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REVIEW ARTICLE

GARDEN NASTURTIUM (*TROPAEOLUM MAJUS* L.) - A SOURCE OF MINERAL ELEMENTS AND BIOACTIVE COMPOUNDS

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ABSTRACT

The garden nasturtium (*Tropaeolum majus* L.) belongs to the family *Tropaeolaceae*. Native to South America it was brought to Europe in XVI century. It is a plant with numerous healing properties. Medicinal plants such as the garden nasturtium contain trace elements and bioactive compounds which can be easily absorbed by the human body. The flowers and other parts of the garden nasturtium are a good source of micro elements such as potassium, phosphorus, calcium and magnesium, and macro elements, especially of zinc, copper and iron. The essential oil, the extract from the flowers and leaves, and the compounds isolated from these elements have antimicrobial, antifungal, hypotensive, expectorant and anticancer effects. Antioxidant activity of extracts from garden nasturtium is an effect of its high content of compounds such as anthocyanins, polyphenols and vitamin C. Due to its rich phytochemical content and unique elemental composition, the garden nasturtium may be used in the treatment of many diseases for example the illnesses of the respiratory and digestive systems. High content of erucic acid in nasturtium seeds makes it possible to use its oil as treatment in adrenoleukodystrophy. It is also applied in dermatology because it improves the condition of skin and hair. More recently, the flowers of this species have been used as a decorative and edible element of some types of dishes. Aim of the review was to summarize available data concerning garden nasturtium *Tropaeolum majus* L.

Key words: *nasturtium, Tropaeolum majus L., chemical composition, bioactive compounds, healing properties*

STRESZCZENIE

Nasturcja większa (*Tropaeolum majus* L.) należy do rodziny *Tropaeolaceae*. Pochodząca z Ameryki Południowej, do Europy została sprowadzona w XVI wieku. Roślina ta znana jest ze swoich licznych właściwości prozdrowotnych. Wykazano, że jest źródłem pierwiastków śladowych i związków bioaktywnych, które mogą być łatwo wchłaniane przez organizm człowieka. Kwiaty, liście i nasiona zawierają makro- i mikroelementy (potas, fosfor, wapń, magnez, cynk, miedź, żelazo). Olejki eteryczne oraz ekstrakty z kwiatów i liści wykazują właściwości antybakteryjne, przeciwgrzybicze, hipotensyjne, wykrztuśne i przeciwnowotworowe. Właściwości antyoksydacyjne ekstraktów z nasturcji większej wynikają z wysokiej zawartości związków o charakterze przeciwutleniającym- antocyjanów, polifenoli, czy też witaminy C. Ze względu na bogaty skład związków fitochemicznych i wartościowy skład pierwiastkowy roślina ta znalazła zastosowanie w leczeniu wielu dolegliwości, na przykład chorób układu oddechowego i układu pokarmowego. Wysoka zawartość kwasu erukowego w nasionach daje możliwość wykorzystania oleju z nich w adrenoleukodystrofii. Nasturcję większą stosuje się także w dermatologii, ze względu na korzystne odziaływanie na stan skóry i włosów. W ostatnich kilku latach kwiaty nasturcji coraz częściej wykorzystywane są jako dekoracyjny i jednocześnie jadalny dodatek do potraw i napojów. Celem artykułu było zebranie danych dostępnych w piśmiennictwie na temat nasturcji większej (*Tropaeolum majus* L.).

Słowa kluczowe: *nasturcja, Tropaeolum majus L., związki bioaktywne, właściwości prozdrowotne*

BOTANICAL DESCRIPTION AND OCCURRENCE

The garden nasturtium (*Tropaeolum majus* L.) belongs to the *Tropaeolaceae* family [2, 23]. The plant is known under many names, some of them are: garden nasturtium, Indian cress or monks cress. It grows wildly in the mountainous areas of Central and South America. In these two regions, it occurs as a perennial plant [2, 23]. It was brought to Europe from Peru in the 16th century and is successfully cultivated as an annual, decorative plant [1, 2, 23]. There are many varieties of the plant that are different in terms of structure, size and the colour of flowers. Among other types, we can

