

## THE ECONOMIC VALUE OF SOME SPONTANEOUS PLANTS FROM THE APIACEAE FAMILY FROM THE TERRITORY OF ROMANIA

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KEYWORDS	ABSTRACT
Apiaceae Essential oils Medicinal plants Seasoning plants	In the spontaneous Flora of Romania there are 124 species with 15 typical subspecies and 25 atypical subspecies, to which there are added 9 critical species and 1 hybrid. From all these species 100 of them can be used for some properties that have 175 uses. Only volatile substances are described for some of them, others plants are still under study. From all of these, we selected 62 species with therapeutic value, 5 species for veterinary medicine, 19 seasoning plants, 4 species for cosmetics, 4 species for food industry, 8 species for fodder in agriculture, 17 species with poor melliferous value, 10 decorative species, 16 toxic species, 22 species contain insecticidal substances, 6 species contain fungidal substances, 1 species contains herbicidal substances, 2 species for ecological restauration, 1 coloring species.

### INTRODUCTION

On Earth, the Apiaceae family includes about 450 kinds with 3540 herbaceous species. It is among the most important families of plants from the economic and social point of view (Heywood V., 2014). This Family includes: the carrot, parsley, celery, dill, parsnip, etc. These are used all over the world but there are also some poisonous plants very well known such as *Conium maculatum* (Hemlock), *Aethusa cynapium* (Dog's Parsley). In Mediterranean and temperate regions, these plants of Apiaceae Family have a considerable importance. In Romania, there are not woody Apiaceae species and they are very rare worldwide.

Many species are cultivated for food and they have high economic value, others are seasoning plants and they have been used in traditional medicine because they contain metabolites with therapeutical importance such as essential oils, phenolic compounds, saponins, triterpenes, alkaloids, polyacetylenes, lignans, flavonoids, sterols (Mohamed et al., 2012).

Oils are increasingly sold in the market. In recent decades they have been used as therapeutic products and as biochemical control agents due to bactericidal, fungicidal, antiviral, antiparasitic, antioxidant effects, etc. (Bakkali et al., 2007).

Various pharmaceutical, cosmetics, food and agricultural products have been obtained because they don't have toxic effects. In the organs of these plants there are secretory channels with volatile and very diverse biochemical compounds. Yet, the global economy trades a few species. Among those that are grown in Romania we mention: dill, angelica, celery, cumin, coriander, carrot, fennel, lovage, parsnip, parsley, anise.

Volatile substances are special metabolites. They appear depending on the response of plants to the stress caused by environmental factors. Oil production depends on genetic variability, soil, climate conditions, pollution, pests and diseases, physiological variations given by organ's development, pollinator activity, seasonal variations, mechanical and chemical damages (Figuieriedo et al., 2008).

Their fruits have the highest concentration of substances, including essential oil.

In Poland, medicinal plants used for centuries are cultivated for essential oil, such as: *Silaum silaus* (L.) Schinz et Thell., *Seseli libanotis* (L.) Koch, *Torilis japonica* (Houtt) DC., *Orlaya grandiflora* (L.) Hoffm. They can destroy a large number of bacteria and fungi.

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## MATERIALS AND METHODS

This synthesis enables the appreciation of the economic value of plants from family Apiaceae. It is mainly useful for scientific works evaluating the primary productivity of phytocenoses, but it can be of interest to other fields of plant biology. Uses for all plants of this family on the territory of Romania have been searched. The method of appreciation of Pop (1982) has been selected and completed with information from <https://pfaf.org/user> and other sources used for the appreciation of other species. Generally, the appreciation scale for one category includes 5 levels. For medicinal and aromatic plants this scale rarely applies. Many species lack such information and require more caution. This is why we have only stated if they have some particular use and did not mention species devoid of economic value.

## RESULTS AND DISCUSSION

A synthetic analysis shows that this family stands out with many species that contain essential oil and many of them have medicinal properties.

New areas of economic interest have appeared, so these toxic plants can also be used. They have not particular interest for beekeeping, fodder production and even for food, although the cultivated species of this family are known to everyone.

### Apiaceae with essential oil

Aromatic plants are traditionally used by all peoples. There are many substances in essential oil, many of them still unknown. In the following species have been identified over 100 substances: *Bupleurum praealtum* L., *Ch. aureum* L., *Ch. hirsutum* L., *Ch. temulum* L., *Orlaya grandiflora* (L.) Hoffm., *Peucedanum alsaticum* L., *P. austriacum* (Jacq.) Koch, *P. cervaria* (L.) Lapeyer, *P. longifolium* W. et K., *P. officinale* L., *P. oreoselinum* (L.) Moench., *Seseli libanotis* (L.) Koch, *Tordylium maximum* L., (Kapetanios et al., 2008).

