

THERAPEUTIC PROPERTIES AND PHENANTRENS COMPOUNDS OF *TAMUS COMMUNIS*

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Abstract

From ancient in folk medicine the plants were used with lots of trust and efficiency. In time, people learn how to cultivate, to sample, and preserve different anatomical parts of the plant for medical purposes. Thus, also *Tamus communis* became an interesting plant, being used in different pharmaceutical formulations to treat different medical conditions. The extracts of root of *T. communis* is just one phyto-pharmaceutical form that demonstrated to have anti-inflammatory and antioxidant effect. Different anatomical parts of *T. communis*, various extraction methods using various solvents, were used in experimental researches to test the efficiency as cytotoxic and antiviral activities, antioxidant activity, anti-inflammatory and analgesic activity. Extracts of *T. communis* are used for preparation of poultice, ointments, and also for infusions, tincture preparation with very good pharmacologic activity. This paper only made a very succinct presentation of the possibilities to used *Tamus communis* as a main ingredient of different natural pharmacological preparation with applicability in human and veterinary medicine.

Introduction

Since ancient many researchers and medical doctors encourage the use of medicinal herbs to prevent, treat and preserve health conditions. Plants – through the active principles contained – can be used as ingredients of pharmaceutical preparations with beneficial effects on human health and not only, but also can be used as ingredients of natural nutritional supplements. People are always looking for organic, natural alternatives that bring health-promoting properties and look back in time to find out more details about specific plants that were used as different products for various medical purposes.

One of the flowering plant is *Tamus communis*, known also as *Dioscorea communis* or black bryony, which is used for its anti-inflammatory and antioxidant properties. The plant contains also saponins – and because of this fact – its use in different pharmaceutical forms has to be very well documented, and also theoretical compositional and experimental evaluated [1].

Experimental studies showed that it is very important the time of the sampling, and more than this is the anatomical part that it is therapeutically used.

Regarding the anatomical part of the *Tamus communis* we have to underline the rhizomes which contain calcium oxalate and histamines which – in high concentrations – may cause skin irritation and dermatitis.



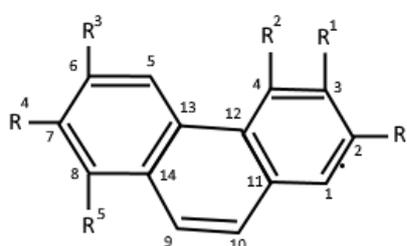
In Romania, black bryony is known in the folk area as “earth butter” and is described as an herbaceous plant, which has a stem of 2-4 meters long clinging on other plants or on stones. Sometimes it is also named as “black vine”, because it develops a thick root up to half a meter long. In Romania *Tamus communis* it grows spontaneously in the sub-Carpathian area in deciduous forests, in shady and stony places, where its root hides being difficult to remove. This plant is used in traditional medicine, being an old remedy for locals. Its root (rhizome) is fleshy, presenting a white core, hence its name as “butter”, and the popular name is more than suggestive in terms of the therapeutic role of the plant "grass of beaten women", because it was used to treat trauma and rheumatic pain, but also to strengthen weakened bodies [2].

Chemical composition

The chemical composition of *Tamus communis* varies by the anatomical part, but the plant contains alkaloids, saponins histamine, flavonoids, allantoin and tannins; vitamins A, vitamin C, vitamins from B complex; mineral salts of calcium, magnesium, sulfur, manganese, zinc (represented very well by calcium oxalate); mono- and polyunsaturated fatty acids.

Experimental studies demonstrated that *T. communis* contain different flavonoids, glucans, sterols, phenanthrene derivatives, spirostane and fructosane derivatives.

Chloroform (CHCl₃) extracts of the rhizomes of black bryony identified several phenanthrene (figure 1) such as: 2,7,8,-trimethoxy-3,4-methylen-dioxy-phenanthrene (compound 1 – c1), 7-hydroxy-2,8-dimethoxy-3,4-methylen-dioxy-phenanthrene (compound 2 – c2), 8-hydroxy-2,3,4,7-tetra-methoxy-phenanthrene (compound 3 – c3), 7-hydroxy-2,4,6-tri-methoxy-phenanthrene (compound 4 – c4), 4,7-dihydroxy-2,3-di-methoxy-phenanthrene (compound 5 – c5), and 4,8-di-hydroxy-2,3,7-tri-methoxy-phenanthrene (compound 6 – c6), respectively [3,4,5].



Specification	R	R1	R2	R3	R4	R5
c1	-OCH ₃	-O-CH ₂ -O	-H	-H	-OCH ₃	-OCH ₃
c2	-OCH ₃	-O-CH ₂ -O	-H	-H	-OH	-OCH ₃
c3	-OCH ₃	-OCH ₃	-OCH ₃	-H	-OCH ₃	-OH
c4	-OCH ₃	-H	-OCH ₃	-OCH ₃	-OH	-H
c5	-OCH ₃	-OCH ₃	-OH	-H	-OH	-H
c6	-OCH ₃	-OCH ₃	-OH	-H	-OCH ₃	-OH

Figure 1. Phenanthrene compounds determined from *Tamus communis* solvents extracts

Black bryony contain phenolic compounds such as: quercetin-*O*-rhamnosyl-*O*-rhamnoside and kaempferol-3,4'-di-*O*-rhamnoside in significant quantity compared to *Lonicera periclymenum* and *Bryonia dioica*, but low quantity of cis-5-*O*-caffeoylquinic acid and trans-3,5-*O*-dicaffeoylquinic acids; and flavones represented by apigenin-6-*C*-glucoside-8-*C*-glucoside [6].

