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Olughenga Morebise
Department of Biochemistry,
Faculty of Basic Medical
Sciences, All Saints University
School of Medicine, Roseau,
Commonwealth of Dominica

Medicinal plants of Dominica—Uses, chemical constituents, bioactivities and prospects

Olughenga Morebise

Abstract

Dominica, the nature isle of the Caribbean, is a country whose citizens are noted for growing old gracefully and living long healthily. The country has been reported to have the highest percentage of centenarians per capita in the world. This is attributed to the wide consumption of natural products which include herbal medicines and cultivated vegetables and fruits. A survey of the medicinal plants popularly used in Dominica was conducted between the months of June and August, 2015. Information on local use of the plants was collected from locals who were well versed in them. Sixteen plants, which appeared to be the most commonly used, are presented in this report. Chemical composition and bioactivity reports on the plants are highlighted and they justify/corroborate the medicinal uses of most of these plants. Bush medicine (or bush tea) is a popular term among people of all walks of life in Dominica and it refers to the decoction, concoction or infusion made from the medicinal plants. Future prospects and recommendations in the areas of herbal formulations, drug discovery and medicinal plant research in Dominica are highlighted.

Keywords: Dominica, medicinal plants, bush tea, bioactivity, herbal medicine

1. Introduction

The Commonwealth of Dominica (also known as Dominica) is a country that belongs to the Lesser Antilles of the Caribbean. It is popularly known as the Nature Isle. Dominica is located between the French islands of Guadeloupe to the North and Martinique to the South ^[1]. Although English is the official language, and is spoken and understood by everyone, a majority of the people uses French Creole in everyday speech ^[1].

Dominicans are noted for growing old gracefully and living longer than people from most other parts of the world. It has been reported that Dominica has the highest percentage of centenarians per capita in the whole world ^[2, 3]. Factors attributed to these include good diets, herbal medicines and good general lifestyle ^[2-5].

Dominica is blessed with a lot of plants, many of which are used for medicinal purposes [1-8]. The use of the medicinal plants in Dominica has its roots in the cultures of the indigenous Kalinago people and those of the African slaves brought to the island ^[5].

Bush tea (or bush medicine) is a popular term among people from all walks of life in Dominica, and it refers to the infusion, decoction or concoction made from the medicinal plants which are usually consumed to treat various ailments ^[4, 6, 8].

While the medicinal plants reported here may have same or different uses in different parts of the world, this report centers on their uses in Dominica, although in a few cases, uses in other parts of the world are also mentioned.

2. Materials and method

Information about the medicinal use of plants in Dominica was collected by interviewing people who normally use the plants, between the months of June and August, 2015. These included market women, traditional drug sellers, students, landlords and farmers. Among them were three persons that were experts in the plants' uses. They are:

1. Mr. Mathew Ferreira of St. Joseph Parish, Dominica
2. Mrs. Jacqueline Theodore of Rockaway, Canefield, Dominica
3. Mr. Roy Registe of Rockaway, Canefield, Dominica.

Mrs. Theodore has a lot of the medicinal herbs and shrubs grown in her compound, and this is characteristic of most Dominican families.

Mr. Ferreira was interviewed separately while Mrs. Theodore and Mr. Registe were interviewed together. The local and scientific names of the plants were cross-checked with the

Correspondence
Olughenga Morebise
Department of Biochemistry,
Faculty of Basic Medical
Sciences, All Saints University
School of Medicine, Roseau,
Commonwealth of Dominica

available literature on Dominican plants' names ^[1-8] while the samples collected from some of the interviewees were cross-checked with online pictures of the plants in the presence of the interviewees (there is no herbarium in Dominica at the moment).

Chemical composition and bioactivity of the plants were sourced from available literature and these were matched with the local uses of the plants.

3. Results and Discussion

Sixteen plants are reported here because they were most frequently mentioned by those interviewed. Their local uses are presented. Their chemical constituents and bioactivity are also presented.

