

**PHYTOPHARMACOLOGICAL INVESTIGATION AND FORMULATION OF  
TRADESCANTIA SPATHACEA DROPS FOR OTALGIA MANAGEMENT**Sakshi Choudhari<sup>\*1</sup>, Shobhit Kishor Suralke<sup>2</sup>Research Scholar<sup>1</sup>, Research Guide<sup>2</sup>  
GRY Institute of Pharmacy Borawan.**\*Corresponding Author: Sakshi Choudhari**

Research Scholar, GRY Institute of Pharmacy Borawan.

DOI: <https://doi.org/10.5281/zenodo.19092551>**How to cite this Article:** Sakshi Choudhari<sup>\*1</sup>, Shobhit Kishor Suralke<sup>2</sup>. (2026). Phytopharmacological Investigation and Formulation of Tradescantia Spathacea Drops For Otagia Management. World Journal of Pharmaceutical and Medical Research, 12(3), 554-561.

This work is licensed under Creative Commons Attribution 4.0 International license.



Article Received on 12/01/2026

Article Revised on 12/02/2026

Article Published on 01/03/2026

**ABSTRACT**

Otagia (ear pain) is a common condition caused by infection or inflammation of the ear. Although conventional treatments such as analgesics and antibiotics are widely used, prolonged use may lead to side effects and antimicrobial resistance. *Tradescantia spathacea* is a medicinal plant known for its anti-inflammatory, antimicrobial, and antioxidant properties, making it a potential natural remedy. The present study focuses on the phytopharmacological investigation and formulation of herbal ear drops using *Tradescantia spathacea* for otagia management. The plant material was collected, authenticated, and extracted, followed by preliminary phytochemical screening to identify bioactive compounds such as flavonoids, tannins, phenolics, saponins, and alkaloids. The extract was formulated into herbal ear drops using glycerin and propylene glycol as vehicles. The formulation was evaluated for physicochemical parameters including pH, viscosity, appearance, homogeneity, and stability. Results showed that the formulation possessed acceptable characteristics and remained stable during the study. The study suggests that *Tradescantia spathacea* based herbal ear drops may serve as a promising natural alternative for the management of otagia.

**KEYWORDS:** Tradescantia spathacea, Otagia, Phytopharmacological investigation, Herbal ear drops, Phytochemical screening, Herbal formulation, Anti-inflammatory activity, Antimicrobial activity, Stability evaluation.**1. INTRODUCTION**

Ear pain, clinically termed Otagia, is one of the most common complaints encountered in both primary healthcare settings and otorhinolaryngology practice. It may occur as a direct result of pathological conditions within the ear itself or may arise as referred pain from surrounding anatomical structures of the head and neck. Otagia is generally classified into two major categories: primary otagia and secondary otagia. Primary otagia originates from diseases affecting the ear, such as otitis externa, otitis media, traumatic injury to the ear canal, and Eustachian tube dysfunction. Secondary otagia, also known as referred ear pain, occurs when pain originates from other regions sharing common neural pathways with the ear, including dental infections, temporomandibular joint disorders, tonsillitis,

pharyngeal infections, cervical spine disorders, and neuralgias involving cranial nerves.<sup>[1]</sup>

Because the ear shares sensory innervation with several cranial and cervical nerves, identifying the underlying cause of otagia can be clinically challenging. Accurate diagnosis requires a thorough clinical evaluation, including detailed patient history, physical examination, otoscopic inspection, and appropriate diagnostic investigations. Early and effective management of otagia is important to relieve discomfort, prevent complications, and improve the quality of life of affected individuals.<sup>[2]</sup>

The management of otagia largely depends on the underlying etiology. Conventional pharmacological treatment typically includes systemic analgesics, anti-

inflammatory drugs, topical anesthetic agents, and antimicrobial medications such as antibiotics or antifungals when infection is present. In addition, supportive measures such as warm compresses, proper ear hygiene, and avoidance of irritants are frequently recommended. Although these treatments are generally effective, the increasing incidence of antimicrobial resistance, potential side effects of synthetic drugs, and economic limitations have encouraged the exploration of alternative therapeutic approaches, particularly herbal and plant-based remedies.<sup>[3]</sup>

Medicinal plants have served as a fundamental source of therapeutic agents for centuries and continue to play a significant role in modern healthcare systems. According to the World Health Organization, a substantial proportion of the global population relies on traditional plant-based medicines for primary healthcare needs. Natural products derived from plants are widely regarded as valuable sources of bioactive compounds with diverse pharmacological properties, including anti-inflammatory, antimicrobial, antioxidant, and analgesic effects.<sup>[4]</sup> Consequently, there has been increasing scientific interest in investigating medicinal plants as potential alternatives or complementary therapies for various diseases.

The ear is a complex sensory organ responsible for two essential physiological functions: hearing and maintenance of balance. It converts sound waves from the external environment into electrical signals that are transmitted to the brain through the auditory nerve. Anatomically, the ear is divided into three main parts: the external ear, middle ear, and inner ear. The external ear consists of the pinna (auricle) and the external auditory canal, which collect and direct sound waves toward the tympanic membrane. The middle ear contains the tympanic cavity and the auditory ossicles—malleus, incus, and stapes—which function to amplify sound vibrations and transmit them to the inner ear. The inner ear comprises the cochlea and the vestibular system, structures responsible for auditory perception and maintenance of equilibrium, respectively.<sup>[5]</sup>