From literature data we can observe that the extracts rich in phenolic compounds of *Tamus communis* are often related with good bioactivity, which is associated with antioxidant activity, mainly of hydro-soluble gels formulations.

Phytotherapy based on *Tamus communis*

The active principles of *Tamus communis*, represented by phenolic acids, flavonoids, anthocyanins, and phenanthrene compounds which are mostly used as hydro-soluble extracts and gels for topical applications [6,7].

Anatomical parts of *T. communis* contain also steroidal saponins – which can be used as precursors or raw material for steroid hormones synthesis – compounds used in contraceptive preparations [8]. Also, it is not recommended the consumption of raw *T. communis* due to the content of different saponines and other compounds which are toxic, especially in significant quantities, so it is not recommended to be used as food or to be ingested at all!

Fresh root can be used in preparation of poultice which is recommended for inflamed joints and bruises.

The root of *T. communis* is used for preparation of infusion or cold maceration with benefic effect when used as local compresses.

The tincture is used in the form of compresses or local rubs.

The ointment from the earth butter is used in the form of massage or external applications in case of rheumatic pains, bruises, bruises, contusions.

Natural therapy with black bryony showed good effects in cases of rheumatism, gout, osteoporosis, lumbosciatica, cervical spondylosis, acute or chronic meniscus pain, shingles, frontal or maxillary sinusitis, arthritis, trauma, hematomas, frostbite, bone deformities, osteoarthritis (hip osteoarthritis, gonarthrosis), purple dermatoses, and acne [9, 10, 11].

Phytotherapy with black bryony products has allergenic, analgesic, anti-inflammatory, anti-rheumatic action, decongestant, diuretic, histaminic, emetic, laxative, rubefacient toxic, propepic, vulnerary, similar to chemically synthesized anti-inflammatory drugs (but some of them has side-effects), venous tonic action, stimulates local circulation, easily revulsive action. Phenanthrene derivatives presented cytotoxic and antiviral activities, while flavonoids from black bryony presented significant antioxidant activity [12, 13, 14, 15; roots aqueous and ethanol extracts showed anti-inflammatory and analgesic activity [16, 17].

Team work of Kucukboyaci evaluated the antioxidant and antimicrobial activity of aqueous extracts of *T. Communis* [18, 19]. Thus, they made two aqueous extracts of aerial parts with distilled water, and then lyophilized the extracts. Further, they made ethanol, *n*-hexane, ethyl acetate and chloroform separated extracts with the lyophilized plant material, and after they used those extract to evaluate the antioxidant activity by flow injection analysis and thio-barbituric acid assay. The aqueous plant extract was able to concentration-dependent scavenge DPPH radicals, where the quercetin was the most effective, followed by ascorbic acid, and then butylated hydroxytoluene (BHT). Also, phenolic and flavonoids compounds were reported having responsible for antioxidant potency of the *T. communis*. The experimental tests for antimicrobial activity demonstrated that the extracts did not present significant antimicrobial activity. Also, the concentration of minerals was low for potential and toxic elements such as: lead, cadmium, aluminum, but presented moderate concentrations of calcium magnesium, copper, iron, manganese and zinc [20].

Due to the oxalates crystals in needle shapes, some patients can also present histaminic reactions, and also by ingestion it could be possible to irritate the oral cavity, esophagus, stomach, and intestines.

The ethanol extracts of *T. communis* (80% ethanol, Soxhlet extraction) was used for impregnation of sterile cotton pellets, and after impregnation the ethanol was extracted by evaporation under vacuum using a rotavapor. The cotton pellets with plant bioactive compounds were used for determination of anti-inflammatory activity. The results proved that granuloma formation was decreased by 12, 27 and 49% for the dose levels of 5, 10 and 20 mg/pellet [17].

Conclusions

Tamus communis is a plant that we can find in different geographical areas. It is used mostly for preparation of extracts (aqueous, chloroform, ethanoic or other solvent extraction), poultice, infusions, tincture or ointments.

The anatomical parts of the black bryony present different composition in phenanthrens, phenols, flavones, anthocyanins, and minerals.

Pharmaceutic forms containing active principles of *T. communis* are used for as natural therapeutic approach which showed good effects in cases of gout, osteoporosis, cervical spondylosis, lumbosciatica, acute or chronic meniscus pain, rheumatism, shingles, frontal or maxillary sinusitis, trauma, hematomas, frostbite, arthritis, bone deformities, osteoarthritis, purple dermatoses, and acne.

Because of this benefic effects the plant is valuable as phyto-therapeutic natural product and deserve more experiments using different anatomical parts, various extraction solvents and methods, and more experimental tests for many disorders and medical problems.

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