The common names of the plant in Dominica are given together with their botanical names.

3.1 Jumbie Tobacco (*Pluchea carolinensis*).

Pluchea carolinensis (Fig 1) is a flowering plant that belongs to the family Asteraceae. The common names for the plant in Dominica include Jumbie tobacco, Tabac Zombie, Bitter tobacco and Indian tobacco ^[9].



Fig 1: The *Pluchea carolinensis* Plant

Medicinal Uses of *P. carolinensis*: In Dominica, the leaves of *P. carolinensis* are boiled and taken as tea. Sugar or salt could be added to taste. The tea is taken as treatment for cough and cold. *P. carolinensis* leaves can also be boiled together with ginger rhizomes and sage (*Salvia officinalis*) leaves to make tea to which sugar is added. The tea is taken to treat troublesome cough, bronchitis, tuberculosis, flu and fevers [Information from interviewed locals, 2015]

In different parts of the world, the plant is used to treat stomach ailments, flatulence, headaches, sore throats, catarrh, high blood pressure, rash and toothaches ^[9]. The plant is also believed to possess anti-inflammatory, anticoagulant and antiseptic property ^[9].

Chemical Constituents of *P. carolinensis*: Pino *et al.* ^[10] determined the chemical composition of *P. carolinensis* by GC/MS. They reported that 107 compounds of the oil were identified with selin-11-en-4 α -ol (43.4%) being the major constituent. They also reported that the flower oil was rich in several aldehydes and esters.

Perera *et al.* ^[11] isolated and characterized flavonols isorhamnetin-3-O-sulfate and 3',4',5,6,7-pentahydroxy-3-methoxyflavone from the n-Butanol crude extract of the leaves of *Pluchea carolinensis*.

Bioactivity Studies on *P. carolinensis*: Garcia *et al.* ^[12] investigated the antileishmanial effects of the leaves of *Pluchea carolinensis*, *P. odorata* and *P. rosea*. Ethanolic and n-Hexane extracts from each of the plant material were used for the study. They concluded that the ethanolic extract from *P. carolinensis* was the most promising of all the extracts used for the experiment. While more research is needed to corroborate the phytomedical uses of the plant, other plants that are rich in flavonoids and essential oils have demonstrated strong anti-inflammatory property and are used to treat various disorders (including respiratory disorders) [13, 14]. Thus the oils and flavonoids from *P. carolinensis* could be responsible for the healing properties of the plant.

3.2 Rosy Periwinkle (*Catharanthus roseus*).

This plant is also known as Madagascar periwinkle because the plant is believed to be native to Madagascar. *Catharanthus roseus* is now cultivated and used for medicinal purposes in many different countries, including Dominica, England, Pakistan and Vietnam ^[15].



Fig 2: The *Catharanthus roseus* plant

Medicinal Uses of *C. roseus*: The Kalinagos of Dominica use the leaves of rosy periwinkle (Fig 2) as tea to treat diabetes [5]. In Dominica and other Caribbean countries, the plant is also used to treat asthma, high blood pressure, eye irritation/infections, diaphoresis and menstrual pains ^[16]. In many different parts of the world, rosy periwinkle is used to treat a vast array of ailments, including diabetes, dengue fever, dysentery, insect bites/ stings, indigestion, dysmenorrhea, sore throat, eczema, psoriasis, rashes, Hodgkin's disease and cancers ^[16-19].

Chemical constituents of *C. roseus*: The rosy periwinkle is very rich in alkaloids. Among the alkaloids derived from this plant are vincristine, vinblastine, vincalokoblastine, leurocristine, vincalurocristine, vincarodine, vincoline, leurocolombine, vramidine, vincathicine, vincubine, isositsirikine, vincolidine, lochrovicine, catharanthine, vindoline, leurosine, lochnerine, tetrahydroalstonine, vindolinine, ajmalicine (raubasine), serpentine, reserpine, coronaridine, 11-methoxy tabersonine, tetrahydroalstonine, and vindorosidine ^[16, 20-21].

