev.	Maroyi 310		Rotenoid (Van Wyk *et al*. 2002)
Phaseolus lunatus L.	Maroyi 324	Butterbean	Whole plant contain cyanogenic glycoside phaseolunatin (Lewis & Elvin-Lewis 1977)
Robinia pseudoacacia L.	Biegel 5805	False Acacia	Bark and seeds contain toxins called robin (Van Wyk *et al*. 2002)
GINKGOACEAE			
Ginkgo biloba L.	Biegel 4412	Maidenhair tree	Fruit pulp highly irritant to the skin (Van Wyk *et al*. 2002)
LOGANIACEAE			
***Strychnos cocculoides* Baker	Maroyi 261	Monkey orange; **Muzumhwi** (Sh)	Strychnine and other indole alkaloids (Philippe *et al*. 2004)
***Strychnos spinosa* Lam.	Maroyi 299	Spiny monkey orange; **Mutamba** (Sh)	Strychnine and other indole alkaloids (Philippe *et al*. 2004)
MELIACEAE			
**Melia azedarach* L.	Rodin 4422	Persian lilac; **Musiringa** (Sh); **Umsiringa** (Nd)	Fruits poisonous due to toxic limonoids (Van Wyk *et al*. 2002)
***Trichilia dregeana* Sond.	Maroyi 275	White mahogany; **Muchichiri** (Sh)	Bark poisonous (Maroyi 2007a)
***Trichilia emetica* Vahl.	Maroyi 259	Natal mahogany; **Muchichiri** (Sh)	Seeds poisonous (Mashungwa & Mmolotsi 2007)
MELIANTHACEAE			
Melianthus major L.	Biegel 5334	Honey bush	Root poisonous from glycosides (Van Wyk *et al*. 2002)
MORACEAE			

Plant species	Voucher specimen	Local name	Toxicity
Maclura pomifera (Raf.) C.K. Schneid.	Goldsmith 23/69	Osage orange	Milky juice causes dermatitis (Lewis & Elvin-Lewis 1977)
MYRTACEAE			
Melaleuca quinquenervia (Cav.) S.T. Blake	Müller 578	Cajeput tree	Cineole causes dermatitis (Lewis & Elvin-Lewis 1977)
NYCTAGINACEAE			
**Mirabilis jalapa* L.	Meara 93		Plant causes gastroenteris in children (Lewis & Elvin-Lewis 1977)
OLEACEAE			
**Ligustrum lucidum* W.T. Aiton	West 6166	Large - leaved privet	Fruits contain secoiridoid glycosides (Van Wyk *et al*. 2002)
OXALIDACEAE			
**Oxalis latifolia* Kunth	Kennan 243	Purple Garden Sorrel	Oxalic acid is fatal if excess amounts are consumed (Van Wyk *et al*. 2002)
PAPAVERACEAE			
**Argemone mexicana* L.	Thompson 644	Mexican poppy	Whole plant contains isoquinoline alkaloids (Van Wyk *et al*. 2002)
PHYTOLACCACEAE			
Phytolacca dioica L.	Whellan 2048	Belombra	Triterpenoids (Van Wyk *et al*. 2002)
**Phytolacca octandra* L.	Simon 768	Belombra	Poisonous (Lewis & Elvin-Lewis 1977)
PLUMBAGINACEAE			
Plumbago auriculata Lam.	Brain 5406		Plumbagin causes dermatitis (de Ruijter 2006)
POLYGALACEAE			
***Securidaca longipedunculata* Fres.	Maroyi 262	Violet tree; **Mufufu** (Sh); **Umfumfu** (Nd)	Saponins (Lewis & Elvin-Lewis 1977)
POLYGONACEAE			
**Fagopyrum esculentum* Moench.	Norlindh & Wimarck 4045	Buck wheat	Whole plant causes photosensitization (Connor 1977)
**Rumex acetosella* L.	Eyles 8477		Whole plant has oxalic acid. Toxic if eaten in large quantities (Van Wyk *et al*. 2002)
PRIMULACEAE			
**Anagallis arvensis* L.	Grosvenor 24		Triterpenoids poisonous if ingested and cause skin allergies (Van Wyk *et al*. 2002)
**Primula malacoides* Franch.	Biegel 2019	Fairy primula	Plant causes dermatitis (Van Wyk *et al*. 2002)
PROTEACEAE			
Grevillea banksii R.Br.	Müller 142		Flowers, fruits and seeds contain cyanogenic glycosides (Sosef & van der Maesen 1997)
Grevillea robusta A. Cunn. ex R.Br.	Biegel 5164	Silky oak	Skin irritant is grevillol (Van Wyk *et al*. 2002)
ROSACEAE			
Malus pumila Mill.	Maroyi 276	Apple	Seeds contain cyanogenic glycosides (Lewis & Elvin-Lewis 1977)

