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Spice raw material available in the domestic grocery trade

Surowce przyprawowe dostępne w krajowym handlu spożywczym

Summary. Spices are a group of plants represented in every corner of the world by numerous species and used in a variety of ways. The analyses show that over 80 spice ingredients from plants belonging to 33 families are available in grocery trade in Poland. The most numerous families are: *Apiaceae*, *Lamiaceae* and *Zingiberaceae*. Both spices based on domestic plants and those found naturally in other climatic zones can be found on markets. The most spice raw materials come from plants that grow naturally and are grown in Asia and the Mediterranean countries. Some of the species, e.g. caraway (*Carum carvi* L.), wild celery (*Angelica archangelica* L.), oregano (*Origanum vulgare* L.), occur in the wild state in Central and Eastern Europe. In Polish grocery trade, spices are available mainly in dried and ground form, and the most sold ones are: black pepper, bay leaf, allspice, cumin, garlic, paprika, marjoram, fennel, parsley, nutmeg and cinnamon. Recently, mixtures of spices for specific meals such as pizza, fish, chicken, barbecued dishes and sauces, are also eagerly bought.

Key words: plant spices, chemical composition, culinary use, retail trade

INTRODUCTION

Trying to systematize the food products consumed by a man, it is possible to divide them into foodstuffs, which include: meat, milk, flour, potatoes, cheese, etc. and stimulants – e.g. tea, coffee, cocoa and spices (including plant spices). There are many definitions concerning the plant spices, and one of them states that "(...) plant spices are natural parts (roots, rhizomes, tubers, bark, leaves, herbs, flowers, fruits, seeds or their components) of a specific species, also in a dried conditions or after mechanical processing,

which due to their aromatic or peculiar taste or smell, are suitable as additives to food, improving its taste" [Begriffsbestimmungen für Gewürze… 1964].

Spices are used worldwide and have been accompanying our civilization for thousands of years [Szczepanowicz 2003, Sztaba 2009, Mueller-Bieniek 2012]. Formerly they were used mainly as medicines, preservatives for perishable products and to improve the taste of rotting food [Pirożnikow 2007]. Today, they are an essential addition in almost every kitchen. In addition to the effects on the organoleptic characteristics of meal, they also affect the human organism, because they stimulate digestion, improve appetite, regulate peristalsis and re-sorption, and can also act as a calming or stimulating agents on nervous system, also in disinfecting and diuretic manner. Currently, spice raw materials are used not only in kitchen, but in various industries: pharmacy, cosmetics and perfumery, or in the liquor industry [Grzeszczuk and Jadczak 2008, Baraniak and Kania 2014, Możdżeń et al. 2016].

It is difficult to find out when exactly people started using plants as food additives [King 1994, Senderski 2007]. Probably, in the Stone Age, a man tried to improve the taste of raw meat using different types of plant raw materials such as: leaves, roots, tubers, rhizomes and fruits. In the excavations from this period, archaeologists have found caraway seeds, poppy seeds and remains of angelica. However, these are information, on the basis of which we can only speculate on this subject. The first and the earliest confirmed notes on spices are contained in Sumerians' texts from 5,000 years ago, who used, among others, laurel tree leaves, caraway fruits, thyme, onions and garlic [Turowska and Olesiński 1951].

Gathering of knowledge and skills in the field of cultivation, harvesting and use of spices gradually penetrated from East to West into the Mediterranean area for millennia [Szymański 2007]. The interest in these plants was so large that their descriptions were found in the works of Hippocrates (460–377 BC), Pliny the Elder (23–79 BC), and Teofrastus of Erasos (370–287). In the Bible, spice plants are part of the scenery of events, beginning with the Old Testament [Szczepanowicz 2003]. In the Middle Ages, consumption of spices and demand for them increased. In that period, spices were used for preserving the food products and served as a way to honor distinguished guests. Monastic orchards and gardens have become a perfect place for growing this type of plants. It was also there that work was underway upon the domestication and refinement of new spice plants, such as hops. Benedictines tried to use spices not only for meals, but also for drinks. Due to spices, they also created excellent vodkas and liqueurs known to this day – using lemon flowers or rhizomes of calamus and ginger [Turowska and Olesiński 1951, Senderski 2007].

Gradual decrease in interest in spices in the 20th century was caused by technological progress in the food industry. Many of spices got completely out of use, and people did not realize their existence and possible applications. Recently, however, there has been a growing interest in plant products, among which spices occupy an important place. People recognize the harmful effects of consuming products containing artificial additives and begin to return to natural products [Żwirska et al. 2015].

The aim of the paper is to review the spice raw materials commonly available in grocery trade in our country and their general characteristics and application.

METHODS

The study was prepared based on the analysis of offers from selected food companies selling spices or their mixtures. Both small regional stores were considered: PHU Roman Zieliński Wszystkie Przyprawy Świata, as well as well-known supermarket and discount food chains operating throughout the country: Delikatesy Alma Market SA, Carrefour, Biedronka. Due to marketing reasons, it is not revealed in the study which stores offer individual spice products in order to avoid suspicion of surreptitious advertising.

To characterize raw spices, among others, following books were used: Czikow and Łaptiew [1982], Hlava and Lanska [1983], Nowiński [1983], Kybal and Kaplicka [1985], Šedo and Krejča [1989], Rejewski [1992], Vaughan and Geissler [2001], Szymanderska [2006], Markuza [2010], and information from the internet portal [http://www.przyprawowy.pl]. In this case, the following features were taken into account: nomenclature (scientific and common), origin, content of active substances, type of raw material used, form of a plant substrate available for sale and culinary use.

In this study, affiliation to families and Latin names of plants was adopted according to "The International Plant Names Index", and the systematic order of families according to Reveal [2007], who took into account changes in the nomenclature of many taxa from 2005.

RESULTS

The study includes 85 spice raw materials available in domestic trade. They are obtained from plants belonging to 33 families. The most-numerously represented families are: *Apiaceae* (11 species), *Lamiaceae* (11 species) and *Zingiberaceae* (6 species). Five representatives each represent families: *Rosaceae* and *Solanaceae* (Fig. 1).

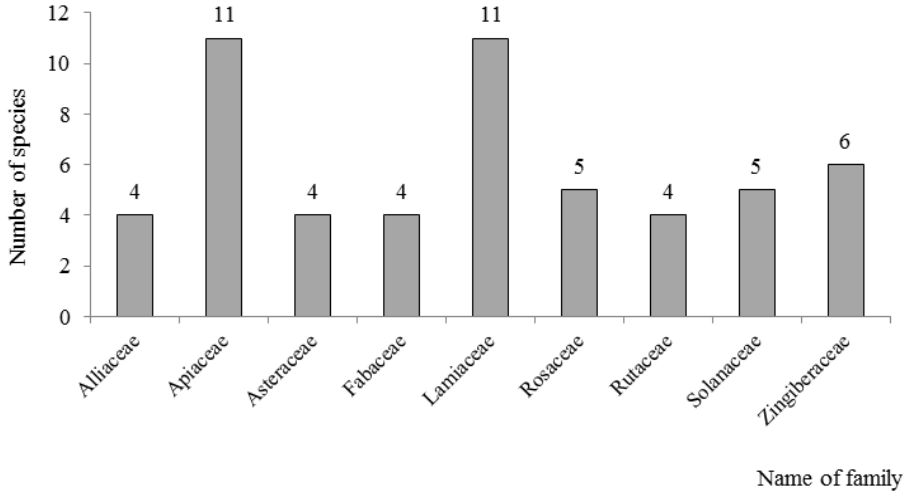

Fig. 1. Comparison of the number of spice species from the most representative families

Most of the spice raw materials originate from Asia, south-east Asia and from areas of Europe, mainly from Mediterranean countries (Fig. 2). Only 15 species of spices are an element of the native flora. The remaining species come from warm and hot climate zones, hence their raw materials are imported to Poland (Fig. 3).

The list of spices and vegetable raw materials available in grocery trade on Polish market, along with their characteristics, is given in Table 1.