Vincristine and vinblastine are popular drugs derived from the rosy periwinkle. Vincristine is used to treat leukemia while vinblastine is used to treat Hodgkin's disease ^[22, 23]. 3',4'-anhydrovinblastine, serpentine, and ajmalicine are also marketed as drugs ^[16, 24].

Beside alkaloids, *Catharanthus roseus* also produces other compounds, including flavonoids, iridoids, anthocyanins and steroids [16, 25].

Bioactivity Studies on *C. roseus*: The rosy periwinkle plant has demonstrated potent bioactivity, including anticancer, anti-inflammatory, antimicrobial and anti-diabetic activity [16, 21, 26], thus justifying the ethnomedical uses of the plant.

3.3 Bois Bande (*Richeria grandis*).

Richeria grandis (Figs 3 & 4) is locally known as Bois bande (or Bwa bande) in Dominica. It is a tree that belongs to the family Phyllanthaceae and is reported to have aphrodisiac properties. The name Bois Bande means hard wood [27-29].

Medicinal Uses of *R. grandis*: The plant is used to stimulate sexual appetite and also to treat erectile dysfunction. Bark of the plant is soaked in rum and drunk. It is reported to have immediate effect. The locals believe that too much of it could be toxic, causing prolonged erection with loss of energy [Information from interviewed locals, 2015].



Fig 3: The *Richeria grandis* Plant



Fig 4: *Richeria grandis* Tree showing Bark

Chemical Constituents and Bioactivity Studies on *R. grandis*: Reports on chemical constituents and bioactivity studies for this plant are not readily available. There is the need for scientific investigations in the line of the medicinal use of the plant.

3.4 Mangosteen (*Garcinia mangostana*)

Garcinia mangostana (Fig 5) belongs to the family Clusiaceae. It is an evergreen tree whose seeds resemble

almonds in shape and size [30].

Medicinal Uses of *G. mangostana*: The ripe fruit is eaten to prevent cancers. The fruit rinds (skins) are boiled in water to make tea which is consumed to treat cancers, high blood pressure and high blood glucose [Information from interviewed locals, 2015].



Fig 5: Figure shows the leaves, fruits and seeds of *G. mangostana*

Chemical constituents of *G. mangostana*: Many chemical compounds have been isolated from *G. mangostana*. Examples are anthocyanin glycosides and several xanthone derivatives, such as α -mangostin, gartanin, β -mangostin and γ -mangostin [31].

Bioactivity Reports on *G. mangostana*: Xanthenes obtained from the mangosteen fruits have been shown to demonstrate anti-proliferative, anti-inflammatory, anti-carcinogenic and pro-apoptotic properties through both *in vitro* and *in vivo* studies, as documented by Gutierrez-Orozco and Failla [32]. These findings thus corroborate/justify the medicinal uses of the plant.

3.5 Roselle Sorrel (*Hibiscus sabdariffa*)

Hibiscus sabdariffa (Figure 6) belongs to the family Malvaceae and is native to West Africa [33]. The dried deep-coloured calyces of this plant are boiled in water and the extract is mixed with other flavours and drunk. The drink is known as sorrel or hibiscus tea in Dominica and some other Caribbean islands and could be served either hot or cold. The plant and the drink derived from it are also popular in many other parts of the world [34, 35].



Fig 6: The *Hibiscus sabdariffa* Plant.

Medicinal Uses of *Hibiscus sabdariffa*: Roselle plant is consumed in Dominica to lower blood pressure, stimulate diuresis and flow of bile, treat indigestion, and to fight off cold and infections [Information from interviewed locals, 2015].

Chemical Constituents and Bioactivity Reports on *H. sabdariffa*: Organic acids, anthocyanins, polysaccharides and flavonoids were reported to be present in *H. sabdariffa* [36, 37]. The organic acids include ascorbic acid (vitamin C), tartaric acid, malic acid, citric acid, hydroxycitric acid and hibiscus acid.

