

**PASSIFLORA – SOURCE OF SANOGENIC COMPOUNDS,  
PROSPECTS FOR MEDICINE AND CURRENT USES**

**PASSIFLORA – SURSĂ DE COMPUȘI SANOGENICI,  
PERSPECTIVE PENTRU MEDICINĂ ȘI UTILIZĂRI CURENTE**

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**Abstract.** *Passiflora* genus includes over 500 species, being the most spread of tropical flora. Originally from South America, with more than 60 edible species, *Passiflora* genus presents more and more interest among researchers. The passion fruit is remarked by a high content of vitamins, polyphenols and carotenoids, antioxidants and anticancer substances (have been identified 13 types of carotenoids, including beta-, zeta- and alpha-carotene, b-cryptoxanthin, lycopene). The researchers demonstrated the antioxidant and antibacterial activities of leaves and stems of *Passiflora quadrangularis*, *Passiflora caerulea* and *Passiflora edulis*. *Passiflora incarnata* species has been extensively studied due to its high content of active substances, which has been reported as antispasmodic, sedative and analgesic use. Considering the available biochemical data and the recording of sanogenic effects of the *Passiflora* genus, it is intended to increase the popularity of these species in order to raise their interest for acclimatization and cultivation in Romania.

**Key words:** ornamental plants, *Passiflora* species, medicine, bioactive compounds

**Rezumat.** Genul *Passiflora* cuprinde peste 500 de specii, fiind cel mai răspândit din flora tropicală. Originar din America de Sud, cu peste 60 de specii comestibile, genul *Passiflora* prezintă tot mai mult interes în rândul cercetătorilor. Fructul pasiunii se remarcă printr-un conținut ridicat de vitamine, polifenoli și carotenoizi, substanțe antioxidante și anticancerigene (fiind identificate 13 tipuri de carotenoizi dintre care beta-, zeta- și alpha-caroten, b-cryptoxanthin, lycopene). Cercetătorii au demonstrat activitățile antioxidante și antibacteriene ale frunzelor și tulpinilor de *Passiflora quadrangularis*, *Passiflora caerulea* și *Passiflora edulis*. Specia *Passiflora incarnata* a fost amplu studiată datorită conținutului ridicat în substanțe active, consemnându-se întrebunțările sale ca antispasmodic, sedativ și analgezic. Având în vedere datele biochimice disponibile și consemnarea efectelor sanogene ale genului *Passiflora*, se urmărește creșterea popularității acestor specii pentru a spori interesul în vederea aclimatizării și cultivării lor în România.

**Cuvinte cheie:** plante ornamentale, specii de *Passiflora*, medicină, compuși bioactivi

## INTRODUCTION

Plants are a source of bioactive compounds, food and human health being closely related to the presence of plants. Since ancient times, plant material is

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important for man's survival. The plant kingdom is the main supplier of chemical compounds used in food, pharmaceutical, cosmetic or agrochemical industries with significant economic value.

The *Passiflora* genus belongs to the Passifloraceae family, the largest of tropical plants, comprising over 500 species, and the genus is the most widespread of tropical flora. More than 350 species of the Passifloraceae family were found in tropical regions and tropical rainforests in South America, and 60 of them are edible (Patil, 2013). In addition to the decorative role of the *Passiflora* creepers, the sanogenic effects of these plants were first discovered in Peru, where the Spanish doctor Monardes, brought it to Europe in 1569. The *Passiflora* aerial parts were the most popular ingredients incorporated in most sedative extracts, tablets and sedatives. Infusion from plant leaves was used in North America in the mid-1800s. In many countries in Europe, America and Canada have been used as tranquilizers for neurosis for more than 200 years. *Passiflora* was first registered as an official medicine in the 1970s and 1990s by pharmacopoeias in America, Great Britain, Germany, France, Switzerland, Egypt and India. For example, in Germany, as early as 1979, there were 42 sedatives and six cardiotonics prepared from derivatives of this species. It has also been used to treat colic, dysentery, diarrhea, menstrual pain, insomnia, headache, eye pain, epilepsy and convulsions in pain or muscle spasms (Mowrey, 1986; Tyler 1994; Gontijo Silva, 2000).

