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Exploring the Phytochemical composition and Pharmacological efficacies of *Viola odorata*: A Comprehensive Review

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Abbreviations

ACE – Absolute eosinophil count; **BPH –** Bengin prostatic hyperplasia; **CRS –** Chronic rhinosinsitis; **DPPH-**Diphenyl picrylhydrazyl hydrate; **ESBL -** Extended spectrum beta lactamases; **GCMS –** Gas chromatography mass **HPLC** – High performance liquid chromatography; **LCMS –** Liquid chromatography mass spectrometry; **MDRTB** – Multidrug resistant TB; **M.H37Rv –** strain of *Mycobacterium tuberculosis*; **MIC –** Minimum inhibitory concentration; **NSFE** – Nasal smear for Eosinophils. **SNOT 22 –** Sinonasal outcomes test-22; **STD –** Sexually transmitted diseases

Abstract

V. odorata Linn., commonly referred to as "sweet violet," is a plant belonging to the violaceae family and has been utilized for its medicinal properties in Ayurvedic and Unani systems of medicine since ancient times. It is indigenous to Europe and Asia. In India, it is commonly known as Banafsa, Banafsha, or Banaksa with multitude of medicinal applications. *V. odorata* is involved in many traditional practices for the treatment of various ailments such as fever, cough, the common cold, headache, sleeplessness, epilepsy, constipation, heart palpitations, difficult or painful urination, breathing difficulties, and skin issues. All parts of the sweet violet plant have medicinal value and possess various biological properties, including sedative, diuretic, laxative, anti-asthmatic, anti-dyslipidemic, antihypertensive, antidiabetic, antibacterial, antimicrobial, anti-inflammatory, antipyretic, antioxidant, hepatoprotective, cytotoxic, anticancer, antifungal, and antitubercular activities. The plant's oil can be used

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topically or by nasal treatment for neurological and dermatological conditions. The leaves of sweet violet contain about twenty-three volatile components in their essential oils, most of which are aliphatic compounds or derivatives of shikimic acid. Additionally, sweet violet produces a variety of cyclotides that have different biological functions. The unique structure of cyclotides, their natural role in plant defence mechanisms, and their diverse range of bioactive properties have considerable significance. This review aims to investigate and emphasize the importance of this highly efficient medicinal herb that possesses multiple therapeutic properties. The objective is to gather existing knowledge and provide a systematic overview of the herb's significance.

Key words: *Viola odorata,* sweet violet, phytochemicals, pharmacological activity.

1. Introduction:

The abundance of natural substances found in medicinal plants, known for their therapeutic properties and minimal side effects, is one of the numerous advantages they offer. Throughout history, medical experts have recognized the healing effects of certain plant-based remedies, which have proven to be powerful solutions for various health conditions. The use of herbal medicines has gained significant attention in global health discussions as well. Recent research indicates that over 80 percent of the global population depends on herbal medicine to benefit from its healing properties (1). In India, the utilization of indigenous plants for treating diverse illnesses has proven to be highly effective in addressing various human ailments (2). The World Health Organization (WHO) defines a drug as any plant or its constituents that possess substances suitable for traditional usage or pharmaceutical synthesis (3). At present, approximately 300 types of aromatic and medicinal plants are employed internationally in industries such as pharmaceuticals, cosmetics, food, and fragrances (4). Sweet violet (Banafsha), a plant of medicinal significance for drug acquisition, has been utilized in India for a long time and is therapeutically employed in the Unani and Ayurveda medical systems. Banafsha can be obtained in three different types: dried aerial parts comprising flowers, stems, and leaves; dried flowers known as Gul-e-Banafsha; and dried aerial parts without flowers referred to as Barg-e-Banafsha. The leaves of Banafsha are broad, ovate-cordate in shape, tufted, and crenate (5). In the Indian market for medicinal drugs, genuine Banafsha is available in two forms: the first is characterized by violet flowers (Gul-e-Banafsha), and the other is the whole plant known as Kashmiri Banafsha. Both the flowers and the whole plant are utilized as medicinal substances (6).

