



**IJPPR**

INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH  
An official Publication of Human Journals

ISSN 2349-7203




Human Journals

**Review Article**

March 2020 Vol.:17, Issue:4


© All rights are reserved by NAGAJYOTHI VIVARAM et al.

## Review on *Tagetes patula* Plant and its Pharmacological Activities



**IJPPR**  
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH  
An official Publication of Human Journals

ISSN 2349-7203



**<sup>1</sup>\*NAGAJYOTHI VIVARAM, <sup>2</sup>VIJAYA LAKSHMI  
NANDIKATTI, <sup>3</sup>VASA JHANSI RANI,  
<sup>4</sup>RAJAKUMARI NAMBURI**

*1-II M.Pharmacy (Project), Dept. of pharm. Chemistry,*

*2-Asst.Professor, Dept. of pharm. Chemistry,*

*3- Asst.Professor, Dept. of pharm. Chemistry,*

*4- II M.Pharmacy (Project), Dept. of pharm. Chemistry.*

**Submission:** 22 February 2020  
**Accepted:** 29 February 2020  
**Published:** 30 March 2020

**Keywords:** *Tagetes patula*, Pharmacological activities, Ocimene, Tagetone

### ABSTRACT

*Tagetes patula* L (French marigold) is an ornamental plant and widely used in folk medicine. Different parts of the *Tagetes* species are used as remedies to treat various health problems, including dental, stomach, intestinal, emotional and nervous disorders, as well as muscular pain etc. The flowers and leaves of *T. patula* contains Triterpenoids, Alkaloids, Carotenoids, Thiophenes, Fatty acids, Tannins and Flavonoids as constituents. Antibacterial, Antifungal, Insecticidal, Antioxidant activity, Larvicidal, Antimicrobial, Antihyperglycemic, Antinociceptive activities have been reported. Therefore researchers are increasingly turning their attention to folk medicine looking for new leads to develop better drugs.



HUMAN JOURNALS

[www.ijppr.humanjournals.com](http://www.ijppr.humanjournals.com)

## INTRODUCTION

*Tagetes* (marigold) is native to America, and its cultivation currently extends to other countries in Africa, Asia, and Europe. Many species of this genus, such as *T. minuta*, *T. erecta*, *T. patula*, and *T. tenuifolia* are cultivated as ornamental plants and studied for their medicinal properties on the basis of their use in folk medicine. Different parts of the *Tagetes* species are used as remedies to treat various health problems, including dental, stomach, intestinal, emotional, and nervous disorders, as well as muscular pain.

The *Tagetes* marigolds, or the common decorative type, are indeed edible, although they do not possess medicinal properties. The fresh flowers may be added to salads or used as an edible garnish; they provide a bitter taste, which can be helpful to balance out an overly sweet dish. The Tangerine Gem and the Lemon Gem varieties are the best-tasting of the *Tagetes*.



**Figure No. 1:** *Tagetes patula* plant      Flower      Leaf

## TOXONOMICAL CLASSIFICATION

### Synonyms:

Marigold, French marigold, African marigold (English) Sthulapushpa, sandu, ganduga (Sanskrit) Genda, gultera (Hindi) Genda (Bengal) Guljharo, Makhnala (Gujarat) Tangla, mentok, genda (Punjab).<sup>[2]</sup>

## SCIENTIFIC CLASSIFICATION<sup>[2]</sup>

Kingdom:      Plantae

Clade:      Tracheophytes

Clade: Angiosperms

Clade: Eudicots

Clade: Asterids

Order: Asterales

Family: Asteraceae

Genus: *Tagetes*

Species: *Tagetes patula*

### PHYSICAL CHARACTERISTICS:

*Tagetes* species vary in size from 0.1 to 2.2 m tall. Most species have pinnate green leaves. Blooms naturally occur in golden, orange, yellow, and white colors, often with maroon highlights. Floral heads are typically 4–6 cm diameter, generally with both ray florets and disc florets. In horticulture, they tend to be planted as annuals, although the perennial species are gaining popularity. They have fibrous roots. Depending on the species, *Tagetes* species grow well in almost any sort of soil. Most horticultural selections grow best in soil with good drainage, even though some cultivars are known to have good tolerance to drought.<sup>[1]</sup>

