



# INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

## BRIEF REVIEW ON OCIMUM GRATISSIMUM AS AN AYURVEDIC REMEDY AGAINST PSORIASIS

<sup>1</sup>Sandesh Sachhidanand Bole, <sup>2</sup>Dr. Vijaykumar S. Wakale, <sup>3</sup>Sonali Baban Pawar, <sup>4</sup>Akshada Dilip Suryawanshi and <sup>5</sup>Anushka Naresh Patil.

<sup>1</sup>Department of Pharmacognosy,

<sup>1</sup>Matoshri Miratai Aher College of Pharmacy, Karjule Harya, Ahmednagar, India.

### ABSTRACT:

Psoriasis is an immune mediated inflammatory disease, in which proliferation of keratinocytes which cause epidermal hyperplasia and further silver scaling of skin. Till now there is no any cure for psoriasis but by using herbal drugs we can reduce the potency of condition. A long list of effective treatments has been available for patient with psoriasis but herbal products represent vital treatment choices for psoriasis. In this review we go to study about psoriasis and effective herbal treatment on psoriatic patients.

**KEY WORDS:** Psoriasis, Herbal drug, Hyperplasia, Psoriatic lesion.

### INTRODUCTION:

Psoriasis is a skin disorder marked with inflammation. The development and progression of the disease are associated with a chronic inflammatory response that is attributed to the deregulated innate immune system. Many medications are obtainable for the mitigation of psoriasis. The presently used ant psoriatic medications are expensive; carry the threat of serious side-effects and frequent remission attacks of the disease. Herbal products represent vital treatment choices for psoriasis. The pathological process and clinical psoriasis symptoms include multiple immunological mechanisms and pro-inflammatory cytokines. All the findings recommended that numerous herbal constituents are liable for anti-psoriatic activity. Herbal medicines will be used as promising anti-psoriatic agents. The ant psoriatic effects of natural medicines are through modulation of the signal pathways of the cells. The inhibition of keratinocytes proliferation and completely differentiation by targeting different molecular targets occurs by phytoconstituents. The results recommended the use of plants as a secure, effective, and inexpensive (cheap) option for treating psoriasis. <sup>[1]</sup>

*Ocimum gratissimum* is an herb used in making anti-bacterial, anti-inflammatory, antifungal medicines. Belonging to *Lamiaceae* family and *Ocimum*. It's a plant that can be grown at home as well as commercially. In India it is known as Vana Tulsi. The plant's leaves and stems contain a volatile oil that is extracted and used to manufacture a variety of medical alternatives. <sup>[2]</sup>

### AIM AND OBJECTIVE:

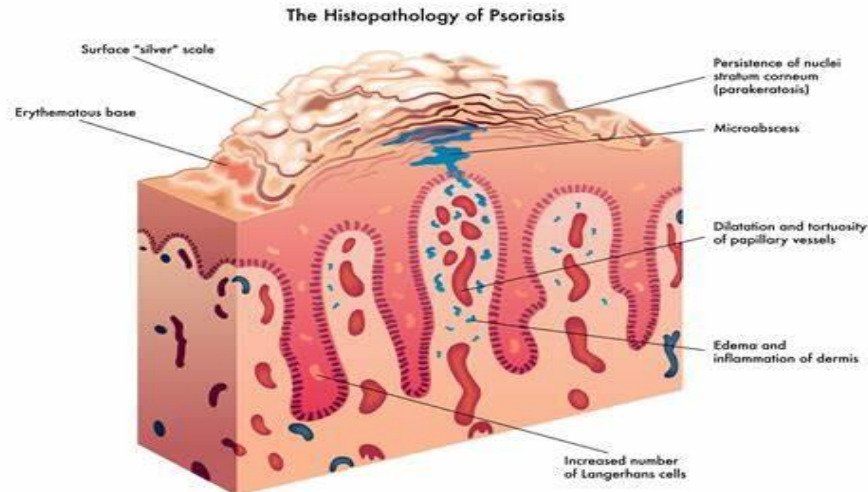
To prepare an ayurvedic remedy of natural origin against Psoriasis.

### OBJECTIVE:

1. To prepare safe and economical herbal remedy against psoriasis.
2. Herbal medicine is easily available and convenient to use.
3. Herbal medicines have no or minimum side effects as compare to synthetic drugs.
4. Major objective of selecting herbal drug is that, in India more than 80% medicines are ayurvedic which show number of beneficial effects on population.
5. It has great potential to manage symptoms of psoriasis.

## PSORIASIS:

Psoriasis is an immune mediated inflammatory disease that has no permanent cure. The word 'psoriasis' comes from the Greek word "psora", which implies "itch" or "scurf" or "rash". Psoriasis is a skin ailment characterised by scaling and inflammation that lasts a long time.<sup>[3]</sup> The dendritic cells and T cells secrete various cytokines leading to disturbances in the keratinocyte proliferation and differentiation. Though, there are many treatment ways to treat psoriasis, no particular medication claims a satisfactory and complete remedy. A wide range of synthetic therapeutic agents have additionally been reported to cause psoriasis as their adverse impact. It is a chronic inflammatory skin disease, poses a major burden on patients' quality of life. Recently psoriasis is being considered a systemic disease of immune dysfunction. The pathological process and clinical features of psoriasis include several environmental and genetic risk factors, various immunological mechanisms and pro-inflammatory cytokines.<sup>[4]</sup>



**Fig No. 1** Psoriasis Affected Skin

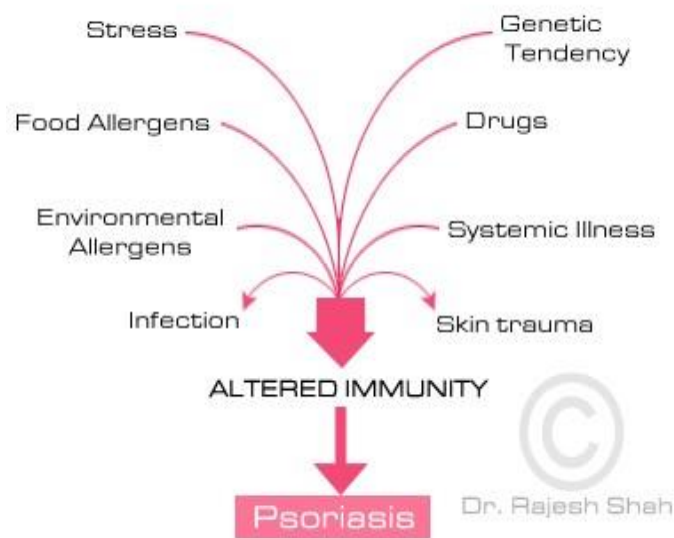
The presently used antipsoriatic medications are expensive, carry the threat of significant side-effects and frequent remission attacks of the disease. The present treatment approaches have limitations, and therefore the production of safer and more effective agents is powerfully needed.<sup>[5]</sup> Natural products represent important treatment choices for psoriasis.<sup>[6]</sup> Skin diseases are treated with medicinal plants. Numerous plants from ancient Ayurveda, Siddha, Thai, Korean, Chinese drugs are used for the management of various skin ailments, psoriasis, vitiligo, dermatitis, and leucoderma. A large population uses complementary medicines for two reasons, namely, the limitations of synthetic medicines and the ability of the natural compounds to act on multiple targets.<sup>[7]</sup>