1.1 Vernaculars names

Unani – Banafsha, Banafsaj,Arbu, Fareer, Kakosh; **Persian** – Kokash, Gul – e –

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Banafsha; **Arabic** – Banafsaj, Fafrer; **English** – Violet, sweet violet; **Hindi** – Banafsha; **Bengali** – Banafshah, Banosa (7).

1.2 Distribution

This herbaceous plant grows significanty during summer season in the Himalayan hills, particularly in Kashmir and Nepal at altitudes exceeding 5000 feet and in the hilly regions of Kashmir and Nepal as well as Kangra and Chamba at elevations ranging from 1500 to 1800 meters (8). It is also found in the northern temperate zones in Iran, Iraq, Afghanistan, the Mediterranean region, and areas of the Caucasus (9).

1.3 Morphological description

Viola odorata Linn., commonly known as the Sweet Violet plant, is a low-growing, creeping herbaceous weed. It lacks a noticeable stem and typically reaches a maximum height of 15 cm. In the northern regions of India, this plant thrives primarily during the winter season. Optimal growth conditions for *V. odorata* include a cool and moist climate. The entire plant possesses a bitter taste and exhibits a hot and pungent flavour profile. The herb originates from a root stock. Root is dry, knotty and as thick as quill. Propagation generally occurs by seeds (10).

1.4 Flowers:

The flowering period typically takes place between April and May. The flowers hang downwards and are of rich violet colour with a bluish white base, spanning a total of six petals. The flowers can also be found in various other colours such as yellow, white, purplish, blue, or pink. They possess elongated, thread-like stalks and grow individually in the leaf axils. The flowers are supported by pedicels, have both male and female reproductive parts, exhibit a symmetrical shape, and are positioned below the ovary. They emit a pleasant fragrance (11). Measuring around 3-4 mm in length and 1.5-2.00 mm in width, the flowers lack a distinct taste and are generally long-lasting. The Corolla possesses five petals that have a deep violet hue. The foremost petal serves as a platform for insects to land on during pollination and contains the nectar produced by the spurs of the lower petals. The Androecium consists of five stamens that alternate with the petals, forming a circular arrangement around the ovary and style. The filaments of the stamens are short, and the anthers face inwards. The gynoecium is composed of three fused carpels, with a single-chambered ovary and placentation along the ovary walls. The pollen grains are spherical, smooth, and have a thin outer wall, with a single opening for germinal growth. The size of the pollen grains is approximately 28.40µ (12).

2. *Viola odorata* in Traditional medicinal practices:

From last few decades, there has been a considerable increase in interest and use of medicinal plant products. Since a very long time, *V. odorata* has been widely utilised for a variety of therapeutic purposes in traditional systems throughout various locations, particularly in Asian nations like India, Pakistan, Bhutan and Nepal. It is regarded as a plant with a cool and damp temperament in Iranian traditional medicine and has been utilised in hot and arid climates for temperamental illnesses

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including fever, extreme thirst and uremic pruritus. The literature review documented that, it is widely employed for pleurisy, pneumonia cough and works well in febrile children, rectal prolapsed and convulsions (13). It treats inflammation of the head, neck, a hot catarrh, gastrointestinal conditions and insomnia. Additionally, it is a significant medicinal herb useful for treating common cold and bronchitis (14). Different traditional treatments employ the use of *V. odorata* as a poultice to cure headaches, coughs, colds, bronchitis and fever (15). According to current research, the primary ingredients in violet leaves are glycosides of salicylic acid which are traditionally used to cure headaches and body aches (16). Headaches caused by heat, bile or high blood pressure can all be cured by inhaling fresh flowers and leaves. Gule injections are used to treat childhood headaches. Banafsha, Sesame and almond oils applied with fresh floral oil are beneficial for sleeplessness, Insomnia and cephalagia can be efficiently treated with Roghan Banafsha. (17).

