



Available online through

[www.jbsoweb.com](http://www.jbsoweb.com)



## Research Article

### PHARMACOGNOSTIC, PHYSICOCHEMICAL AND PHYTOCHEMICAL INVESTIGATION OF *TAGETES ERECTA* LINN FLOWERS (ASTERACEAE)

Kadam Prasad Vijay\*, Bhingare Chandrashekhar Laxman, Sumbe Rajashri Balasaheb, Nikam Rohini Yuvraj, Patil Manohar Janardhan

Marathwada Mitra Mandal's College of Pharmacy, Thergaon (Kalewadi), Pune, Maharashtra, India

#### \*Correspondence

Prof. Prasad V. Kadam

Head Dept. of Pharmacognosy, Marathwada  
Mitra Mandal's College of Pharmacy, Thergaon  
(Kalewadi), Pune 411033 Maharashtra, India

DOI: 10.7897/2321-6328.01124

Article Received on: 12/05/13

Revised & Accepted on: 11/06/13

#### Abstract

Standardization is used in herbal medicine to try to make extracts of the same herbs as similar to each other. It is used to describe all measures which are taken during the manufacturing process and quality control leading to a reproducible quality. Among the various techniques, identification of plant drug by pharmacognostic study is more reliable. The plant locally known as Genda Phul (Marigold) belongs to the family Asteraceae. The flower has numerous pharmacological activities such as antipyretic, astringent, carminative, stomachic, scabies. It is used as wound healing, reducing inflammation, soothing and softening the skin and thus in skin care products, as it has unique properties and assists the cell rejuvenation. The present work deals with Pharmacognostic evaluation for the flower of *Tagetes erecta* includes macromorphology and microscopical characters, physicochemical constant and phytochemical screening. These findings will be useful towards establishing pharmacognostic standards on identification, purity, quality and classification of the plant, which is important in plant drug research.

**Keywords:** Pharmacognostic, Physico-chemical, Phytochemical, standardization, *Tagetes erecta*.

## INTRODUCTION

Medicinal plants and derived medicine are widely used in traditional cultures all over the world and they are becoming increasingly popular in modern society as natural alternatives to synthetic chemicals.<sup>1</sup> The beneficial medicinal effects of plant materials typically result from the combinations of secondary metabolites present in the plant such as alkaloids, steroids, tannins and phenolic compounds, flavanoids, resins, fatty acids and gums which are capable of producing definite physiological action on body.<sup>2</sup> There is a need for documentation of research work carried out on traditional medicines. With this backdrop, it becomes extremely important to make an effort towards standardization of the plant material to be used as a medicine. The process of standardization can be achieved by stepwise pharmacognostic and phytochemical studies. These studies help in identification and standardization of the plant material. Correct identification and quality assurance of the starting materials is an essential prerequisite to ensure reproducible quality of herbal medicine which will contribute to its safety and efficacy.<sup>3</sup> The plant *Tagetes erecta* Linn. locally known as *Genda Phul* (Marigold) belongs to the family Asteraceae. It is a stout, branching herb, native of Mexico and other warmer parts of America and naturalized elsewhere in the tropics and subtropics including India and Bangladesh.<sup>4</sup> These are rapid-growing annual flowering plants with heights ranging from dwarfs of 6-8 inch, to medium and taller and erect-growing plants with height from 10 in to 3 ft, bearing large pompon-like double flowers up to 5 in across and has a shorter flowering period from midsummer to frost; Different parts of this plant including flower are used in folk medicine to cure various diseases. The flower is useful in fevers,

epileptic fits (Ayurveda), astringent, carminative, stomachic, scabies and liver complaints, skin diseases and is also employed in diseases of the eyes. Phytochemical studies of its different parts have resulted in the isolation of various chemical constituents such as thiophenes, flavonoids, carotenoids and triterpenoids. The plant *Tagetes erecta* has been shown to contain quercetagetin, a glucoside of quercetagetin, phenolics, syringic acid, methyl-3, 5-dihydroxy-4-methoxy benzoate, quercetin, thienyl and ethyl gallat.<sup>2</sup> The current article describes some pharmacognostical, physicochemical and phytochemical characteristics studied. The main objective of this study is to supplement constructive information with regards to its identification, Characterization and standardization of plant *Tagetes erecta*.