### BASIC PRINCIPLE:

Psoriasis is a chronic, non-contagious autoimmune disease marked by elevated, abnormal skin patches. These areas are purple or red dry itchy and scaly skin in peoples. The severity of psoriasis varies from tiny, localized patches to whole body coverage. Triggering of psoriatic skin changes at that spot, known as the Koebner phenomenon.<sup>[8]</sup>

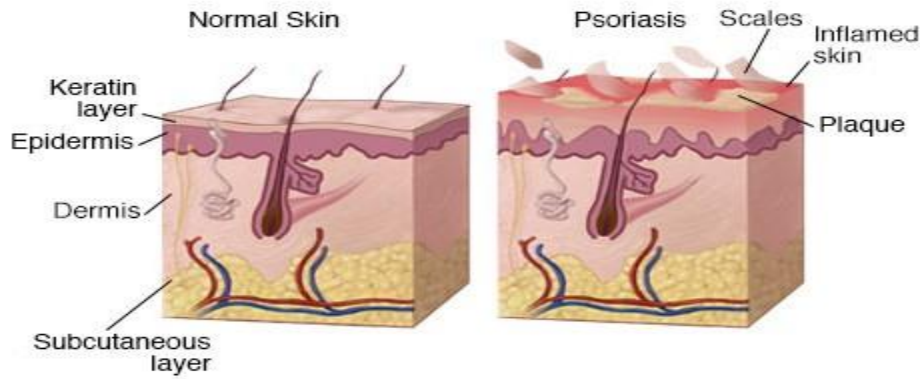
### CAUSES OF PSORIASIS:

- Genetic
- Immunological
- Injury
- Infection
- Extreme temperature
- Drugs
- Stress



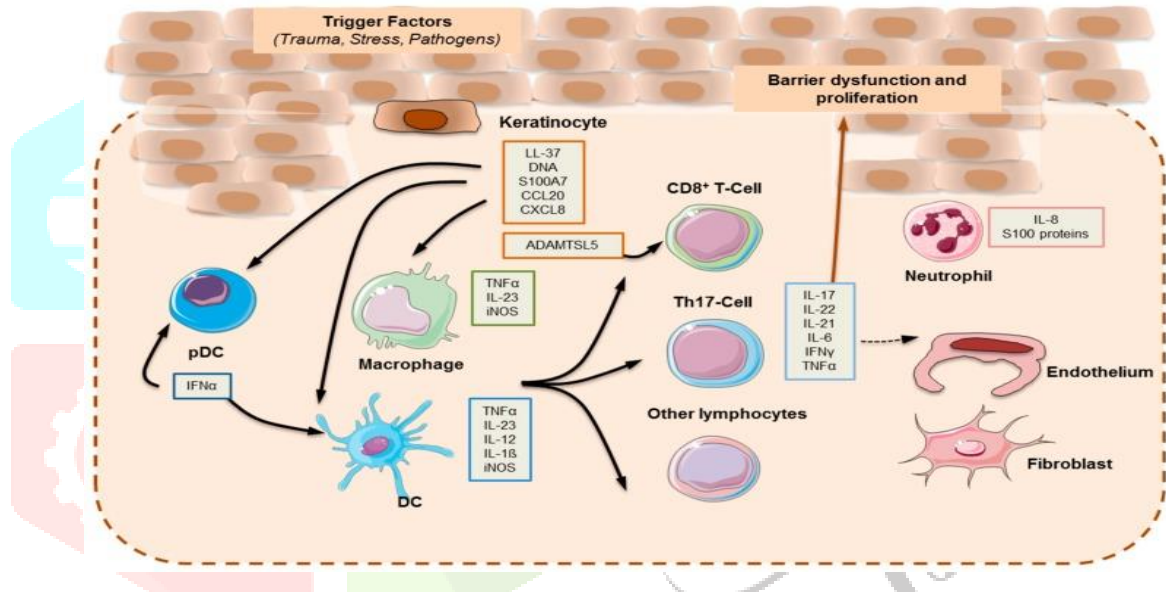
**Fig No. 2** Psoriasis: Multifactorial Causes<sup>[9]</sup>

**BASIC MECHANISM OF PSORIASIS/PATHOPHYSIOLOGY:**

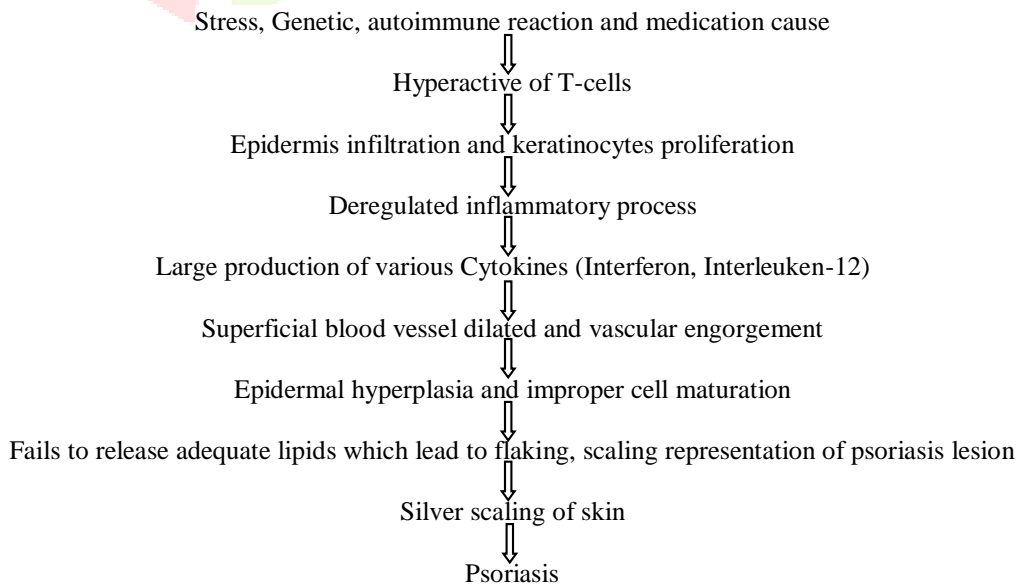


**Fig No. 3** Pathophysiology of Psoriatic Skin Compared To Normal Skin

Psoriasis is characterized by associate abnormal excessive and rapid growth of the epidermal layer of the skin. The cascade of pathogenic processes in psoriasis results in abnormal skin cell production (particularly during wound repair) and an overpopulation of skin cells. In psoriasis, skin cells are changed every 3-5 days rather than the usual 28-30 days. [10]



**Fig No. 4** Pathogenesis Of Psoriasis [9]



**CLINICAL MANIFESTATIONS:** <sup>[11]</sup>

- The first symptom of psoriasis is usually red areas on the body.
- Dry, swollen and inflamed patches.
- Patches covered with silver white flakes.
- Raised and thick skin.