Half of plants analyzed for this family from the territory of Romania are known for their essential oil. These are: *Aegopodium podagraria* L., *Angelica archangelica* L., *Anthriscus caucalis* M. Bieb., *A. nemorosus* (M. Bieb.) Spreng., *A. nitida* (Wahlenb) Gaecke, *A. sylvestris* (L.) Hoffm., *Athamantha turbith* (L.) Brot., *Bifora radians* Bieb., *Bupleurum praealtum* L., *Cachrys alpina* MB, *Carum carvi* L., *Caucalis platycarpus* L., *Chaerophyllum aromaticum* L., *Ch. aureum* L., *Ch. hirsutum* L., *Ch. temulum*, *Cicuta virosa* L., *Conioselinum tataricum* Hoff., *Conium maculatum* L., *Daucus carota* L. ssp. *carota*, *D. guttatus* Sm. ssp. *zahariadii* Heywood, *Echinophora tenuifolia* L. ssp. *sibthorpiana* (Guss.) Tutin., *Eryngium planum* L., *Ferulago campestris* (Besser) Grec., *F. sylvatica* (Besser) Rechenb., *Laserpitium latifolium* L., *Ligusticum mutellina* (L.) Crantz., *Meum athamanticum* Jacq., *Orlaya grandiflora* (L.) Hoffm., *Peucedanum alsaticum* L., *P. austriacum* (Jacq.) Koch, *P. cervaria* (L.) Lapeyer, *P. longifolium* W. et K., *P. officinale* L., *P. oreoselinum* (L.) Moench., *P. palustre* (L.) Moench., *Pimpinella anisum* L., *P. peregrina* L., *P. tragium* Vill., *Sanicula europaea* L., *Scandix pecten-veneris* L., *Seseli campestre* Besser, *S. libanotis* (L.) Koch, *S. rigidum* Waldst. et Kit., *S. tortuosum* L., *Silaum silaus* (L.) Schinz et Thell., *Sison amonum* L., *Tordylium maximum* L., *Torilis arvensis* (Huds) DC., *Trinia glauca* (L.) Dumort. Some of these have therapeutic effects.

In the spontaneous flora there are frequent: *Aegopodium podagraria* L., *Conium maculatum* L., *Daucus carota* L., *Eryngium planum* L.

Some of them can have high economic value and can be cultivated. We can mention the following: *Angelica archangelica* L., *Carum carvi* L., *Conioselinum tataricum* Hoff., *Meum athamanticum* Jacq.

In *Ligusticum mutellina* (L.) Crantz were not found differences between the collected oil from natural plants and from the cultivated plants. The oil is more toxic to the larvae of *Pseudaletia unipunctata* than the oil from *Rosmarinus officinalis* L., *Satureja hortensis* L., *Origanum vulgare* L. var. *creticum* (L.) Briq., *Thymus vulgaris* L. etc. (Pasrüter et al., 2005).

The essential oil can also be used from these toxic plants *Chaerophyllum aureum* L. and *Conium maculatum* L.

Essential oils with antifungal effect can be used from *Carum carvi* L., *Echinophora tenuifolia* L. ssp. *sibthorpiana* (Guss.) Tutin., *Cicuta virosa* L., *Eryngium planum* L., *Seseli tortuosum* L. etc.

*Conium maculatum* L. oil has bacteriostatic action on phytopathogenic bacteria (Sousa et al., 2021).

For the food industry there are known: *Meum athamanticum* Jacq. which has traditional uses for flavoring some foods (Paula De Vos, 2010) but in Romania it is rare. *Pimpinella peregrina* L. has oil that can be incorporated into the outer shell for cheese preservation (Ksouda et al., 2019).

### Medicinal plants – uses

Many spontaneous species of this family are known for essential oil with therapeutic value. In our country are introduced into culture *Carum carvi* L.(cumin) and *Angelica archangelica* L., but the list is longer and new sources have appeared. Among these we mention some examples:

**Plants with antidiabetic effects:** *Aegopodium podagraria* L., *Falcaria vulgaris* Bernh., *Lasepitium siler* L., *Peucedanum longifolium* W. et K.

