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Therapeutic Use of Some Romanian Medicinal Plants

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Abstract

Romanian traditional medicine has an extremely old history. The Dacian knowledge of the curative properties of medicinal plants was documented by Herodotus, Hippocrates, Galen, and Dioscorides. It must be emphasized that modern chemical screening has confirmed the therapeutic properties of the medicinal plants used by the Dacians. More interesting is that Dacians used many of these herbs for different dishes. Practically, for Dacians, food was medicine. Recent research on some Romanian medicinal plants has highlighted their pharmacognostical importance. It is known that currently, the importance and dynamics of the research on medicinal plants in the area of drug discovery continues to increase worldwide. The main reason is not only the high efficiency of secondary metabolites in case of serious diseases (cancer, viral infections, malaria, etc.) but also the minimization of the side effects of the synthetic drugs.

Keywords: Dacians, phytotherapy, secondary metabolites

1. Introduction

Phytotherapy has always played an essential role in the development of humanity. Traditional medicine still continues to have major importance in many areas of the world, especially in low-income regions [1–7].

Although in developed countries, alternative medicine has been outdated by modern medical techniques, at present, there is a growing trend toward natural remedies. The importance of medicinal plants emerges from the fact that worldwide, almost 50% of existing synthetic medicaments are derived from natural extracts [2–7].

The main ancient medicinal systems are considered to be: Ayurvedic, Greek, and Chinese medicine [8, 9]. However, there are very few documents about Dacian medicine, considered by their contemporaries and later by archeological evidence as highly advanced [8, 10–21].

In traditional Romanian medicine, almost all the natural remedies taken from the Dacians are found [8, 10–23].

2. Romanian medicinal plants

Romanian phytotherapy is an important part of our natural and cultural heritage. In this respect, it should be emphasized that in the flora of Romania, there are about 4000 plant species, of which over 20% are medicinal plants. Scientific research has confirmed the therapeutic properties of almost 50% of Romanian medicinal plants and about 25% plants are already used to obtain botanical products on large scale [2, 4, 5, 12, 23].

Between the Romanian people and traditional medicine, there was always a very deep connection. Basically, through the entire evolution of Romanians, healing herbs played an important role. Daco-Getic civilization was considered as the most evolved society at that time in Europe [10, 12, 18]. The Dacian's vast knowledge about healing plants has been certified by several personalities of those times (Herodotus, Discorides, Tucidide, Pseudo-Apuleius, Ovid, Virgil, etc.) [10, 12, 13, 17, 18]. The Dacian's knowledge about medicine, surgery, phytotherapy, and astronomy was confirmed by historical documents and archeological evidence [11, 12, 18].

In fact, the life philosophy of our ancestors proves to be more current than ever. In this regard, it must be mentioned that the Dacians knew the psychosomatic concept and the interdependence between the psychological and the somatic factors that triggered different affections [10–13, 18]. This is not only extremely interesting but at the same time extremely rare for that time period. It must be underlined that psychosomatic medicine was recognized as a branch of medicine only many centuries later.

According to the Dacians, the human body represents a complex energy system which maintains the physical body [10, 12, 18].

Our ancestors believed that there was a perfect balance between man and nature. Each plant or tree is a being to be respected. Thus, plant harvesting must take place only at a certain time of year, when the plant is mature and the concentration of active principles is maximal. For instance, Herb Robert (*Geranium robertianum*) is collected on the morning of August 15 [11, 12, 16, 18].

Plant name	Main secondary metabolites identified	Therapeutic effect	References
Dandelion	Flavonoids, phenols, fatty acids	Hepatoprotective, diuretic, anti-inflammatory, antitumoral [82]	[4, 5, 12, 15, 16, 19, 23, 66, 82]
Daisy	Saponins, triterpenes, anthocyanins, polyphenols, flavonoids	Antimicrobial, neuroprotective, cicatrizing effect, emollient, anti-inflammatory, antioxidant, hypolipidemic, hemostatic	[4, 5, 12, 15, 16]
Allheal	Tannins, sterols, phenolic acids, alkaloids	Astringent, hemostatic agent, cicatrizing effect	[4, 5, 12, 15, 16]
Borango	Fatty acids, alkaloids	Anti-inflammatory, antitumoral, antidiabetes, cardioprotective, immunomodulatory agent	[4, 5, 12, 15, 16, 78]
Hogweed	Coumarine, lignans, flavonoids	Neuroprotective, antioxidant, anticancer, antimicrobial, antidiabetic, antiviral, and anti-inflammatory	[4, 5, 12, 15, 16, 79]
Fat grass (Dacian name: Iaca)	Vitamins (A, C, B), fatty acids (omega 3), proteins, saponins, phenolic acids, coumarine, flavonoids, coenzyme Q10, alkaloids	Cicatrizing effect, wound healing, antibacterial, antipyretic, depurative, diuretic, regenerative	

Table 1.
Main bioactive compounds of some healing herbs included in Dacian's diet.