## MATERIALS AND METHODS

### Collection and preparation of sample:

The fresh flower plant of *Tagetes erecta* was collected in the month of October from wakad, Pune District, Maharashtra state, India. The plant was identified and authenticated by Botanical Survey of India, western Regional Centre 7, Pune and a voucher specimen was deposited with a voucher specimen sample No. BSI/WRC/Tech./2012/431. The shade dried petals were powdered for determination of powder microscopy, physicochemical characterization and phytochemical analysis.

### Preliminary phytochemical screening for powder of *Tagetes erecta*:

For preliminary phytochemical screening, the powder was subjected to various qualitative chemical tests to determine the presence of various phytoconstituents.<sup>5, 6</sup>

### Extraction Procedure

The fresh flower part of plant was dried in shade for 20 days. About a significant amount of dry flower petals was extracted with methanol at temp. 40-60 °C using soxhlet apparatus. The methanol extract was filtered and concentrated to a dry mass by using rotary evaporator. A deep reddish brown viscous residue obtained having characteristic odour. Further the solvents were evaporated to dryness by using vacuum oven.<sup>7, 8</sup>

### Preliminary phytochemical screening for flower extract of *Tagetes erecta*:

For preliminary phytochemical screening, the extract were subjected to various qualitative chemical tests to determine the presence of various phytoconstituents like glycosides, protein, steroids, terpenoids, flavonoids, saponins, alkaloids, acidic and phenolic compounds etc.<sup>5, 6</sup>

### Macroscopic study:

The entire fresh flower and the powder was evaluated for their sensory profile by observing their colour, odour, taste along with some extra macromorphological characters such as receptacle, inflorescence, calyx and corolla as per standard WHO guideline.<sup>9-10</sup>

### Microchemical testing:

Microchemical testing was done by preparing thin hand section of calyx and corolla of flowers of *Tagetes erecta* Linn. The section was stained with staining reagents and mounted in glycerine. Photomicrographs of the microscopical sections were taken with the help of MOTIC Digital Microscope, provided with MOTIC IMAGE PLUS 2.0 software<sup>11, 12, 13</sup>

### Physicochemical parameters:

Analysis of Physicochemical constants of the powder flower has been done to evaluate the quality and purity of the drug. The determination of various physicochemical parameters such as moisture content, total ash, acid insoluble ash, water soluble ash, sulphated ash, water soluble extractive value and alcohol soluble extractive value, were calculated as per reported method.<sup>5, 10</sup>

### Fluorescence Analysis:

Many herbs show fluorescence when their powder is exposed to UV light and this can be useful in their identification. It is important to observe reaction with different chemical reagent under ultra violet light. The fluorescence character of the flower powders (40 mesh) was studied both in daylight and UV light (254 nm and 366 nm) and after treatment with different reagents.<sup>3, 14</sup>

## RESULT AND DISCUSSION

### Macroscopic description:

The plant *Tagetes erecta* is taller and erect-growing with height from 10 in to 3 ft, bearing large pompon-like double

flowers; the flower head is about 5cm. in diameter, with numerous barren disc-florets and one or more rows of fertile ligulate ray-florets. The flower consists almost entirely of the ligulate corollas of the ray florets, the limb or strap of corollas is 1.2-3.7 cm long and 3.5-6 cm broad at the widest part; it is oblanceolate and is terminated by acute teeth. The tube of corolla is 1.5-2 mm long and bears characteristic trichomes externally. The organoleptic evaluation of the flower and flower powder revealed that, flower was bright orange and powder was brownish orange in colour, with aromatic odour and a distinctly bitter taste.<sup>15, 16</sup> The macromorphology of *Tagetes erecta* flower are shown in figure1 and the results of macromorphology were mentioned in Table 1.

### Microchemical testing:

The free hand thin transverse sections of flower sepal and petal shows typical characteristic of flower. Sections were treated with different staining agent and mounted on a glass slide. The transverse section calyx (sepal) shows presence of cortical portion and fibro vascular bundle. In the cortical portion the cells are rectangular and compactly arranged where the fibro vascular bundles are arranged alternately. The transverse section of corolla (ray-florets) shows epidermis, veins and vein reaches through stamen portion. Microscopy of calyx and corolla are shown in Figure 3 and 4.

### Preliminary Phytochemical Screening:

The preliminary phytochemical investigations of powdered flower and methanolic extract of *Tagetes erecta* was performed which shows the presence of tannins and phenolic compounds, steroids, terpenoids, flavanoids, saponins, alkaloids which indicates therapeutic activity.<sup>6</sup> The result of screening were expressed in Table 2.