Banafsha and barley flour paste applied locally or just the leaves themselves can treat hot irritation. Hot irritation is removed with plaster of Banafsha and Barley flour or alone with Banafsha leaves (18). To treat whooping cough, headaches and migraines sweet violet is a well-known herb in Ayurvedic and Unani medical systems. Its leaves, petals or buds are consumed in India as raw or cooked salad ingredients or tea ingredients. Its root decoctions are said to be potent emetic (19). In India, malignancies of the tongue or throat are treated with liquid extracts of fresh leaves or leaves syrup. In bilious illnesses, dried flowers are expectorant, diuretic, antipyretic, diaphoretic, and purgative. The decoctions of the flowers are used to treat fever because of their anodyne properties. In order to make syrup to treat cough and hoarseness, its blooms are employed (20).

According to the Ayurvedic system, *V. odorata*, also known as Vanapsika, has three properties Madhura Rasa (sweet taste) Sheeta Veerya (cool potency) and Madhura Vipaka (sweet post-digestive effect) that are thought to work together to naturally balance the environment and diminish kapha in the body (21). In Iranian system of medicine, violet flowers are applied topically, ingested or used as a nasal spray to treat hot headaches, sanguinary or biliary disorders, warm catarrh, abdominal disorders, neck and head pain, headaches and insomnia (14). Joint pain was treated with an ointment made from the flowers of *V. odorata* (22). Its oil is created by macerating the plant's flower in heated oil. It is used to treat sleeplessness, stiff joints and to protect the nails. As a nasal drop, its oil is used for warm, cold and helmet headaches (23). For bronchial discomfort, skin irritability and exhaustion, aromatherapy uses the essential oil of *V. odorata* (24). Flowers from *V. odorata* are gargled to soothe sore throats (25). Flowers have nutritional and culinary value and used for flavouring and coloring the confectionary or breath fresheners (20). As a result, numerous parts of this plant including flowers, leaves, seeds and roots are utilised in many traditional systems. However, the leaves and flowers are primarily utilised to produce syrups for the treatment of fever, bronchitis and cough in both adults and

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children (26). The traditional medicinal applications are mentioned in Table 1.

3. Phytochemical profile:

Phytochemical constituents with diverse chemical structures have been extracted from different species belonging to the *Viola* genus. These compounds include cyclotides, flavonoids, alkaloids, and triterpenoids (27). The active fraction was examined using GC-MS, and the results indicated the existence of certain compounds in a significant amount. These compounds were identified as: 2,3,4-trimethylpentane (45%), Palmitic acid (28.85%), Pentadecanoic acid (8.14%) and 10-Undecyn1-ol (14.13%) (28).

The flowers of the plant contain a pigment and a small quantity of a volatile oil, acids, and a substance that induces vomiting known as violin, which is likely the same as emetine. They also contain viola-quercitrin, a compound closely related to but not identical with quercitrin or rutin, as well as sugar. It is believed that the violin is present throughout all parts of the plant (29). The flowers also contain compound glucoside and methyl salicylic ester. A novel compound, named 3-(2′,4′,6′,6′-tetramethylcyclohexa1′,4′-dienyl) acrylic acid, which shares a structural similarity to ionones, has been discovered in the above-ground components of *V. odorata*. This compound exhibits noteworthy biological effects. The ionones, dihydroionones, ionols, and epoxy ionones are a few examples of compound groups that belong to the same family (21).

Analysis of essential oil composition in *V. odorata* leaves confirm the existence of 25 compounds (Table 2), accounting for 92.77% of the oil with butyl-2-ethylhexylphthalate and 5,6,7,7a-tetrahydro-4,4,7a-trimethyl-2(4H)-benzofuranone (30).

3.1 Cyclotides present in V. odorata:

Cyclotides are cyclic polypepetides generally found in plants with about 27-37 amino acid residues (Table 3). Cyclotides have not been explored much but their production in plants is often related to plant host defence, mostly in case of pests (31). The members of family Violaceae have shown to contain most of cyclotides (32). The initial cyclotide Kalata B1, derived from the African plant kalata–kalata (*Oldenlandia affinis*) in the year 1970, served as a traditional medication by African women to hasten the labour cases (33). Today cyclotides are largest known circular polypeptide families (32). There have only been about 300 cyclotides found so far, with estimates putting that number at over 50,000 (34).