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distinguish such varieties as: short shoots, long shoots, vines and semi-creeping, bushy or branchy plants [2, 5]. The garden nasturtium has creeping, fragile stalks which are between 30cm to 5m long. They creep on the ground or climb up supports [1, 28]. In Poland, there are two dominating varieties of the plant – the bushy one, and the vine. The latter (var. *altum*) has shoots up to 5m long, whereas the bushy form (var. *nanum*) reaches up to 30 cm of height [16]. The shoots are fleshy, thick and fragile, and they root easily while lying on the ground [28]. The leaves are round, with soft edges, yellow-green venation, and they have long petioles which entangle supports [1, 2, 5, 16, 28]. The flowers are large, with bilabial calyx and the lower lip is equipped with a spur [28]. They resemble small trumpets, 4-5cm wide, which grow out of the angles of the leaves on long pedicels [2, 5]. A long, up to 28 mm spur (nectary) grows out of one calyx [16]. The flowers can be single, half-full or full [28]. The crown of the flower consists of five petals and its colour ranges from yellow through orange to brick red [1, 28]. The root is short and branched [16]. The plant blooms and fruits from about May to November [1, 2, 28]. The fruit of the garden nasturtium is a schizocarp that splits up into three furrowed mericarps which are yellow-green and later shift to yellow-grey [23]. The whole plant has a characteristic pungent smell [28]. Because of its origins, the garden nasturtium is very sensitive to low temperatures. This is why sowing is performed in well aerated soil, around the half of May [5, 28]. The seeds sprout after 15-20 days, and the blooming occurs after 8-10 weeks [2]. The plant grows well in a well-lit or slightly shaded place [5]. It requires light soil of medium fertility and humidity [2]. Excessive use of nitrogen fertilizers has a negative effect on the plant as it leads to the formation of many leaves, but fewer flowers [28]. The cultivation of the plant involves soil aeration and the removal of weeds [2].

Chemical composition

The chemical composition in *Tropaeolum majus L.* is not fully known. The few available studies show the presence of some chemical components in particular parts of the plant, but the full characterization has not been performed. In the light of the available literature, it can be assumed that the chemical composition of the *Tropaeolum majus* L. is different depending on the part of the plant, the method and place of cultivation and the colour of flowers [7, 10, 11, 15, 26, 27, 29, 31]. Flowers are the most analyzed part of the plant in this context [10,11, 26, 27, 31]. The composition of seeds and flowers is significantly different (Table 1) [7, 26, 31]. Seeds turn out to be a richer source of protein, roughage and fats [7].

Table 1. Nutrients content in *T. majus* [7, 26, 31]

Components	Average content in flowers	Average content in seeds
Raw protein, %	26.7	1.99
Roughage, %	11.0	4.51
Ash, %	5.8	0.63
Non-protein nitrogen, %	0.6	-
Fats, %	7.6	0.33
Carbohydrates, %	-	7.14
Calories, kcal/100 g	-	21.44
Dry weight, %	11.27	-

In recent years, there has been an increase in the awareness of the importance of trace elements in relation to human health. Plants serve as a natural source of micro and macro elements. This is why phytotherapists recommend herbs, as they are a source of macro and micro elements that are easily absorbed and because numerous disorders result from their insufficiency. Diet supplements derived from plants and plant medicaments are usually characterized by higher bioavailability of elements than synthetic medicines. The knowledge of the content of elements present in plant resources applied in treatments is an important factor in the evaluation of their quality. It is important to know the content of elements in particular herb species and in their specific morphological parts. Furthermore, it is also imperative to evaluate their susceptibility to extraction, which determines their bioavailability. The content of elements in the particular above-ground and underground parts of the garden nasturtium is still largely unknown. Its flowers are the only resource studied in this regard. Two authors decided to characterize this resource [26, 31]. The data presented in literature is varied, which is probably the result of different conditions (sun exposure, type of soil, fertilizing), or maybe the plants themselves were of different varieties. These factors have a significant influence on the composition of elements in the plants' flowers, which may be related to their phytochemical properties. The flowers of the garden nasturtium are a good source of micro elements such as potassium, phosphorus, calcium and magnesium and macro elements, especially of zinc, copper and iron (Table 2). 100 g of nasturtium flowers covers 73-100% of the recommended dietary allowances (RDA) of zinc for an adult [26, 31]. Zinc is an essential micronutrient and an essential component of more than 300 metalloenzymes participating in the synthesis and degradation of carbohydrates, lipids, proteins, and nucleic acids as well as in the metabolism of other micronutrients [9]. Zinc supports normal growth and development during