Other Symptoms of psoriasis include-

- Pain, itch and burning sensation.
- Restricted joint motion or pain
- Cracked and bleeding skin
- Dandruff on scalp
- Pus stuffed blisters
- Genital lesions in males
- Yellow discoloured nail

**TYPES OF PSORIASIS:** <sup>[12]</sup>

- 1) Plaque Psoriasis
- 2) Guttate Psoriasis
- 3) Flexural or Inverse Psoriasis
- 4) Pustular Psoriasis
- 5) Erythrodermic Psoriasis
- 6) Psoriasis Arthritis

**1) Plaque Psoriasis:**

Psoriasis vulgaris is the most prevalent type of psoriasis. Psoriasis vulgaris (plaque psoriasis) is a kind of psoriasis. An estimated 85% to 90% of people with psoriasis have plaque psoriasis. Oval or irregularly shaped, crimson, finely delineated, elevated plaques with silvery scales characterise it. <sup>[13]</sup>



**Fig No. 5** Plaque Psoriasis

These patches often appear on the-

- Elbows
- Knees
- Lower back

Patches are usually 1 to 10 cm wide, but can even be larger and cover more of the body. The symptoms can often become worse if you scratch at the scales. <sup>[14]</sup>

**2) Guttate Psoriasis:**

Guttate psoriasis is characterised by little red spots on the skin. It's the second most common type, affecting around 8% of the people with psoriasis. This type of psoriasis starts in kids or young adults. The spot is tiny, separate, drop shaped and pink-red in colour. <sup>[15]</sup>



**Fig No. 6** Guttate Psoriasis



They often appear on you're:

- Trunk
- Upper arms
- Thighs
- Scalp

This type of psoriasis is temporary. Some cases, though, are more stubborn and need treatment. <sup>[16]</sup>

### 3) Flexural or Inverse Psoriasis:

This type of psoriasis usually found in these locations –

- Armpits
- Behind the ears
- Around the navel
- Backside of knees
- Groin
- Under the breast
- Skin folds in the buttocks and around the genital organ

Symptoms include –

- Patches of skin that are bright red, smooth and glossy, but don't have scales.
- Getting worse with sweating and rubbing.

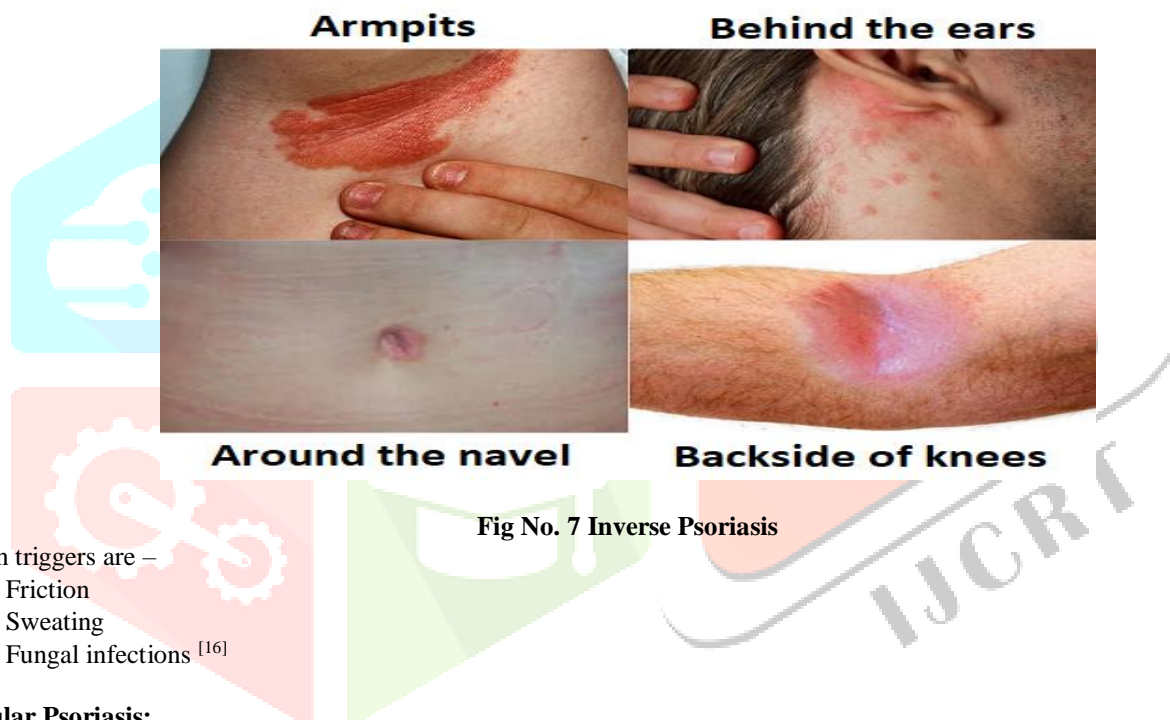


Fig No. 7 Inverse Psoriasis

Common triggers are –

- Friction
- Sweating
- Fungal infections <sup>[16]</sup>

### 4) Pustular Psoriasis:

Pustular psoriasis is a severe type of psoriasis. This type of psoriasis is rare and mostly appears in adults. It results in pus-filled bumps (pustules) encircled by red skin. Pustular psoriasis might have an effect on isolated areas of the body, like the hands and feet or cover most of the skin surface. These pustules can form scaling.

People may go through phases of pustules and then remission. Whereas the pus is non-infectious, this disorder has the potential to cause flu-like symptoms such as –

- Fever
- Chills
- Rapid pulse
- Muscle weakness
- Loss of appetency <sup>[17]</sup>



**Fig No. 8** Pustular Psoriasis

### 5) Erythrodermic Psoriasis:

Erythrodermic psoriasis, one among the rarest kind of psoriasis. It affects most of your body and causes widespread, fiery skin that seems to be burned. This type of psoriasis is widespread, red and scaly. It is widely distributed on the body.