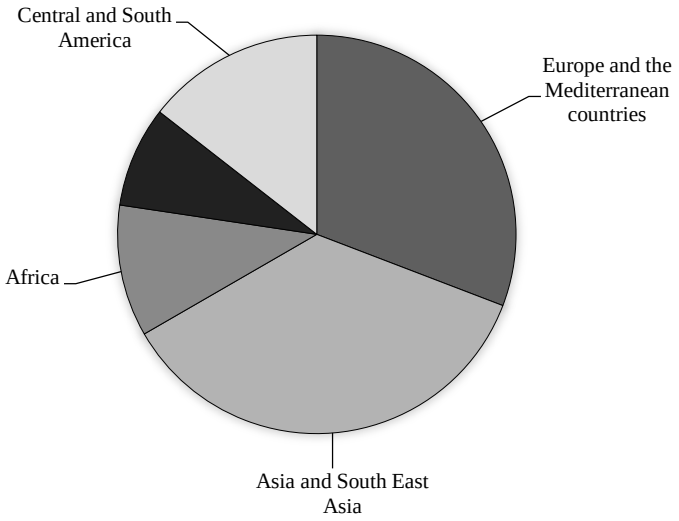

Fig. 2. Origin of spice species recorded in the food trade

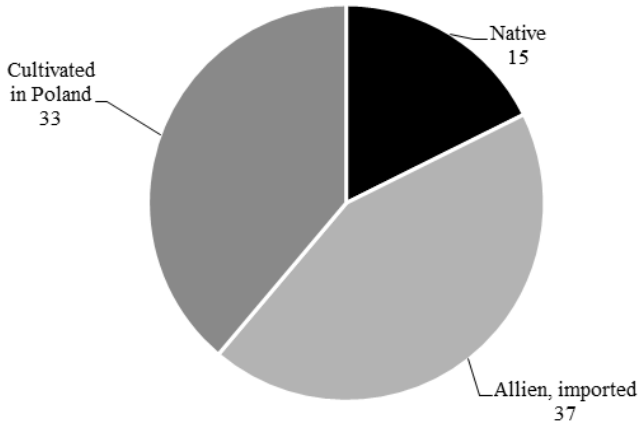

Fig. 3. Comparison of the number of spice species – native, cultivated in Poland (of foreign origin) and imported, the raw materials of which were recorded in food trade

DISCUSSION

Most of the spices used today were initially applied as medicinal plants. Particularly high importance was attributed to exotic species, believing that they have magical and miraculous effects [Lewkowicz-Mosiej 2013]. Exceptional aroma and taste as well as healing properties gave rise to the desire to trade the spices. Learning more and more plants and their applications significantly increased the sale of spices [Turowska and Olesiński 1951]. Trade in these products since ancient times, has gained pace and more and more other countries had a monopoly on their distribution. The merchants saw great opportunities in it. Their relatively easy storage and transport at a very high price per weight unit made them perfect for overseas trade. Over the centuries, the spice trade experienced periods of many falls and ups, because prices of spices were comparable to that of gold, pearls and precious stones [Tumiłowiczowa 1938].

The value and application of each spice are determined by specific organic compounds that give it a specific scent and flavor [Lutomski 2001]. In terms of chemical structure, these substances are very diverse. All affect our senses – taste and smell receptors [Blaim 1965, Łuczaj 2004]. Spice raw materials, like other plant-origin raw materials, are abundant, among others, in proteins, fats, carbohydrates, minerals, vitamins, enzymes or phytohormones [Melchior, Kastner 1978, Kohlmüntzer 1985, Jadczak and Grzeszczuk 2004, Szajdek and Borowska 2004]. Essential oils, also known as volatile oils or essences are an important component of plant spices [Seidler-Łożykowska et al. 2006, Góral and Kluza 2008]. They are fragrant organic substances with a complex chemical composition. They are dominated by terpenes and their derivatives. Some stimulate the nervous system, others may increase the secretion of gastric juice, stimulating appetite or acting as a disinfectant [Adaszyńska and Swarcewicz 2013]. Examples of spice plants abundant in this type of substance are: peppermint, lemon balm, thyme, marjoram (Table 1). Another interesting component of volatile oils are fucocoumarins found in the roots and fruits of celery plants (*Apiaceae*) and mints (*Lamiaceae*), that act as an antispasmodic agent and stimulate metabolism [Della Beffa 2004]. In the commercial offer of the Polish grocery market, raw materials obtained from plants belonging to those families constitute the largest group (Fig. 1).

Spice plants also contain steroids, among which sterols (present in many plant oils) and saponins, can be distinguished [Kopeć et al. 2011]. Saponins are glycosidic compounds capable of forming with water, colloidal, foaming solutions that reduce the surface tension of liquids. In small doses, they irritate the mucosa of the gastrointestinal tract, while in larger ones, they are poisonous [Sadowska et al. 2014]. They can be found, among others, in nigella and licorice (Table 1).

A special position among active compounds present in spices, and especially in stimulants, is occupied by alkaloids, which are a very numerous and chemically diverse group (up to now, about 12,000 have been identified). They are organic nitrogen compounds, very active physiologically, and many of them are potent drugs or poisons [Grau et al. 2004, Adaszyńska i Swarcewicz 2013]. Particularly abundant in alkaloids are plants from the families: *Ranunculaceae*, *Papaveraceae*, *Piperaceae*. Without alkaloids, we would not feel the characteristic stinging taste of black pepper. Alkaloids in pepper, especially its spicy varieties, such as ‘Habanero’, have also a significant flavor (Table 1).

Table 1. List of spice plants and raw materials available in retail trade on Polish market including: synonyms and common names, affiliation to families, origin, chemical composition of the raw material, its forms available in the trade and use in the cuisine

No.	Name of species, = synonyms, common names	Origin	Chemical composition	Raw material, form	Culinary use
1	*2*	*3*	*4*	*5*	*6*
Family: *Cupressaceae* Gray					
1.	**Juniper** *Juniperus communis* L. (common juniper) – N	South Europe	essential oil, terpenes (pinene, kamfene, cardynene, limonene, terineol), flavonoids, glycosides, tannins, resins, bitters, sugars, pectins, vitamin C, organic acids	dried whole fruits – juniper berry	for roasted meats, sausages, stew, stewed vegetables, salads, patés, and for marinating fish
Family: *Schisandraceae* Blume					
2.	**Anise** *Illicium verum* Hook. f., (star anise, staranise, star anise seed, Chinese star anise, badiam) – I	South East Asia	essential oil containing at least 86% *trans*-anetol; tannins, resins and sugars	dried, ground or whole fruit (8 single-seeded bags)	for cakes, compotes, puddings and for flavoring low-alcoholic beverages (eg liqueurs), dishes made of beef, chicken, soups
Family: *Myristicaceae* R. Br.					
3.	**Nutmeg** *Myristica fragrans* Houtt. (mace) – I	Asia	essential oil, fats, myristic acid, oil (myristic butter)	dried seeds (whole or ground) – nutmeg, parchment (macis = mustard flower)	for cakes, puddings, creams, cheeses, soufflés and cheese sauces, it complements the taste of dishes from eggs and vegetables (cabbage, spinach, broccoli, beans, onions and others); gives the taste of Italian mortadella, Scottish haggis (a mutton-like dish similar to black pudding), and Middle Eastern lamb dishes
Family: *Lauraceae* Juss.					
4.	**Cinnamon** *Cinnamomum verum* J. Presl. (true cinnamon tree, Ceylon cinnamon tree) – I	South East Asia, South America, Tropical zone countries	cinnamic aldehyde, eugenol, triterpene compounds, slimes, tannins, starch, sugars	fermented and dried bark (ground or in pieces)	spicy-sweet taste fits desserts, cakes and sweets as well as meat, soups, fish and various types of beverages

5.	**Laurel** *Laurus nobilis* L. (bay laurel, sweet bay, bay, true laurel, Grecian laurel, laurel tree) – I	South Europa, Africa, America	cyneol, pinene, felandrene, geraniol, linalol, tannins, bitters, sugars, starch, sesquiterpenes (eugenol), lauric, palmitic, oilic and linolic acids glycerides	dried leaves (whole or ground), in mixtures	for soups, marinades, stew, sauces, boiled fish, pates, meat jellies
Family: *Piperaceae* Giseke					
6.	**Black pepper** *Piper nigrum* L. (pepper) – I	South East Asia	alkaloids (piperine), fats, sugars, vitamin A, B_6, iron, magnesium, sodium, potassiumsium	fresh pickled fruits (whole green pepper), dried fruits (i.e. black, whole or ground), after removing the shell (white pepper, ground pepper); a mixture of black or white pepper with citric acid, lemon zest and curcuma (lemon pepper); colorful mix and others	very wide culinary use: for various marinades, soups, sauces, fish, meats, etc.
Family: *Orchidaceae* Juss.					
7.	**Vanilla** *Vanilla planifolia* Andrews. (flat-leaved vanilla, Tahitian vanilla, West Indian vanilla) – I	South and Middle America	vanilla oil (vanillin and traces of: eugenol, piperonal and capronic acid)	fermented and dried, pod-shaped seed bag – vanilla stick: whole, powder, oil, sugar	for cakes (cheesecakes, mazurkas, biscuits, etc.), cakes and various sweets, including chocolate, for drinks and tinctures, fruit desserts, etc.
Family: *Iridaceae* Juss.					
8.	**Saffron** *Crocus sativus* L. (saffron crocus, autumn crocus) – U	South East Europe or Asia Minor	bitter picrocrocin (gives the spice characteristic taste), safranal (gives fragrance) and crocin (yellow pigment)	dried marks	to give flavor, aroma and color to sauces, soups and dishes of rice with fish and seafood (Spanish paella and bouillabaisse), bakes, e.g. donuts, confectionery and alcohol production

Table 1 – cont.