4. Evidence - based pharmacological activities:

4.1 Antibacterial activity: *V. odorata* aqueous extract shows considerable antibacterial activity against *E. coli* and *S. typhi*. The unprocessed ethanol extracts and its subsequent solvent portions (petroleum ether, ethyl acetate and dichloromethane) also shown to have important antibacterial activity against *K. pneumonia* and *E. coli* (35). Powerfull bactericidal action with regard to gram-negative bacteria was found in the common violet isolate cycloviolacin O_2, which also reduced the development of *S. typhi, E. coli, Klebsiella pneumonia* and *Pseudomonas aeruginosa* in various experiments (36). The essential oils demonstrated antibacterial action against *S. epidermis, K. pneumonia* and *B. subtilis* while

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the methanol extract demonstrated antibacterial activity against *E. coli*, *P. aeruginosa, P. vulgaris* and *S. epidermidis*. Chloroform fraction also demonstrated antibacterial action against *P. vulgaris* and *S. epidermidis* (30).

4.2 Antimicrobial activity: Having minimal inhibitory concentration levels between 1 and 2%, *V. odorata* show most efficient antibacterial activity. Studies have discovered a significant synergistic inhibitory impact of two aqueous extracts of *Ruta graveolens* and *V. odorata* in the development of *Trichomonas vaginalis* cultivated in (CM161) medium at doses of 0.15625, 0.3125 and 10-20 mg/cm^3 (37). The most frequent and treatable STD is *Trichomonas vaginalis*. In developing nations, trichomoniasis is a serious health concern. A dosage of 10 mg/cm^3 for the inhibitor showed complete inhibition (38). Gram-negative organisms *Pseudomonas aeruginosa* and *Klebsiella pneumoniae* were resistant to bactericidal effects of Cyclotide O_2 in time-kill experiments. No cyclotides, shown significant action in opposition to *Staphylococcus aureus*. Chemically conceal the charged Lys and Glu residues in Cyclotide O_2 leading to almost complete loss of activity against *Salmonella* whereas concealing Arg led to slighter significant loss of activity. Strong antibacterial activity against human pathogenic bacteria was discovered in cyclotides from Iranian *V. odorata* (39). Extracts of plants and fractions from *V. odorata* show *in vitro* efficacy in case of *Klebsiella pneumoniae* and *E. coli* that makes ESBLs (35).

4.3 Antioxidant activity: In DPPH assay, water extracts of *V. odorata* flowers have radical scavenging behaviour and visions that need concentration (40). *In vitro*, *V. odorata* leaf extract demonstrated antioxidant activity (41). A study revealed that common violet aqueous extracts, ethanol, ethyl acetate and dichloromethane may all scavenge NO radicals. Additionally, the ethanolic extract significantly inhibited tyrosinase (80.23% 0.87%) (42).

4.4 Antihelmithic activity: *V. odorata* isolated cycloviolacin O_2, cycloviolacin O_3, cycloviolacin O_8, cycloviolacin O_{13}, cycloviolacin O_{14}, cycloviolacin O_{15} and cycloviolacin O_{16} compounds were particularly effective against *T. colubriformis* and *H. contortus* (43). The activity of the methanol extract, ethyl acetate and chloroform against these worm/nematodes was low to moderate (44).

4.6 Antitumor and anticancer activity: Entire aerial portions including leaves, stem and flowers are utilised in cancer treatment. According to reports, *Viola* has potential as a pharmacological instrument and a source of anticancer drugs (45). Cycloviolacin O_2, a cyclotide from the violaceae family and plant *V. odorata* exhibits anticancer properties and kills cells by permeabilizing their membranes. This study identifies a number of cyclotides with strong cytotoxicity that show promising activity as a chemosensitizing agent for breast cancer that is resistant to treatment (46).

4.7 Neurological activity: In an animal study, the common violet's effects of sedation and anaesthesia were assessed. An extract from a 70:30 methanol and chloroform mixture has been shown to have superior sedative effect and pre-anesthetic effects than diazepam dose (45). The severity index for insomnia and sleep both were

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improved after giving sweet violet oil to patients suffering from insomnia as a nasal spray for one month (47).