Da-Costa-Rocha *et al.* [37] gave a comprehensive review of the chemical composition and biological activity of *H. sabdariffa*, which clearly justified/corroborated the medicinal uses of the plant.

3.6 Hibiscus Flower (*Hibiscus rosa-sinensis*)

Hibiscus rosa-sinensis (Fig 7) belongs to the family Malvaceae. It is a bushy evergreen shrub or small tree with red flowers [38].

Medicinal Uses of *H. rosa-sinensis*: In Dominica, the flowers of the plant are boiled in water and used as tea to treat cough. Leaves and flowers are also applied to hair as refresher [Information from interviewed locals, 2015].



Fig 7: The *Hibiscus rosa-sinensis* Plant

Chemical Constituents and Bioactivity Reports on *H. rosa-sinensis*: *H. rosa-sinensis* is reported to contain vitamins (ascorbic acid, thiamine, niacin, riboflavin), fructose, glucose, quercetin, oxalic acid, fatty acids, fatty alcohols, phytosterols, tannins, saponins, flavonoids, alkaloids, gums, citric acid, malvalic acid, sterculic acid, apigenidin, pelargonidin, among other substances [39, 40]. The plant has been shown to possess hair growth potential and to help alleviate respiratory disorders [39], thereby justifying its local uses.

For more information on the chemical constituents and bioactivity reports on this plant, check Pekamwar *et al.* [39] and Kumar and Singh [40].

3.7 Semein Cotou (*Dysphania ambrosioides* or *Chenopodium ambrosioides*)

Dysphania ambrosioides (or *Chenopodium ambrosioides*, Fig 8) is known as Semein Cotou or worm bush in Dominica. It belongs to the family Amaranthaceae [41].

Medicinal Uses of *C. ambrosioides*: In Dominica, the plant material (stems and leaves) is boiled in water to make tea to which sugar could be added. It is consumed for the treatment

of stomach upset and worm infestation. It is popular for its capability to expel worms from the body. It is also believed that consumption of this plant revitalizes the brain and helps the memory [Information from interviewed locals, 2015].



Fig 8: The *Chenopodium ambrosioides* Plant

Chemical Constituents of *C. ambrosioides*: *C. ambrosioides* is rich in essential oil. Components of the essential oil include α -Terpinene, (Z)-Ascaridole, 2-Carene, *p*-Cymene and Isoascaridole [42-44]. Barros *et al.* [45] also reported the presence of sugars, organic acids, phenolic compounds, fatty acids and tocopherols in the plant.

Bioactivity Reports on *C. ambrosioides*: Chu *et al.* [43] reported that the crude essential oil of the plant exhibited strong toxicity against the maize weevil, *Sitophilus zeamais*; they concluded that the essential oil may be explored as a natural potential fumigant. Bai *et al.* [44] reported the nematocidal activity of the essential oil from *C. ambrosioides* against the root-knot nematode, *Meloidogyne incognita*. This corroborates the worm expelling use of the plant. Barros *et al.* [45] reported the antioxidant and antitumour properties of the plant. They claimed that the plant extract demonstrated anti-tumour activity against colon, cervical and hepatocellular carcinoma cell lines.

3.8 Noni (*Morinda citrifolia*)

Morinda citrifolia (Fig 9) is a small evergreen tree that grows in coastal areas in many parts of the world. It belongs to the family Rubiaceae. Its trunk is straight; it has large bright green leaves and yellow fruits (when ripe) [46].



Fig 9: *Morinda citrifolia*

Medicinal Uses of *M. citrifolia*: In Dominica, the ripe fruits of the plant are put in a big jar and left to ferment for several

days. Clean cloth is used to strain the fermented fruits in order to get the liquid portion. The liquid is taken either alone or with honey. It is consumed to treat cancers, to cut body fat and shed weight, and also for rejuvenation. Usually, two tablespoonsful of the drink are consumed per day by adults; it is very popular in Dominica [Information from interviewed locals, 2015]. Similar uses of the plant in other parts of the world have also been reported [46-49].