**Plants with anticancer properties:**

- *Angelica archangelica* L. used for treatment with leaves and roots that stop the growth of tumors (Kaur et al. 2021);
- *Anthriscus sylvestris* L. The fruits have an antiproliferative effect in gastric, uterine and melanoma cancer (Ikeda et al., 1998); in Korea it is known as a source of raw material used in the treatment of gastric cancer (Cho et al., 2013; Chen et al., 2014);
- *Athamantha turbith* (L.) Brot. contains myristicin, a dominant antioxidant substance, with an anti-infective and anti-cancer effect (Seneme et al., 2021);
- *Bupleurum falcatum* L. has in the root substances that regenerate the gastric mucosa in ulcer, it is immunomodulatory in acute and chronic inflammations, it is anti-cancer (Köroğlu et al., 2012);
- *B. praealtum* L. contains sulfate flavonoids (Harbone et al., 1976),
- *B. ranunculoides* L. contains sulfate flavonoids (Harbone et al., 1976);
- *B. rotundifolium* L. Roots are anti-inflammatory and immunomodulatory, they are used for acute inflammation, gastric disease, gastric cancer, they have antitumor effect (Eujioka et al., 2006; Chen et al., 2015);
- *Carum carvi* L. Antioxidant substances have a high effect, they are involved in the treatment of neurodegenerative, cardiovascular diseases, cancer, they have clean radicals and pro-oxidant substances, can eliminate microbes and chelate heavy metals (Thippeswamy et al., 2013);
- *Eryngium* is effective in cancer, *Eryngium campestre* L., *E. maritimum* L. and *E. planum* L. can be used for ovarian cancer (Soumia, 2018; Kikowska et al., 2023);
- *Laserpitium archangelica* L. contains lactones with anti cancer, antimicrobial and antioxidant effects (Rimpelová, 2019);
- *Laserpitium krapfii* Crantz. The seeds are rich in antioxidants, phenolic compounds; they have anticancer properties, reduce stress in chronic degenerative diseases, inflammatory diseases, they are anti-mutagenic (Bogucka-Kocka et al., 2019);
- *Peucedanum alsaticum* L. and *P. cervaria* (L.) Lapeyer contain phenolic acids with protective role against cancer and coronary diseases. They have synergistic effects together with antitumor drugs (Skalicka-Woźniak et al., 2008);
- *Scandix pecten-veneris* L. contains sulfate flavonoids (Harbone J. et al., 1976), essential oil with appreciable amounts of monoterpenoids and sesquiterpenoids (Sousa et al., 2021). It has antimutagenic and antioxidant effect, it can be used in bronchial asthma, cancer, osteoporosis, arteriosclerosis, chronic obstructive pulmonary disease, etc. (Sharifi-Red et al., 2016);
- *Torilis japonica* (Houtt.) DC. contains torylin with antioxidant and anticancer effect, can be used in hyperplasia and other disease (Rahimpour et al., 2022);

**Aromatic plants are sources of antioxidant substances.** Frequently they are used as nutritive products (Stanković et al., 2015).

In this category there are the following plants: *Angelica archangelica* L.; *Anthriscus cerefolium* (L.) Hoffm.; *A. sylvestris* (L.) Hoffm.; *Athamantha turbith* (L.) Brot.; *Bifora radians* Bieb.; *Carum carvi* L.; *Chaerophyllum hirsutum* L.; *Daucus carota* L.; *Echinophora tenuifolia* L.; *Eryngium planum* L.; *Ferula heuffelii* Griseb.; *Ferulago campestris* (Besser) Grec.; *Falcaria vulgaris* Bernh.; *Laserpitium archangelica* L.; *L. krapfii* Crantz.; *L. siler* L.; *Peucedanum longifolium* Waldst. et Kit.; *Pimpinella saxifraga* L.; *Sanicula europaea* L.; *Scandix pecten-veneris* L.; *Selinum carvifolia* L.; *Seseli rigidum* Waldst. et Kit.; *Smyrniolum perfoliatum* L.; *Tordylium maximum* L.; *Torilis japonica* (Houtt.) DC.

**Aromatic plants with antibacterial properties:**

- *Aegopodium podagraria* L. has a significant antimicrobial effect, especially on bacteria (Brković et al., 2006);
- *Angelica archangelica* L. is effective for the destruction of many bacteria and fungi (Bhat et al., 2017);
- *Angelica sylvestris* L. has a small antibacterial effect (Brković et al., 2006);
- *Anthriscus nemorosus* (M. Bieb.) Spreng. contains 0,2% essential oil, with appreciable amount of monoterpenoids and sesquiterpenoids that have antibacterial and antifungal effect on *Candida albicans* (Pavlović et al., 2010; Sousa et al., 2021);
- *Carum carvi* L. oral antibacterial (Miraj et al., 2016);
- *Chaerophyllum bulbosum* has a small antibacterial effect (Brković et al., 2006);
- *Daucus carota* L. ssp. *carota* has a significant antimicrobial effect, especially on bacteria, it is useful in processing the food (Duško et al., 2006; Stanojević et al., 2023);
- *Echinophora tenuifolia* L. ssp. *sibthorpiana* (Guss.) Tutin contains 0,5 – 1,5% oil. In Turkey, it is used as a traditional ingredient in cheese, tomato paste, pickles, meatballs. It is promising for introduction into culture because when it is cultivated has 3.5 times more oil, however with some biochemical differences compared to the plants that are growing into wild fields (Gokbulut, 2013; Sauli et al., 2022);
- *Eryngium planum* L. has antibacterial properties (Ghaderian et al., 2024);
- *Ferula heuffelii* Griseb ex Heuff. has antibacterial effects (Sonigra et al., 2023);