4.8 Pulmonary diseases: Recent studies have looked at how *V. odorata* syrup obtained from flowers affects the repression and additionally reducing cough in children with sporadic asthma. As a result, it was superior to the placebo in terms of effectiveness and might be used as an adjuvant in addition to short-acting agonists (48).

4.9 Antinflammatory effect: In order to cure lung damage brought by formalin in case rats, an aqueous extract from sweet violet petals have been studied. This extract demonstrated some modest benefit in avoiding lung injury when used as a pre-treatment. It was discovered that this result was comparable to hydrocortisone's (13). A clinical trial has recommended an oral dose of co-amoxiclav, fexofenadine and a common violet decoction to treat recurrent tonsillitis and peritonsillar abscess. Results indicated that tonsillitis and peritonsillar abscess rates can be reduced by applying decoction repeatedly (49).

4.10 Diuretic activity: Diuretic consequences of methanol, butanol, n-hexane and aqueous extracts from aerial parts of sweet violet for diuresis in a rat model have been studied. Results showed that 400 mg/kg of n-hexane or methanol extract taken orally had highest activity after 24 hours (50).

4.11 Benign prostrate hyperplasia: Panahi *et al.* conducted a double-blind, placebo-controlled trial of a combination of *V. odorata*, *Physalis alkekengi* and *Echiumamoenum* in men which have symptom of BPH. It is age associated condition which leads to prostate gland enlargement that can cause urinary difficulty. Throughout the course of the trial, no notable adverse effects or anomalies in biochemical testing and urinalysis were noticed. Results show that the above combination is both safe and beneficial for enhancing BPH patient's quality of life (51).

4.12 Chronic Rhinosinsitis: In order to assess the effectiveness of a flower decoction of *V. odorata* in treating chronic rhinosinusitis, Mulla *et al.* conducted a prospective randomised controlled trial. 30 patients suffering from CRS were randomly randomised to receive either the active control treatment or the test for 30 days. The enhancement in sinonasal symptoms, as determined by a sinonasal outcome questionnaire served as the major outcome measure (SNOT-22). Secondary outcome indicators were improvement in the x-ray paranasal sinus and a decline in absolute eosinophil count (AEC). The significance level was left at 5%. The test group's SNOT-22 score was noticeably low following the conclusion of therapy (52).

4.13 Antipyretic and antihypertensive: An evaluation about complementary therapy using *V. odorata* essential oil for controlling fever in febrile neutropenic children was conducted by Tafazoli et al. (2019). 41 febrile children participated in a randomised placebo-controlled clinical trial. The children were split into two categories, the active drug group and the placebo group. The outermost edge of the patient's umbilicus had to be massaged with 20 drops of *V. odorata* oil for the active medication group. After 30 minutes of treatment, the mean temperature considerably dropped from

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Viola groups but not in the placebo group. In the *Viola* group, substantially fewer patients received paracetamol as the rescue medication than in the placebo group. Siddiqi *et al.* studies the vasodilator effect of the leaves of *V. odorata* extract in the anaesthetized rats and found that the extract is mediated through a number of pathways including inhibition of Ca^{2+} influx via membranous Ca^{2+} channels, its release from intracellular stores and NO mediated pathways, which may account for the decrease in blood pressure (53).

4.14 Repellent activity: It was noted that *V. odorata* essential oils, when combined with essential oils from other plants have strong insect repellent efficacy against a variety of mosquitoes including *Aedes aegypti*, *Anopheles stephensi and Culex quinquefasciatus* (54).

4.15 Analgesic activity: *V. odorata* 400 mg/kg crude methanolic extract was found to be analgesic in acetic acid-induced writhing and tail immersion animal models, according to research (55).

4.16 Laxative activity: Rats were used to test the laxative effects of butanol, methanol, n-hexane and aqueous extract from aerial parts of sweet violets. Butanol and aqueous extract may considerably improve gastrointestinal motility (47).