Chemical Constituents of *M. citrifolia*: Chemical compounds that have been reported to be present in noni include octanoic acid, caproic acid, caprylic acid, ursolic acid, amino acids, ascorbic acid, linoleic acid, alizarin, acubin, L-asperuloside, alkaloids, β -sitosterol, carotene, vitamin A, flavone glycosides, anthraquinones, rutin, and proxeronine [46-49].

Bioactivity Reports on *M. citrifolia*: Products obtained from noni have been shown to exhibit antibacterial, antiviral, antifungal, antitumour, anthelmintic, analgesic, anti-inflammatory, hypotensive and immune enhancing properties [46, 50-51]. These reports justify the medicinal uses of the plant.

3.9 Clove (*Syzygium aromaticum*)

The aromatic flower buds (Fig 10) of the clove plant, *Syzygium aromaticum* are usually referred to as cloves in Dominica. *Syzygium aromaticum* (Fig 11) belongs to the family Myrtaceae [52].



Fig 10: Dried Flower Buds of Cloves

Medicinal Uses of *S. aromaticum*: In Dominica, cloves and young guava leaves are boiled together in water to make tea. The tea is drunk to treat stomach upset, diarrhea and vomiting. According to locals, the treatment has an immediate effect as the ailment would stop promptly [Information from interviewed locals, 2015].



Fig 11: The *Syzygium aromaticum* Plant

Chemical Constituents of *S. aromaticum*: The chemical constituents of the essential oil of *S. aromaticum* buds include thymol, eugenol, carvacrol and cinnamaldehyde [53].

Bioactivity Reports on *S. aromaticum*: Caieb *et al.* [53] reported that the clove bud essential oil exhibited strong antimicrobial activity against several microorganisms, including bacteria, fungi and viruses. The essential oil also exhibited antioxidant, anti-inflammatory, cytotoxic, insect repellent and anaesthetic properties [53].

3.10 Lemon (*Citrus limon*).

Citrus limon is a citrus tree and its fruits (Fig 12) (and juice made from the fruits) are quite common in many parts of the world [54-57].



Fig 12: Fruits of *C. limon*

Medicinal Uses of *C. limon*: Lemon juice is a popular refreshing drink in Dominica and other parts of the world. It is also used for medicinal purposes. Medicinal uses of lemon juice in Dominica [Information from interviewed locals, 2015] include the following:

- i. Lemon juice is added to hot water and drunk. This is taken to lower blood glucose and body fat. It is also believed to calm the pulse.
- ii. Lemon juice plus coconut water: According to locals, lemon juice is mixed with coconut water and consumed to lower blood glucose and blood pressure. They believed that this treatment works fast and warned that it must not be taken every day so that hypotension would not result.

Chemical Constituents of and Bioactivity Reports on *C. limon*: Lemon is very rich in important chemicals including vitamin C, phenolic compounds, essential oil, pectin and minerals and the lemon juice has been shown to exhibit antioxidant property [55-57]. Kato *et al.* [58] has reported the blood pressure lowering effect of lemon juice. The medicinal effects of lemon juice could be due to the antioxidant property of its rich content of vitamin C and the phenolic compounds [55, 59].

3.11 Pomme-Coolie (*Momordica charantia*).

Momordica charantia (Fig 13) is a climbing vine and belongs to the Family Cucurbitaceae [60]. The plant is known as Pomme-coolie in Dominica.



Fig 13: *Momordica charantia*

Medicinal Uses of *M. charantia*: In Dominica, the leaves of *M. charantia* are crushed in water and applied to the skin for the treatment of all skin disorders, including rashes. The water strained from the crushed leaves can also be used to bathe to treat skin diseases and fevers. Children are also bathed with the strained water to induce sleep. The treatment also helps to remove diaper rash. The strained water is consumed (by adults and children) to treat diabetes in adults and all inflammatory disorders, including arthritis. The drink is also a coolant, and so is the bathe taken with it [Information from interviewed locals, 2015].