1	*2*	*3*	*4*	*5*	*6*
Family: *Alliaceae* Borkh.					
9.	**Onion** *Allium cepa* L. (bulb onion, common onion) – U	probably Central Asia	thiamine, ryboflavin – niacin, folic acid, vitamins: B_6, A, E, K, C, fitoncides, mineral salts of: phosphorus, magnesium, sulfur, zinc, silica, potassiumsium	dried and fresh bulbs (storage leaves) and chives (green leaves) dried, roasted leaves, mixtures	for sandwiches, vegetable salads, curd and pastes, soups, roasted meat: pork, mutton, poultry, venison and fish, for sausages, hams, pates, marinades, etc.
10.	**Ramsons** *Allium ursinum* L. (ramsons, buckrams, wild garlic, broad-leaved garlic, wood garlic, bear leek, bear's garlic) – N	probably Central Asia	essential oil ursalin (divinyl polysulfides and thiols, alliin, methiin), vitamins A, C, pro-vitamin A, mineral salts of: phosphorus, potassiumsium, magnesium, iron, bitters, tannins, glycoside flavonoids, phenolic compounds, steroid saponins, lectins, polysaccharides (fructans), fatty acids, phytoncides	dried (ground, crumbled) and fresh leaves	for various pastes based on cottage cheese, soups and sauces, patés
11.	**Garlic** *Allium sativum* L. (European garlic, Italian garlic) – U	Central Asia, Europe, Africa	essential oil, pro-vitamin A, vitamins PP, C, B_1, B_2, B_3, mineral salts (phosphorus, potassiumsium, iron,),	bulbs (cloves) in fresh or dried form (ground, dried flakes, granulated, mixtures, e.g. Mr. Harris)	just like onions
12.	**Chives** *Allium schoenoprasum* L. = *A. schoenoprasum* var. *alpinum* DC., *A. schoenoprasum* var. *foliosum* Reg. *A. sibiricum* L. (garlic chives, Chinese chives) – U	Europe and Asia	vitamin C, carotene, vitamin B_2, sodium, calcium, potassium, phosphorus, iron, carbohydrates, phytoncides	dried and fresh leaves	for curd cheese, cheese pastes, vegetable salads, stews and soups or for the decoration of ready-made soups, sauces and other meals, eg scrambled eggs, sandwiches, casseroles, potatoes, etc.
Family: *Arecaceae* Bercht. & J. Presl					
13.	**Coconut** *Cocos nucifera* L. (coconut palm) – I	South East Asia, North West America	fats (abundant in lauric and myristic acids), coconut water, vitamin C, amino acids (isoleucine, leucine, lysine, phenylalanine, valine, arginine, asparagic acid, glycine, proline, serine), carbohydrates, potassium, calcium, chlorides, iron	endocarp forming a seed (so-called coconut) in ground form (spice shavings) or fresh; liquid form of endosperm - coconut water, palm milk	in confectionery, an addition to cakes, sweets (chips), drinks (vodkas and liqueurs), desserts, etc., as a coating

Family: *Poaceae* Barnhart					
14.	**Lemon grass** *Cymbopogon citratus* Stapf = *Andropogon citratus* DC. (oil grass) – I	South East Asia, North Africa	essential oil, citral – organic compound from aldehyde group, vitamin C	dried stems	dried or fresh as an addition to soups, seafood dishes, marinades, drinks including fruit teas, etc.
Family: *Zingiberaceae* Martinom					
15.	**Melegueta pepper** *Aframomum melegueta* K. Schum.= *A. grana-paradisi* (L.) K.Schum., *Alpinia grana-paradisi* (L.) Moon, *Amomum grana-paradisi* L., *A. grandiflorum* Sm., *Cardamomum grana-paradisi* (L.) Kuntze, (**grains of paradise, melegueta pepper, alligator pepper, Guinea grains, ossame, fom wisa**) – I	West and Central West Africa	alkaloids, flavonoids, phenols, tannins and saponins, antioxidants	seeds	formerly for beer, wine, spirits, now in Scandinavia for flavoring aquavitas and vinegar, a substitute for ginger and cardamom pepper
16.	**Greater galangal** *Alpinia galanga* Willd. = *Maranta galanga* L., *Languas vulgare* Koenig, *Amomum galanga* Lour. (Thai galangal, blue ginger, Thai ginger) – I	South East Asia	volatile oil containing alpinone, galganol, tannins	dried (powdered) or fresh rhizome, seeds	for dishes of meat, fish, various kinds of soups, eg potato, pea and bean soups and fatty sauces
17.	**Ginger** *Zingiber officinale* Rosc. (ginger root) – I	Asia, Mediterranean areas	essential oil containing gingerol, zingerone and citral, sesquiterpenes (ziniberene, zingiberol), resins, starch, sugars, organic acids	fresh or dried whole or ground rhizome, marinated or candied	for meat (poultry, pork, veal and fish), suitable for salads, drinks, eg tea, beer (ginger ale type), oriental soups; in confectionery - spice for gingerbread, various cookies, puddings, hot chocolates and marmalades, especially apple ones
18.	**True cardamom** *Elettaria cardamomum* Maton (green cardamom) – I	Asia, Central America	essential oil, terpenes (cyneol, linalol, limonene, sabinene, borneol, alfa terpineol, alfa-terpinene acetate), fats, calcium salts	seeds or whole bags (ground)	for teas, coffees, alcoholic drinks: vodkas, liqueurs (eg angostura and curacao), for cakes, meat marinades, sausages, silage and sauces

Table 1 – cont.

1	*2*	*3*	*4*	*5*	*6*
19.	**Black cardamom** *Amomum subulatum* (hill cardamom, Bengal cardamom, greater cardamom, Indian cardamom, Nepal cardamom, winged cardamom, brown cardamom) – I	Asia	kardamonin, flavonoid alpinetin, 3,5-petunidin diglucoside and leucocyanidine glycoside; seed oil containing cineols	whole bags (ground), in mixtures	for goulash, sauces, soups and rice, a component of garam masala
20.	**Turmeric** *Curcuma longa* L. (no synonyms found) – I	South Asia, Central America	essential oil, sesquiterpenes (turmerone, arturmerone), carbohydrates and fats, curcuminoids (curcumin, desmetaoxycurcumin), mineral salts abundant in microelements	ground, dried, bulbous rhizome, in mixtures	addition to spice mixes, such as: curry or garam masala; Suitable for marinades, meat dishes (especially lamb), fish and poultry, as well as vegetables and rice
Family: *Papaveraceae* Juss.					
21.	**Poppy** *Papaver somniferum* L. (opium poppy, breadseed poppy) – U	Mediterranean countries, Middle East	proteins, fats, alkaloids (morfin, kodein, papaverin, tebain, noskopin), alkaloids, anthocyanins, organic acids, slimes, phytosterols, mineral salts	dried seeds, oil	for cakes, sweets, bread, salad oil
Family: *Berberidaceae* Juss.					
22.	**Barberry** *Berberis vulgaris* L. (common barberry, European barberry) – N	South and Central Europe, West Asia	alkaloids (berberin), bitters, tannins, resins, wax, vitamin C and E, slime, organic acids (malic), pectins, sugars, ascorbic acid, carotenoids, carotene	dried fruits	addition to juices, jams, wine, spirits and liqueurs, dried ground fruits can be seasoned with meat (in the Caucasus barberry, water, pepper and salt are prepared a spicy seasoning for meat dishes), fish and sauces
Family: *Ranunculaceae* Juss.					
23.	**Black caraway** *Nigella sativa* L. (black cumin, nigella, kalonji) – U	Iraq, Turkey	alkaloids: diterpene (nigellamin), isochinoline (nigellimin N-oxide, called nigelline), rare in plant kingdom indasole alkaloids (nigellidin and nigellicin), essential oil (trans-anetol, limonene, p-cymene, carvone, tymoquinone), tymoquinone polymer, nigellon, flavonoid glycosides, tannins, saponins, bitters	dried whole or ground seeds	for cakes and bread, cheeses and fatty meats, silage and pickles