Among the bioactive compounds that may be present in *Passiflora* leaves are counting alkaloids, saponins, cyanogen compounds, and mainly phenolic compounds. The passion fruit is appreciated for taste and aroma, but it is an important source of nutrients such as carbohydrates, flavonoids, alkaloids, ascorbic acid, carotenoids, vitamins, minerals and terpenoids. More than 200 components of passion fruit flavors have been described (Gislaine C. Silva *et al.*, 2014).

## MATERIAL AND METHOD

*Passiflora quadrangularis* (fig. 1) is a decorative vine appreciated for the great flowers, and especially for its tasty fruits. This species produces the biggest fruit of the *Passifloraceae*. The *Passiflora quadrangularis* extract is used in Caribbean to treat headaches or as sedative. Leaf tea is used to treat high blood pressure and diabetes (Dhawan *et al.*, 2004).



**Fig. 1** *Passiflora quadrangularis*  
([www.chilternseeds.co.uk](http://www.chilternseeds.co.uk))



**Fig. 2** *Passiflora edulis*  
(<https://en.wikipedia.org>)

*Passiflora edulis* (fig. 2.) is recognized and cultivated for its edible fruits and for its decorative impact. The traditional use of *P. edulis* for its sedative properties is well known in South America, particularly in Brazilian traditional medicine. Such a traditional use is based on the utilization of leaves and roots. Fruits are also highly appreciated and use against stomach cancer, considered as a digestive stimulant, against constipation and as a remedy against gastric carcinoma. Also, *P. edulis* has anthelmintic, diuretic, sedative properties, is used against colic sugars and in menopausal symptoms (Chopra *et al.*, 1956, Watt *et al.*, 1962, Hartwell, 1970; Kirtikar *et al.*; Mowrey, 1993).

*Passiflora incarnata* (fig. 3) has been recommended since the beginning of the century against insomnia and nerve manifestations during menopause. Its aerial parts (flowers, fruits and stems) have been used in traditionally medicine (in the USA) against anxiety and neuralgia (Brasseur *et al.*, 1984; Leclerc, 1920 cited by Gontijo Silva, 2000). *P. incarnata* is cultivated in Europe and widely used in homeopathy and phytotherapy. Since this species has a slightly sedative effect, it can be used in combination with other species of the same type of effect, such as *Valeriana officinalis*, *Humulus lupulus* and *Piscidia piscipula* for the treatment of insomnia (Rehwald *et al.*, 1995 cited by Gontijo Silva, 2000). In addition to these uses, it was also considered beneficial against headaches and blood pressure (Ody, 1996).

*Passiflora caerulea* (fig. 4) is especially appreciated for its ornamental value, its fruits are traditionally used as sedatives and anxiolytics. In India, Netherlands and South America the root was used as sedative and vermifug, and in Italy as antispasmodic and sedative (Kirtikar *et al.*, 1975; Hickey *et al.*, 1988 cited by Dhawan *et al.*, 2004).



**Fig. 3** *Passiflora incarnata*  
(<https://en.wikipedia.org>)



**Fig. 4** *Passiflora caerulea*  
(<http://en.hortipedia.com>)

## RESULTS AND DISCUSSIONS

**Bioactive compounds.** The *Passiflora* genus has been deeply investigated to determine bioactive substances. The chemical content of the species is not yet well established. Researchers are trying to differentiate if its sedative effects are due to hallucinogenic alkaloids such as harmin and harmalin, or flavonoids such as apigenin, luteolin or scopolentin (Tiwari *et al.*, 2016). Phytochemical analyzes highlighted the content of alkaloids, phenols, cyanogenic compounds and flavonoid glycosydes of *P. edulis* and *P. incarnata*. Passicol is a substance with antifungal and antimicrobial action, found in *Passiflora* leaves, produced in a higher rate when living tissue is injured (Nicolls, 1973).