pregnancy, childhood, and adolescence. It plays a role in immune system functioning, protein synthesis, wound healing, DNA synthesis and cell division. 100 g of the flowers of this plant provide from 0.55 to 0.64 mg of iron, which constitutes 3.9 to 4.6% of the recommended dietary allowances for this element in reference to adults [9]. Furthermore, the amount covers 7% of the daily need for phosphorus, 2.5% for potassium, 3% for calcium and 4% for magnesium. The flowers of the garden nasturtium are also a source of copper. According to various sources, they cover the daily need for this element from 1.2 to 5.2% [26, 31]. Studies showed that optimal intakes of elements such as sodium, potassium, magnesium, calcium, manganese, copper, and zinc could reduce individual risk factors, including those related to cardiovascular disease for both human beings and animals [18]. The studies carried out by *Navarro-González* et al. [26] documented the presence of strontium – 0.39 mg in 100 g of the plant's flowers. The element has anti-inflammatory and anti-itching properties. However, it has to be noted that the element might come from the pollution of the natural environment. This is why the area of harvesting of this resource has to be chosen carefully if the material is to serve in food or cosmetic industries.

Table 2. Minerals content in the flowers of *T. majus*

Mineral	[mg/100 g of fresh mass] [31]	[mg/100 g of fresh mass] [26]
P	48.13	0.050
K	245.33	0.225
Ca	33.72	0.055
Mg	14.93	0.035
Na	8.85	0.010
Fe	0.64	0.551
Mn	0.58	0.397
Cu	0.11	0.472
Zn	0.90	0.66
Mo	0.02	-
Si	-	0.040
Sr	-	0.388

The carotenoids and phenolic compounds were labelled in the flowers of *T. majus* (Table 3). The flowers were described as a good source of lutein, but the substance was partially esterified in this part of the plant. The content of compounds in particular groups is different depending on the colour of the flowers – yellow ones included 450 µg/g of lutein, and the yellow-brown ones 350 µg/g [27]. The dyes from the anthocyanin group paint the flowers of the garden nasturtium from yellow, through orange to red.

Table 3. Bioactive compounds in the flowers of *T. majus*

Compound group	Biologically active compounds
Carotenoids	Violaxanthin, Antheraxanthin, lutein, zeaxanthin, zeinoxanthin, β-cryptoxanthin, α-carotene, β-carotene [27]
Phenolic compounds	flavonoids (flavonols and anthocyanins): quercetin, myricetin, kaempferol, pelargonidin [26], delphinidin, cyanidin [11], the derivatives of hydroxycinnamic acid [26]

The main anthocyanin labelled in red flowers was delphinidin (114.5 mg/100 g of fresh mass) (Figure 1), in orange flowers – pelargonidin (58.2 mg/100 g of fresh mass) (Figure 2), whereas in yellow flowers the amount of pelargonidin and delphinidin was similar (31.9 mg/100 g of fresh mass) [10].

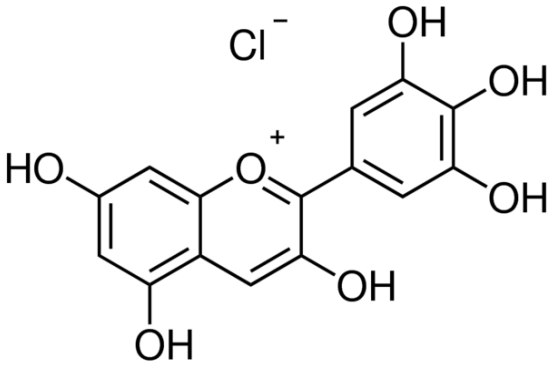

Fig. 1. The main dye in red flowers – delphinidin

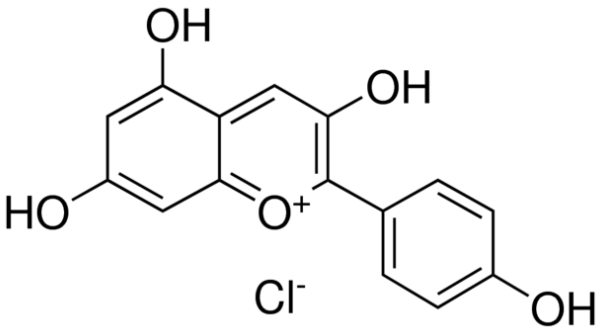

Fig. 2. The main dye in orange flowers – pelargonidin

Phenolic compounds content differs depending on the colour. Red flowers contained the biggest amount of myricetin (315.1 mg of the equivalents of myricetin/100 g of fresh mass) (Figure 3). The other compounds included 40.9 mg of kaempferol and 16.1 mg of quercetin. Orange flowers contained kaempferol (167 mg of the equivalents of kaempferol/100 g of fresh mass) (Figure 4), chlorogenic acid (81.2 mg of the