- *Falcaria vulgaris* Bernh. Leaves and seeds have antibacterial, antifungal, antidiabetic, carminative, hemostatic effects. They can be used as a spring vegetable because they reduce cardiac ischemia, gastric ulcer, also heal skin wounds (antiseptic), liver and kidney protector, anti anemic effect, improve male fertility through the antioxidant effect, in large doses, the plant is abortive (Khazaei et al., 2022).
- *Heracleum sphondylium* L. is an ingredient used in ancient borsches, it is rich in furocoumarins and essential oils with a significant antibacterial and antifungal effect (Matarrese et al., 2023). The hydroalcoholic extract of the fruits has strong antibacterial action (Sousa et al., 2021);
- *Laserpitium latifolium* L. has a weak antibacterial effect (Stanković et al., 2015);
- *L. siler* L., only the oil from this plant has antibacterial effect (Mileski et al., 2022);
- *Myrrhoides nodosa* (L.) Cannon (*Physocaulis nodosus* (L.) Tausch.) contains volatile oils, they have antibacterial and fungidal effects on *Aspergillus* (Thiviya et al., 2022);
- *Peucedanum alsaticum* L. și *P. cervaria* (L.) Lapeyer, has been used for centuries as an antibacterial agent with moderate and sometimes high activity against human pathogens (Marčetić et al., 2017);
- *P. longifolium* W. et K. has relatively weak antibacterial action (Ilić et al., 2015);
- *P. oreoselinum* (L.) Moench. has a small antibacterial activity (Brković et al., 2006);
- *Pimpinella saxifraga* L. has an antimicrobial effect, especially on bacteria (Duško et al., 2006);
- *Sanicula europaea* L. has a small antibacterial effect (Brković et al., 2006);
- *Selinum carvifolia* (L.) L. contains phenolic compounds with antioxidant, antibacterial, antifungal and cytostatic activity whose concentration increases at high altitude (Srivastava et al., 2023);
- *Seseli libanotis* (L.) Koch contains oil in the aerial parts. The oil in the fruit is strongly antimicrobial especially against Gram positive bacteria and also this plant is a good antioxidant (Matejić et al., 2012);
- *Silaum silaus* (L.) Schinz et Thell. has moderate antibacterial activity on Gram Positive bacteria such as *Staphylococcus aureus* and *S. epidermidis*, weak activity on Gram Negative bacteria (Widelski et al., 2021);
- *Sison amonum* L. has a broad antibacterial spectrum (Rosato A., et al., 2018), including phytopathogenic bacteria (Sousa et al., 2021);
- *Smyrniolum perfoliatum* L. has antioxidant, carminative, stomachic, antibacterial actions (Minareci et al., 2012);
- *Tordylium maximum* L. is a spice plant. The oil contains more than 100 substances, with antioxidant, antibacterial, antifungal effect on *Candida albicans* (Matejić et al., 2013);
- *Torilis japonica* (Houtt.) DC. has an efficient antibacterial effect (Barković et al., 2006).

### Digestive system

- *Aegopodium podagraria* L. is used empirically to stimulate salivary, gastric, intestinal, hepatic and pancreatic secretion (Pârvu, 2001);
- *Angelica archangelica* L. is recommended in indigestion and it is good in flatulent colic. Also it is carminative and bitter tonic, stomachic, stimulates salivary, gastric and intestinal secretions. It is good in vomiting, gastric and intestinal colic, treats ulcers, stimulates appetite, it is very good in anorexia, it has a spicy-aromatic taste and stimulates digestion. It is good for constipation, giardiasis and other intestinal parasites;
- *A. sylvestris* L. has an anti-inflammatory effect in diseases of the gastrointestinal and respiratory tract, nervous system, fever, infections, colds (Vogl et al., 2013);
- *Bifora radians* Bieb., the aerial part of the plant is used in Turkish traditional medicine for digestive effects, stomachic and carminative properties, also as flavouring in soups. It has antioxidant and antimicrobial action (Köroğlu et al., 2012; Gizem et al., 2014);
- *Bupleurum falcatum* L. The roots are used for treating chronic hepatitis (Khare, 2007), they improve liver and hormonal functions (Romm, 2010) and they regenerate the gastric mucosa in ulcers (Köroğlu et al., 2012);
- *B. rotundifolium* L. the root's extract has anti-ulcereogenic effect (Hirano et al., 1993);
- *Carum carvi* L. The seeds can be used as a remedy with a general effect on human body. On the digestive system they are carminative, astringent, antispasmodic, aromatic, digestive, etc. They can be used in stomatitis, diarrhoea, dyspepsia, bloating, abdominal gas, loss of appetite, burning or spasms in the stomach, in gastrointestinal cramps, feelings of fullness, colics and flatulence at infants, morning sickness, they improve liver function and they are antihelminthic etc.;
- *Falcaria vulgaris* Bernh. Leaves and seeds have carminative, hemostatic effect, they reduce gastric ulcer and they offer liver protection (Khazaei et al., 2022);
- *Laserpitium archangelica* L. is used empirically in gastric and liver diseases, it eliminates hepatobiliary secretion and the sensation of pain (Pârvu, 2004);
- *L. latifolium* L. used in gastro-intestinal and liver diseases, improves digestion, it is tonic for the stomach (Marian, 1870-1906; Pârvu, 2013; Mileski et al., 2022). Fruit oil has a good antimicrobial activity (Popović et al., 2015; Farida et al., 2018);
- *L. siler* L. can be used for toothache as a mouthwash, it reduces inflammation and infections; the rhizome is effective on *Candida*, (Popović V., et al., 2015), *Tripianozoma* (Nghang Kamte et al., 2018), and in gastric disorders, improves digestion (Mileski et al., 2022);