Dacian medicinal plant	Scientific name of plant	Dacian therapeutic recommendation
Aniarsexe	<i>Onobrychis viciifolia</i> (Fabaceae)	Diuretic, abscess, sudorific
Ionits	<i>Aconitum napellus</i> (Ranunculaceae)	Astringent, antidote (snake bite), poison for arrows
Sopitis	<i>Aristolochia clematitis</i>	Analgesic, contraceptive, anti-inflammatory
Dacina	<i>Adonis vernalis</i> (Ranunculaceae)	Diuretic, analgesic, cardiogenic
Boudathla	<i>Anchusa officinalis</i> (Boraginaceae)	Sudorific, diuretic, anti-inflammatory effect, respiratory infections
Cinouboila	<i>Bryonia alba</i> L. (Cucurbitaceae)	Antibacterial, depigmentation effects, antiepileptic, snake bite antidote (viper venom), headaches, anti-inflammatory, analgesic, induce abortion, wet cough, hemostatic agent, induce lactation
Coadama	<i>Alisma plantago-aquatica</i> L. (Alismataceae)	Astringent, dermatologic diseases (irritation, inflammations)
Coicolida	<i>Physalis alkekengi</i> L. (Solanaceae)	Hepatoprotective, diuretic, laxative, edema
Dielleina	<i>Hyoscyamus niger</i> L. (Solanaceae)	Analgesic, hallucinogenic, hypnotic, anti-inflammatory, antitussive, hemostatic, antibacterial, antipyretic, toothache, sedative, psychomotricity
Diesema	<i>Verbascum phlomoides</i> L. (Scrophulariaceae)	Astringent, diarrhea, antitussive, antispastic, toothache, analgesic, cicatrizing effect, expectorant, anti-inflammatory
Doctila	<i>Ajuga chamaepitys</i> L. (Lamiaceae)	Liver disease, sciatica pain relief
Duodela	<i>Achillea millefolium</i> L. (Asteraceae)	Anti-inflammatory, gallbladder relief, antiasthmatic, hemorrhoids, stimulating appetite, detoxifying, sedative, analgesic, antiviral, liver diseases, cicatrizing effect, antitussive digestive diseases
Dyn	<i>Urtica dioica</i> L. (Urticaceae)	Wound healing, anti-inflammatory, antitumoral, abscess, hemostatic, aphrodisiac, expectorant, cicatrizing effect, antimicrobial, detoxifying, disinfectant
Guoleta	<i>Lithospermum arvense</i> L. (Boraginaceae)	Nephrolithiasis, diuretic
Malva	<i>Mallow sylvestris</i> (Malvaceae)	Anti-inflammatory activity, cicatrizing effect, laxative, respiratory disorders
Mendruta	<i>Veratrum album</i> (Melanthiaceae)	Anti-inflammatory, antispastic, antibacterial (dysentery), hypotensive

Dacian medicinal plant	Scientific name of plant	Dacian therapeutic recommendation
Mizela	<i>Thymus vulgaris</i> L. (Lamiaceae)	Anti-inflammatory, antiasthmatic, increase fertility, anthelmintic, antiedema
Priadila	<i>Clematis vitalba</i> L. (Ranunculaceae).	Diuretic, analgesic, antiepileptic, antitussive, hair growth, dizziness
Propodila	<i>Potentilla reptans</i> L. (Rosaceae)	Toothache, anti-inflammatory for diseases of oral and pharyngeal cavity, antiviral, detoxifying, antipyretic, cicatrizing effect
Riborasta	<i>Arctium lappa</i> (Asteraceae)	Anti-inflammatory, disinfectant, antimicrobial, cicatrizing effect, detoxifying effect
Salia	<i>Datura stramonium</i> L. (Solanaceae)	Anti-inflammatory, diuretic, menstrual induction, psychomotricity
Sciare	<i>Dipsacus pilosus</i> L. (Caprifoliaceae)	Anti-inflammatory, hemorrhoids, anal fissures, antiviral
Stirsozila	<i>Erythraea centaurium</i> Pers. (Gentianaceae)	Cicatrizing effect, wound healing, biliary dyskinesia, menstrual induction, anti-inflammatory, analgesic, induce abortion, eye infections, sedative
Tendila	<i>Mentha piperita</i> L. (Lamiaceae)	Snake bite treatment, diuretic, anti-inflammatory, anthelmintic, detoxifying, antispastic
Usazila	<i>Cynoglossum officinale</i> L. (Boraginaceae)	Hair growth, laxative, cicatrizing effect, wound healing