Erythrodermic psoriasis can develop from-

- Pustular psoriasis
- Widespread, poorly controlled plaque psoriasis
- A bad sunburn
- Infection
- Alcoholism
- Significant stress
- Abrupt discontinuation of a systemic psoriasis medicine. <sup>[18]</sup>



**Fig No. 9** Erythrodermic

### 6) Psoriasis Arthritis:

Psoriatic arthritis is a condition wherever you have both psoriasis and arthritis (joint inflammation). People with psoriasis for roughly 10 years are 70% more likely to develop psoriatic arthritis. 90% of those who have it also have nail alterations.



**Fig No. 10** Psoriasis Arthritis

Symptoms:

- Pain is worse in the morning and after rest
- Sausage-like swelling of the fingers and toes occurs.
- Warm joints that will be discolored <sup>[19]</sup>

**NAIL PSORIASIS:**

Nail psoriasis is a manifestation of psoriasis. The condition can often be confused with fungal infections and other infections of the nail.



**Fig No. 11** Nail Psoriasis

Nail psoriasis can cause:

- Nail pitting
- Grooves
- Discoloration
- Loosening or crumbling of the nail
- Thickened skin under the nail
- Colored patches under the nail

Although there is no cure for psoriatic nails, several therapies can help to enhance their health and look. <sup>[20]</sup>

**TREATMENT OF PSORIASIS:**

Treatment is based on-

- The severity of the disease
- The extent and location of the areas involved
- Responsiveness to the treatment

**1. Topical Treatment:**

- Corticosteroid creams and ointments (most common treatment)
- Synthetic forms of vitamin D and retinoids
- Retinoids
- Coal tar preparations
- Bath solutions and moisturizers
- Tacrolimus and pimecrolimus (especially for inverse psoriasis) <sup>[21]</sup>

**2. Photo (Light) Therapy:**

Many patients find that daily, non-burning exposure to sunlight clears or improves their psoriasis. Initial treatments frequently include exposure to sunlight. In many circumstances, a controlled kind of artificial light treatment (UVB phototherapy) is performed. UVA light and psoralen can both be used to treat psoriasis. Psoralen is an oral or topical drug that increases sensitivity to light in the body. PUVA is the name for this treatment.

Phototherapy may cause side effects such as-

- Nausea, headache, fatigue, burning, and itching.
- Squamous cell and perhaps melanoma skin malignancies are both increased by UVB and PUVA exposure. <sup>[22]</sup>

**3. Systemic Treatment:**

For more severe types of psoriasis, systemic therapy includes

- Methotrexate - a type of systemic medication that affects the whole immune system.
- Cyclosporine - another type of systemic medication that suppresses the immune system.
- Hydroxyurea - although it is less toxic than methotrexate or cyclosporine, it may be ineffective.
- Systemic retinoids - in severe cases, compounds having vitamin A-like characteristics that are taken internally may be given.
- Newer medications include biologic agents, which affect a part of the body's immune response by targeting certain cells in the immune system that cause inflammations. <sup>[23, 24]</sup>

**DRUG PROFILE (OCIMUM GRATISSIMUM):**

- ✓ **Common Name:** English - Shrubby Basil, Clove basil, African basil and in Hawaii as wild basil, Jangali Tulsi (Marathi), Vriddhutulsi (Sanskrit), Ram tulsi (Hindi)
- ✓ **Synonym:** Ocimum viridiflorum Roth, O. suave Willd, O. viride Willd
- ✓ **Family:** Lamiaceae
- ✓ **Geographical source:** The plant is indigenous to tropical areas especially Africa, India, Nigeria and cultivated in Ceylon, South Sea Islands, Nepal, Bengal. Found in some states of North India like Jammu, Punjab, Haryana and also cultivated in Kerala.<sup>[25]</sup>

**Collection and cultivation of plant:**

- Growing and care: Well drained soil. Add additional water on hot summer days, fertilize every 2-4 years with organic matter, cut the bloom stems once a year, and fertilize every 2-4 years with organic matter.
- Best way to start growing: whole plant, seeds or vegetative reproduction
- Recommended plant season: Spring in hardiness zone 5-10 as an annual, as perennial spring to summer in hardiness zone 10b, spring to autumn in hardiness zone 11 and hardiness zone 12+ all years.
- Pest and diseases: Aphids, in warm place strong place
- Pruning season: All the season. Prune within the starting of the bloom.
- Size of the plant: 40-60cm, 16-24 inches
- Growth speed in optimal condition: Fast growing, Medium growing
- Water requirement: Average quantity of water/ Big amount of water
- Light condition in optimal condition for growing: Full sun.
- Blooming information:  
Bloom season- summer  
The flower itself is a little purple bloom that grows on an inflorescence.
- Thinning the bloom: When the inflorescence begins to bloom, all of the plant's strength is directed toward the blossom.
- Vegetative Reproduction: Cutting  
The best time for vegetative reproduction: Early summer, Spring.  
1-2 weeks' time take to grow roots in vegetative reproduction.
- Edible leaves  
Leaves harvesting season: All time of the year
- Sowing requirement: Small round brown seeds  
Saving seeds until sowing: Room temperature, dry  
Sowing season: Spring to autumn  
Planting spacing: 20\*20cm (8\*8 inches)  
Depth of Sowing: 1-1.5 cm (0.5-0.7 inch)
- Conditions for seeds germinate: Moist, full sun  
Watering requires for Seeds: Big amount of water  
Germination time: 5-17 days
- Condition of seedling: Well drained soil<sup>[26]</sup>

**Morphological Characteristics:**

Height: 1.9m

Leaves: 10 x 5 cm.

Ovate to ovate- lanceolate, pubescent and dotted on both sides, sub-acuminate to acuminate at apex, cuneate and decurrent at base with a coarsely crenate, serrate edge, pubescent and dotted on both sides.

Trichomes: Glandular.