- *Peucedanum officinale* L. stimulates the appetite and it is a digestive tonic (Figueredo et al., 2009)
- *Pimpinella saxifraga* L. The oil eliminates flatulence, has significant antimicrobial and antioxidant action (Marchyshyn S., et al., 2018). In Romania it was used as a stomachic for heartburn (Marian, 1870-1906; Crăciun et al., 1977);
- *Sanicula europaea* L. is highly appreciated in healing wounds and internal bleeding. The root has an anti-inflammatory effect, it is used in gastric and intestinal inflammations, stomach pains, diarrhoea, dysentery, slow digestion, small internal bleeding, intestinal parasites, intestinal disorders, hepatobiliary disorders. Externally, it is used in oral inflammations, stomatitis, gingivitis, pharyngitis, throat's pain, wounds of oral cavity (Scarlat, 2019);
- *Scandix pecten-veneris* L. Its leaves can be consumed in dyspepsia, gastroenteritis, cystitis, nephritis, pyelitis (Liopa-Atsakalidi, 2014), bad-smelling breath (Bulut et al., 2014), etc.

### Edibles

Wild species are of a little interest as edibles, although some of them are seasoning. Essential oils can be used in the food industry as preservatives.

In this category we mention the following:

- *Aegopodium podagraria* L. is consumed in (Drăgulescu, 1992), Poland, Estonia, Ukraine, Belarus, Scandinavia (Jakubezyk et al., 2020);
- *Angelica archangelica* L. culinary food (Marian, 1870-1906; Todor, 1958; Pop, 1982; Pârnu, 2000), edible 3/5, in large doses can produce photodermatitis (<https://pfaf.org/user>). The seeds or the oil can be used to flavor alcoholic beverages as vermouth and flavoring in confectionary products (Fraternal et al., 2014; Shat et al., 2011). It can be ingredient in omelette and trout;
- *A. sylvestris* L. edible 3/5, in high doses depress the central nervous system and produces photodermatitis (<https://pfaf.org/user>);
- *Eryngium maritimum* L. Young sprouts are rich in phenols, potassium, calcium, magnesium. They are edible and can be used as a decoction and tincture. They have diuretic, hypoglycemic, aphrodisiac, expectorant and antihelmintic effects. They are also antidote for poisons, they have anti-inflammatory effects and they inhibit the formation of kidney stones (Preira et al., 2018);
- *Heracleum sphondylium* L. Bear's sole. The seeds are appreciated for the preparation of pleasant liqueurs in France, food and food additive in Asia. Young sprouts are consumed in Great Britain (Mir Babak Bahadori et al., 2016). It is an ingredient used in ancient borsches, it is rich in furocoumarins and essential oils with a significant antibacterial and antifungal effect (Matarrese et al., 2023). Dried and yellowed plants have a sweet taste. Leaves in sour milk were eaten as a raw soup. ssp. *Sphondylium* is edible 3/5;
- *Ligusticum mutellina* (L.) Crantz. the leaves are very poorly edible, seasoning, aromatic in liquors. It is cultivated in Bavaria for essential oil;
- *Seseli libanotis* (L.) Koch. The leaves and the root have a very small edible value but with carminative effect. They can be consumed when there are inflammations, swellings, rheumatism, pain, musculoskeletal diseases, common colds (Küpel et al., 2005);
- *Silaum silaus* (L.) Schinz et Thell. has edible leaves;
- *Sium sisarum* L. has edible root 4/5;
- *Smyrniolum perfoliatum* L. is edible.

### Respiratory diseases

- *Angelica archangelica* L. is tonic in colds, its cataplasm is used in lung and chest diseases. It is very good for bronchitis, pertussis, sinusitis, respiratory viruses, nasal decongestant and it improves breathing (Gămulea et al., 2022);
- *A. sylvestris* L. has an anti-inflammatory effect in diseases of the gastrointestinal tract, respiratory tract, nervous system, fever, infections, colds (Vogl et al., 2013), bronchial catarrh (Brković et al., 2006);
- *Carum carvi* L. The seeds have a curative effect as an expectorant, in the treatment of bronchitis and they are an ingredient of cough remedies, particularly used for children (Chevallier, 1996). They are used for bronchial asthma, fever, inflammation of the respiratory tract (Scarlat, 2019);
- *Eryngium planum* L. is Romanian antidote used in spastic cough, pertussis, tracheo-bronchitis, pharyngitis, inflammation of the respiratory tract, flu, irritating cough (Scarlat, 2019);
- *Peucedanum arenarium* Waldst. Et Kit., *P. cervaria* (L.) Lapeyer; *P. longifolium* W. et K., *P. officinale* L., *P. oreoselinum* (L.) Moench., all of them are sometimes indicated in respiratory diseases (Javanović et al., 2012);
- *Pimpinella major* (L.) Huds. has an anti-inflammatory effect in diseases of respiratory tract (Vogl et al., 2013);
- *P. saxifraga* L. - its roots have been used empirically to eliminate secretions from the respiratory tract (expectorant), cough, sore throat, bronchitis (Marchyshyn et al., 2018);
- *Sanicula europaea* L. - its roots have an anti-inflammatory effect in diseases on the respiratory tract: bronchial asthma, bronchitis, cough, hemoptysis, chest pain (Vogl et al., 2013);

