A REVIEW ON : *KALANCHOE FEDTSCHENKOI*

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ABSTRACT:

Kalanchoe fedtschenkoi is one of the ornamental and succulent plants, as well as a therapeutically effective plant. It comes under the Kalanchoe genus and has a higher therapeutic effect in ethno-medicine. Juicy plant species encompass a range from small annual plants to giant trees and belong to the family Crassulaceae. This review covers the plant profile, phytochemicals, traditional uses, and ethno-pharmacology. Following this, the plant was subjected to extraction using the cold maceration method with solvents of hexane, chloroform, and methanol. The validation and identification of secondary metabolites present in the plant were performed using TFC, HPTLC, and GC/MS. The ethno-pharmacological effects of *k. fedtschenkoi* include its use in treating inflammation, various kinds of microbial infections, cytotoxicity, and other uses.

Keywords: *Kalanchoe*; Crassulaceae; plant profile; chemical composition; pharmacological activities.

INTRODUCTION:

- Traditional medicine includes knowledge, practices, and beliefs that help in an integrated approach. Integration to treat or avoid several illnesses is known for its accessibility and affordability. Traditional medicine is used as the first response to medical emergencies in African countries. In traditional medicine, syrups, branch points, injections, and extracts from herbs or medicinal plants are used as antibiotics, anticancer, anti-inflammatory, or anticoagulant agents.
- Medicinal plants and their parts are often used in the production of therapeutic Extracts. In traditional medicine, medicinal plants are primarily used to treat diseases. This is because it represents an inexpensive alternative that has fewer side effects than current treatments.

SUCCULENT PLANTS:

- Many plant species are adapted to life in arid environments by developing the ability to store water in stems, leaves, and/or underground organs. This phenomenon is called “succulence”. Succulent plants are found in over 70 plant families [1].
- Juicy plants have a global distribution and are found in all areas. Over 30 plant families have juicy plant species, which range in size from small, annual plants to giant trees. The Cactaceae family is the largest and, perhaps, best known of the juicy plant families [2].
- The succulent lifestyle has been recorded in approximately 80 plant families, and it is estimated that 10,000 species are recognized as succulents worldwide. Such plants are particularly prevalent in arid and semi-arid regions. A variety that goes far beyond these species, South Africa has the richest and most diverse succulent plants in the world. Plants that store water do so in one or more of three organs: roots, stems, and leaves. In some species, the continuum between the roots and stems is swollen and expanded, forming a highly covered caudex in nature or in cultivation when these adaptations are present [3].
- Sacco Fit is a plant with at least one juicy fruit. A juicy fruit is a vibrant structure that, in addition to the potential for other functions, provides at least temporary storage and guarantees access to usable water. Plants of the genus *Kalanchoe* (family :

Crassulaceae) are used in traditional tropical medicine to treat a variety of conditions [4].

KALANCHOE FEDTSCHENKOI:

- The term *Kalanchoe* was originally used by Michel Adan son in 1763 and refers to the audio transcription of the Chinese term "Kalan Chauhuy"[3]. This means something that falls and grows. The name *Kalanchoe* describes the spread of the leaf embryo.
- Another explanation of the name refers to the terms "kalanka" and "chaya" used by the indigenous peoples of Brazil [5].
- Some members of the genus *Kalanchoe* have a long history of therapeutic use and are known as "Wunderblatt" due to their surprising healing properties and traditional applications in the treatment of several diseases and disorders. Some of these biological activities correlate with a specific class of secondary metabolites already described in *Kalanchoe* species; examples of these include cardiac-active glycosides and phenolic compounds (flavonoids, phenolic acids, and tannins) [6].
- *Kalanchoe adansii,* a member of the family Crassulaceae, is composed of 144 species and is mainly distributed in tropical areas of Africa and Asia. The Crassulaceae family belongs to Saxifrages, or the stonecrop family. Regarding distribution, the presence of a class member was recorded in the southwest of South Africa [7].
- It is widely known for its decorative adaptability to drought, its exquisite colours, its simple cultivation, its clonal growth, and the lush members of this reproductive kind. Quares of many species are important horticultural plants [8].
- This is because a small plant can easily be propagated along the edge of the leaves by cutting off branches. Many members from the interior can spread from plants formed at the edge of the leaf, which complicates the exclusion of the existing population. *Kalanchoe* has important groups: *Kalanchoe* and *Bryophyllum.* However, uncertainty still remains, and more work must be done to completely clarify the classification characteristics and the history of quanta [9].
- Two species, *Kalanchoe mortagei* and *K. fedtschenkoi*, decided to use ethno-plants. Three sections (Callanche term, Section Briofilm, and Section Kitchen Gear) of *Kalanchoe's* view are quite popular and well-accepted. The species members in these sections show differences in flower morphology and geographical distribution.
- It spreads across wet areas of Madagascar and in arid habitats. In order to adapt to arid environments, the *kalanchoe* species probably acquired drought-resistant traits. Nevertheless, these plants have a variety of breath-taking shapes and are often grown

as decorative objects of strange beauty. It is also sometimes called the "miracle blade" to treat different symptoms.