Metabolites synthesized by plants belonging to the genus *Tagetes* show significant effects as antioxidants, enzyme inhibitors, precursors of toxic substances, and pigments. In addition, these bioactive compounds are involved in photosensitization and energy transfer, actions of plant Molecules, growth hormones and regulators, control of respiration and photosynthesis, and defense against parasites, bacteria, fungi, and some insects.

In some climates, it flowers from July to October. In its native habitat of the highlands of central Mexico, blooms are produced from September to killing frost. Achenes ripen and are shed within two weeks of the start of bloom. The heads contain mostly hermaphrodite (having both male and female organs) florets and are pollinated primarily by beetles in the wild, as well as by tachinid flies and other insects. The leaves of all species of marigold include oil glands. The oils are pungent. It requires growing in sunlight. Resists cold well to -1°C; from there it is sensitive to frost and does not develop in the shade.<sup>[3]</sup>

## USES OF *TAGETES PATULA*

*Tagetes* is a multipurpose plant having ornamental, Ritual, medicinal, anthelmintic, insecticidal, colorant, food flavoring agents, and for- age applications.

- Healing properties of *Tagetes* species have been implemented by folk medicine for centuries.
- Flowers and entire herb of *Tagetes patula* are used for preparing ethnobotanical remedies against rheumatism, Eyewash, stomach and intestinal problems, kidney and hepatic disorders, fever, pneumonia and also used in refreshing drinks.
- Flowers are used as carminative, aromatic, digestive, diuretic and sedative.
- Decoction of flowers used to relieve flatulence, treatment of indigestion, colic, severe constipation, coughs, and dysentery.
- The methanolic extract of *Tagetes patula* florets shows activity against acute and chronic inflammation, and also having anti-oxidant activity.
- The leaves of *Tagetes patula* are applied on boils and carbuncles and used against kidney troubles, muscular pains, and piles. Their juice is prescribed for earache and ophthalmia.
- Paste of leaves applied to cuts and wounds as soon as possible after preparation. Leaves also applied to external bleeding.
- The leaves are having insecticidal activity and used in the preparation of natural repellent.
- Dried flowers used as adulterant of saffron, used for coloring foods yellow. Also used for coloring textiles.
- Secretions from roots have an insecticidal effect on the soil, against nematodes and keeled slugs.

## CHEMICAL CONSTITUENTS

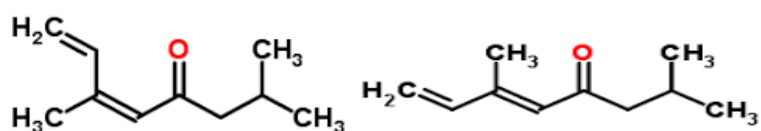
The different parts of *Tagetes patula* (roots, leaves and flowers) are found to having phytochemicals like Terpenoids (essential oils), Flavonoids, Thiophenes.<sup>[16]</sup>

The essential oil of *Tagetes patula* contains nearly 21 active ingredients, among them  $\alpha$ -terthieryl, Pentatriacontane, 2-ethyl-dodecanol are major constituents. It also contains limonene,  $\alpha$ -terpinolene, (*E*)- $\beta$ -ocimene,  $\beta$ -caryophyllene, piperitone, and piperitenone.<sup>[4]</sup>

*Tagetes patula* contains several flavonoids belonging into the group of flavonols like quercetin, quercetagenin, patuline, quercetin -3-glucoside, quercetin -7-glucoside, quercetin -3,7 -diglucoside, lutein.