Chemical constituents of *M. charantia*: Zhang *et al.* [61] reported the presence of seventeen cucurbitane-type triterpenoids in the leaves of *M. charantia* leaves. Gupta *et al.* [62] also reported the presence of triterpenes, proteins, steroids, alkaloids, phenolic compounds and organic acids in the leaves of the plant.

Bioactivity Reports on *M. charantia*: The leaves of *M. charantia* have been reported to demonstrate anticancer, cytotoxic, antidiabetic, antimicrobial, anthelmintic, antimalarial, anti-ulcerative and immunomodulatory properties [61, 62]. These bioactivity reports justify/corroborate the medicinal uses of the plant.

3.12 Gwen Anba Fey (*Phyllanthus tenellus*).

Phyllanthus tenellus (Fig 14) is an herbaceous plant popularly known as Gwen Anba Fey in Dominica. It belongs to the family Phyllanthaceae [7, 63].



Fig 14: *Phyllanthus tenellus*.

Medicinal Uses of *P. tenellus*: The plant (stem and leaves) is boiled in water to make tea. Sugar can be added to taste. It is consumed for the treatment of flu, cold, cough, high blood pressure and high blood glucose [Information from interviewed locals, 2015].

Chemical constituents and bioactivity reports on *P. tenellus*:

There is not much report on the chemical composition and biological studies to corroborate the medicinal use of this plant although it was reported that the plant contains carotenoids and phenolic compounds [64]. In an acute toxicity test conducted by Silva *et al.* [65], aqueous extracts of *P. tenellus* induced agitation, spasms, increased respiratory frequency and signs of depression in experimental mice. The medicinal properties of the plant might be due to its contents of carotenoids and phenolic compounds, as these have been shown to exhibit anti-oxidant and other healing properties [13, 55, 59].

3.13 Man-Better-Man (*Achyranthes aspera*)

Achyranthes aspera (Fig 15) is an annual herb that belongs to the family Amaranthaceae [66]. It is also known as the Devil's horsewhip.

Medicinal Uses of *A. aspera*: Leaves of the plant are boiled in water and drunk as tea for seven days by women. It is believed that this will melt ovarian cysts and abnormal growths on the womb (tumours) and also helps women to conceive. Women also take the tea to alleviate menstrual pains. Men and women also take the tea to clear the bladder [Information from interviewed locals, 2015].



Fig 15: *Achyranthes aspera*

Chemical Constituents of *A. aspera*: *A. aspera* has been reported to be rich saponins, tannins, flavonoids, alkaloids and oils [67, 68].

Bioactivity Reports on *A. aspera*: Srivastav *et al.* [68] gave a comprehensive review of the plant *A. aspera*. The plant has been shown to exhibit antimicrobial, antioxidant, antiparasitic, spermicidal, hypoglycemic, hepatoprotective, analgesic, antipyretic, anti-inflammatory, antiarthritic, nephroprotective, antidepressant, diuretic, bronchoprotective, antiallergic, wound healing, immunomodulatory and hypolipidemic properties. For more information the reader may wish to read Srivastav *et al.* [68]. The biological activities of this plant justify its medicinal uses.

3.14 Wedelia (*Wedelia trilobata*)

Wedelia trilobata (Fig 16) belongs to the family Asteraceae. It is known as Wedelia or Z Herbe a Femme in Dominica and in

some other parts of the world [69, 70]. It is a low growing plant with yellow flowers.

Medicinal Uses of *W. trilobata*: The leaves are boiled in water and drunk as tea to alleviate symptoms of flu and cold. It is also used in combination with other herbs to clear the placenta from the body after birth. The leaves can also be crushed and used as poultice to alleviate symptoms of cold and flu. It was also reported that some people consume this plant for abortion purpose [Information from interviewed locals, 2015].