**The following Apiaceae can be used for the nervous system:**

- *Angelica archangelica* L. is used to calm the nervous system, to eliminate twinges, it is nerve tonic and anti-hysterical;
- *A. sylvestris* L. is edible 3/5, but in large doses depresses the central nervous system (<https://pfaf.org/user/>);
- *Carum carvi* L. has an adaptogenic effect, eliminates stress, acts on the nervous, endocrine and immune systems (Ethnobotany of the Himalaya, 2021);
- The leaves and seeds of *Peucedanum arenarium* Waldst. et Kit.; *P. cervaria* (L.) Lapeyer; *P. longifolium* W. et K.; *P. officinale* L.; *P. oreoselinum* (L.) Moench are used by traditional medicine in the Balkans, in cardiovascular, respiratory, genito-urinary and nervous system disorders (Javanović et al., 2012);
- *Selinum carvifolia* (L.) L. in India it is used in hysteria and as a nervous sedative in fits.

**Good effects in Alzheimer** have the following plants: *Eryngium campestre* L., *E. planum* L., *Ferulago campestris* (Besser) Grec., *Falcaria vulgaris* Bernh.

**Beneficial effects in cardio-vascular** diseases have the following plants: *Angelica archangelica* L.; *Carum carvi* L.; *Falcaria vulgaris* Bernh.; *Laserpitium latifolium* L.; *L. siler* L.; *Peucedanum arenarium* Waldst. et Kit.; *P. cervaria* (L.) Lapeyer; *P. longifolium* W. et K.; *P. officinale* L.; *P. oreoselinum* (L.) Moench.

**For the excretory system**, there are used the following plants:

- *Aegopodium podagraria* L. is used empirically in Poland for inflammatory conditions in the kidneys and urinary bladder (Jakubezyk et al., 2020);
- *Carum carvi* L. is used in urinary incontinence, relieves bladder urinary irritation (Gairola et al., 2014 in Ethnobotany of the Himalaya, 2021; Miraj et al., 2016);
- *Eryngium campestre* L. is used in urinary lithiasis, prostatitis, prostate hypertrophy, blenorragia, leg edema (Scarlat, 2019); frequently used in pertussis and kidney disease (Hawas et al., 2016). Successfully it treats diseases of kidneys and urinary tract. The roots have anti- edematous, anti-inflammatory and anti-nociceptive effect (Küpeli et al., 2006);
- *E. planum* L. is also used for urinary retention (Ghișă, 1966, Crăciun et al., 1977);
- *Heracleum sphondylium* L. has a vasodilator effect in urinary disorders and dysuria (Gămulea et al., 2022);
- *Peucedanum arenarium* Waldst. et Kit.; *P. cervaria* (L.) Lapeyer; *P. longifolium* W. et K.; *P. officinale* L.; *P. oreoselinum* (L.) Moench. are used empirically in Balkans and also for genito-urinary diseases (Javanović et al., 2012);
- *Pimpinella saxifraga* L. has a diuretic effect. In Romania it has been used since ancient times in cystitis, kidney and urinary stones, urinary retention and kidney, respiratory, digestive diseases, etc. (Marian, 1870-1906; Crăciun et al., 1977);
- *Sanicula europaea* L. its root has an anti-inflammatory effect in chronic diseases of the urinary tract and other systems in the human body (Scarlat, 2019);
- *Silaum silaus* (L.) Schinz et Thell has edible leaves, with a good effect on the urinary bladder (Jaroslaw Widelski, 2021).

**Apiaceae with immunostimulant effect:** *Angelica archangelica* L., *Bupleurum rotundifolium* L., *Carum carvi* L. In this family there are also toxic plants that cause death: *Aethusa cynapium* L., *Conium maculatum* L., *Cicuta virosa* L. Many toxic species can be used in agriculture as biopesticides.

**Herbicides**

Most of the species in this family of plants contain biocidal substances: phthalide monoterpenes, terpenoids, phenyl propanoids and polyacetylenes. Their oils have a great diversity of substances that act synergistically and they have powerful effects. The oils can also destroy the culture weeds by inhibiting the germination of seeds. They are used as natural herbicides.

*Carum carvi* L. oil can reduce the growth of *Echinochloa crus-galii* (L.) Beauv., *Amaranthus retroflexus* L., *Centaurea solstitialis* L., *Raphanus raphanistrum* L., *Sonchus oleraceus* L.