Family: *Myrtaceae* Juss.					
24.	**Cloves** *Syzygium aromaticum* (L.) Merr. & Perry = *Eugenia caryophyllus* (Spreng.) Bullock & S.G.Harrison (no synonyms found) – I	Malay Peninsula, Zanzibar, Madagascar	clove oil, tannins, caryophillin, eugenin, oleanic acid, slimes	dried flower buds (cloves), whole or ground, in mixtures	for seasoning sweet and sour dishes, white meats, marinades, pickles and pickles, gingerbread spice ingredient, for desserts, drinks
25.	**Allspice** *Pimenta dioica* (L.) Merr. = *Myrtus dioica* L., *M.s pimenta* L., *Pimenta officinalis* Lindl., *P. pimenta* (L.) H. Karst., *P. vulgaris* Lindl.,(pimenta, Jamaica pimenta, myrtle pepper) – I	Central and South America	essential oil, eugenol, resins, tannins, sugar, malic acid, gallic acid	dried berry-like fruit, whole or ground	for meat dishes - roasts (eg pork loin), pates and jellies, marinades, pickles, canned goods, sauces, soups and stuffing, stew, Greek-style fish or vegetable salads, curry mixtures, alcohol liqueurs and desserts (cakes)
Family: *Fabaceae* Lindl.= *Leguminosae* Juss., = *Papilionaceae* Giseke					
26.	**Fenugreek** *Trigonella foenum-graecum* L. (Greek hay) – U	Asia and East Europe	slimes, steroid saponins (diosgenine derivatives), foenugracein, large amounts of proteins, fats, vitamin B_3, flavonoids, protein compounds, choline, alkaloid trygonelin, essential oil, vitamin PP, mineral salts	dried seeds	for marinades, spice mixes: curry, panch phoron, Saltah, szarena sol, pasta, bread, meat dishes (veal and beef) and fish (tuna or mackerel), soups, curds, dips, dressings and other types of sauces
27.	**Liquorice** *Glycyrrhiza glabra* L. (licorice) – U	Mediterranean countries, West Asia	essential oil, tannins, flavonoids, large amounts of carbohydrates, triterpene saponins (glycirisinic acid, glycirisin), hydroxycoumarins, phytosteroles, amino acids, betaine, choline, resins, bitters, mineral salts	dried, powdered root	for drinks, cocktails, liqueurs (eg Italian Sambuco liqueur), beer (eg Guinness), confectionery: cakes, other pastries and sweets
28.	**Peanut** *Arachis hypogaea* L. (groundnut, goober) – I	South America, Africa, Europe, Asia	numerous amino acids, greasy oil (abundant in arachidonic acid), proteins, sugars, vitamin B_1, E, H, panthotenic acid, purins, saponins, mineral salts	roasted seeds contained in pods (peanuts), shelled, roasted, salted	for desserts, cakes, confectionery, salads and vegetable pastes
29.	**Alexandrian senna** *Senna alexandrina* Garsault (Egyptian senna, Tinnevelly senna, East Indian senna) – I	Africa, Asia	sennosides A-D, A_1, E and F (antraglycosides), glycosides rheiny = reiny (rhein-8-O-glukozyd) and aloe-emodins, naphthalene glycosides, flavonoids (kaemferol, isoramnetin), tannins and bitters	ground, dried leaves and pods	addition to herbal teas that improve digestion

Table 1 – cont.

1	*2*	*3*	*4*	*5*	*6*
Family: *Rosaceae* Juss.					
30.	**Chokeberry** *Aronia melanocarpa* (Michx.) Elliott) = *Photinia melanocarpa* (Michx.) Robertson & Phipps (black chokeberry) – U	North America	organic acids, flavonoids (quercetine derivatives), anthocyanins, phenoloacids, tannins, pectins, vitamins E, PP, of group B, C and P, potassium, calcium, phosphorus, magnez, iron, iodine, manganese, molybdenum	dried fruits	for roasted meats, sandwiches, desserts, tinctures, teas
31.	**Hawthorn** *Crataegus monogyna* Jacg. = *C. oxyacantha* var. praecox hort. ex Loudon (common hawthorn, single-seeded hawthorn, may, mayblossom, maythorn, quickthorn, whitethorn, motherdie, haw) – N	Asia, Europe, North Africa	flavonoids (hiperoside, protocyanide), saponins, tannins, crategins, anthocyanidins and amines, choline, purine derivatives, pectins, caffeic acid, triterpene acids (urosolic, hawthornic), large amounts of vitamin C	dried fruits	addition to jams (eg from apples), marmalades and jellies, for flavoring liqueurs or fruit syrups, for cold and hot beverages (eg fruit teas)
32.	**Almond** *Amygdalus communis* L. = *Amygdalus dulcis* Mill., *Prunus communis* (L.) Arcang., *P. dulcis* var. *amara* (DC.) Buchheim (no synonyms found) – I	Asia, North Africa, Europe	triglycerides (almond oil), fats, glycosides, starch, proteins, slimes, vitamins B_2, A, E, D, saccarose, oleic acid, linolic acid, palmitic acid, stearic acid	shelled pits (almonds) whole, ground (roasted, blanched, salted) or in the form suitable flakes, oil	as an addition to various types of confectionery, including for the production of marzipan, cereals - for vegetable and fruit salads
33.	**Dog rose** *Rosa canina* L. (wild rose) – N	Europe, North America	vitamins C, B_1, B_{12}, E, K, P, provitamin A, organic acids, flavonoids, tannins, carotenoids, tannins, sugars, xanthophylls, pectins, mineral salts	dried hypance (apparent fruit), whole flowers or their petals	addition to teas and alcoholic beverages, fruit jam for meats (especially venison) and confectionery (eg donuts)
34.	**Plum** *Prunus domestica* L. (common plum) – U	Asia	proteins, sugars, fats, vitamin A, vitamins of B, E groups, mineral salts	dried and smoked fruits (drupes)	addition to meats and cabbage dishes, eg stew, for bread, snacks, salads, fruit cocktails, desserts and other sweet dishes

Family: *Urticaceae* Juss.					
35.	**Nettle** *Urtica dioica* L. (common nettle, stinging nettle, nettle leaf) – N	Europe, Asia, North Africa, North America	formic acid, proteins, iron, potassium, sulfur, calcium, vitamins A, K, B_2, B_6, C, tannins, flavonoids, phytoncides, organic acids, phytosterols, plant pigments (chlorophyll, xanthophyll, beta-carotene), mineral salts (calcium, magnesium, iron, potassium, silica, phosphorus, iodine, sulfur, sodium)	dried leaves	as an addition to salads, cottage cheese, soups, stews, egg dishes, pastes and herbal teas
Family: *Cucurbitaceae* Juss.					
36.	**Pumpkin** *Cucurbita pepo* L. (squash) – U	Central America and southern states of the USA	cucurbitacins, phytosterols (beta-sitosterole), enzymes, greasy oil containing unsaturated fatty acids, caroteneoids, vitamins E and B_1, mineral compounds (magnesium, zinc, selenium etc.)	dried, shelled seeds, marinated berry fruit pulp	as an addition to bread and cakes, vegetable salads and pastes, as a topping for meat
Family: *Juglandaceae* DC. ex Perleb					
37.	**Walnut** *Juglans regia* L. (Persian walnut, English walnut, Circassian walnut) – U	Europe, Asia	proteins, fats, sugars, juglon, tannins galotannins, phenoloacids, volatile oil, vitamins A, C, B, P, E and D, caroteneoids, triterpenes, fats, leucoanthocyanins, mineral salts (including iron and cobalt), flavonoids quercetin and kaempherol derivatives	shelled, dry seeds (quasi-drupes)	addition to cakes, cookies and other confectionery, to vegetable and fruit salads, to pastes and pasta
Family: *Betulaceae* Gray					
38.	**Hazel** *Corylus avellana* L. (common hazel, cob nut) – N	Europe, Asia	fats, palmitic, stearic, oleinic acids, proteins, amino acids (leucine, isoleucine, serine, glycine, alanine, histidine, threonine, tryptofan, valine, arginine, phenyloalanine, methionine), vitamins A, of groups B, D, E, C, macro- and microelements (calcium, potassium, magnesium, phosphorus, iodine, iron, copper, zinc, manganese)	dried, shelled seeds (hazelnuts), hazelnut oil	addition to various types of salads, salads, pasta and meat, for the production of liqueurs and liqueurs, for cakes, cookies and various confectionery products

Table 1 – cont.