Stomata: Anomocytic stomata (Lower surface)

Mainly absent or rarely present (on upper surface)

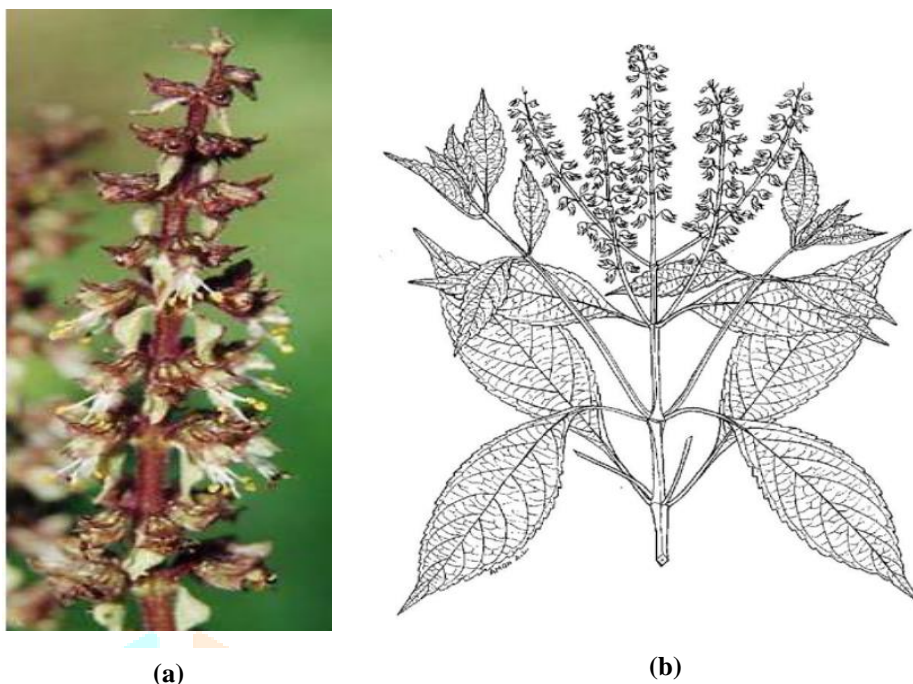
Petioles: 6 cm long

Racemes: up to 18 cm long

Peduncles: densely pubescent

Calyx: up to 5mm long, campanulate and 5-7 mm long, greenish- white to greenish-yellow in colour.<sup>[27]</sup>





**Fig No. 12** (a) Flowering tops of *O. gratissimum*. (b) Whole plant *O. gratissimum*.

#### Microscopical Characteristics:

The uneven shapes on the two surfaces of the leaf epidermal cells are typical.

Diacytic type of stomata.

Simple pluricellular hairs on the leaf veins contain secretory glands, which are most abundant inside the leaf.

The epidermis monostratificada (beam), a layer of parenchyma fenced in sub-epidermal position, parenchymal pond, and lastly the epidermis monostratificada lower are shown in cross section.<sup>[28]</sup>

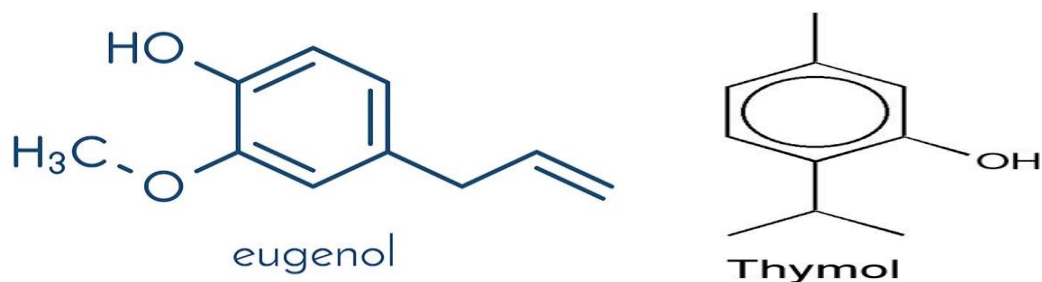
#### Powder microscopic characteristics:

- Pelos and non-glandular uniseriate pluricellular.
- Gland view from the top of the head with 4 cells radiant.
- Fragment of skin with glands and stomata.
- Of leaf tissue lagoon.
- Hair with glandular stalk multicellular.
- Parenchyma fence.
- Tracheal reticular<sup>[29]</sup>

#### Chemical Constituents:

**Table No. 1** List of Biologically Active Compounds that have been Isolated from *O. gratissimum*

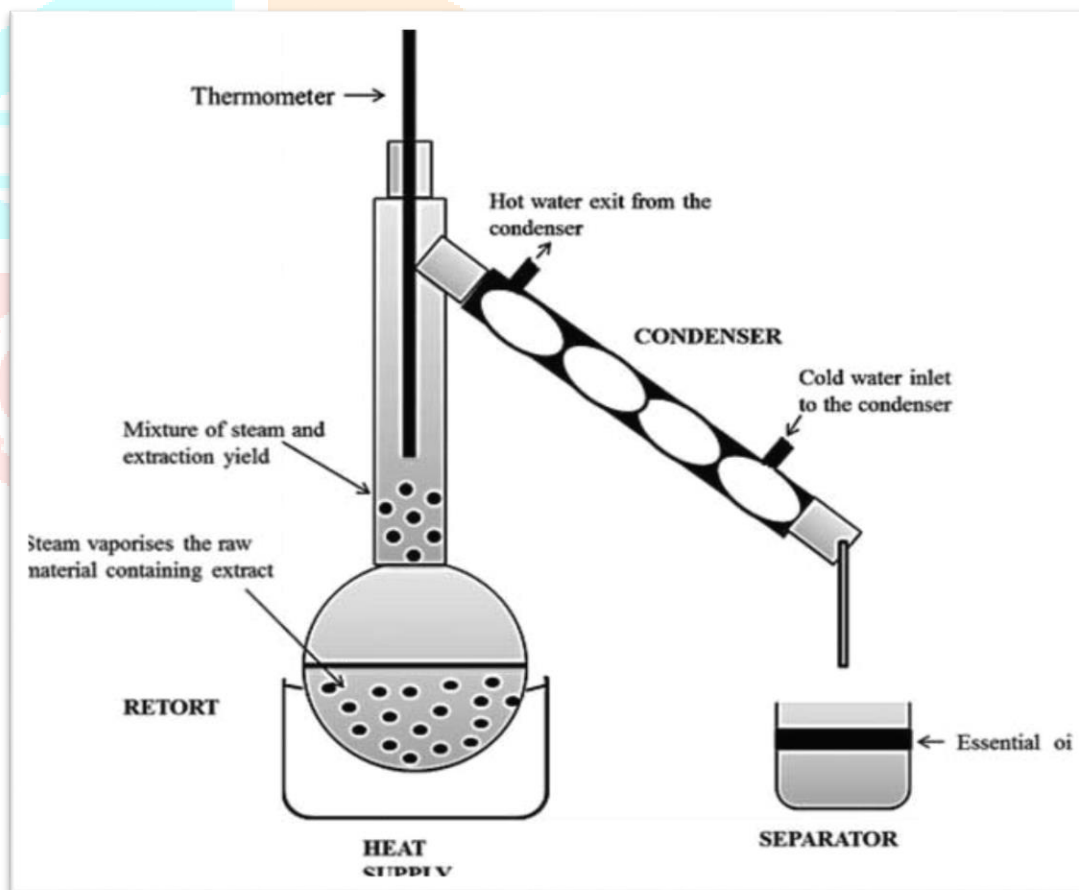
Class	Part used	Chemical Constituents
Essential Oil	Whole Plant	Thymol, eugenol, Citral, ethyl cinnamate, methyl chavical, Gratissimol, Eugenol, methyl eugenol, cis-ocimene, trans-ocimene, pinene, camphor, germacrene- D, trans-caryophyllene, farnesene and 1-bisabolene, p-cymene, terpene and trans sabiene hydrate, 1,8-cineole, linalool, linalool, p-cymene, oleanolic acid
Phytochemical evaluation	Whole plant	Alkaloids, tannins, flavonoids and oligosaccharides
	Aqueous extract	Tannins, steroids, triterpinoids, carbohydrates
Mucilage	Seed	Pentoses, hexoses, uronic acid and lipids