Fig 16: *Wedelia trilobata*

Chemical Constituents and Bioactivity Reports on *W. trilobata*: The leaves of *W. trilobata* have been reported to contain saponins, flavonoid, terpenoids and tannins. The plant has also been reported to exhibit analgesic, anti-inflammatory, antimicrobial, larvicidal, trypanocidal, antitumour, antidiabetic, hepatoprotective, uterine contraction and wound healing properties [71], thus corroborating the local medicinal uses of the plant.

3.15 Glory Cedar (*Gliricidia sepium*).

Gliricidia sepium (Glory cedar, Fig 17) is a tree plant that belongs to the family Fabaceae [72].



Fig 17: *Gliricidia sepium*

Medicinal Uses of *G. sepium*: In Dominica, the plant has different medicinal uses. For instance, the leaves are crushed and used to rub skin of people for the treatment of skin rashes and all inflammatory skin disorders. The crushed leaves are also strained and used to bathe people to treat skin disorders and fevers.

The leaves are boiled in water and drunk as tea, or the leaves

are blended with water and drunk to treat fevers, coughs sore throat and asthma. The young leaves can also be crushed and used as poultice around the neck. The locals claimed that the sore throat would go within 5 minutes [Information from interviewed locals, 2015].

Chemical Constituents and Bioactivity Reports on *G. sepium*: Takemuro *et al.* [72] reported coumarin as the main allelochemical of *G. sepium* and that the coumarin inhibited the growth of lettuce (*Lactuca sativa*) radicles. Rastrelli *et al.* [73] reported the isolation of saponins and aromatic compounds from the leaves of the plant. The medicinal use of the plant to treat skin disorders could be due to its saponin contents, as saponins from other plant materials have also been shown to possess antimicrobial properties [13, 74]. The coumarin content of the plant is discussed under the general discussion of this review.

3.16 Soursop (*Annona muricata*)

Annona muricata (Fig 18) is an evergreen flowering tree that produces an edible fruit. It belongs to the family Annonaceae. [75].

Medicinal Uses of *A. muricata*: In Dominica, the leaves of this plant are boiled in water and drunk as tea to treat insomnia. The leaves are crushed and strained with water and used to bathe for a cooling/relaxing effect. The fruits of the tree are eaten as a cure for cancer [Information from interviewed locals, 2015].



Fig 18: Figure shows *A. muricata* leaves and fruit

Chemical Constituents and Bioactivity Reports on *A. muricata*: Annonaceous acetogenins and alkaloids have been reported to be present in the leaves, bark, stem and fruit seeds of soursop. The plant has been shown to demonstrate anticancer, antibacterial, antifungal, antiviral, insecticidal, antiparasitic, anti-inflammatory and anti-depressive properties [76, 77]. These reports justify the medicinal uses of the plant.

4. General Discussion

Information contained in this report shows that medicinal use is popular, not only in Dominica, but in many other parts of the world. Many of the plants reported here have similar uses in Dominica as in other parts of the world, but the Dominicans appear to be deeply rooted in medicinal plant use and this has form part of their cultural norms and beliefs [2-8]. This cuts across all strata of life—the rich and the poor, the educated and the uneducated, the old and the young, the male and the female; even my medical students that are Dominicans do appreciate their bush medicines [Personal communication with

locals, 2015].

Catharanthus roseus is used to treat diabetes and menstrual pains in Dominica and other parts of the world [5, 15-19]; *Pluchea carolinensis* is used to treat respiratory disorders in Dominica and other countries [9]. *Hibiscus sabdariffa* is used to treat high blood pressure, cold, infections and stimulate flow of bile in Dominica and other countries [35, 37].