1	*2*	*3*	*4*	*5*	*6*
Family: *Brassicaceae* Burnett, = *Cruciferae* Juss					
39.	**Black mustard** *Brassica nigra* (L.) W.D.J. Koch = *Sinapis nigra* L. (no synonyms found) – U	North Africa, Europe, Asia	mustard oil, glycosides, flavonoids, phytoncides, enzyme mirosinase, greasy oil, proteins, slimes, mineral substances	dried seeds	main ingredient of mustard, for seasoning marinades, cold meats, herb butter, mayonnaise, salads, pickles; in Indian cuisine for chutney and other sauces
40.	**Brown mustard** *Brassica juncea* (L.) Czern. (Chinese mustard, Indian mustard, leaf mustard, Oriental mustard, vegetable mustard) – I	Asia (Siberia, China), East Europe, North America	essential oil, glycosides, fats, proteins, mineral salts, namely sulfur	dried seeds	the main ingredient of the Sarebska mustard, for seasoning meats, marinades, herb butter, mayonnaise and salads, pickled vegetables; herbal pepper ingredient
41.	**White mustard** *Sinapis alba* L. = *Brassica alba* (L.) Rabenh., *B. hirta* Moench (no synonyms found) – N	Mediterranean countries	volatile oil, glycosides, synapin, synalbine glucosinolate, phytoncides, mineral salts, slimes, greasy oil, protein compounds, amines	dried seeds	for mustard, herbal pepper, marinades, fatty meats and cold cuts, egg dishes, cheese and various sauces
Family: *Anacardiaceae* R. Br.					
42.	**Pistachio** *Pistacia vera* L. (no synonyms found) – I	Asia	fats, sugars, vitamin A, B_6, calcium, potassium, sodium, iron, magnesium	dry shelled drupes (pistachio nuts), roasted	for confectionery: cakes, strudel, marzipan, ice cream, pudding, as a filling for sweets
43.	**Peruvian pepper** *Schinus molle* L. (*American pepper, Peruvian peppertree, escobilla, false pepper, molle del Peru, pepper tree, peppercorn tree, California pepper tree, pirul, Peruvian mastic*) – I	South America	essential oil containing α-pinene, germacrene D and spathulenol	spherical dried drupes (red pepper) mix fruits, whole, ground	pepper substitute, addition to colored pepper mixtures
44.	**Rose pepper** *Schinus terebinthifolius* Raddi (*Brazilian peppertree, aroeira, rose pepper, broadleaved pepper tree, wilelaiki, wililaiki, Christmasberry, Florida Holly*) – I	South America (South East Brazil, Argentina and Paraguay)	phenols, triterpenes and antraquinones, flavones, xanthones, flavonoids, leucoanthocyanidins, free steroids; tannins and essential oil	spherical dried drupes (red pepper) mix fruits, whole, ground	pepper substitute, addition to colored pepper mixtures

Family: *Rutaceae* Juss.					
45.	**Key lime** *Citrus aurantifolia* Hort. ex Tanaka = *C. acida* Roxb., *C. medica* var. *acida* Hook f., *C. medica* subsp. *acida* (Roxb.) Engler, *C. aurantium* subsp. *aurantifolia* Guillaumin, *Limonia aurantifolia* Christm et Panz. (West Indian lime, bartender's lime, Omani lime, Mexican lime, dayap bilolo) – I	South East Asia	essential oil, sugars, vitamin C, citric acid, calcium, potassium, phosphorus	fresh fruit (berries), dried leaves	addition to juices and spirits, drinks (eg mojito), desserts (eg refreshing sorbets), cakes and preserves
46.	**Lemon** *Citrus limon* (L.) Burm. = *C. limonum* Risso (no synonyms found) – I	South East China	essential oil, vitamins C i B_1 and citric acid	fresh fruit (berries) and their peel, lemon oil, blends	addition to teas, juices and alcohols, drinks, cakes and other confectionery, to fish dishes (neutralizes their smell)
47.	**Orange** *Citrus sinensis* (L.) Osbeck = *C. aurantium* L. var. *dulcis* L. *C. auriantum* var. *sinensis* L. (no synonyms found) – I	China	vitamin C, aspargic acid, glutamic acid, glycine, carbohydrates, mineral salts	fresh fruit (berries) and their fresh or candied skin, blends	addition to teas, juices and alcohols, drinks, cakes and other confectionery products
48.	**Japanese pepper** *Zanthoxylum piperitum* (L.) DC. (Korean pepper, sanshō, chopi) – I	Japan, China, South Korea	essential oil containing linallyl acetate, linalol and limonene, citronelal, geranylacetate, flavonoids (quercetin, hyperoside)	dry outer husk of berry fruit (ground)	pepper substitute; seasoning for chicken and duck; with star anise, fennel, cloves and cinnamon is part of Chinese five spices and a Japanese blend of seven flavors
Family: *Malvaceae* Juss.					
49.	**Hibiscus** *Hibiskus rosa-sinensis* L. (Chinese hibiscus, China rose, Hawaiian hibiscus, rose mallow shoeblackplant) – I	Asia	sugars, proteins, fats, calcium, phosphorus, iron, vitamin C, mixture of malic and citric acids, anthocyanins, pectins, tartaric, oxalic, galacturonic acids, hydroxyflavones, phytosterols, saponins, oils	dried flower whole or crushed, in fruit tea mixes	for teas and drinks

Table 1 – cont.

1	*2*	*3*	*4*	*5*	*6*
Family: *Bixaceae* Kunth					
50.	**Achiote** *Bixa orellana* L. = *Orellana americana* var. *leiocarpa* Kuntze (lipstick tree) – I	South America, Central America	pigment bixin (E160b), vitamin A, selenium, magnesium, calcium, essential oil, pentosans, pectins, proteins, tannins, mineral salts (selenium, magnesium, calcium)	dried seeds, powdered flowers	yellow food color for cheese, margarine, popcorn, confectionery, meat seasoning, meat and fish marinades
Family: *Solanaceae* Juss.					
51.	**Habanero** *Capsicum chinense* Jacq. 'Habanero', *C. sinense* Murray, *C. toxicarium* Poepp. ex Fingerh. (bonnet pepper) – I	South America	large amount of alkaloid capsaicin	dried, powdered whole berries, mix in flakes, in mixtures	for spicy sauces and dressings, for vegetable salads and grilled meat dishes
52.	**Pepper** *Capsicum annuum* L. (bell peppers, jalapeños, New Mexico chilli, cayenne peppers) – U	Central and South America	essential oil, alkaloids (including capsaicin), caroteneoids, flavonoids, organic acids, vitamins C, B, B_2, E, PP, mineral salts	dried, powdered berries, smoked and fresh; in mixtures, e.g. Harris spice	for seafood: oysters, sardines, salmon and smoked trout, scallops, fried mussels, crabs, lobsters and crayfish; for soups and snacks, boiled eggs, omelettes and soufflés; addition to grilled meats, fried or stewed, for chicken, fish and vegetables; for goulash, casseroles and sauces, especially cheese and grill; for biscuits, marinades, ketchups, chocolate and smoked foods; ingredient of Worcestershire sauce, often in curry mixes
53.	**Chili pepper** *Capsicum frutescens* L. (piri piri, tabasco pepper) – U	South America or Central America	alkaloids (capsaicin), vitamins C, E, flavonoids, organic acids	dried, powdered berries mix in flakes, in mixtures	for soups, steamed vegetables or in dressing, for salads, Tabasco sauce, for different meats
54.	**Chinese boxthorn** *Lycium chinense* Mill. = *L. barbarum* var. *chinense* (Mill.) Aiton, *L. ovatum* Poir., *L. sinense* Gren., *L. trewianum* Roem. & Schult.	Asia	alkaloids, cyclopeptides, lignans, antraquinones, coumarins, flavonoids, terpenoids, sterols	dried berries (goji berries)	for drinks - teas, wines, juices, fruit cocktails and various dishes - soups, fruit salads, rice, vegetable dishes, biscuits, cereal bars and muesli