Members of this genre are used to treat countless diseases in developing countries [10].

- The importance of *Kalanchoe* species depends on their ability to exhibit a variety of biological activities; therefore, they are proposed as treatments for rheumatic disorders, abscesses, wounds, and burns. It has been reported that extracts from similar leaves can provide hepatic-protection, hypocholesterolaemia, nephron protection, and nematicidal activities. Furthermore, species within the genus are used in traditional medicine to induce smooth muscle relaxation and prevent premature birth [11].

DISTRIBUTION:

A plant department that appears in areas such as the Himalayas, East Africa, and Madagascar, and requires detailed testing is *Kalanchoe spp*. It is often considered an exotic or invasive species. The presence of toxic cardiac glycosides in several *Kalanchoe spp.* poses risks to animal grazing in agriculture, with occurrences recorded in Brazil, South Africa, and Australia. Lavender Jacob's Ladder comes from Madagascar Island and has since been introduced [12].

Several regions of various continents, including South Asia, North Africa, and East Africa, suffer from water scarcity. South America and parts of South Asia are affected by the spread of the quagga mussel. Decorative charm and adaptation to a wider variety of climate zones than its original one [13].

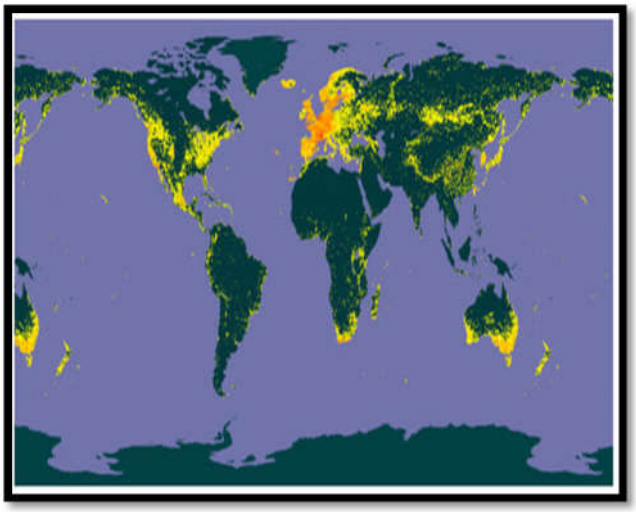

Figure:1 distribution of *Kalanchoe*- yellow spots

Figure:2 *Kalanchoe fedtschenkoi* plant

Crassulaceae J. St. Hil. The family consists of 36 genera. This type of family is distributed mainly in Africa and Asia, located in Madagascar and Arabia, but also in the US and Australia, Karanche (synonyms of heterologous species: *Baumgartenia tratto, Briofilm Salis*, Clavia Com. Ex Lam.,) belong to the Crassulaceae family and contains 179 accepted species [14].

PLANT PROFILE:

- **Synonym(s):** *Bryophyllum fedtschenkoi*, Variegated Lavender Scallops, South American Air Plant, Kalanchoe Stonecrop, grey Sedum.
- **Division:** Magnoliophyte
- **Kingdom:** Plantae
- **Family:** Crassulaceae *DC.*
- **Class:** Magnoliopsida
- **Clade:** Angiosperms
- **Genus:** Kalanchoe
- **Species:** K. *fedtschenkoi*
- **Subclass:** Core Eudicots
- **Order:** Saxifrages
- **Family:** Crassulaceae
- **Subfamily:** Sempervivoideae
- **Tribe:** Kalanchoeae

Figure:3 Whole plant

PLANT DESCRIPTION:

LEAF : Leaf blades: 20–70 × 15–40 mm, succulent, 1–10 mm long, obovate to nearly circular, and perennial; the leaves are glabrous.

- **Base:** Narrow and cuneate
- **Apex:** Rounded-obtuse
- **Petiole:** Thin
- **Margin:** Irregularly toothed with coarse, acute, and subacute crenation's in the upper half; teeth are sometimes dark brown, purple, angled, and form bulbils in the crenation's, especially after leaves are detached.

STEM: Thin, green to greenish-purple when young, they become brown and are variously erect or prostrate (creeping), rooting along the way. Leaning branches develop long, nearly woody characteristics. Peeling to flaking within age, it's flimsy and brown .

INFLORESCENSE:

- Terminal and apically branched.
- Flowered head-shaped corymb.
- 200 mm tall.

ROOT: It was found that in true multicellular roots, the hairs were uniseriate or biseriate [15].