**Extraction Technique:**

1. Hydro distillation
2. Steam distillation
3. Microwave distillation techniques

**1) Hydro distillation:**

Samples of the botanical leaves were cut into pieces less than 2×2cm, weighed sample of 100gm was placed within a round bottom flask (2000mL) containing 1000mL of distilled water that was connected to a Clevenger type-apparatus. Hydro distillation was carried out with a laboratory heater. The heat was permitted to go through the herb samples stuffed with water. The both liquid (immiscible Liquids) were fed through the condenser having an inlet and outlet water ways in which to the 3-way tap where each liquid are separated by skimming it off the top. The oils were then kept in a dark glass bottle and weighed on a potable digital weighing machine (AND EK-610J). At an end of 2hrs 45minutes of operation the extraction of oil come to a ceased.<sup>[30]</sup>



**Fig No. 13** Hydro distillation Assembly of Crude Drug Extraction

## 2) Steam Distillation:

Steam distillation was carried out in the same way as hydro distillation. In the case of steam distillation, the sample material (100gm) was placed in a perforated still round bottom flask, and steam (containing 1000mL of water) was driven through the perforated portion of the flask to the substance. The extraction of oil came to a halt after 1hr 42 minutes of operation. Hydro distillation was used to determine the weight of oil extracted. [31]

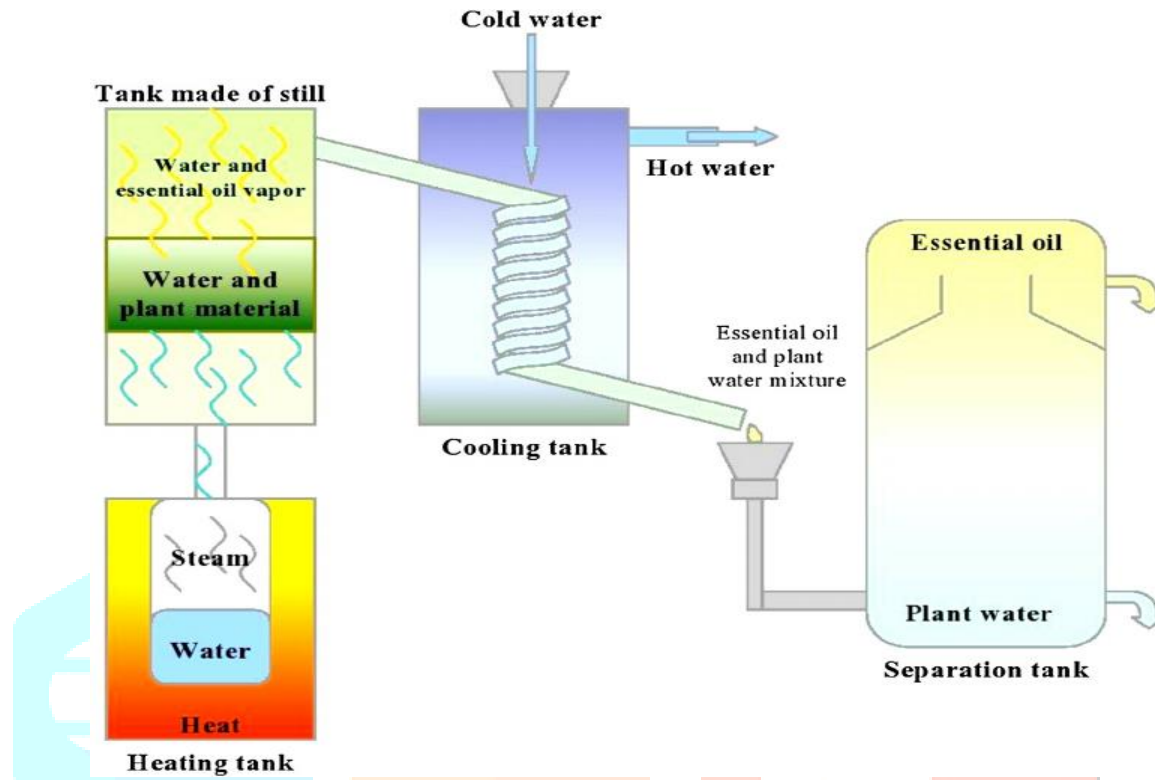


Fig No.14 Steam Distillation Assembly of Crude Drug Extraction

## 3) Microwave distillation:

A similar amount of leaf sample (100gm) and distilled water (1000mL) were used in the microwave procedure. The botanical sample was placed in a Clevenger-style equipment and placed in a modified microwave oven, where heat was applied for 52 minutes to extract the oil fully. With the help of microwave heat radiation, a botanical leaf sample was able to achieve its boiling point in a short amount of time. When compared to other distillation procedures, it takes less time to distil. Hydro distillation and steam distillation were used to determine the weight of oil extracted. [32]