54.	(Chinese boxthorn, Chinese matrimony-vine, Chinese teaplant, Chinese wolfberry, wolfberry, Chinese desert-thorn) – I				
55.	**Tomato** *Lycopersicon esculentum* P. Mill (no synonyms found) – U	North West America	proteins, sugars, fats, vitamins A, B, C, D, E, K, mineral salts (calcium, sodium, potassium, phosphorus, iodine, iron, copper, zinc, manganese), pantotenic, folic, oxalic acids, biotin, traces of nicotin, lycopene	dried fruit type berries, sometimes in a marinade of olive oil or as a puree or addition to ready-made sauces	for vegetable salads, cheese, curd cheese, cottage cheese pastas, cold snacks
Family: *Pedaliaceae* R. Br.					
56.	**Sesame** *Sesamum indicum* L. (benne, sesame seeds) – I	Asia, Central America	essential oil, proteins, sugars, fats, sesame oil, niacin, amino acids (leucine, isoleucine, thyrosine, tryptofan, alanine, glycine, proline)	dried seeds	for baking: bread, cakes, cookies; ingredient of halva and other sweets, addition to humus, sauces (eg to kebabs), salads, salads, soups, meat and fish, etc., for various dishes of pasta and rice
Family: *Lamiaceae* Martinov, = *Labiatae* Juss.					
57.	**Basil** *Ocimum basilicum* L. (great basil, Saint-Joseph's-wort, Genovese basil, sweet basil) – U	does not occur in the wild state	essential oil (containing linalol, eugenol), tannins, saponins, glycosides, enzymes, flavonoids, organic acids, mineral salts (potassium, calcium, magnesium, phosphorus)	fresh or dried leaves or whole herbs	for salads and soups, stewed vegetables and curd, for poultry, stews, sauces, pates, dishes based on pasta and tomatoes, the main ingredient of Pesto
58.	**Savory** *Satureja hortensis* L. (summer savory) – U	South East Europe	essential oil, tannins, ursolic acid, resin and slime substances, tannins, caroteneoids, flavonoids, vitamin C, mineral salts (calcium, potassium, magnesium, iodine etc.)	dried herbs	for potatoes, stews, soups and green vegetables (especially beans, lentils, etc.), for scrambled eggs or omelette, ingredient of Provensal blend
59.	**Lavender** *Lavandula angustifolia* Mill. (true lavender, English lavender, garden lavender, common lavender, narrow-leaved lavender) – U	Mediterranean countries	essential oil, carbohydrates, mineral salts, tannins, triterpenes, coumarins, phytosterols, anthocyanins, organic acids	dry or fresh inflorescences	for meat dishes, main of mutton or venison, as an addition to cakes and creams, ingredient of a mixture of Provencal blend and a Moroccan mixture of Ras El handout

Table 1 – cont.

1	*2*	*3*	*4*	*5*	*6*
60.	**Oregano** *Origanum vulgare* L. (wild marjoram, sweet marjoram) – N	Europe, Asia, North Africa	essential oil (containing carvacrol, thymol), sesquiterpenes, tannins, vitamin C and P, catequin, phenoloacids, flavonoids, phytosterols, resins, bitters, mineral compounds	dried leaves	for sauces, pizza, seasoning meat, salads, ingredient of a mixture of Provencal blend, for some vodkas, vermouth wines, liqueurs
61.	**Marjoram** *Origanum majorana* L. (knotted marjoram, pot marjoram) – U	Mediterranean countries	essential oil, tannins, phenoloacids, flavonoids, triterpene acids, polysaccharides, pectins, bitters, vitamins, mineral salts	dried herbs	for fish sauces, mussels, seafood, sauces based on butter or tomatoes, vinegar, mushrooms, eggplant dishes, sausages, grilled meats and peppers stews, chilli, for soups: eg sour soup, pea, bean, poultry, pates, cheeses, etc., for flavoring liqueurs, teas
62.	**Lemon balm** *Melissa officinalis* L. (balm, common balm, balm mint) – U	South Europe, North Africa, Asia	essential oil, tannins, bitters, phenoloacids (caffeic, rosemaric, ferulic acids), triterpene compounds, terpene compounds (citral, linalol, citonelal), slimes, flavonoids, organic acids (mellic acid), resins, vitamin C, mineral salts	fresh or dried leaves, herbs	fresh leaves perfectly match the salads, giving them a lemon flavor, for decorating desserts with fruit and whipped cream, addition to cocktails and sorbets, dried leaves are an addition to teas, egg dishes, creams, soups and casseroles, stuffed poultry, mutton or pork, sauces and marinades for fish; ingredient of French liqueurs Bénédictine and Chartreuse
63.	**Peppermint** *Mentha × piperata* L. (no synonyms found) – U	Europe, Asia	essential oil (containing menthol), mentol esters (acetate and isovalerianin), ketones (menthone and isomenthone, piperitone, pulegone), monoterpenes (limonene, felandrene, alfapinene), terpene oxides (cineol, jasmon), mentofuran, sesquiterpenes, phenoloacids, caroteneoids, sterols, triterpenes, flavonoids, tannins, bitters, vitamins C, B_1 and B_{12}, provitamin A, mineral salts	fresh or dried leaves	for vegetables such as: new potatoes, tomatoes, carrots and peas, salad dressings, haggis and black puddings, desserts (ice cream, sorbets), grilled meat, stuffed vegetables and rice, additions to drinks (eg mojito) and liqueurs and tinctures

64.	**Rosemary** *Rosmarinus officinalis* L. (anthos) – U	Mediterranean countries, Europe	essential oil (containing borneol, cineol, limonene, pinene, camfora), tannins, bitters, phytosterols, rosmarinic acid, saponins, triterpenes, germacranicol, flavonoids, organic acids, vitamins P, C and B_1, carotene, resin compounds, mineral salts	fresh or dried leaves	for poultry, fish, lamb, beef, veal, pork and game meat, for vegetables: spinach, tomatoes, peas, baked potatoes, mushrooms, lentils, cheese, eggs, soups, e.g. potatoes and aubergines, as well as pickles , dressings and cream sauces
65.	**Chia** *Salvia hispanica* L. (no synonyms found) – I	Mexico, Gwatemala	essential oil, proteins, fats, 25% of crude fiber, antioxidants: chlorogenic and caffeic acids, flavonoids (myrycetin, quercetin, kaemferol), mineral salts: iron, magnesium, zinc, phosphorus, sodium, calcium, vitamins: E, B_1, B_3, fatty acids omega-3 and omega 6	dried seeds	as a component of salads, yoghurts, breads, desserts and cocktails
66.	**Sage** *Salvia officinalis* L. (garden sage, common sage, culinary sage) – U	Mediterranean countries	essential oil (containing tujon, cyneol, kamfora, borneol, borneol acetate, pinene), tannins, bitters, saponins, triterpenes, germacranicol, flavonoids, organic acids, vitamins P, C and B_1, carotene, resin compounds, mineral salts	dried leaves, whole or ground	for fatty meats, such as: pork, goose or duck, other poultry as well as sausages and fish (eg eel)
67.	**Thyme** *Thymus vulgaris* L. (common thyme, German thyme, garden thyme) – U	Europe, North Africa	essential oil, flavonoids, tannins, phenoloacids, triterpenes, bitters, organic acids, vitamin B, C and K, sugars, salts of magnesium (lithium and magnesium)	dried herbs	for meats: veal, lamb, beef, poultry, fish, for stuffing, pate, sausages, goulash, soups and bouillons, for bread, herb butter, herbal mayonnaise, flavored vinegar, mustard, for casseroles of beans and lentils, for other vegetables: tomatoes, onions, cucumbers, carrots, aubergines, parsnips, leeks, mushrooms, asparagus, green beans, broccoli, sweet peppers, potatoes, spinach, corn, peas, cheese, eggs and rice; for lemon, garlic and basil

Table 1 – cont.