equivalents of chlorogenic acid/100 g of fresh mass), quercetin (9.7 mg of the equivalents of quercetin/100 g of fresh mass) and the lowest amount of myricetin (1.21 mg of the equivalents of myricetin/100 g of fresh mass). In the yellow flowers, the most numerous compounds of this group were the derivatives of the hydroxycinnamic acid (235 mg of the equivalents of chlorogenic acid), and the amount of these compounds was significantly larger in comparison to the two remaining varieties of flowers of *T. majus* (Figure 5). The total content of phenolic compounds was the lowest in yellow flowers [10]. Polyphenols' concentration was determined in infusions prepared from *T. majus* flowers. Their content, depending on the brewing temperature, varied from 97.3 up to 101.1 mg/l. The lowest amount of polyphenols was found in infusions prepared at 25°C, whereas the highest was obtained at 90°C. Antioxidant capacity, represented as % of DPPH (2,2-diphenyl-1-picrylhydrazyl) inhibition, for those infusions was also determined. Similarly, infusion prepared at 90°C had the highest antioxidant capacity, where at 25°C infusion characterized the lowest potential. Results of % DPPH inhibition varied within a range 16 – 36% [19].

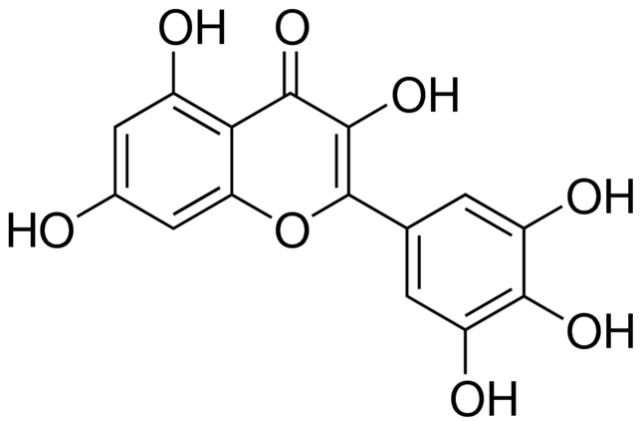

Fig. 3. Main phenolic compounds in red flowers – myricetin

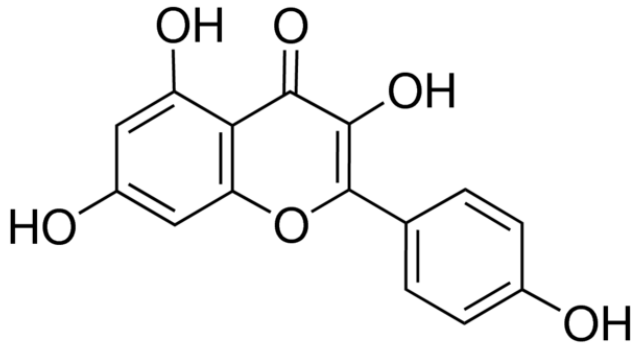

Fig. 4. Main phenolic compounds in orange flowers – kaempferol

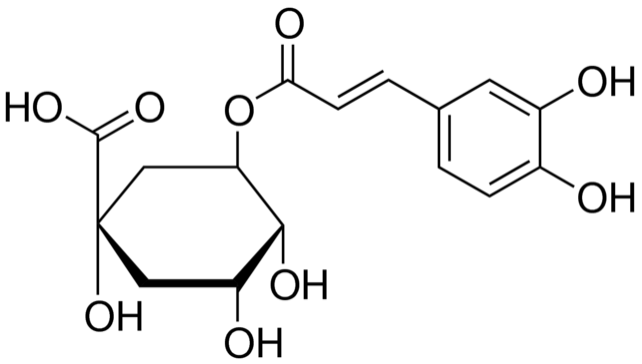

Fig. 5. The main phenolic compounds in yellow flowers – chlorogenic acid

The leaves and seeds of the garden nasturtium also consist of fatty acids, flavonoids, glucosinolates and tetracyclic triterpenes of cucurbitin. The chemical compounds belonging to the abovementioned groups labelled in *T. majus* are presented in Table 4.