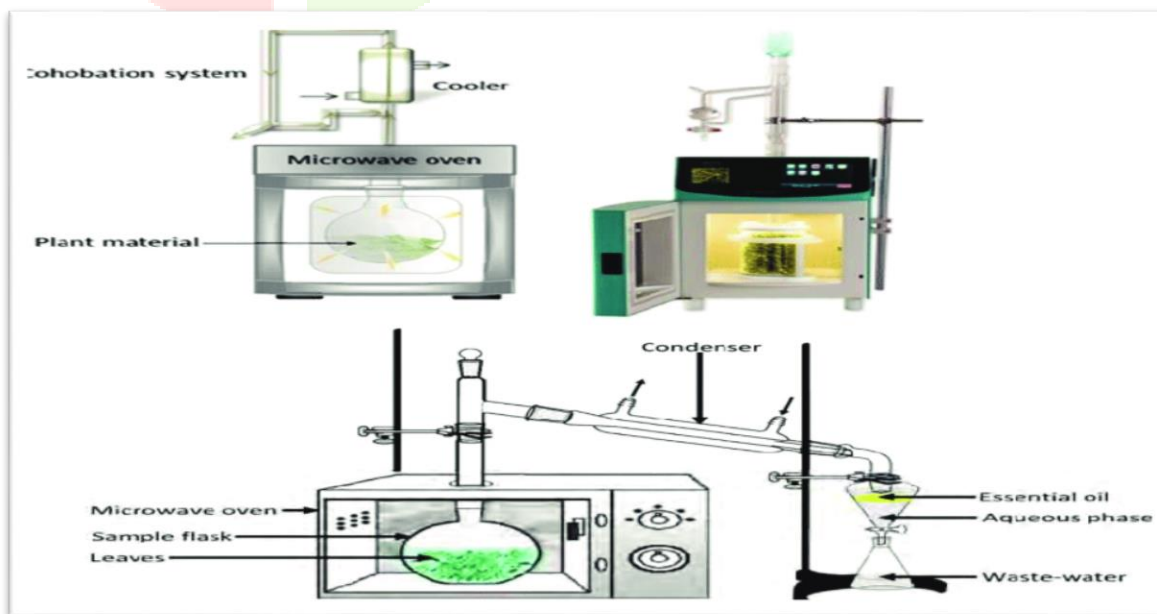


Fig No. 15 Microwave Distillation Assembly Of Crude Drug Extraction

**ISOLATION AND IDENTIFICATION OF THE MAJOR CONSTITUENT (EUGENOL):**

The above-mentioned essential oil (0.8 g) was chromatographed on a silica gel column and eluted with a hexane-dichloromethane gradient (95:5, 85:15, and 60:40) to 100 percent dichloromethane. TLC was used to separate one hundred and sixty-five fractions of 20 mL each into seven groups (G: 1-7). Eluting with hexane, Group G-2 (fractions 18-78) was treated to preparative TLC and eluted with dichloromethane. The substance was purified by flash chromatography, as described by Still et al., (1978), with a 95:5 eluent mixture of petroleum ether and ethyl acetate. Thirty fractions (5 mL each) were taken. The active component, eugenol (0.1 g), was found in fractions 13-25. [33]

**USES:****1) Therapeutic Uses:**

- I. Anti-inflammatory activity.
- II. Several tonics are made from these herbs and used in treating as skin infections, respiratory diseases and conjunctivitis, psoriasis, etc.
- III. Antifungal.
- IV. The plant extracts can be used in relaxing intestinal muscles.
- V. The herbaceous plant has anti-nociceptive effects.
- VI. It is effective in reducing blood glucose level.
- VII. It can reduce diabetes.
- VIII. It helps to avoid seizures and convulsions.
- IX. The plant possesses anticonvulsant properties, making it useful in the treatment of convulsive diseases.
- X. Traditionally the herb is employed to treat diarrhea.
- XI. It contains anti-malaria ingredients that aid in the treatment of the disease.
- XII. Antiseptics are made from the herb, which is effective in treating wounds.
- XIII. Crushed leaves are used to manufacture cough medicines.
- XIV. The plant roots act as sedatives for children.
- XV. Used for the treatment of Sunstroke, Headache, Influenza, as a Diaphoretic, Antipyretic.
- XVI. Mental illness.
- XVII. Used for regulation of menstruation and as a cure for prolapse of the rectum
- XVIII. Used as pulmonary Antiseptic, Antitussive and Antispasmodic.

**2) Commercial:**

- I. *Ocimum gratissimum* mainly used in industry for extraction of eugenol
- II. Eugenol shows Anti-inflammatory action against various disease conditions. Since used as anti-inflammatory agent.
- III. The strong aroma of the leaves is used in flavouring soups.
- IV. It is used as a flavour in spicing meat product.
- V. Components of this herb are used in manufacturing mosquito/insect repellents.
- VI. Fever and diaphoresis are treated using 'Ocimum tea,' an infused version of the herb.
- VII. The essential oil has antibacterial properties. [34]

**CHEMICAL TEST: [35]****Table No. 2 Chemical Test**

Sr.no	Test	Observation	Inference
1.	Take thin section of the drug + add alcoholic solution of Sudan III	Red colour	Globules indicate presence of volatile oil.
2.	Take thin section of the drug + add a drop of tincture, alkane	Red colour	Presence of volatile oil.

**FUTURE CHALLENGES FOR HERBAL REMEDY FOR PSORIASIS TREATMENT:**

The herbal sources are presently getting more reliability due to their safety and easy availability. For herbal remedy and screening of plant extracts for anti-psoriatic activity the main targets to consider is the T-cell activation, T-cell trafficking, Cytokine inhibition and Counter offensive strategies. Anti-inflammatory and next generation immunosuppressant drug ideally would be able to treat psoriasis effectively. Future challenges are many folds and include the caring and observation of patient and biologic monitoring of the historical background, chronic inflammatory mediators. The specific trigger identified for initial production of TNF- $\alpha$  cytokines can also impact TNF- $\alpha$  production include HMG B1, IL-15 and IL-23. Elucidation of the fundamental mechanism by which the disease is transmitted from one generation to another generation is another aspect of the research that should be investigated to explore some more herbal drugs for the treatment of psoriasis. Many Researchers also conduct and find new ways and technology to get better derivatives from herbal plants like *Ocimum gratissimum*. The research is also conducting to improve the effectiveness of eugenol against Psoriasis. In future we will ready to cure Psoriasis by herbal drug derivatives. [36]



**CONCLUSION:**

Psoriasis is a complex multifunctional inflammatory skin condition characterized by T-cell activation, local vascular changes, abnormal keratinocyte proliferation and neutrophil activation. The synthetic drugs used to treat it are having side effects and it's been seen that some the synthetic medicines have psoriasis as adverse effect. In that case, the herbal natural remedy is that the obvious alternative, that is safe and equally effective as the synthetic drug.

*Ocimum gratissimum* is one of the herbal drugs which shows anti-inflammatory activity, will facilitate to manage symptoms of psoriasis *Ocimum gratissimum* greatly suppresses psoriatic condition however there is no cure for psoriasis, though treatments and natural remedies can help people to manage their symptoms.