Table 2.
A brief overview of most popular Dacian medicinal plants.

Herb name	Scientific name of plant	Main chemical composition	Biological activity
Aniarsexe (Sparceta)	<i>Onobrychis viciifolia</i> (Fabaceae)	Tanins, flavons, proteins, minerals (Cu, Ca, P)	Anti-inflammatory, detoxifying action, urinary diseases, sexual dysfunctions, hypoglycemic, anticholesterolemic, etc. [4, 5, 26]
Cinouboila	<i>Bryonia alba</i> (Cucurbitaceae)	Flavonoids, cucurbitacins, sterols, lectins, aminoacids, etc.	Wound healing, hemostatic, diuretic, antispasmodic, anti-inflammatory, hepatoprotective, antiatherosclerotic agent, rheumatism, antitumoral activity [4, 5, 27–29]
Wolfsbane	<i>Aconitum napellus</i> (Ranunculaceae)	Aconite (alkaloid)	Antirheumatic, analgesic, neuralgia, respiratory tract disorders, anti-inflammatory activity, etc. [4, 5, 30–32]
Pheasant's eye	<i>Adonis vernalis</i> (Ranunculaceae)	Flavons, quinones, saponins, coumarins, etc.	Sedative, diuretic, cardiotoxic effect [83, 84]
Mallow	<i>Mallow sylvestris</i> (Malvaceae)	Phenols, terpenoids, flavonoids, vitamins (A,B,C,E), minerals (Fe, Zn, Ca, Se, K, Mg), mucilage, inulin	Anti-inflammatory activity, asthma, respiratory diseases, antimicrobial, kidney infections, wound healing, dermatological diseases (eczema, acne), antioxidant, hepatoprotective, anticancer [4, 5, 34, 35, 82]
Budathla (ox tongue)	<i>Anchusa officinalis</i> (Boraginaceae)	Flavonoids, polyphenols, choline, allantoin	Antioxidant, antimicrobial, wound healing, emollient, antitumoral, expectorant, diuretic, analgesic, etc. [4, 5, 36]
Common water-plantain	<i>Alisma plantago-aquatica</i> (Alismataceae)	Terpenoids, phenolic acids, sterols, alkaloids,	Antibacterial, antiallergic anti-cholesterolemic, diaphoretic, diuretic, hypoglycemic, hypotensive [36]
Winter cherry	<i>Physalis alkekengi</i> (Solanaceae)	Alkaloids (solanină și fisolină), vitamins (C), glucocorticoids, lycopene	Diuretic, laxative, anti-inflammatory activity, sedative, hepatoprotective, analgesic, antiseptic [37–39]
Black henbane	<i>Hyoscyamus niger</i> L. (Solanaceae)	Alkaloids (hyoscyamine, scopolamine and atropine), flavonoids, lignans, phenols, coumarin, saponins, glycosides	Sedative, analgesic, antispasmodic, hypnotic, hallucinogenic, hypotensive, antimicrobial [4, 5, 40]
Mullein	<i>Verbascum phlomoides</i> L. (Scrophulariaceae)	Phenols, terpenes, sterols, fatty acids, alkaloids, glycosides	Anti-inflammatory activity, wound healing, antispasmodic, anthelmintic, expectorant, antifungal effect, diuretic [41–43]
Yellow bugle	<i>Ajuga chamaepitys</i> L. (Lamiaceae)	Tanins, alkaloids, anthocyanins, sterols, terpenes, glycosides, essential acids	Diuretic, anti-inflammatory activity, tonic, antimicrobial, antioxidant activity, antirheumatic, anthelmintic, antifungal effect [44–46]