Table 4. Fatty acids, flavonoids and glucosinolates in the leaves and seeds of *T. majus*

Compound group	Chemical compounds
Fatty acids	erucic acid, oleic acid, linoleic acid [29]
Flavonoids	isoquercetin, quercetin 3-glucoside, kaempferol [13, 14]
Glucosinolates	benzyl glucosinolate (glucotropaeolin), sinalbin [9]

The lutein was labelled in the leaves of *T.majus* and had a non-esterified form, similarly to the flowers [27].

The seeds and flower petals of *T. majus* include a large contribution of gondolic acid and erucic acid in triglycerides, whereas only trace amounts of linoleic and linolenic acids were found [30].

Mature seeds of *T. majus* have a cell wall built from xyloglucan polysaccharide (amyloid), and proteins and lipids as reserve substances [17]. The oil from the seeds of the garden nasturtium has a high content of monounsaturated fatty acids (>96%). The content of erucic acid reaches 80% in some varieties of the plant, whereas the content of eicosanoic acid is about 15%. The oleic acid, its content below 2%, shows an opposite correlation in relation to the erucic acid. According to *Carlson* and *Kleiman* [7], the varieties of the garden nasturtium can be divided into three groups on the basis of the content of oleic acid (<2%, 4-8% and 17,5%) or erucic acid (<68%, 68-74% and >76%). Small amounts of nervonic acid (<3%) and significant amounts of trierucin were also labelled in the oil from the seeds of *T. majus* [7].

44 chemical compounds responsible for the smell of the garden nasturtium were identified by means

of gas chromatography. Two of the compounds had the largest influence on the smell: (E)-hex-2-enal, responsible for the fruity note, and diethyl trisulfide which gives the aroma of sulphur [4]. Another aromatic compound labelled in *T. majus* is O,S-diethyl thiocarbonate [3].

THE HEALING PROPERTIES AND THE APPLICATION

Due to its rich phytochemical content, the garden nasturtium has been widely applied in folk medicine as a healing plant. Currently, it is used in such areas as medicine, cosmetology and cooking, and it is also valued as a decorative plant. The flowers of the garden nasturtium (*Tropaeoli Flos*), leaves (*Tropaeoli Folium*), herb (*Tropaeoli Herba*) and green or mature seeds (*Tropaeoli Semen*) are considered a herbal resource [16]. The abovementioned parts of the plant are used in order to create acetate, ethanol and water extracts, syrups, macerates, infusions and nasturtium alcohols [16, 29]. There is a rising tendency to use fresh nasturtium flowers and its immature green seeds as additional ingredients for a number of dishes [16]. Because of the presence of anthocyanins, especially in the orange flower petals, nasturtium extracts are often used as natural dyes in pharmaceutical and food industries. The properties of different parts of the resource cause different effects, which is probably related to the differences in chemical composition [29].

DIURETIC PROPERTIES AND THE EFFECT ON THE URINARY SYSTEM

The research carried out on rats confirmed that the water-ethanol extracts of the garden nasturtium have a diuretic effect. When administered orally (300 mg/kg) for 7 days, the extracts, rich in isoquercetin, caused an increase of Na+ in urine and had a diuretic effect [12]. Due to the large amount of glucotropaeolin (benzyl glucosinolate), the substance belonging to the group of glucosinolates [24], the leaves of the garden nasturtium also have an antibacterial influence on the urinary system [22]. In the human body, benzyl glucosinolate is transformed into benzyl isothiocyanate which, subsequently, undergoes transformation into the derivatives of acetylcysteine [34]. In the kidneys, these components are secreted to urine where a large portion of them is rehydrolysed to benzyl isothiocyanate [22, 34]. This phenomenon causes an increase in antibacterial activity through the inhibition of bacterial growth in the urinary system. The output amount of the consumed glucotropaeolin has to be large enough so that the appropriate amount of benzyl isothiocyanate is secreted to urine [22]. The problem with this phenomenon is that part of the substance undergoes decomposition when it is dried. This is why, to minimize the effect, the leaves of the plant should be used when they are fresh [22].