**REFERENCE:**

- 1) A. Y. Chandane, A. P. Kulkarni \* and A. R. Shastri: an overview of promising herbal medicines for treatment of psoriasis. IJPSR, 2021; Vol. 12(2): 727-743.
- 2) [https://www.onlyfoods.net/ocimum-gratissimum.html#Ocimum\\_Gratissimum\\_Common\\_Names](https://www.onlyfoods.net/ocimum-gratissimum.html#Ocimum_Gratissimum_Common_Names)
- 3) Questions and Answers about Psoriasis 1<sup>st</sup> National Institute of Arthritis and Musculoskeletal and Skin Diseases.
- 4) Kim HK, Bae MJ, Lim S, Lee W and Kim S: A water soluble extract from *Actinidia arguta* ameliorates psoriasis-like skin inflammation in mice by inhibition of neutrophil infiltration. *Nutrients* 2018; 10(10): 1399.
- 5) Deenonpoe R, Prayong P, Thippamom N, Meehansan J and Na-Bangchang K: Anti-inflammatory effect of naringin and sericin combination on human peripheral blood mononuclear cells (hPBMCs) from patient with psoriasis. *BMC Complement Altern Med* 2019; 19(1): 1- 11.
- 6) Males Z, Drvar DL, Duka I and Žužul K: Application of medicinal plants in several dermatovenerological entities. *Acta Pharm* 2019; 69(4): 525-31.
- 7) Smolińska E, Wegrzyn G and Gabig-Cimińska M: Genistein modulates gene activity in psoriatic patients. *Acta Biochim Pol* 2019; 66(1): 101-10.
- 8) <https://en.wikipedia.org/wiki/psoriasis>
- 9) <https://www.medifee.com/blog/what-do-you-know-about-psoriasis/>
- 10) <https://www.shared.com/psoriasis-how-to-treat/>
- 11) Adriana Rendon and Knut Schakel: Psoriasis Pathogenesis and Treatment. *International Journal of Molecular Science* 2019; 20(6)
- 12) <https://www.healthline.com/health/photos-types-psoriasis#pictures>
- 13) Van de Kerkhof PCM, Nestle FO. 2012. Psoriasis. In *Dermatology* (ed. Bologna JL, Jorizzo JL, Schaffer JV). Elsevier, Amsterdam.
- 14) Henseler T, Christophers E. 1985. Psoriasis of early and late onset: Characterization of two types of psoriasis vulgaris. *J Am Acad Dermatol* 13: 450-456.
- 15) Griffiths CE, Barker JN. 2007. Pathogenesis and clinical features of psoriasis. *Lancet* 370: 263-271.
- 16) <https://www.webmd.com/skin-problems-and-treatments/psoriasis/psoriasis-types>
- 17) Marrakchi S, Guigue P, Renshaw BR, Puel A, Pei XY, Fraitag S, Zribi J, Bal E, Cluzeau C, Chrabieh M, et al. 2011. Interleukin-36-receptor antagonist deficiency and generalized pustular psoriasis. *N Engl J M.*
- 18) Boyd AS, Menter A. 1989. Erythrodermic psoriasis. Precipitating factors, course, and prognosis in 50 patients. *J Am Acad Dermatol* 21: 985-991.
- 19) Boyd AS, Menter A. 1989. Erythrodermic psoriasis. Precipitating factors, course, and prognosis in 50 patients. *J Am Acad Dermatol* 21: 985-991.
- 20) <https://www.mayoclinic.org/diseases-conditions/psoriasis/symptoms-causes/syc-20355840>
- 21) American Academy of Dermatology <http://www.org/dermatology-a-to-z/diseases-and-treatments/m-p/psoriasis>.
- 22) Moderate to severe psoriasis:biologicdrugs.National psoriasis Foundation,<http://www.psoriasis-foundation.org/net-community/sublearn-03-severe-metho>.
- 23) <http://www.ebscohost.com/dynamed> updated September8,2014.
- 24) Varanasi J. Bhagavathula N, Ellis CN, Pershadsingh HA. Thiazolidinediones: potential as therapeutics for psoriasis and perhaps other hyperproliferative skin diseases. *Expertopin Investig. Drugs.*2006;15:1453- 1468.
- 25) K.S. Prabhu, R. Lobo, A.A. Shirwaikar and A. Shirwaikar: *Ocimum gratissimum*: A Review of its Chemical, Pharmacological and Ethnomedicinal Properties. *The Open Complementary Medicine Journal*, 2009, 1, 1-15.
- 26) <https://www.growplants.org/growing/ocimum-gratissimum>
- 27) Bhat KG. *Flora of Udipi*. 1st ed. Indian Naturalist: India 2003.
- 28) García LD, Sandra PT, Crespo M. Lic. Leticia Fuentes. Study farmacognóstico of *Ocimum gratissimum* L. (Cimarrón oregano). *Rev Plant Cuban* 1998; 3: 31-6.
- 29) Tharanathan RN, Shamanna D. Composition of *OcimumGratissimum* Shrubby Basil Seed Mucilage. *Indian J Chem* 1975; 13: 307-8.
- 30) Virendra, P. S., & Diwaker, P. (2007). Extraction of Essential Oil and its Applications. Thesis submitted in partial fulfillment of the requirements of Bachelor of Technology (Chemical Engineering). National Institute of Technology Rourkela-Orissa.
- 31) Satish Kumar, K. (2010). Extraction of Essential Oil using Steam Distillation. A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Bachelor of Technology in Department of Chemical Engineering. National Institute of Technology Rourkela.
- 32) S. C. Ibeh, O. D. Akinlabi, I. Asmau, J. Audu, A. M. Muritala: Extraction Of *Ocimum gratissimum* Using Different Distillation Techniques. *International journal of scientific & technology research* volume 6, issue 05, may 2017.

- 33) Terezinha de Jesus FariaRafael Sottero FerreiraLidiane YassumotoJosé Roberto Pinto de SouzaNoemia Kazue IshikawaAneli de Melo Barbosa: Antifungal activity of essential oil isolated from *Ocimum gratissimum* L. (eugenol chemotype) against phytopathogenic fungi. Agriculture, Agribusiness and Biotechnology • Braz. arch. biol. technol. 49 (6) • Nov 2006.
- 34) [https://www.onlyfoods.net/ocimum-gratissimum.html#Ocimum\\_Gratissimum\\_Common\\_Names](https://www.onlyfoods.net/ocimum-gratissimum.html#Ocimum_Gratissimum_Common_Names)
- 35) C.K. Kokate, A.P. Purohit and S.B. Gokhale: Book of Pharmacognosy. Nirali Prakashan, 2019, Edition-56<sup>th</sup>, ISBN: 9788196396152.
- 36) Kamlesh Kumar Singh, Surendra Tripathy: Natural Treatment Alternative for Psoriasis: A Review on Herbal Resources. Journal of Applied Pharmaceutical Science Vol. 4 (11), pp. 114-121, November, 2014.