4.17 Antitubercular activity: The antibacterial activity from extracts and pure ingredients of *V. odorata* in case of *Mycobacterium tuberculosis*. By use of several solvents, the plant's crude ethanol extract was fractionated to produce the desired extracts. The dichloromethane fractions and n-hexane had good action against both strains and were purified using chromatographic methods and prep-HPLC to produce a number of pure chemicals that were then identified by LCMS. Seven isolated pure compounds were tested at various concentrations against *M. tuberculosis* H37Rv, MDRTB isolate and their MICs were noted. In the case of an MDR-TB isolate, the same concentrations were used. The findings revealed that *V. odorata* contains very effective chemicals against M. H37Rv and *M. tuberculosis*. Avium is a possible lead material for future clinical studies of anti-TB medication compositions (56).

4.18 Antiviral activity: Mobius cyclotides, such as kalata B1were often slighter cytotoxic for target cells and had equivalent inhibitory effect against HIV infection to bracelet cyclotides, such as cycloviolacin O_2 (57).

4.19 Molluscicidal activity: Crude cyclotide extracts from the *Oldenlandia affinis* and *V. odorata* in case of *Pomacea canaliculata* (golden apple snail) was corresponding to that of man-made molluscicide metaldehyde (58).

Conclusion

V. odorata has been utilized for its therapeutic potential throughout history and is mentioned in traditional medicinal systems as a remedy for various ailments. In Iranian traditional medicine, it is considered a plant with a cooling and moist nature and has been used in hot and arid regions to treat conditions such as fever, excessive thirst, and uremic pruritus. All parts of the plant are employed to treat bronchitis, tumours, cancer, postoperative tumor metastasis, and common digestive issues. It contains a diverse range of phytochemical

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constituents, including steroids, flavonoids, tannins, saponins, and alkaloids, which are responsible for its biological properties. The sweet violet also produces different types of cyclotides, which are presumed to have specific biological functions. Cyclotides are highly significant due to their unique structure, natural role in plant defense mechanisms, and their potential applications as bioactive compounds in medicine and agriculture. However, *V. odorata* is currently facing threats such as overexploitation, habitat destruction, pollution, and genetic risks. Its conservation is a critical concern according to the IUCN list. Therefore, urgent action is required to protect this valuable herb, allowing it to continue providing medicinal benefits for the treatment of numerous diseases.

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Author contributions

MS4 suggested the idea and designed the study. SY1 and S3 collected the data and involved in draft preparation for the review. The final editing and technical check were done by MS2 and MS4 approved the final version.

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Ethical Approval

Not Applicable.

Consent to Participate

Not Applicable.

Conflict of interest

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Table 1: Traditional medicinal applications of *Viola odorata*

Plant Part/oil	Ailment	Method	Reference

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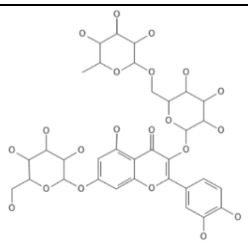
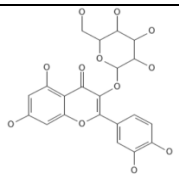
Leaves	Pleurisy, pneumonia, cough	Poultice	13
Leaves	Hot irritation	Paste application	18
Leaves	Inflammation, hot catarrh, insomnia	Inhalation	14
Leaves	Headaches, body aches	Ingestion	16
Leaves	Sleeplessness, hot irritation	Local application	18
Leaves	Whooping cough, headaches, migraines	Consumption	19
Plant oil	Warm, cold and helmet headaches	Nasal drops	23
Flowers	Fever, expectorant, diuretic	Decoction	13
Flowers	Cough, hoarseness	Syrup	25
Flowers	Sore throats	Gargling	25
Flowers	Joint pain	Ointment	22
Leaves, flowers, seeds, roots	Fever, bronchitis, cough	Syrup production	26

Table 2. Phytoconstituents present in various plant parts of *Viola odorata*.