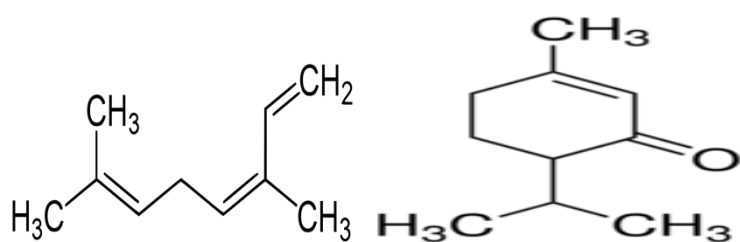
The roots, shoots and flowers contains four types of thiophenes like 5-(4-hydroxy-1-butenyl)-2,2'-bithienyl, 5-(4-acetoxy-1-butenyl)-2,2'-bithienyl, 5-(3-buten-1-ynyl)-2,2'-bithienyl and 2,2' : 5'2"-terthienyl.<sup>[17]</sup>

The *Tagetes* genus is rich in aromatic compounds and resinous exudates.



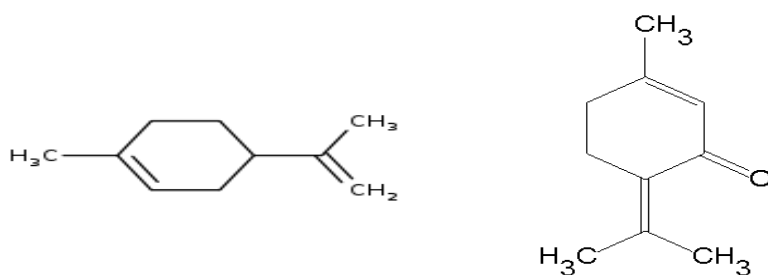
Z-Tagetone

E-Tagetone



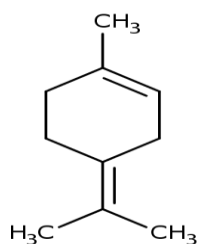
Ocimene

Piperitone

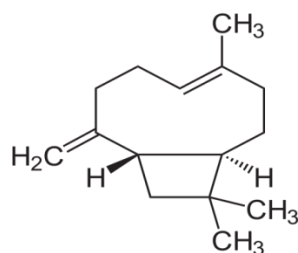


Limonene

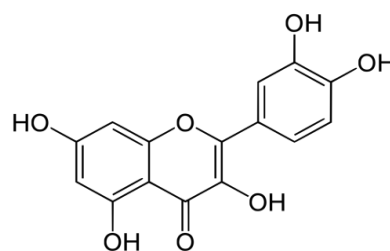
Piperitenone



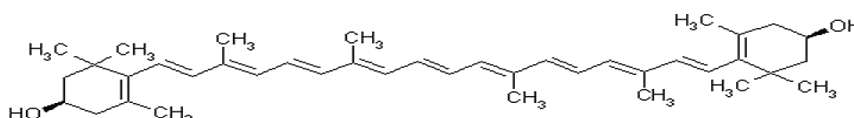
Terpinolene



Caryophyllene



Quercetin



Lutein

## PHARMACOLOGICAL ACTIONS

- **Antibacterial activity**

Crude petroleum ether, methanol, and 70% methanol extracts of different parts of *T. patula* were tested against bacteria. Amongst the three extracts of aerial part, the petroleum ether extract was active against all the Gram-negative bacteria except *Pseudomonas aeruginosa*. The methanol and 70% methanol extract showed significant activity against *Klebsiella pneumoniae* and *Pseudomonas aeruginosa*. Antibacterial activity against the *E. coli*, *Pasteurella multocida*, *B. subtilis*, and *S. aureus* strains, with *Tagetes patula* presenting inhibition zones with values.<sup>[5]</sup>

- **Antifungal activity**

Antifungal activity of hexane and methanolic extracts of aerial parts and roots of *T. patula* was determined by the disk diffusion method on the Spores of the species *Ganoderma lucidum* and *Alternaria alternata*.<sup>[6]</sup>