Plant species	Voucher specimen	Local name	Toxicity
Prunus armeniaca L.	Biegel 4677	Apricot	Cyanogenic glycosides (Van Wyk *et al*. 2002)
Prunus cerasus L.	Chase 6924	Sour cherry	Cyanogenic glycosides (Lewis & Elvin-Lewis 1977)
Prunus persica (L.) Batsch	Rushworth 1051	Peach; **Mupichisi** (Sh)	Cyanogenic glycosides (Van Wyk *et al*. 2002)
Prunus serotina Ehrh.	Davies 2257	Wild black cherry	Cyanogenic glycosides (Van Wyk *et al*. 2002)
RUTACEAE			
Citrus limon (L.) Osbeck	William 225	Lemon; **Lemoni** (Sh)	Thorn and peels cause skin irritation in some individuals (Van Wyk *et al*. 2002)
SOLANACEAE			
Capsicum annuum L.		Chillies	May cause severe pain and distress (Van Wyk *et al*. 2002)
**Cestrum aurantiacum* Lindl.	Maroyi	Yellow cestrum	Diterpenols (Van Wyk *et al*. 2002)
**Datura ferox* L.	Drummond 5994	Datura	Tropane alkaloids (Van Wyk *et al*. 2002)
**Datura inoxia* Mill.	Evans 1		Tropane alkaloids (Van Wyk *et al*. 2002)
Datura metel L.	Phipps 1275	Horn-of–plenty	Tropane alkaloids (Van Wyk *et al*. 2002)
**Datura stramonium* L.	Martinean 824	Jimson weed / Thorn apple; **Chowa** (Sh)	Tropane alkaloids (Van Wyk *et al*. 2002)
**Lycopersicon esculentum* Mill.	Jarman 200	Tomato	α-solanine (Van Wyk *et al*. 2002)
**Nicotiana glauca* Graham	Davies D193	Tree tobacco	Poisonous due to nicotine (Connor 1977)
**Nicotiana tabacum* L.	Maroyi 274	Tobacco; **Fodya** (Sh); **Igwayi** (Nd)	Nicotine (Connor 1977)
**Physalis peruviana* L.	Grosvenor 683	Cape gooseberry; **Mubheri** (Sh)	Main alkaloid is hyoscyamine (Lewis & Elvin-Lewis 1977)
Solanum aculeatissimum Jacq.	Biegel 3486		Steroidal alkaloids (Connor 1977)
Solanum linnaeanum Hepper & P.-M.L. Jaeger	Eyles 2151		Steroidal alkaloids (Van Wyk *et al*. 2002)
Solanum mauritianum Scop.	Chase 5806	Bugweed	Steroidal alkaloids (Lewis & Elvin-Lewis 1977)
Solanum melongena L.	Mahlunge 1	Egg plant	Steroidal alkaloids (Connor 1977)
Solanum pseudocapsicum L.	Maroyi 64	Jerusalem cherry	Steroidal alkaloids (Van Wyk *et al*. 2002)
Solanum tuberosum L.	Maroyi 270	Potato	α-solanine (Van Wyk *et al*. 2002)
VERBENACEAE			
**Duranta repens* L.	Armitage 185/55		Whole plant poisonous (Van Wyk *et al*. 2002)
**Lantana camara* L.	Gonde 28/73	Cherry pie; **Mbarapati** (Sh); **Besikhiwa** (Nd)	Toxic principle is triterpenoid (Van Wyk *et al*. 2002)