1	*2*	*3*	*4*	*5*	*6*
Family: *Ericaceae* Juss.					
68.	**Lingonberry** *Vaccinium vitis-idaea* L. (lingonberry, partridgeberry, The Lingering O'Mahoney, cowberry) – N	Asia, Europe, North America	glycosides: arbutin, methylarbutin, erykolin; organic acids, catequine tannins, anthocyanins, vitamins: B_1, B_2, PP, C	candied berries	addition to dark meats and venison, fruit teas, liqueurs and tinctures
69.	**Cranberry** *Oxycoccus palustris* Pers. = *O. quadripetalus* Gilib. (small cranberry, bog cranberry, swamp cranberry) – N	North and Central Europe, Asia, North America	large amounts of carbohydrates, organic acids (benzoic, citric, gallic, quinic), vitamin C, anthocyanins, caroteneoids, pectins, tannins, sugars, mineral substances (iodine salts), glycisde arbutin	candied berries	for desserts, cakes, muesli or as a component of sauces, addition to meats, fruit teas and liqueurs, vodkas, fruit salads
Family: *Araliaceae* Juss.					
70.	**Ginseng** *Panax ginseng* C. Meyer = *P. schinseng* T. Nees *Aralia ginseng* (C. A. Mey.) Baill. (Asian ginseng, Chinese ginseng, Korean ginseng) – I	North East Asia	saponins triterpene derivatives of damarane, essential oil, alcohols (panaxydol, panaxynol, panaxytriol, falkarinol), amino acids, peptides, choline, polysaccharides, flavonoids	dried, powdered root	for tinctures, green tea, soups, sauces and meat
Family: *Apiaceae* Lindl., = *Umbelliferae* Juss.					
71.	**Angelica** *Angelica archangelica* L. = *Archangelica officinalis* Hoffm, (garden angelica, wild celery, Norwegian angelica) – N	North Eurasia	essential oil (containing felandrene, terpenes, pinene), carbohydrates, glycosides, tannins, acids: valeric, angelic, methylethylacetic, oxsypentadecylic, sesquiterpenes, coumarins, flavonoids, tannins	dried rhizome and root, fresh stems	in confectionery for decorating cakes and cakes (slantingly cut stalks collected in May are fried in sugar), addition to liqueurs and vodkas (angelica liqueur)
72.	**Anise** *Pimpinella anisum* L. (aniseed) – U	East Mediterranean countries	essential oil (containing anetol), greasy oil, flavonoids, coumarin glycosides, proteins, mineral substances, sugars	fruit (schizocarp), ground	for cakes and sweets, rye bread, for fish, poultry, soups and vegetable dishes, for alcoholic beverages and syrups

73.	**Ajwain** *Trachyspermum ammi* Sprague (ajowan, ajowan caraway, Joyan, oomam, ajman, bishop's weed, carom) – I	India	essential oil, thymol, flavonoids, organic acids	dried and roasted fruits of the schizocarp type; food color hao hien (orange)	Asian and Indian cuisine, incl. in preparing parathy (a kind of bread) with Ajman
74.	**Fennel** *Foeniculum vulgare* Hill. = *F dulce* Mill., *F. capillaceum* Gilib *Anethum foeniculum* L., (Florence fennel, finocchio) – U	Mediterranean countries	essential oil (containing anetol, fenchon), flavonoids, vitamin C, B_1, B_2, mineral salts, slime, sugar	fruit (schizocarp), dried leaves, dried inflorescences	for compotes, sauces (including sweet ones, e.g. chutneye), for vegetables (cabbage, beetroot, boiled cauliflower, broccoli and potatoes), for meat (especially baked on a spit), dishes of fish and seafood, cheeses (in the kitchen Italian), bread (in French cuisine)
75.	**Cumin** *Cuminum cyminum* L. (no synonyms found) – I	Mediterranean countries	essential oil, flavonoids	fruit (schizocarp), in mixtures, e.g. Mr. Harris	for cheese, liqueurs and wines
76.	**Caraway** *Carum carvi* L. (meridian fennel, Persian cumin) – N	Central and North Europe, North West Africa, North America	essential oil (containing carvon, limonene, carveol, dihydrocarvon), tannins, flavonoids, vitamin C, resin, slime, greasy oil, polyacetylenes, protein compounds, sugars, organic acids, coumarins, vitamins A and D	fruit (schizocarp) whole or ground	for greasy dishes, eg pork, goose and duck, omelets, rice and pasta and vegetable dishes, sauerkraut, smoked cheeses, pastries: cookies, rye bread, patties, brine, sticks, soups: cabbage soup, mushroom, pea, potato, for alcoholic drinks (Kummel, Gin Akuavit and caraway vodka) and teas
77.	**Coriander** *Coriandrum sativum* L. (cilantro, Chinese parsley) – U	Mediterranean countries, South East Asia	essential oil, coumarins (umbelliferon and skopoletin) fats, alkaloids, pectins, phytoncides, vitamin C, tannins, resins, protein compounds, flavonoids, phytosterols, organic acids, greasy oil, carbohydrates, mineral salts, triterpenes (koriandrol)	fruit (schizocarp) dried, in mixtures, eg Harris spice	ingredient of garam masala spice mixture, for marinades, cakes, bread and other bakery products, for lamb dishes, goat meat, all stuffing and stuffing, fish, vegetable salads

Table 1 – cont.

1	*2*	*3*	*4*	*5*	*6*
78.	**Lovage** *Levisticum officinale* W.D.J. Koch = *L. crispum* W.D.J.Koch (no synonyms found) – U	Europe, Asia, North America	essential oil (containing terpeinol, esters, acetic and valeric acids), starch in large amounts, sugars, resins, phthalide compounds (derivatives of phthalic acid – butylphthalides), coumarins and furanocoumarins (bergaptene andi psolarene), polyphenolic acids (caffeic and chlorogenic), phytosterols	dried leaves, stems (ground), fruit (schizocarp)	leaves (fresh or dried) - an addition to soups, stocks, flavor vinegars, pickles, goulash and salads, sauces; seeds – for salads and mashed potatoes, for bread, cookies, biscuits and cheeses; stalks – for sauces and goulash, and candied leaves for cake decoration
79.	**Parsley** *Petroselinum crispum* Hoffm. = *P. hortense* auct., *P. sativum* Hoffm., *P. vulgare* Lag. *Apium petroselinum* L., *Carum petroselinum* (L.) Benth. & Hook. f.(garden parsley) – U	Asia, Mediterranean countries	essential oil (containing apiol, mirystycin, limonene, 1,3,8-p-mentatriene), terpenes, flavonoids (apiin, luteolin-apiosylglucoside), provitamin A, vitamin C, B1, B2, phytosterols, resins, sugars, betacarotene, iron salts	fresh or dried leaves, root, in mixtures	for goulash, sauces, cheese pastes, rice dishes, vegetables, omelettes and fish dishes, for omelettes, scrambled eggs, mashed potatoes, soups, pasta and vegetable dishes, as well as sauces for fish, poultry, veal and pork dishes
80.	**Chervil** *Anthriscus cerefolium* Hoffm. = *A. crispum* (Mill.) Nymann, *A. longirostris* Bertol., *Scandix cerefolium* L. (French parsley, garden chervil) – U	South East Europe, South West Asia	essential oil, tannins, carotene, vitamin C, provitamin A, mineral salts of iron and magnesium	dried fruit, schizocarp type, dried leaves	popular in Dutch, English and French cuisine for soups, salads, fish, cheese, scrambled eggs
81.	**Asafoetida** *Ferula assa-foetida* L. (food of the gods, devil's dung, jowani badian, hing, hengu, inguva, kayam, ting) – I	South and Central Asia	milky juice with gum-resin (asafetid, asafoetid – stinking gum)	powdered gum-resin obtained from roots and rhizomes	for preparing vegetarian dishes, sauces and marinades, it also suits stewed meats (lamb), vegetables (especially pulses) and fish