### Physicochemical parameters:

Analysis of Physicochemical constants of the powder flower has been done to evaluate the quality and purity of the drug and to establish identity of it.<sup>3</sup> Moisture is inevitable component of crude drug, which must be eliminated as far as practicable. Determination of moisture content evaluates the total moisture content in the crude drug. The total ash determination is important as is indicate purity of herbal drug i.e. presence or absence of any foreign matter. The amount of acid insoluble matter, water soluble ash, and sulphated ash was determined. Determination of extractive value is useful for evaluation of crude drug. It gives an idea about nature of chemical constituent present in a crude drug. According to results it indicates that large amount of flower constituent was soluble in water than alcohol.<sup>5, 10</sup> physicochemical parameters were expressed in table no.3

### Fluorescence analysis:

Fluorescence study is an essential parameter for first line standardization of crude drug. In fluorescence the fluorescent light is always of greater wavelength than the exciting light. Light rich in short wavelengths is very active in producing fluorescence and for this reason ultraviolet light produces fluorescence in many substances which do not visibly fluoresce in daylight.<sup>13</sup> The results of fluorescence analysis were expressed in Table 4.

**Table 1: Macroscopic evaluation description**

Characters	Observation
<b>Organoleptic Characters</b>	
Colour	Bright Orange
Odour	Aromatic
Taste	Distinctly bitter
<b>Quantitative Macromorphology</b>	
Length	2-3 cm
Thickness	3.5-5 mm

**Extra Features**

Inflorescence	Raceme
Calyx	Dark green, ovate
Corolla	Bright orange, oblanceolate

**Table 2: Preliminary phytochemical screening of flower of *Tagetes erecta***

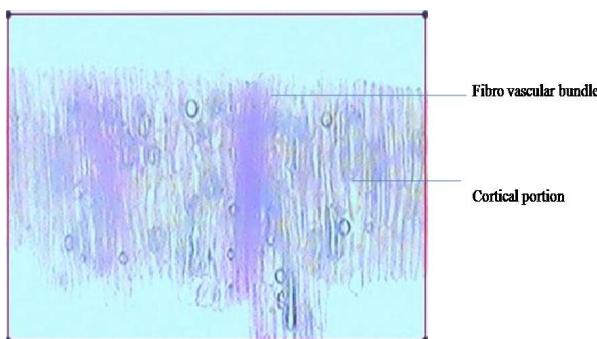
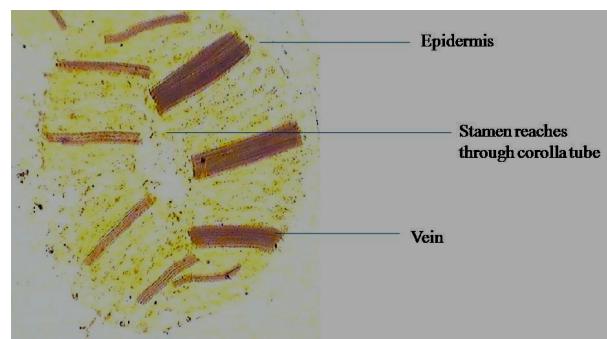
Phytoconstituent	Observation
Tannins	+
Phenolic compound	+
Flavanoids	+
Steroids	+
Triterpenoids	++
Saponins	+
Alkaloids	+

**Table 3: Physicochemical parameters of *Tagetes erecta***

Parameters studied	Flower powder ( values obtained on dry weight basis w/w)
Loss on drying ( moisture content)	7.46 %w/w
Total ash	4.95 % w/w
Acid insoluble ash	0.2 %w/w
Water soluble ash	1.65 %w/w
Sulphated ash	1.3 %w/w
Water soluble extractive value	72 %w/w
Alcohol soluble extractive value	16.8 %w/w

**Table 4: Fluorescence analysis of Powder**

Solvent used for treatment	Ordinary light	UV light 254nm	UV light 366nm
Powder + distilled water	Orange yellow	Greenish yellow	Blackish green
Powder + pet ether	Orange yellow	Green	Blackish green
Powder + chloroform	Orange	Dark green	Blackish green
Powder + methanol	Orange	Green	Dark black
Powder + conc. HCl	Orange	Yellowish green	Black
Powder + conc. HNO <sub>3</sub>	Lime yellow	Green	Blackish green
Powder + conc. H <sub>2</sub> SO <sub>4</sub>	Brown	Blackish brown	Black
Powder + picric acid	Orange yellow	Green	Black
Powder + ammonia solution	Orange black	Blackish brown	Black
Powder + 10% sodium hydroxide (NaOH)	Orange red	Reddish brown	Brownish black
Powder + ferric chloride	Blackish green	Mud brown	Black