Herb name	Scientific name of plant	Main chemical composition	Biological activity
Yarrow	<i>Achillea millefolium</i> L. (Asteraceae)	Flavonoids, choline, sterols, vitamin K, volatile oils, tanins	Anti-inflammatory activity, hemostatic, wound healing, analgesic, disinfectant, antispasmodic, gastroprotective, astringent, hypotensive, antitumoral [4, 5, 47, 48]
Stinging nettle	<i>Urtica dioica</i> L. (Urticaceae)	Coumarine, sterols, terpenoids, carotenoids (β -carotene lutein and lycopene) fatty acids, poly-phenols, amino acids, chlorophyll, vitamins (A,C,B D,E,F,K,P), tannins, carbohydrates, sterols polysaccharides, isolectins, minerals (Fe, Ca, Zn, Co, Na, Cr, I, S, Cu), lignans	Diuretic, anemia, laxative, anti-inflammatory, antiallergic, antimicrobial, hypoglycemic, anti-histamine effect, hemostatic [4, 5, 49]
Gromwell	<i>Lithospermum canescens</i> (Boraginaceae)	Phenolic acids, flavonoids, vitamins, sterols, phenols, allantoin	Sedative, anti-inflammatory, antipyretic, diuretic, antiseptic, colargol, antipruritic, contraceptive [4, 5, 50]
False hellebore	<i>Veratrum album</i> (Melanthiaceae)	Alkaloids, fatty acids, sterols, amino acids	Antithrombotic activity, hypotensive, anti-inflammatory, hypoglycemic [4, 5, 51, 52]
Thyme	<i>Thymus vulgaris</i> L. (Lamiaceae)	Terpene, flavonoids, antiviral, essential oils, tanins	Anti-inflammatory, antitussive, antiseptic, antimicrobial, astringent, antihelminthic, tonic, carminative, disinfectant [4, 5, 53–55]
Old man's beard	<i>Clematis vitalba</i> L. (Ranunculaceae)	Terpenoids, saponins, volatile acids, alkaloids	Diuretic, diuretic, analgesic, diuretic, anti-tumor, anti-inflammatory agent, antipyretic, antirheumatic [4, 5, 56–58]
Creeping cinquefoil	<i>Potentilla reptans</i> L. (Rosaceae)	Tanins, flavonoids, terpenes, anthocyanins, phenolic acids	Anti-inflammatory, antimicrobial activity, hypoglycemic hepatoprotective, anticancer effect, spasmolytic [4, 5, 59–61]
Burdock	<i>Arctium lappa</i> (Asteraceae)	Tanins, minerals (K), vitamins (B), volatile oils, phenolic acids	Hypoglycemic, detoxifying, anticancer, anti-inflammatory, antimicrobial, antiseptic, regenerating activity, hair growth, hepatoprotective, diuretic, anticancer, antidiabetic, antiviral activities, hypolipidemic [4, 5, 62, 63]
Jimson weed	<i>Datura stramonium</i> L. (Solanaceae)	Alkaloids (atropine, scopolamine), saponins, lignins, sterol, tannins, flavonoids, carbohydrates, proteins	Analgesic, antiasthmatic activities, antimicrobial, wound healing, purgative [4, 5, 64]

Herb name	Scientific name of plant	Main chemical composition	Biological activity
Teasel	<i>Dipsacus pilosus L.</i> (<i>Caprifoliaceae</i>)	Phenolic acids, terpene	Stomatologic, analgesic, blood circulation, anti-inflammatory, powerful remedy for Lyme disease [65]
Centaury	<i>Erythraea centaurium Pers.</i> (<i>Gentianaceae</i>)	Terpenoids, phenolic acids, flavonoids, xanthones, volatile oils, coumarine, fatty acids, polysaccharides	Tonic, purgative, sedative, antipyretic, antihelminthic, anti-inflammatory, analgesic and diuretic properties, antidiabetic activity antimicrobial activity, gastroprotective, carbohydrate and lipid metabolism [4, 5, 67–69]
peppermint	<i>Mentha piperita L.</i> (<i>Lamiaceae</i>)	Volatile oils, flavonoid glycosides	Astringent, analgesic, antiseptic, antioxidant, antispasmodic, cardioprotective, antiviral, bacteriostatic, anthelmintic, anti-protozoal, immunomodulatory, antiparasitic, carminative, antiemetic, antiallergic, antitumoral [4, 5, 23, 70, 71]
Birthwort	<i>Aristolochia clematitis</i> (<i>Magnoliiflorae</i>)	Terpenoids, alkaloids, tanins, flavonoids, glycosides, saponine, fatty oils, minerals, sterols	Aphrodisiac, immunomodulatory, cicatrisant, wound healing, dermatological diseases (eczema, acne), analgesic, antitumoral, depurative, anti-inflammatory [4, 5, 24, 73, 74, 76]
Houndstongue	<i>Cynoglossum officinale L.</i> (<i>Boraginaceae</i>)	Pyrrolizidine alkaloids	Antibacterial, antihemorrhagic, antiseptic, diuretic, anti-hyperlipidaemic, antidiabetic activity, diuretic, anti-inflammatory, and non-central analgesic activities [4, 5, 72, 73]