Family: *Asteraceae* Bercht. & J. Presl, = *Compositae* Giseke					
82.	**Absinthe** *Artemisia absinthium* L. (absinthium, absinthe wormwood, grand wormwood, wormwood) – N	Asia, North Africa, Central and South Europe	essential oil, tujon, flavonoids, organic acids, bitters, tannins, sugars, slimes, mineral salts (including potassium)	dried herbs	for flavoring beer, meads, liqueurs, bitter liqueurs of vermouths, vodkas (absinthe)
83.	**Tarragon** *Artemisia dracunculus* L. (estragon) – U	South East Europe, Central Asia	essential oil, vitamins, tannins, flavonoids, coumarin compounds, carotene, vitamin C, organic acids, mineral salts (including iodine)	dried or fresh herbs	culinary spice, in herbes de Provence, for seasoning herbal vinegar and mustard, pickling cucumbers and cabbage, freshly added to salads and soups, poultry, fish and egg dishes
84.	**Yarrow** *Achillea millefolium* L. (common yarrow, gordaldo, nosebleed plant, old man's pepper, devil's nettle, sanguinary, milfoil, soldier's woundwort, thousand-leaf, thousand-seal) – N	Euroasia, North America	essential oil (azulene), tannins, zflavonoid compounds (glycoside derivatives of apigenin and luteolin), organic acids (formic, acetic, isovaleric, ascorbic), bitter – achillein, pyrolidine alkaloids (betonine, stachydrine, choline), mineral salts (Mn), vitamin C	dry leaves	dry or fresh leaves are suitable as an addition to salads and sandwiches
85.	**Sunflower** *Helianthus annuus* L. (common sunflower) – U	North America	derivatives of diterpenes, triterpene alcohols (heliantrol), triterpene glycosides, caroteneoids, flavonoid glycosides, pectins, choline, betaine, xanthophyll, bitters, organic acids, oil, flavonoids, tannins, sugars, glycerides, steroids	dried fruit (achenes), shelled	addition to bread, sweets, e.g. halva

N – native, U – foreign, cultivated in Poland, I – foreign, imported

A significant group of chemical compounds present in spice plants is made up by bitterness and tannins. Bitterness is nitrogen-free, non-toxic, bitter substance, enhancing the secretion of gastric juices. It can be applied, among others, in the case of a weakened appetite. Bitter compounds include glycosides that occur, e.g. in garlic, mustard, juniper or saffron (Table 1). Bitterness also includes tannins, substances with a stringent and tart taste, that also have a bactericidal effect, disinfect as well as inhibit tissue distribution. Tannins occur, among others, in raw materials obtained from plants of *Lamiaceae* family – basil, marjoram, savory, lavender [Della Beffa 2004].

Another group of substances present in spice plants are flavones and flavonols, from which plant dyes are also derived [Jasiński et al. 2009]. For instance, chlorophyll has antiseptic properties and eliminates unpleasant odors from the mouth. Therefore, after eating garlic or onion, sucking parsley with a high content of this pigment, helps to get rid of their intense aroma.

The phytoncides and slimes are poorly understood chemical compounds found in some spice plants. Even in small doses, phytoncides inhibit the growth of bacteria, fungi and protozoa. They occur in onion, garlic, mustard, nettle, coriander [Krauz 1997]. In contrast, the action of slimes consists in coating the affected areas in the case of mucositis, especially the upper respiratory tract [Della Beffa 2004]. Spice plants containing these substances include fenugreek or cinnamon (Table1).

Commercial offer of domestic spice market is still dominated by raw materials imported from warmer regions of the world, which have been popular in our cuisine for many years (Table 1, Fig. 2, 3). These include: pepper, nutmeg, ginger, cloves, cinnamon, vanilla, cardamom, etc. A large group are also species grown in our country, but originating from the Mediterranean, e.g. basil, marjoram, rosemary, lemon balm, savory, licorice, coriander etc. [Newerli-Guz 2016]. Finally, among the popular spices, there are also raw materials obtained from native plant species that can be found in the wild state, e.g., oregano, caraway, wormwood, juniper berries, etc.

In addition to spices from the temperate climate regions, the trade offer also includes exotic spices. People visiting foreign countries try new dishes that have completely different taste. It triggers their desire to make culinary experiments in their own homes [Šedo and Krejča 1989]. Culinary books and magazines as well as television programs devoted to "healthy" cooking have a large impact on the popularity of exotic spices. Producers, willing to meet customers, are trying to fill the gap of exotic and unknown spices creating newer and newer plant additives imported from the farthest corners of the world. From year to year, the popularity of various species and varieties of annual peppers increases, which due to the presence of capsaicin guarantees a sharp taste of meals (Table 1). There are also many species that are still unknown to a wider group of consumers, e.g. melegueta pepper, lemongrass, greater galangal (wild cardamom), Peruvian pepper tree, pepper turnover (Sichuan pepper) etc. Most often, they are ingredients of various spice mixtures and they can rarely be bought in pure form.

In order to achieve the desired taste of a given dish, often apart from individual spice raw materials, their mixtures in various combinations are used. Spice mixtures occur in the following forms: uncrushed, coarsely ground and finely ground. Depending on the type, composition and purpose, they are variously specified: spice for pizza, fish, chicken, pates, goulash, barbecue dishes, soups, salads or sauces [Melchior and Kastner 1978]. For example, one of the classic blends is a product of the Kotanyi brand called

"Salsa de Yucatan" – a mixture of spices for Mexican cuisine. On the packaging of the product, there is an information about the mixture origin (Latin America), what tastes best and the label "without flavor enhancers". On the reverse of the packaging, we can familiarize with the recipe proposed by the producer and what is the most interesting – the composition. This kind of reliable description allows the use of this mixture even by people who did not know its use before.

However, in recent years, apart from seasoning blends, an increase in the sales offer of highly processed food products, so-called "powdered foods", can be observed. These are: instant soups, sauces and others, which are proposed by various companies on our market. In their composition, spices can be found, but most often in the presence of pigments and substances used only to extend the durability date or to improve the taste [Grau et al. 2004, Ptasińska 2005, Rogozińska and Wichrowska 2011, Friedrich and Kuchlewska 2012]. When buying ready-made mixtures, we save time and money, but the products consumed are many times poorer in terms of natural components. By manual preparing the same mix of spices, we get a wholesome composition. Frequent use of ready-made mixtures containing artificial additives stimulates an "illusive" appetite and thus contributes to remarkable weight gain.

Most often, there are no artificial additives in the mix of spices offered at specialized points of sale. These blends smell and look like pure spices, from which they were prepared. They do not have additional pigments, preservatives or flavor enhancers or fragrances. The only additive sporadically found in these mixtures is salt. Therefore, when choosing a mixture of spices, read their composition or use the offer prepared by non-commercial locations focused on the sale of quality products. A good prognosis is the fact that Poles are beginning to convince themselves of the values of pure spices without unnecessary admixtures and chemical additives. Especially popular are fresh spices or spice plants bought in pots, due to recently fashionable model of ecological life, compatible with nature [Metera 1984].

SUMMARY AND CONCLUSIONS

The present study is a review and concerns spice plants, the raw materials of which are available in domestic grocery trade. Among 85 listed spice raw materials, many are known and traditionally used in Polish cuisine. However, the fashion for healthy food and meals of other nations has caused an influx of new spices, which are not yet well known to a wide range of consumers. Many of them are sold in the form of very popular mixtures used for specific dishes. It's good to know the composition of these blends, but at the same time, pay attention to whether they are really natural, or contain "flavor enhancers" or preservatives.

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Streszczenie. Rośliny przyprawowe to grupa reprezentowana w każdym zakątku świata przez wiele gatunków i używana w różnoraki sposób. Z przeprowadzonych analiz wynika, że w handlu spożywczym w Polsce dostępnych jest ponad 80 surowców przyprawowych, pozyskiwanych z roślin należących do 33 rodzin. Najliczniej reprezentowanymi rodzinami są: *Apiaceae*, *Lamiaceae* oraz *Zingiberaceae*. W sprzedaży można znaleźć zarówno przyprawy bazujące na roślinach krajowych, jak i występujących naturalnie w innych strefach klimatycznych. Najwięcej surowców przyprawowych pochodzi z roślin rosnących naturalnie i uprawianych w Azji oraz krajach śródziemnomorskich. Niektóre z gatunków, np. kminek zwyczajny (*Carum carvi* L.), arcydzięgiel litwor (*Angelica archangelica* L.), lebiodka pospolita (*Origanum vulgare* L.), występują w stanie dzikim na terenie Europy Środkowo-Wschodniej. W polskim handlu spożywczym przyprawy są dostępne głównie w formie suszonej i mielonej, a do najczęściej sprzedawanych należą: pieprz czarny, liść laurowy, ziele angielskie, kminek, czosnek, papryka, majeranek, koper, pietruszka, gałka muszkatołowa oraz cynamon. W ostatnim czasie chętnie kupowane są również mieszanki przypraw do konkretnych potraw, np. do pizzy, ryb, kurczaka, potraw z grilla czy sosów.

Słowa kluczowe: przyprawy roślinne, skład chemiczny, zastosowanie kulinarne, handel detaliczny

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