HYPOTENSIVE PROPERTIES AND INFLUENCE ON THE CIRCULATORY SYSTEM

Studies confirm that *T. majus* has a positive influence on the circulatory system. Hot infusions of the herb and macerates with honey stimulate circulation and purify blood. The alcoholic extracts, when applied on the skin and rubbed in, improve the circulation of lymph and blood in certain areas [32]. The research carried out on rats confirms that the water-ethanol extracts (10-300 mg/kg) and the ethanol fraction secreted from them, which is rich in isoquercetin (12.5-100 mg/kg), have a hypotensive effect in a dose-dependent manner. Regardless of whether they were applied via the duodenum or orally, they decreased the blood pressure of rats of both correct or increased blood pressure. Furthermore, no negative effects on the functioning of the heart were found in relation to the extracts or isoquercetin [13].

Antioxidative properties

The studies concerning the antioxidative potential of this plant focus mainly on the flowers of *T. majus*, which are a natural source of antioxidants [10, 11, 26, 31]. Vitamin C and anthocyanins are present in the petals [11, 16]. The antioxidant activity of the flowers of the garden nasturtium was measured by their ability to sweep DDPH and ABTS (2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid)) radicals and by the ORAC (Oxygen Radical Absorbance Capacity) method, which are often used in the evaluation of the antioxidant capacity of natural products [10, 11, 26, 31].

The ability of fresh orange petals to sweep the ABTS radicals was compared to the antioxidant capacity determined by the same method of the known food products. It was observed that the petals showed higher antioxidant capacity than American blueberries (45.9 μmol equivalents of trolox/g), which are considered to be one of the richest sources of antioxidants, and higher than blackberries (0-25.3 μmol of the equivalents of trolox/g of fresh mass), which are recommended for the improvement of nutritional value due to their high antioxidant capacity. In terms of the ability to sweep the DPPH radical, flowers of the garden nasturtium showed similar properties to those of cranberries (92.9 μm of the equivalents of trolox/g of dry mass) and strawberries (121.6 μm of the equivalents of trolox/g of dry mass). The flowers of the garden nasturtium are able to suppress these radicals probably through the reaction of electron transfer [11].

Table 5. Antioxidative properties of the flowers of *T. majus*

Method of measuring the antioxidative potential	Value according to *Rop* et al. [31]	Value according to *Navarro-Gonzales* et al. [26]
TPC (Total Phenolic Content)	3.31 g of the equivalents of gallic acid/kg of fresh mass	12.95 mg of the equivalents of gallic acid/g
TAC (Total Antioxidant Capacity)	5.12 g of the equivalents of ascorbic acid/kg of fresh mass	-
TFC (Total flavonoids Content)	1.35 g of rutin/kg of fresh mass	-
ORAC (Oxygen Radical Absorbance Capacity)	-	47.84 µmol of the equivalents of trolox/g
TEAC (Trolox Equivalent Antioxidant Capacity)	-	9.51 µmol of the equivalents of trolox/g

The antioxidative potential is often associated with the content of polyphenols. The content of phenols and other substances and the ability to reduce free radicals is presented in Table 6. Out of the three colours of flowers (red, orange and yellow), red flowers were labelled as having the highest content of flavonoids and the biggest capabilities of sweeping free radicals (ORAC) [10]. The content of polyphenols in all three colours of flowers was presented in Table 3. The content of vitamin C in orange flowers is 71.5 mg/100 g of fresh mass [11].

Table 6. Total polyphenol content (TPC) and the oxygen radical absorbance capacity (ORAC) in flowers depending on the colour of flowers of *T. majus* [10]

Flower colour	TPC value (mg of the equivalents of gallic acid/100 g of fresh mass)	ORAC value (µmol of the equivalents of trolox/100 g of fresh mass)
Red	908.7	18719
Orange	687.7	11790
Yellow	538.4	7111

Studies confirm that the content of polyphenols in flowers influences the flowers' antioxidative potential and that the compounds play an important role as natural antioxidants [11]. Red flowers showed the highest antioxidative potential [10].

Influence on adrenoleukodystrophy

Adrenoleukodystrophy is a recessive illness linked to chromosome X. It causes the disturbance of proximal beta oxidation, which results in the accumulation of long chains of fatty acids. This leads to the inefficiency of the adrenal cortex, the demyelination of white matter in the central nervous system and the inefficiency of male gonads [25]. The seeds of the garden nasturtium contain a high amount of erucic acid, which is one of the main components of the medicine used in the treatment of this illness – Lorenzo's Oil (a mixture of oleic and erucic acid) [7, 16]. Among plants rich in this type of acid, the family *Tropaeolaceae* – especially the garden nasturtium – is a resource with the highest content of the acid, which is at the level of 80% in the seeds. According to the most recent taxonomy, only one type belongs to this family – the garden nasturtium.