Table 3.
 Biological activity of main groups of natural compounds identified in Dacian medicinal plants.

Their complex information about therapeutic botanicals was appreciated as being very impressive and different ancient historical texts [8, 10–13, 17, 18, 20, 21]. In the first pharmacopoeia, Discorides mentioned over 700 different medical plants and about 6% were presented as Dacian origin [8, 10–13, 17, 18, 20, 21].

Complementary to phytotherapy, various products of mineral origin were used, of which the most well known are: limestone powder (hemostatic effect), volcanic tuff (healing effect), etc.

Thermal springs are used as natural remedies for bone diseases or circulatory system disorders. In this respect, they were highly appreciated the waters of Geoagiu Bath, known by the Dacians as Germisara [11–13, 18].

Fumigations of cannabis were used as anesthetic and analgesic, mainly in labor and childbirth.

Also, Dacians paid special attention to medical preventive measures. Thus, they treated the clothing with extracts of lavender (*Lavandula angustifolia*) [4, 5, 24]

Herb name	Scientific name of plant	Chinese medicine	Indian medicine/other medicine systems
Aconite	<i>Aconitum napellus</i>	Fever treatment and skin irritation [31, 32]	
Water-plantain	<i>Alisma plantago-aquatica</i>	Antitumor, antimicrobial, anti-inflammatory, immunomodulatory agent [36]	—
Birthwort	<i>Aristolochia clematitis</i>	Antispasmodic, antidote (snake venom), analgesic [73, 74, 76, 77]	
Black henbane	<i>Hyoscyamus niger</i>	Analgesic, antispasmodic [40].	—
Old man's beard	<i>Clematis vitalba</i> L	Anti-inflammatory, analgesic, antipyretic, diuretic	—
Burdock	<i>Arctium lappa</i>	Anti-inflammatory, cicatrizing effect, wound healing [62]	—
Jimson weed	<i>Datura stramonium</i>	—	Anti-inflammatory, analgesic, cicatrizing effect, wound healing, antipyretic [64]

Table 4.
Some examples of Dacian medicinal plants recognized and used in the traditional medicine of other peoples.

and wormwood (*Artemisia absinthium*) [4, 5, 25]. Scientific screenings of these two plants have highlighted the fact that lavender has antibacterial properties and wormwood is a disinfecting agent [11–13, 18].

Moreover, the inclusion of different healing herbs in the Dacian diet once again reveals their profound knowledge on plant's active principles. Basically, for Dacians, food was more than a way to ensure daily nutrient needs, it was mainly a medicine per se. In this regard, we can remember some of the most commonly used healing herbs in Dacian and later Romanian cuisine: malva (*Althaea officinalis*), stinging nettle (*Urtica dioica* L.), dandelion (*Taraxacum officinalis*), daisy (*Bellis perennis*), allheal (*Prunella vulgaris*), thyme (*Thymus vulgaris* L.), borange (*Boranga officinalis*), hogweed (*Heracleum sphondylium*), and fat grass (*Portulaca oleracea*) [8, 10–21, 23].

In fact, modern studies have identified in these natural products different secondary metabolites with high biological activity [9, 24–83]. The main bioactive compounds and their therapeutic effect are summarized in **Table 1**.

The Dacian's botanical preparations were quite diverse from decocts, infusions, oilments, plant mixtures to fumigations. This proves the Dacians knew how to extract or capitalize on the active principles of the healing plants [8, 10–21].

Table 2 summarized some of these plants used by Dacians and their therapeutic recommendations.

It is quite remarkable that Dacian's therapeutic recommendations were corroborated by thorough scientific studies on those medicinal plants [8–21, 24–84]. This is further evidence of the fact that the Dacians had in-depth knowledge of phytotherapy, for which they were also appreciated by the great scientists of antiquity.