✓ **Flavonoids** are the main bioactive compounds of Passifloraceae. From their category are part of apigenin, luteolin, C-glycosyl flavonoids, kaempferol, quercetin, vitexin, isovitexin, orientin and isorientin. The largest quantities of flavonoids have been found in leaves between pre-flowering and the flowering stages of the plant (Dhawan *et al.*, 2004; Ingale *et al.*, 2010).

✓ **Glycosides** are basic compounds of *P. edulis*. Passiflorins are the main glycosidic compounds active in this species, including luteolin-6-C-quinovoside, luteolin-6-C-fucoside, cyanophedinoid cyanohydrin glycosides, passicapsin, pasibiflorin, epipasicoracin and epithephilin (Seigler *et al.*, 1989; Olafsdottir *et al.*, 1989; Mareck *et al.*, 1991 cited by Dhawan *et al.*, 2004). One of the six isolated alkaloids of *P. incarnata* is called "passiflorine", a chemical compound considered by some researchers the active compound of the planet (Tiwari *et al.*, 2016).

✓ **Chrysin** is a natural flavor extracted from *P. caerulea* acting as an aromatase inhibitor, administered to cultures and athletes as a dietary supplement. The inhibitory effect of chrysin on mammary carcinoma cells, thyroid cancer cells and prostate tumors has also been reported (Yin *et al.*, 1999, Knowles *et al.*, 2000, Yin *et al.*, 2001 cited by Ingale *et al.*, 2010).

**Therapeutical properties.** *Passiflora* extracts are used in the pharmaceutical, food, or cosmetic industries. Traditional medicine plays an important role in the treatment of affections suffered by man, so that the population relies on traditional and plant-based medicines to 80%, according to The World Health Organization.

✓ **Generalized anxiety** may occur with twice the incidence in women than in males and up to 9% of the population. The *Passiflora* extract can improve the benzodiazepine concentration for generalized anxiety management. Passion flower tincture has anxiolytic effects. *Passiflora* treatment improves the control of emotions, diminishes irritability, and favors a calm state, so it can also be used to treat furies from panic attacks (Coleta *et al.*, 2006).

✓ **Hypertension** and cardiovascular disease remain the main cause of morbidity and mortality worldwide. *P. edulis* has been reported for its antihypertensive effects. The methanol or luteolin extracts from this plant has significantly lowers blood pressure by oral administration. *Passiflora* reduces the predisposition to infarction by almost 40%. Moreover, in combination with *Crataegus* spp., *Passiflora* increases effort, relieves breathing and improves the quality of cardiac life (Ichimura *et al.*, 2006).

✓ **Antimicrobial activity** of Passifloraceae may be an important step in the development of medicine. The identification or development of new antimicrobial substances is one of the priority directions for the elimination of antibiotic resistance situations. Passicol is a chemical component of *Passiflora* with antimicrobial properties. The extracts from passion flower leaves (with ethanol and acetone) against human pathogenic bacteria (*Pseudomonas putida*, *Vibrio cholerae*, *Shigella flexneri* and *Streptococcus pyogenes*) were tested by agar

inoculation. The results demonstrated remarkable activity against all bacterial pathogens (Mohanasundari *et al.*, 2007). The antifungal activity of extracts of *P. caerulea* and *P. edulis* on the mycelium of *Candida albicans* and *Cryptococcus neoformans* was tested to demonstrate the inhibition of germination and micellar growth of the fungus (Nicolls, 1973).

## CONCLUSIONS

The *Passiflora* genus is known on a large area at world level being highly appreciated for the gardens and terraces decoration, but also growing in pots for bright and spacious interiors. Numerous studies have demonstrated the use of the species in antimicrobial, cardiac or neurodegenerative treatments. Various types of extracts have been found to have compounds with a broad spectrum of action on certain organs, biochemical processes or physiological functions. At the level of Romania, the *Passiflora* genus is not sufficiently studied, but the potential culture and valorification of this plant would be high, both of the ornamental value and the therapeutic properties. Therefore, studies can be carried out on the acclimatization of *Passiflora* in Romania, as well as supplementing the research on the sanogenic potential and medicinal impact.

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