Influence on the respiratory system

The garden nasturtium is applied in the treatment of respiratory system illnesses [14, 20, 23, 32]. In folk medicine, it was used as a soothing medicine for chest illnesses. The extracts from the leaves were used in the treatment of tonsillitis and bronchitis [20, 23]. The syrups made from infusions and the macerates of *T. majus* also have an antiseptic and expectorant effect, which is useful during rhinitis [32, 33]. They also reduce the congestion of the respiratory tract [33]. In the Andean folk medicine, the garden nasturtium was used in the treatment of lungs and bronchia [29]. The infusions made from fresh or dried herb, combined with sugar or honey, are used in the treatment of respiratory system problems, cough, hoarseness and colds [14, 32]. After the consumption of the leaves of the garden nasturtium, there is a synthesis of the substances that inhibit the growth of the bacteria of diphtheria and a synthesis of the bacteria that cause the inflammation of lungs [29].

Influence on the digestive system

The water extracts prepared from dried herb and the macerates made of fresh herb have a strong bile-forming effect and they strongly stimulate the digestive system. The garden nasturtium is also credited for its ability to accelerate metabolism, regulate defecation and prevent cholelithiasis [16].

Anticancer effect

The glucosinolates present in the garden nasturtium undergo a number of thermal, enzymatic

and microbiological transformations in the body (with the contribution of the intestinal microflora). The compounds that are formed due to these processes may have an anticancer effect [8, 21].

Antibacterial and antifungal effects

Compounds present in the garden nasturtium inhibit the development of fungi, viruses, bacteria and protozoa [6, 16, 32]. The extracts from the garden nasturtium are effective in the treatment of bacteria resistant to sulphonamides and antibiotics [32]. The leaves have the strongest antibacterial effect [22]. Once they are consumed, there is a synthesis of substances that inhibit the growth of the bacteria of diphtheria and the bacteria that cause the inflammation of lungs [23, 29].

Influence on the skin and hair

T. majus is also used in dermatology. The vinegar extracts of the fresh garden nasturtium kill skin parasites such as mites, fleas and louses [32]. Nasturtium alcohol is used for problems with seborrhoea, eczema, pimples and skin lumps. Infusions of the dried herb diluted with nasturtium wine, water or vinegar can be used against acne [32]. The fresh herb, when used in wraps, helps in the treatment of bedsores and abscesses and it accelerates the healing of wounds and boils. The liquid created from the vinegar, alcoholic extract or wine of the herb of the garden nasturtium improves the colour and elasticity of the skin and facilitates the metabolic exchange in the skin [32]. Due to the high content of vitamin C, the garden nasturtium has antiscorbutic properties [29]. *T. majus* is a source of sulphur which strengthens hair and prevents it from falling out. The juice of the garden nasturtium leaves is useful against itching [16].

SUMMARY

The garden nasturtium is successfully cultivated as an annual decorative plant in many countries. It is used in phytotherapy, cosmetology and cooking. The garden nasturtium includes various biologically active compounds, such as flavonoids (isoquercetin, kaempferol) and carotenoids belonging to the group of phenolic compounds. This plant is also rich in micro and macro elements, such as potassium, phosphorus, calcium, magnesium, zinc, copper and iron. We need to underline that flowers of the garden nasturtium are a rich source of zinc which is responsible for many metabolic functions in the human body. Zinc is an essential component of metalloenzymes participating in the synthesis and degradation of carbohydrates, lipids, proteins, and nucleic acids as well as in the metabolism of other micronutrients. Thanks to these components, it has numerous healthy properties – antioxidative, hypotensive, antibacterial and anticancer. The garden nasturtium is rich in benzyl glucosinolate which has a anticancer and antibacterial effect. The plant is also used in the treatment of the illnesses of the respiratory, digestive and urinary systems. It is a resource rich in erucic acid, which is the main component of the medicine used in the treatment of adrenoleukodystrophy. *T. majus* is a potential phytotherapist which can be used in the treatment of many illnesses thanks to its content. The plant is worthy of recommendation in the prophylaxis of common ailments and in natural home cosmetology.

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