Table 3 summarized the main phytochemicals identified in Dacian healing herbs and their biological activity.

Another aspect to be mentioned is the fact that the Dacian medicinal plants are also found in other important traditional medicinal systems, such as Chinese or Hindu medicine (**Table 4**).

Herb name	Other uses of Dacian herbs
Mallow	Edible plant, cosmetic industry [81]
Stinging nettle	Edible plant, cosmetic industry [4, 5, 51]
Burdock	Edible plant [62]
Centaury	Cosmetic industry [4, 5, 67–69]
Mint	Cosmetic industry, food industry [4, 5, 23, 67, 69, 70]
Thyme	Cosmetic industry, food industry [4, 5, 53–55]

Table 5.
Modern applications of Dacian healing plants.

Currently, some the Dacian healing herbs are appreciated worldwide for their nutritional values and even have found modern applications in several sectors of the industry (Table 5).

3. *Aristolochia clematitis*: chemical screening of main phytoconstituents

Aristolochia clematitis is a highly regarded herb in traditional medicine and at the same time controversial due to the latest research that revealed the potential carcinogenic effect of aristolochic acid [73, 74, 76, 77, 85].

In an effort to identify the secondary metabolites from *Aristolochia clematitis*, the plant extract was analyzed in two different solvents (methanol and water). The plant material (*Aristolochia clematitis* leaves, young stems, and flowers) was obtained from a collection taken in 2017 in Timis, Romania. Plant sample was identified at Victor Babes University of Medicine and Pharmacy Timisoara. The botanical material was dried and then finely ground in a ball mill. Separation of the main constituents from different parts of the botanical material was done using two different polar solvents: water and methanol. A plant sample (2 g) was placed in a 100-mL volumetric flask containing 45 mL of solvent. The resulting mixture was sonicated for 50 min at 40°C, with a frequency of 50 kHz. Then, the solution was filtered through a 0.25- μ m pore size filter. Thus, four birthwort fractions were prepared: B₁ (water extract from leaves and stems), B₂ (methanol extract from flowers), B₃ (water extract from leaves), and B₄ (methanol extract from stems). Identification of the main compounds from the birthwort fractions, B₁, B₂, B₃, and B₄, was performed using TOF-MS method.