Biocidal substances degrade easily in heat, humidity, light and oxygen. Insecticides and herbicides from this family are effective (Thiviya et al., 2022).

Bioinsecticides have been used for centuries until the discovering of chemical products (Amoabeng et al., 2019). Most of these cultivated plants contain essential oils that kill mosquitos (Spinoza et al., 2021).

Bioinsecticides for harmful species can be used from the following plants: *Bifora radians* Bieb and the plant *Ligusticum mutellina* (L.) Crantz. The *Bifora radians* Bieb has an insecticidal effect on *Lipaphis pseudobrassicae* and inhibits the hatching and also kills the larvae in grape moth, *Paralobesia viteana* Clements.



*Ligusticum mutelina* (L.) Crantz is more toxic to the larvae of *Pseudaletia unipunctata* than the oils from *Rosmarinus officinalis*, *Satureja hortensis* L., *Origanum vulgare* L. ssp. *hirtum* (Link) A. Terracc., *Thymus vulgaris* L. etc. (Pasrüter et al., 2005).

*Carum carvi* L., has antifungal, herbicidal, nematostatic, molluscicidal effects and it is a good insecticide (Agrahari et al., 2014; Sousa et al., 2021; Boulogne et al., 2012). It can also destroy coleoptera (Amoabeng et al., 2019). The seeds contain the highest concentration of biopesticides substances (Thiviya et al., 2022);

*Peucedanum austriacum* (Jacq.) Koch is studied for the production of an insecticide at the larvae of the butterfly *Spodoptera littoralis* (Hadačec et al., 1993);

*Pimpinella anisum* L. is insecticidal and antifungal (Boulogne et al., 2012);

The most used as an insecticide is *Feniculum*. Its insecticidal substances also contain *Heracleum sphondylium* L. **Against arthropods**, there can be used strong repellents of dill, celery, cumin, fennel.

**The following plants have bacteriostatic action** on phytopathogenic bacteria: *Torilis japonica* (Houtt.) DC., *Daucus carota* L., *Heracleum sphondylium* L., *Aegopodium podagraria* L., *Pimpinella saxifraga* L.

To kill molluscs, *Conium maculatum* L. can be used.

To destroy helminths and protozoa, *Sison amonum* L. can be used (Sousa et al., 2021).

### Synthesis by categories of use:

In this list we indicate the economic value of the *Apiaceae* on Romanian territory. This is useful for botanists, phytosociologists, pharmacists, doctors, biochemists, farmers, pratorologists, horticulturists, foresters, etc.

*Aegopodium podagraria* L., edible, medicinal, cosmetic, antifungal, antibacterial for phytopathogenic agents;

*Aethusa cynapium* L., toxic, empirical veterinary medicine;

*Angelica archangelica* L., psychic protector, culinary food, with medicinal value, medium melliferous, veterinary medicine, cosmetic, decorative, insecticide and antifungal. It is a natural monument;

*A. palustris* (Besser) Hoffm., medicinal, melliferous, very rare;

*A. sylvestris* L., medicinal, edible 3/5, yellow- brown dye, antiparasitic, melliferous, toxic, biopesticide, decorative;

*Anthriscus caucalis* M. Bieb. contains essential oil;

*A. cerefolium* (L.) Hoffm., culinary, aromatic, medicinal, weak melliferous, biopesticide;

*A. nemorosus* (M. Bieb.) Spreng., antifungal, medicinal, food industry;

*A. nitida* (Wahlenb.) Gaecke, contains essential oil;

*A. sylvestris* (L.) Hoffm., medicinal, insecticide and biopesticide, melliferous;

*Apium nodiflorum* (L.) Lang., medicinal culinary, biopesticide, rare;

*Athamantha turbith* (L.) Brot., medicinal;

*Berula erecta* (Huds.) Coville, toxic;

*Bifora radians* Bieb., medicinal, insecticide;

*Bupleurum affine* Sadler, medicinal;

*B. falcatum* L., medicinal;

*B. praealtum* L., medicinal;

*B. ranunculoides* L., decorative;

*B. rotundifolium* L., medicinal, decorative;

*Cachrys alpina* MB, contains oil;

*Carum carvi* L., medicinal, aromatic spice, cosmetic, veterinary medicine, poor fodder, antifungal, herbicide, nematostatic, molluscicidal, good insecticide;

*Caucalis platycarpus* L., medicinal;

*Chaerophyllum aromaticum* L., medicinal, poor melliferous, biopesticide, toxic;

*Ch. aureum* L., toxic, biopesticide, fodder;

*Ch. bulbosum* L., culinary food, weak antibacterial, toxic;

*Ch. hirsutum* L., weak melliferous;

*Ch. temulum* L., toxic, contains volatile substances;

*Cicuta virosa* L., very toxic, medicinal, antifungal;

*Conioselinum tataricum* Hoff., aromatic food;

*Conium maculatum* L., homeopathic, insecticide, highly toxic;