resenting 59.4% of the entire garden plants in Zimbabwe. The remaining 40.6% belong to 32 families, with the majority represented by one species each. Seven families with particularly high percentage of toxic plant species are the following: Solanaceae (15.1%); Euphorbiaceae (13.2%); Apocynaceae (8.5%); Fabaceae (8.5%); Rosaceae (4.5%); Anacardiaceae (4.5%) and Araceae (4.5%). Apart from being a reflection of the worldwide high number of species found in these families, this is also a reflection of the toxic principles in the families. The majority of poisonous plants of Solanaceae family are known to possess a diversity of alkaloids that range from mildly irritating to fatal. One of the most important groups of these compounds is tropane alkaloids, whose toxicity and lethality is well documented (Harborne *et al*. 1997, Van Wyk *et al*. 2002, Verdcourt & Trump 1969). While several members of the Euphorbiaceae family are characterized by a milk latex which contains toxic principles such as diterpenoids, triterpenoids and various alkaloids and flavonoids (Alpin 1976, Hardin & Arena 1974, Lai *et al*. 2004, Van Wyk *et al*. 2002, Verdcourt & Trump 1969, Watt & Breyer-Brandwijk 1962). The latex is generally poisonous, it damages the eyes and mucous membranes. Members of the Apocynaceae family are the traditional sources of African arrow poisons (Bisset 1991, Watt & Breyer-Brandwijk 1962). Most members of this family contain cardiac gycosides which have the effect of slowing down the heart rate (Lewis & Elvin-Lewis 1977, Van Wyk *et al*. 2002).

Ethnomedicinal uses of poisonous plants

Of 106 plants with proven or alleged toxicity potential, 22% have been used in ethnomedicine in Zimbabwe (Table 2). These poisonous plants are used for a number of diseases, ranging from simple headache or stomachache to complicated conditions like epilepsy and convulsions. This high use of potentially harmful plants is consistent with observations made by Watt and Breyer-Brandwijk (1932) that toxic constituents of some poisonous plants are invaluable medicinal drugs when administered at a low dosage. Different parts of medicinal plants are used as medicines, including roots, bark, stem, leaves and plant sap or latex. Methods of preparation of medicines varied for different plants and nature of disease. These include chewing, crushing of parts in order to squeeze out plant sap or oil to inhaling plant smoke. The medicines are administered as decoctions or infusions and also applied externally, in dressing fresh wounds, snake bites and skin diseases (Table 2). The continued use of garden plants in ethnomedicine is due to the fact that they are within easy reach of the community and as such they remain the best alternative to cope with primary health care needs of the community. This widespread use of the potentially harmful traditional medicines in Zimbabwe could also be attributed to cultural acceptability, efficacy and affordability of traditional medicines when compared with modern drugs.

Available documentation on contemporary ethnomedicinal uses of poisonous plants varies from region to region. For India, and to some extent South Africa (e.g., Satri 1962, Sharma & Kaul 1959, Van Wyk *et al*. 2002), ethnopharmacological data is well documented, whereas information is scanty and often vague for the rest of tropical countries. The applications of poisonous plants in ethnomedicine will be a strong base for carrying out pharmacological and phytochemical research against the stated ailments. Plants reported for curing more than two ailments need to be screened against the ailments they are used for. Therefore, it is necessary to asses these plants for phytochemical analyses and ethnopharmacological

Table 2. Reported ethnomedicinal uses of poisonous plants in Zimbabwe. Cited from Gelfand *et al*. (1985) unless otherwise indicated.

Scientific name	Mode of administration	Medicinal uses
Agave americana L.	Fiber used as a talisman	Caput medusae
Carica papaya L.	Root decoction taken by mouth	Depressed fontanelle
Citrus limon (L.) Osbeck	Root infusion taken by mouth	Aphrodisiac
Croton megalobotrys Müll. Arg.	Bark or root infusion taken by mouth	Swollen stomach (dropsy), purgative
	Bark powder taken by mouth in porridge	Abortifacient, infertility in women
Cucumis hirsutus Sond.	Decoction or infusion of fruit / root taken by mouth	Abdominal pains, abortifacient, constipation, convulsions
Datura stramonium L.	Infusion of leaves taken by mouth	Abdominal pains
	Leaf smoke inhaled	Asthma (Mavi 1996)
Erythrina abyssinica Lam.	Bark / root infusion taken by mouth	Abdominal pains, Backache, cough, diarrhea, venereal diseases, wasting in infants (Kambizi & Afoyolan 2001)
	Mouth washed with root infusion	Wounds in mouth
	Seed ointment applied on face	Lucky charm