However, while *C. roseus* is being used for high blood pressure, eye irritation and diaphoresis in Dominica [16], the plant is reported to be used for dysentery, indigestion, eczema, rashes and insect stings in other places [17-19]. While *P. carolinensis* is used mainly for fever and respiratory disorders like flu, tuberculosis, bronchitis and hard cough in Dominica [Personal communication with locals, 2015], the plant has additional uses like treating toothaches and skin rashes in other places [9].

While *Gliricidia sepium* has a lot of medicinal uses in Dominica and other parts of the world [78, 79], it is reported that the bark of the tree is cooked with maize for rodenticidal purpose in Central America [80, 81]. It was reasoned that the coumarin in the *G. sepium* would be converted by bacteria into dicoumarol which would cause haemorrhage in the rodents [81]. Toxicity of *G. sepium* to rabbits and chicken has also been documented [82, 83]. This calls for standardization and toxicological monitoring for the human consumption of this plant in Dominica. The same is true of the other medicinal plants.

G. sepium is an important dry season forage in countries like Sri Lanka, Colombia and Guatemala [81, 84-85] whereas in countries like Nigeria and Philippines, the plant is unpalatable and unacceptable to farm animals [81, 86]. This is a clear indication of differences probably due to variations in geographical distribution and harvesting methods.

4.1 Future Prospects

It is noteworthy that Dominica, the Nature Isle, is blessed with a lot of medicinal plants, some of which are reviewed in this report. Reports on the chemical constituents and bioactivity of most of the plants have justified their medicinal uses.

Medicinal plants have contributed immensely to the health care of the world [16, 87-88]. During the past decades, the World Health Organization (WHO) and several Governments in the developing countries have campaigned for the promotion and integration of herbal remedies in healthcare delivery as supplementary contributions to modern medical facilities [87].

A large percentage of Orthodox drugs in clinical management of cancer have their roots in plants and other natural products while more than 60% of cancer patients still resort to use of herbs to manage the disease. [13, 89-90].

From the rosy periwinkle are obtained vincristine, vinblastine and other popular drugs [16, 22, 24], and this plant is very popular in Dominica.

In view of the foregoing, there are great prospects for medicinal plants in Dominica in terms of research, production, sales and consumption.

4.1.1. Phytochemical/ Herbal Research

There is need for further phytochemical studies on some of the plants reviewed. For instance, further bioactivity studies are needed to corroborate the medicinal uses of *Pluchea carolinensis* in the treatment of respiratory disorders. There is the need to screen the bark of *Richeria grandis* for its chemical composition and biological activities. Further studies are also needed on *Gliricidia sepium*, a plant that is palatable to animals in some countries [81, 84-85], unacceptable to animals in other countries [81, 86], and is a herbal remedy in Dominica and

some other countries [78, 79].

There is also need to do research for standardization of dosages for some of these herbal medicines. For instance, *Richeria grandis* (Bois bande) is a plant that is being used for aphrodisiac purpose and for treatment of erectile dysfunction in Dominica, with some reported cases of prolonged erection (over-dosage) as mentioned by locals [Personal communication with locals, 2015]. There is need to conduct research to know the safe limits of the herbal materials and their possible toxic effects.

4.1.2. Herbal Supplements/ Formulations

There is the prospect of developing standardized herbal supplements/formulations in Dominica for the management and treatment of a vast array of diseases. The products can also be exported to other countries. This will generate income and employment for people, in addition to the health benefits that would be derived.

4.1.3. Drug Discovery and Production

Just as important drugs have been obtained from many medicinal plants [16, 22, 24], it is hoped that in the future important drugs would be isolated, characterized and marketed from Dominica.

4.1.4 Herbarium

There is need to establish a herbarium in Dominica for easy plant recognition and medicinal plant research.

5. Conclusion

This article has highlighted the popularity of medicinal plant use in Dominica and the corroborating evidences from the phytochemical and bioactivity reports. Medicinal plant use has been claimed to be a contributing factor to the longevity and graceful aging that is observed in Dominica.

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Competing Interests

The author hereby declares that no competing interest exists.

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