PHYTOCONSTITUENTS : [16,17,18]

S.No	ANALYSING METHODS	PHYTOCHEMICALS	
1.	TFC of Methanol Extract from *K. fedtschenkoi*	**Flavonoids:** ➢ Quercetin (Qu) ➢ Kaempferol ➢ Myricetin ➢ Luteolin ➢ Eupafolin, or their derivatives	
2.	HPLC Analysis	**Flavonoids:** ➢ Quercetin di-O-hexoside ➢ Methylquercetin-Ohexoside-O-deoxyhexoside ➢ Kaempferol O-hexoside-di-O-deoxyhexoside	
		Hexane extract: ➢ Phytol ➢ n-hexadecanoic acid ➢ Stearic acid	**Chloroform extract:** ➢ Phytol ➢ Hexadecanoic acid ➢ Stearic acid

3.	GC/MS Analysis	➢ Squalene ➢ Hexane ➢ *d*-Tocopherol ➢ Tocopherol ➢ *a*-Tocopherol ➢ Stigmasterol ➢ Heptacosane ➢ Simiarenol ➢ Friedelin ➢ Octadecanal ➢ 2-Hexadecanol	➢ Chloroform ➢ 1-Hexadecanol ➢ 1-Pentatriacontanol ➢ *d*-Tocopherol ➢ 1-Docosene ➢ Tocopherol ➢ *a*-Tocopherol ➢ *b*-Stigmasterol ➢ Heptacosane ➢ *b*-Simiarenol ➢ Octadecanal

PHARMACOLOGICAL ACTIVITES OF *KALANCHOE FEDTSCHENKOI*:

ANTIMICROBIAL ACTIVITY:

Kalanchoe fedtschenkoi - chloroform and methanol extracts showed weak anti-bacterial activity against the test panel. This processing using 150 µg/mL of chloroform inhibited the growth of *Pseudomonas aeruginosa* only. At the same concentration, the methanol extract suppressed the growth of MRSA (Methicillin-resistant Staphylococcus aureus). There was no inhibition of yeast strains. Inhibition of *Pseudomonas aeruginosa* was achieved using an ethanol extract of *K. fedtschenkoi* at a concentration of IC50 128 µg/mL. This concentration is effective against *A. baumannii* and *S. aureus.* These results may be associated with differences in harvest, climate, soil characteristics, extraction methods, implemented methodologies, and growth conditions [18].

ANTI-INFLAMMATORY ACTIVITY:

K. Fedtshenkoi's chloroform extract stimulated the secretion of the anti-inflammatory cell Khan IL-10 at 50 µg/mL. The anti-inflammatory activity of the chloroform extract can be associated with the presence of a stigma. This well-known phytosterol can inhibit the production of other pro-inflammatory cytokines, such as IL-6, and the production of tumor necrosis factor α (TNF-α). Meanwhile, hexane treatment and methanol extraction improved IL-6 secretion, likely because of the cytotoxicity of these extracts [18].

CYTOTOXICITY ACTIVITY:

K. fedtschenkoi - Cyst toxicity extraction increases with the polarity of the solvent. The treatment with methanol extracts at 1.722 g/mL was highly cytotoxic to THP-1 cells, whereas treatment with hexane extracts reduced cell lifespan capacity at 2.090 g/mL. Another study evaluated the cytotoxicity of ethanol extracts from *K. fedtschenkoi* on human keratinocyte cells (HaCaTs). This study showed that ethanol extracts reduced the cell lifespan volume at 250 g/mL[18].

The N-butanol group (KFBuOH), from *K. fedtschenkoi* aqueous leaf extract, reduced the lifetime capacity of B16F10 melanoma cells by 65% at 100 µg/mL and was fractionated using RP-18 solid-phase extraction (SPE) and Sephadex LH-20 column chromatography. The fraction was analyzed by 1H-NMR spectroscopy and subjected to MTT cytotoxicity tests on cultured melanoma cells. Orthogonal projections to latent structures discriminant analysis (OPLS-DA) were used to correlate 1H-NMR profiles with cytotoxic activity [19].

CONCLUSION

Water-reservoir tissue is one of the most successful drought controls in the plant kingdom. Xeromorphic succulents are a large and diverse resource with exceptional potential for mitigating the adverse effects of climate change, which are most keenly felt in areas where interventions are most needed. A challenge of using these adaptations is the knowledge gaps associated with fundamentals, such as the mechanisms of water storage and its regulation at the genetic level. This overview describes the general uses, anatomical, and biological aspects of *Kalanchoe* species, a genus of plants widely used in folk medicine and commonly known as Wunderblatt. However, pharmacological assessments do not always examine these species. Plants are known potential sources of curative compounds. More attention was paid last year to the ethno-botanical and traditional uses of natural connections, especially those from the origins of vegetables, which have been well tested for their effectiveness and are generally considered safe for human use. This summary is on *K. fedtschenkoi*, which demonstrates the pharmacological potential of *Kalanchoe* and helps researchers explore more about this valuable system.

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