Scientific name	Mode of administration	Medicinal uses
Euphorbia ingens E. Mey. ex Boiss.	Drop of latex taken by mouth in porridge	Bronchitis, emetic, purgative
	Latex smoke inhaled	Asthma
Euphorbia tulearensis (Rauh) Rauh	Root infusion taken by mouth	Gonorrhoea
Gloriosa superba L.	Juice of root tuber applied on painful tooth	Toothache
Holarrhena pubescens Wall. ex G. Don	Root infusion taken by mouth	Abdominal pains, abortifacient, aphrodisiac, asthma, constipation, venereal diseases, infertility in men and women (Mavi 1996)
Lantana camara L.	Head washed with decoction of whole plant	Headache
Lycopersicon esculentum Mill.	Leaf infusion dropped into the ear	Earache
	Root infusion taken by mouth	Blood in urine (Haematuria)
Melia azedarach L.	Leaf infusion / decoction taken by mouth	Abdominal pains, bile emesis, gonorrhoea, depressed fontanelle
Mundulea sericea (Willd.) A. Chev.	Root infusion taken by mouth	Infertility
Nerium oleander L.	Leaf infusion taken by mouth	Venereal diseases
Nicotiana tabacum L.	Leaf / root infusion taken by mouth	Asthma, respiratory problems
	Rubbing leaf / root	Warts, wounds
Ricinus communis L.	Tooth washed with root decoction	Toothache
	Leaf / root infusion taken by mouth	Bilharziasis, heart pains, pneumonia
	Seed oil taken by mouth	Abdominal pains
	Seed pulverized	Constipation, diarrhea
	Seed ointment applied to the affected part	Convulsions, depressed fontalle, external parasites, measles
	Leaves burnt, smoke inhaled	Hiccoughs
	Leaf sap dropped into eyes	Sore eyes
	Seed oil dropped into ear	Earache
Securidaca longipedunculata Fres.	Root decoction / infusion taken by mouth	Abdominal pains, aphrodisiac, bile emesis, constipation, convulsion, diarrhea, epilepsy, infertility in women, pneumonia, tapeworm and hookworm, tuberculosis, venereal diseases
	Root applied over bitten part	Snakebites
	Root ointment rubbed on back, infusion taken by mouth	Backache
	Root powder sniffed	Headache
	Root infusion dropped into eyes	Cataracts
Strychnos cocculoides Baker, *Strychnos spinosa* Lam.	Root decoction / infusion taken by mouth / unripe fruit	Abdominal pains, aphrodisiac, diarrhea, emetic, gonorrhea, sore throat, infertility
Trichilia dregeana Sond., *Trichilia emetica* Vahl	Bark infusion taken by mouth / enema	Abortifacient, purgative (Mavi 1996)

screenings so as to validate the efficacy of the garden plants as herbal medicines. Further study may contribute to development of important pharmaceutical products for future use. Ethnobotanical surveys have been found to be one of the reliable approaches to drug discovery (Ajibesen *et al*. 2008), and several active compounds have been discovered from plants on the basis of enthnomedicinal information and used directly as patented drugs. Typical examples include: maprouneacin isolated from *Maprounea africana* Müll. Arg., used as an antidiabetic agent and artemisinin isolated from *Artemisia annua* L., used as a potent antimalarial compound (Ajibesen *et al*. 2008).

Results from this investigation are consistent with other published studies that have shown introduced plants to be vital medicines (e.g., Bennet & Prance 2000, Heinrich 1998, Prance & Plana 1998). The role of cultivated and exotic plants has been discussed by many authors who have interpreted their diversity of uses in some cultures as a sign of acculturation (Albuquerque *et al*. 2007). While other workers have pointed out that garden plants, particularly weeds and invasive plants have taken on important roles in traditional pharmacopoeia throughout the world (Stepp 2004, Stepp & Moerman 2001). Some of the plants discussed in this study have been used for centuries as traditional medicines and the knowledge accumulated in their utilization over generations will assist in identification and isolation of active principles in medicinal preparations.

Conclusions

Some of the taxa reported in this study are noted for healing properties in their places of origin and in many countries where they occur. Examples include: *R. communis*, *Carica papaya* L., *Citrus limon* (L.) Osbeck and *L. camara*. These species frequently appear in medicinal plant lists from Africa, Europe, Australia, America and Asia. Therefore, there is need for further research into the scientific validation of the plants listed in Table 1, aimed at developing effective drugs that are non-toxic and affordable to the majority of people living in developing countries. This study has shown that some of the important poisonous plants used in ethnomedicine are weeds, belonging to plant families characterized by certain types and classes of toxic chemical compounds. Examples being Solanaceae, Euphorbiaceae and Apocynaceae. No study of ethnomedicine can be done without some basic knowledge of botanical identification of the species, as there is a relationship between taxonomy and chemical profile. People involved in ethnomedical practices have learned how to deal with poisonous latex, seeds and tubers in taxa like *Euphorbia* spp., *R. communis* and *G. superba.*

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