- **Insecticidal activity**

The aqueous and methanolic extracts of leaves, stems and buds of *Tagetes patula* were reported for insecticidal activity against the second stage larvae of *Tylenchulus semipenetrans* and *Anguina tritici*.<sup>[7]</sup>

- **Antioxidant activity**

The essential oil of cultivated *Tagetes patula* L. flowers was obtained by hydro-distillation and analyzed by GC-MS. The volatile oil has a typically pungent odour and is amber red in colour. The main volatile oil is 2'-diphenyl-1-picrylhydrazyl (DPPH). Antioxidant activity was checked by 2,2'-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging method.<sup>[8]</sup>

- **Larvicidal activity**

The petroleum ether extract of the roots of *Tagetes patula* exhibited toxicity against the third stage mosquito larvae of *Culex fatigans*.

The crude acetone extract (CAE) of defatted inflorescences of *Tagetes patula* was partitioned into five semipurified fractions: n-hexane, dichloromethane, ethyl acetate, n-butanol, and aqueous. CAE and the semipurified fractions were assayed for larvicidal activity against *Aedes aegypti*.<sup>[9]</sup>

- **Antimicrobial activity**

The ethanolic extract of the aerial parts of *Tagetes patula* exhibited slight antimicrobial activity against *Bacillus subtilis*, *Pseudomonas aeruginosa* and *Proteus vulgaris*.<sup>[10][11]</sup>

- **Anti-hyperglycemic activity:**

The methanol extract of *Tagetes patula* macerated stems, were evaluated for the anti-diabetic activity in mice. The blood glucose levels were measured by glucose oxidase method.<sup>[12]</sup>

- **Antinociceptive activity:**

The methanol extract of *Tagetes patula* macerated stems, were evaluated for the Antinociceptive activity in mice. From the result, it was observed that the extract having Anti-nociceptive activity which relieves pain caused by physical damage at particular area of body.<sup>[12]</sup>

## OTHER USES

### Medicinal

From the literature it was identified that some of the other pharmacological activities were not yet reported, which were using in Ayurveda. For example, the plant parts like dried leaves or florets in the form of infusions was used to treat fungal infection and also using as pesticide against bedbugs.<sup>[13][14]</sup>

### Culinary

The dried and ground flower petals constitute a popular spice compatible with the flavours of cinnamon and cloves which was used in the preparation of spicy dishes.<sup>[15]</sup>

### Colouring

*Tagetes patula* florets are used to color human foods. A golden yellow dye is used to color animal-based textiles without a mordant, but a mordant is needed for cotton and synthetic textiles.<sup>[15]</sup>

### Fragrance


The flower and distilled for its essential oil used in perfumery. It is blended with sandalwood oil to produce 'attar genda' perfume.<sup>[15]</sup>

## REFERENCES

1. Cicevan R, Al Hassan M, Sestras AF, Prohens J, Vicente O, Sestras RE, Boscaiu M., "Screening for drought tolerance in cultivars of the ornamental genus *Tagetes* (Asteraceae)" *PeerJ*, Vol -4, 2016, page no 21 - 33.
2. <https://en.wikipedia.org/wiki/Tagetespatula>.
3. Gupta P., Vasudeva N., "Marigold: A potential ornamental plant drug", *Hamdard "Med"*, Issue 55, 2012, page no 45-59.
4. Dharmagadda V.S., Naik S.N., Mittal P.K., Vasudevan P. "Larvicidal activity of *Tagetes patula* essential oil against three mosquito species", *Bioresour. Technol*, Issue 96, 2005, page no 1235-1240.
5. Shaheen Faizi, Humaira Siddiqi, Samina Bano, Aneela Naz, Lubna, Khalida Mazhar, "Antibacterial and Antifungal Activities of Different Parts of *Tagetes patula* .: Preparation of Patuletin Derivatives", 2008, Page no 309-320.
6. Mares, "Chemical characterization and antifungal activity of essential oil of capitula from wild Indian *Tagetes patula* L", *Protoplasma*, Issue 225, 2005, page no 57-65.
7. Pankaj Gupta, Neeru Vasudeva, Guru Jambheshwar "Marigold A Potential Ornamental Plant Drug", University of Science and Technology, Hisar-125001 (Haryana), India.
8. J. S. Negi, V. K. Bisht, A. K. Bhandari & R. C. Sundriyal, "Essential Oil Contents and Antioxidant Activity of *Tagetes patula* L", 2013, Pages 364-367,