S.No.	Compound Name	Class	Structure	Plant Part	References
1.	Quercetin 3 – O – rutinoside (rutin, rutoside)				
2.	Quercetin 3 – O – β -D – glucopyranoside (isoquercitrin)				

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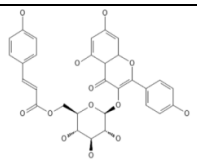
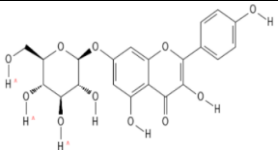
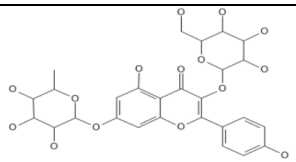
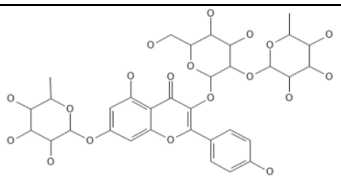
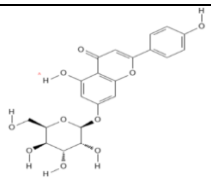
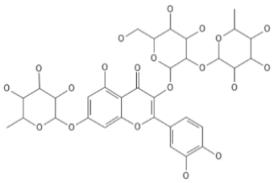
3.	Kaempferol 3 -O – β – D - glucopyranoside	Flavone O - glycoside		Flowers	27
4.	Kaempferol 7 – O – β – D – glucopyranoside				
5.	Kaempferol 3- O – (2,6-di–O – α-L-rhamnopyranosyl)- β-D – glucopyranosyl-7-O-α-L-rhamnopyranoside				
6.	Kaempferol 3- O (2,6-di-O-α-L-rhamnopyranosyl)-β-D-glucopyranoside				
7.	Apigenin 7-O-β-D-glucopyranoside				
8.	Quercetin 3 -O-(2,6-di-O-α-L-rhamnopyranosyl)-β-D-glucopyranosyl-7-O-α-L-rhamnopyranoside				

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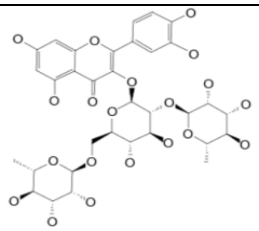
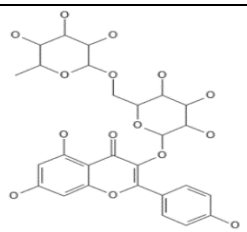
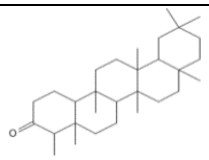
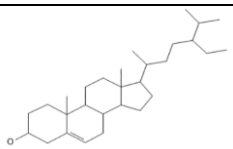
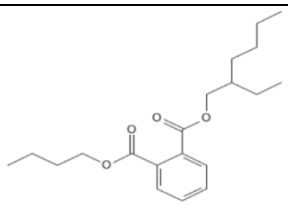
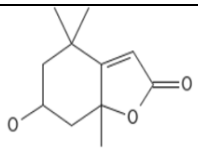
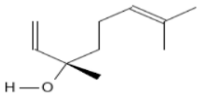
9.	Quercetin 3-O-(2,6-di-O-α-L-rhamnopyranosyl)-β-D-glucopyranoside				
10.	Kaempferol 3-O-rutinoside (nicotiflorin)				
11.	Friedelin	Triterpenoids		Whole plant	28
12.	B - sitosterol	Sterols			
13.	Butyl 2 – ethylhexyl phthalate	Benzoate ester		Leaves	29
14.	5,6,7,7a – Tetrahydro – 4,4,7a – trimethyl 1 – benzofuran – 2 (4H) – one	Benzofurans			
16.	Linalool	Monoterpene			

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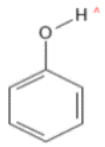
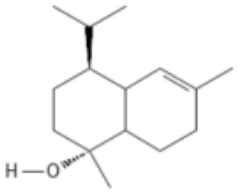
17.	Phenol	Aromatic compound			
18.	α Cardinol	Sesquiterpenoid alcohol			
19.	Viridifloral	Sesquiterpenoid