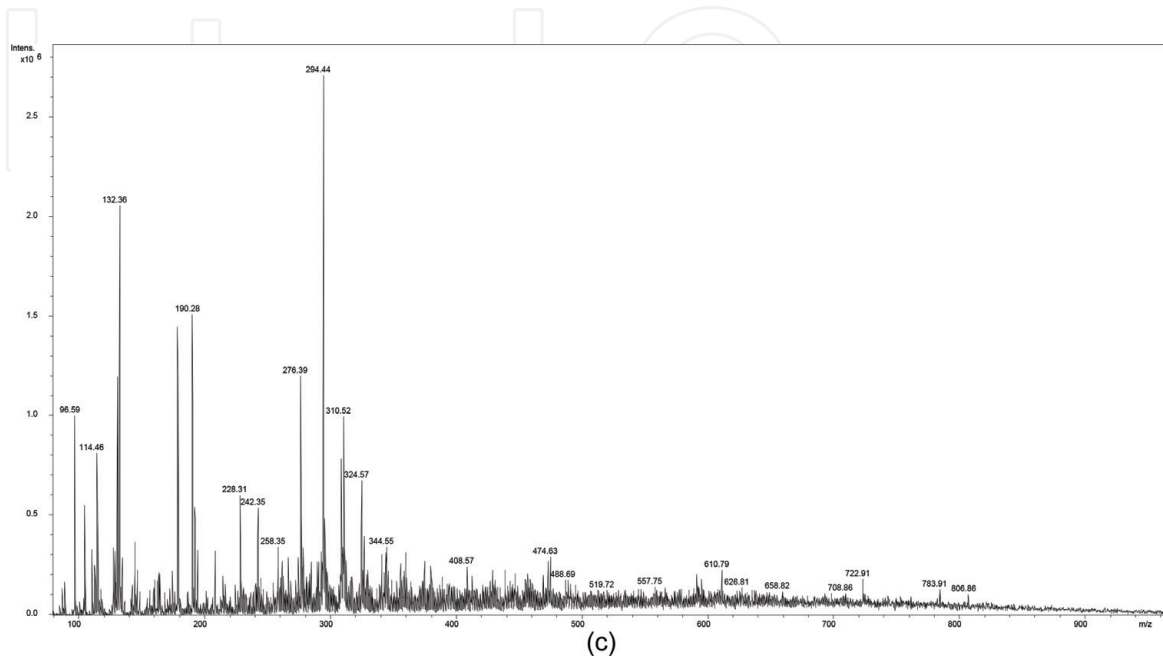
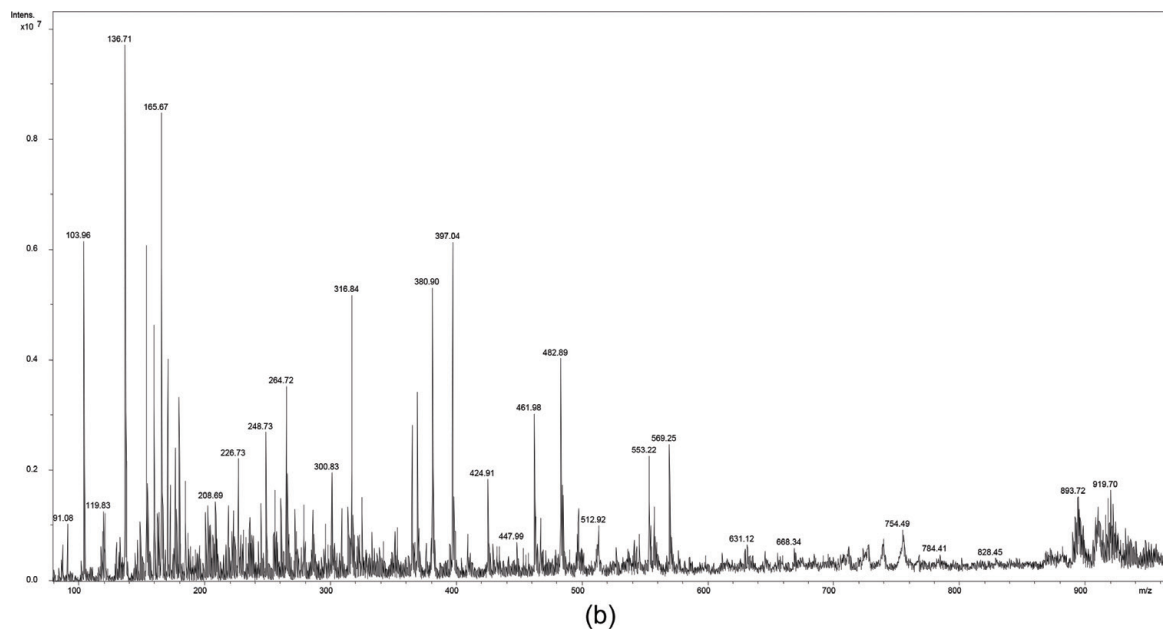
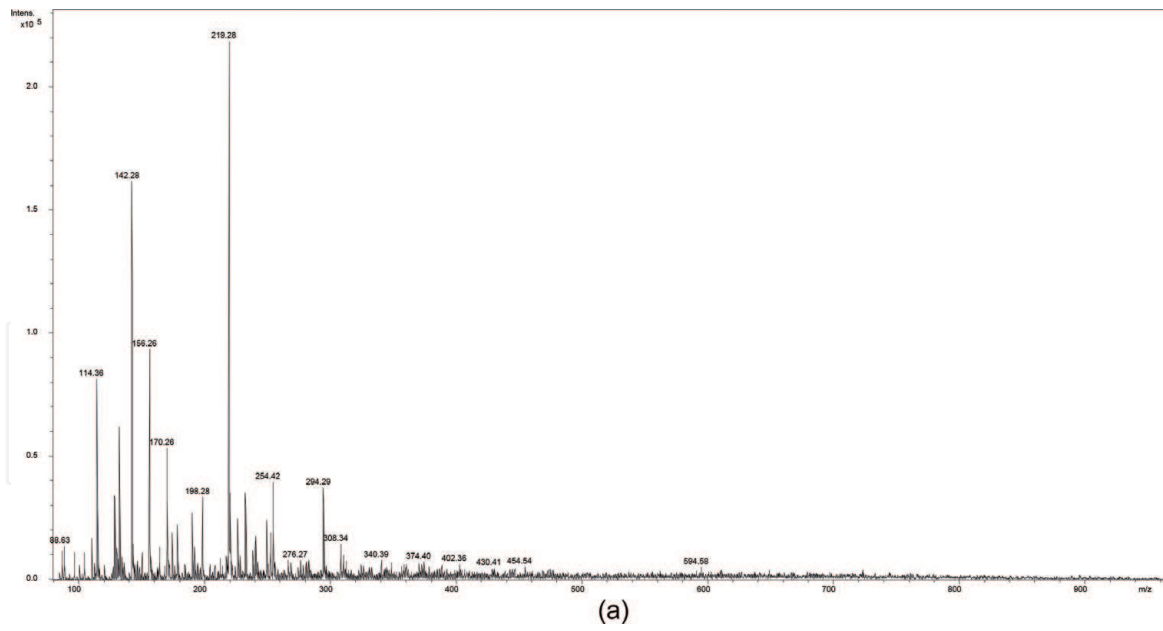
4. TOF-MS analysis