9. Letícia Maria Krzyzaniak, Tânia Mara Antonelli-Ushirobira et. al., “Larvicidal Activity against *Aedes aegypti* and Chemical Characterization of the inflorescences of *tagetespatula*”, 2017.
10. Jawad, A.M., Jaffer, H.J., Al-Naib, A., Saber, H. and Razzak, A.A.W., “Antimicrobial activity of some Iraqi plant”, *Fitoterapia*, Issue59,1988, page no 130-133.
11. Hethelyi, E., Koczka, I. and Tetenyi, P. “Phytochemical and antimicrobial analysis of essential oils”, *HerbaHung*, Issue 28, 1989, page no 99- 115.
12. Sharmin Islam Sathi, Shiblur Rahman, Md. Abu Shoyeb, Kallol Debnath et. al. “A Preliminary Study of The Antihyperglycemic And Antinociceptive Potential Of *Tagetes patula* (Asteraceae) Stems”, *Advances in Natural and Applied Sciences*, 2012, page no:1515-1520.
13. Mares D, Tosi B, Poli F, Andreotti E, RomagnoliC., “Antifungal activity of *Tagetes patula* extracts on some phytopathogenic fungi: ultrastructural evidence on *Pythiummultimum*”, *Microbiol*, Issue 159,2004, page no:295–304.
14. C. Romagnoli., R. Bruni; E. Andreotti; M. K. Rai; C. B. Vicentini& D. Mares. "Chemical characterization and antifungal activity of essential oil of capitula from wild Indian *Tagetes patula* L", *Protoplasma*. Issue 225,2005,page no:57–65.
15. L. Kaplan, “Historical and Ethnobotanical aspects of domestication in *Tagetes*” *Economic Botany*, vol. 14, 1960, page no:200–202.
16. Pankaj Gupta and NeeruVasudeva, “Marigold A Potential Ornamental Plant Drug”, *HamdardMedicus* Vol. 55, No. 1, 2012, page no:45-59.
17. P.Ravikumar., “Chemical examination and insecticidal properties of *Tagetes erecta* and *Tagetes patula*”, *Asian Journal of bioscience*, Vol 5, Issue 1,2010, page no29-31.

	<p><b>Name: Nagajyothi Vivaram</b>  <b>Affiliation: Student (M.Pharmacy)</b>  <b>Institute Address: Hindu College of pharmacy, Amaravathi road, Guntur, Andhra Pradesh.</b></p>
<p><i>Image Author -2</i></p>	<p><b>Name: Vijayalakshmi Nandikatti</b>  <b>Affiliation: Asst. Professor</b>  <b>Institute Address: Hindu College of pharmacy, Amaravathi road, Guntur, Andhra Pradesh.</b></p>
<p><i>Image Author -3</i></p>	<p><b>Name: Vasa Jhansi Rani</b>  <b>Affiliation: Asst.Professor</b>  <b>Institute Address: Hindu College of pharmacy, Amaravathi road, Guntur, Andhra Pradesh</b></p>
<p><i>Image Author -4</i></p>	<p><b>Name: Namburu Rajakumari</b>  <b>Affiliation: Student</b>  <b>Institute Address: Hindu College of pharmacy, Amaravathi road, Guntur, Andhra Pradesh</b></p>