*Daucus carota* L. ssp. *carota*, biopesticide, medium fodder, medium melliferous, medicinal, food processing;

*D. guttatus* Sm. ssp. *zahariadii* Heywood, contains essential oil;

*Echinohora tenuifolia* L. ssp. *sibthorpiana* (Guss.) Tutin, aromatic and antifungal for food industry;

*Eryngium campestre* L., medicinal, medium melliferous, toxic weed;

*E. maritimum* L., medicinal, decorative, red list species;

*E. planum* L., medium melliferous, medicinal, veterinary medicine, agricultural, decorative, harmful to meadows, toxic;

*Ferula heuffelii* Griseb. ex Heuff., medicinal, rare;

*F. sadleriana* Ledeb., coumarine source;

*Ferulago campestris* (Besser) Grec., medicinal, food, perfumery;

*F. sylvatica* (Besser) Rechenb., aromatic, medicinal;  
*Falcaria vulgaris* Bernh., medicinal, fodder;  
*Hacquetia epipactis* (Scop.) DC., decorative;  
*Laserpitium archangelica* Wulfen, medicinal;  
*L. krapfii* Crantz., medicinal, ecological restoration;  
*L. latifolium* L., medicinal, weak spicy;  
*L. prutenicum* L., medicinal;  
*L. siler* L., very weak spicy, food, aromatic, medicinal;  
*Ligusticum mutellina* (L.) Crantz, edible seasoning 1/5, industrial flavouring, insecticide, medium fodder;  
*Meum athamanticum* Jacq., aromatic food;  
*Myrrhoides nodosa* (L.) Cannon, fungicide;  
*Oenanthe aquatica* (L.) Poir., medium melliferous, very toxic, insecticide, antifungal, decorative;  
*Oenanthe banatica* Heuff., toxic, medium melliferous;  
*O. fistulosa* L., toxic;  
*O. peucedanifolia* Pollich, edible 1/5;  
*O. silaifolia* M. Bieb., medium melliferous;  
*Orlaya grandiflora* (L.) Hoffm., aromatic, medicinal;  
*Pastinaca sativa* L.ssp. *sylvestris* Roug & Camus, medium melliferous, medicinal;  
*Peucedanum alsaticum* L., medicinal;  
*P. arenarium* Waldst. Et Kit., medicinal, weak melliferous;  
*P. austriacum* (Jacq.) Koch, medicinal, insecticide;  
*P. cervaria* (L.) Lapeyer, medicinal;  
*P. longifolium* W. et K., medicinal;  
*P. officinale* L., medicinal, insecticide;  
*P. oreoselinum* (L.) Moench., medicinal;  
*P. palustre* (L.) Moench, very weak culinary food, medicinal, insecticide;  
*Pimpinella anisum* L., insecticide and antifungal;  
*P. major* (L.) Huds., medicinal, weak fodder;  
*P. peregrina* L., aromatic;  
*P. saxifraga* L., weak fodder, weak melliferous, medicinal, veterinary medicine, food industry, biopesticides;  
*P. tragium* Vill., aromatic;  
*Sanicula europaea* L., medicinal, decorative;  
*Scandix pecten-veneris* L., medicinal;  
*Selinum carvifolia* (L.) L., medicinal, insecticide;  
*Seseli annuum* L., antifungal;  
*S. campestre* Besser, medicinal;  
*S. gracile* (L.) Koch, possibly medicinal;  
*S. hippomaranthum* Jacq., possibly medicinal;  
*S. libanotis* (L.) Koch, edible medicinal 1/5, decorative;  
*S. pallasii* Besser, medicinal;  
*S. osseum* Crantz em. Simonkai, contains essential oil;  
*S. peucedanoides* (Bieb.) Koso-Pol, contains essential oil;  
*S. rigidum* Waldst. et Kit., medicinal;  
*S. tortuosum* L., medicinal;  
*Silaum silaus* (L.) Schinz et Thell, medicinal, edible;  
*Sison amonum* L., medicinal, biopesticide;  
*Sium latifolium* L., medium melliferous, toxic;  
*S. sisarum* L., edible root 4/5, toxic?;  
*Smyrniolum perfoliatum* L., medicinal;  
*Tordylium maximum* L., medicinal;  
*Torilis arvensis* (Huds.) DC., contains essential oil;  
*T. japonica* (Houtt.) DC., medicinal;  
*Trinia glauca* (L.) Dumort., medicinal;

## CONCLUSION

Cultivating these plants on the land is very good for food and nutritional industry, spices, beverages, pharmacy, cosmetics, aromatic substances, antifungal, larvicidal, antibacterial, insecticide and repellent industry.



Due to the large number of substances that these plants contain, they can have beneficial effects on all systems of the human body. Some of them entered the economic circuit. For example: *Ferula* and *Peucedanum* that contain various substances of pharmaceutical interest. Until now, the most cultivated with vivid interest were *Angelica archangelica* L. and *Carum carvi* L.

At many species there are quoted information from the foreign authors. This impose also a verification of Romania's plants because there are local influences of soil and climate.

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