The mass spectra of birthwort fractions: B₁–B₄ (acquired in positive ion mode, in a mass range of 100–3000 m/z) are presented in Figure 1a–d.

The results gained through mass spectrometry confirmed the presence of aristolochic acid in all four samples analyzed (m/z detected: 294, 293, 308, 355) among other secondary metabolites [86].

Further, thorough investigations are required to highlight:

- the maximum concentration of phytoconstituents from that called perfect moment to harvest the plant and the composition of active principles from a randomly harvest plant;
- validation of curative properties/cytotoxicity effects of plant extract depending on plant dosage (plant concentration, time, etc.).



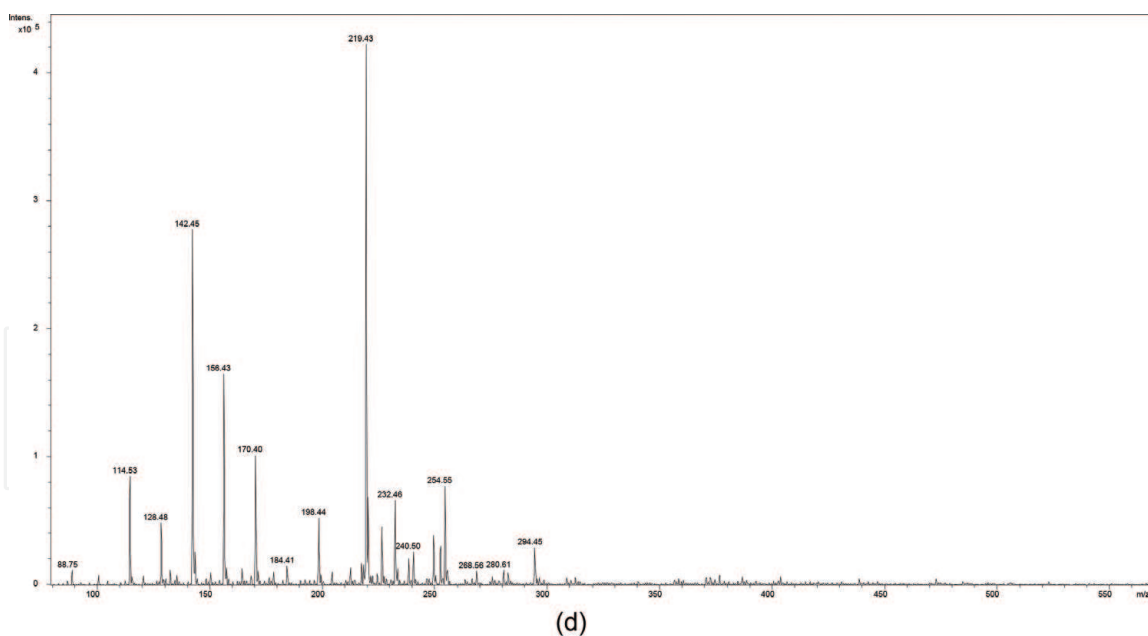


Figure 1.

Figure 1 a-d. Positive ion mode TOF-MS of of birthwort fraction B1-B4. (1a) Positive ion mode TOF-MS of of birthwort fraction B1. (1 b) Positive ion mode TOF-MS of of birthwort fraction B2. (1c) Positive ion mode TOF-MS of of birthwort fraction B3. (1d) Positive ion mode TOF-MS of of birthwort fraction B4.

5. Conclusions

Natural compounds are essential for the existence of humanity; this assertion has been demonstrated by the most modern researches which once again highlights the particular curative properties of phytochemicals isolated from medicinal plants known and appreciated since the earliest times.

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