Figure 1 : Macromorphology of *Tagetes erecta* flowerFigure 2: Morphological features of *Tagetes erecta* flower  
A: calyx (Sepal)  
B: corolla (ray-florets)Figure 3: Transverse section of sepal (calyx) of *Tagetes erecta* Linn flowerFigure 4: Transverse section of corolla tube of *Tagetes erecta* Linn flower

## CONCLUSION

Standardization is essential measure for correct identity, quality and purity of crude drug. The majority of information on the identity, quality and purity of plant material can be obtained from its macroscopic, microscopic and physicochemical parameters. The present work is undertaken to produce some pharmacognostical standard and help to proper identification and ensures of quality of drug. This study is useful for further pharmacological and therapeutic evaluation along with standardization.

## REFERENCES

1. Gopi G, Elumalai A and Jayasri P. A Concise Review on *Tagetes erecta*. International Journal of Phytopharmacy Research; 2012, 3(1), 16-19
2. Kiranmai M and Ibrahim M. Anti bacterial Potential of Different Extracts of *Tagetes erecta linn*. International Journal of Pharmacy ; 2012, 2(1), 90-96
3. Kadam PV, Deoda RS, Shrivastava RS, Yadav KN, Patil MJ. Scholars Research Library, Der Pharmacia Lettre; 2012, 4 (2), 607-613
4. Nikkon F, Habib MR, Saud ZA, Karim MR, Roy AK, Zaman S. Toxicological Evaluation of Chloroform Fraction of Flower of *Tagetes erecta L.* on Rats. International Journal of Drug Development and Research, 2009, 1(1);161-162
5. Khandelwal KR. Practical Pharmacognosy Techniques And Experiments, 22<sup>nd</sup> ed., Nirali Prakashan , Pune; 2012 , 25.1- 25.7
6. Devika R and Koilpillai J, Phytochemical Screening Studies of Bioactive Compounds of *Tagetes erecta*. Int J Pharm Bio Sci; 2012, 3(4),(B), 596 – 602
7. Tripathi AK, Kohli S. Pharmacognostic and Phytochemical Studies on The Flower of *Punica granatum*(L). International Journal Of Pharmaceutical Research And Development ; 2011, 3(11), 1-7
8. Solanki R, Gupta A, Tripathy A, Soni D, Jana GK. Pharmacognostic, Phytochemical and Physiochemical Studies of *Atrocarpus heterophyllus* Leaf (Moraceae), Scholars Research Library, J. Nat. Prod. Plant Resour; 2011, 1 (4), 20-26
9. World health organization. Quality Control Methods for Medicinal Plant Material. WHO/PHARM/92.559,1998;4-46.
10. Dr. Mukherjee PK. Quality Control of Herbal Drugs. 1st ed., Business horizons publication, Delhi; 2002, 142-195.
11. Kokate CK, Purohit AP, Gokhale SB. Pharmacognosy.22<sup>nd</sup> ed., Nirali Prakashan, Pune; 2003, 109-157
12. Iyengar MA. Anatomy of Crude Drugs. 11<sup>th</sup> ed., Manipal, Manipal Press Limited; 2008, 58
13. Kumar VK, Kumar PS, Venkatachalam T, Selvi PK, Dr. Kumar NS, Pharmacognostic standardization and Physico-Chemical Evaluations of *Bauhinia tomentosa* linn flower. International Journal of Pharma Research and Development – Online; 2010, 2(5), 1-8
14. Majumder P. Evaluation of Pharmacognostic, Phytochemical Profile Along With Quantitative Physicochemical Standards on The Root of Medicinal Herb *Peperomia pellucida* (L.) HBK, Journal of Pharmaceutical and Biomedical Sciences; 2011, 10(10), 1-3
15. Jacqueline.Cheerful Marigolds (*Tagetes erecta*, *Tagetes patula*) [John&Jacq~s Garden.htm] ;2009 March 27, cited 2012 sep 22.
16. Wallis TE. Textbook of Pharmacognosy. 5<sup>th</sup> ed., CBS Publishers and Distributors, New Delhi; 2005,167.

Source of support: Nil, Conflict of interest: None Declared