Due to its delicate structure and exposure to environmental factors, the ear is susceptible to various pathological conditions, including infections, inflammation, and trauma. Among these conditions, inflammatory disorders such as otitis externa and otitis media are major causes of ear pain. Effective therapeutic interventions must therefore target both the inflammatory process and the underlying microbial infection. In recent years, herbal formulations designed for topical application in the ear have gained attention due to their potential to provide localized therapeutic action while minimizing systemic side effects.<sup>[6]</sup>

Among the medicinal plants investigated for their therapeutic potential, *Tradescantia spathacea* has attracted considerable scientific interest. This plant

belongs to the family Commelinaceae and is commonly known by several names, including oyster plant, boat lily, and “Moses-in-the-cradle.” The genus *Tradescantia* comprises numerous herbaceous species widely distributed across tropical and subtropical regions. *T. spathacea* is believed to be native to Central America and Mexico but has been introduced to many regions worldwide, where it is cultivated as an ornamental plant due to its attractive foliage.<sup>[7]</sup>



**Fig. No. 1: Tradescantia Spathacea Plant.**

Morphologically, *T. spathacea* is characterized by a rosette arrangement of thick, lance-shaped leaves that are dark green on the upper surface and purple on the underside. The plant grows from fleshy rhizomes and produces small white flowers enclosed in distinctive boat-shaped bracts. These morphological features make the plant easily recognizable and widely cultivated as a decorative species in gardens and indoor environments.<sup>[8]</sup>

In addition to its ornamental importance, *T. spathacea* has been used in traditional medicine for the treatment of a wide variety of health conditions. Ethnomedicinal reports indicate that different parts of the plant, particularly the leaves and flowers, have been used to treat cough, bronchitis, diarrhea, dysentery, tuberculosis, urinary tract infections, and inflammatory conditions. The plant has also been reported to possess expectorant, hypoglycemic, and wound-healing properties in various traditional healthcare systems.<sup>[9]</sup>

Phytochemical investigations of *T. spathacea* have revealed the presence of several biologically active compounds, including flavonoids, phenolic acids, alkaloids, tannins, saponins, anthocyanins, and terpenoids. These phytoconstituents are known to contribute to the pharmacological properties of the plant. For example, flavonoids and phenolic compounds are widely recognized for their antioxidant and anti-inflammatory activities, which can help reduce tissue inflammation and oxidative stress. Similarly, tannins and saponins possess antimicrobial properties that may inhibit the growth of pathogenic microorganisms responsible for infections.<sup>[10]</sup>

Several experimental studies have demonstrated the pharmacological activities of *T. spathacea*, including antibacterial, antiviral, antioxidant, anti-inflammatory, cytotoxic, and immunomodulatory effects. The antimicrobial activity of plant extracts has been reported against both Gram-positive and Gram-negative bacterial strains, suggesting potential applications in the treatment of infectious diseases. Furthermore, antioxidant and anti-inflammatory properties of the plant may contribute to the alleviation of pain and inflammation associated with ear infections.<sup>[11]</sup>

The therapeutic potential of *T. spathacea* in the management of ear disorders is particularly promising due to the combined antimicrobial and anti-inflammatory properties of its phytoconstituents. These properties may help control microbial infections, reduce inflammation, and relieve pain in conditions associated with otalgia. Additionally, topical herbal formulations prepared from plant extracts may offer advantages such as localized drug delivery, reduced systemic toxicity, and improved patient compliance.<sup>[12]</sup>

In this context, the development of herbal ear drop formulations using *T. spathacea* represents an innovative approach for the management of ear pain. Phytopharmacological investigation of the plant may provide valuable insights into its bioactive compounds and therapeutic potential. Therefore, the present study focuses on the phytopharmacological investigation and formulation of herbal ear drops derived from *Tradescantia spathacea* for the management of otalgia. The research aims to evaluate the phytochemical composition of the plant extract and develop a stable and effective otic formulation that may serve as a natural alternative for the treatment of ear pain.

## MATERIALS AND METHODS

### Plant Material Collection

Fresh and healthy leaves of *Tradescantia spathacea* were collected from the medicinal garden of GRY Institute of Pharmacy, Borawan, Khargone, India. The collected leaves were washed thoroughly with distilled water to remove dust and impurities and then shade-dried at room temperature. The dried leaves were pulverized into coarse powder using a mechanical grinder and stored in sterile airtight containers until further analysis.



Fig. No. 2: *Tradescantia Spathacea* Plant At Gry Aushadhi Udhyan.

### Preparation of Plant Extract

The powdered plant material was subjected to extraction using the Soxhlet extraction method. Approximately 250 g of dried leaf powder was extracted with ethanol as the solvent. The extraction process was continued until

complete extraction was achieved. The obtained extract was filtered, and the filtrate was concentrated under reduced pressure using a water bath to obtain the crude extract.



Fig. No. 3: Extraction Process Of Tradescantia Spathacea.

### Hydroethanolic Extraction

For hydroethanolic extraction, about 250 g of crushed leaf material was soaked in 70% hydroethanolic solvent (ethanol: distilled water). The mixture was kept in a conical flask and allowed to macerate for 48 hours at room temperature with periodic shaking. The extract was then filtered and concentrated under reduced pressure to obtain the crude hydroethanolic extract.

### Phytochemical Screening

Preliminary phytochemical screening of the extract of Tradescantia spathacea was carried out using standard

qualitative chemical tests to identify the presence of major secondary metabolites such as alkaloids, flavonoids, and phenolic compounds.

Flavonoids were detected using the Shinoda test and alkaline reagent test, where the appearance of pink or red coloration confirmed their presence. Alkaloids were identified using Mayer's and Dragendorff's reagents, which produced characteristic precipitates. Phenolic compounds were confirmed using the ferric chloride test, which produced a blue or green coloration.

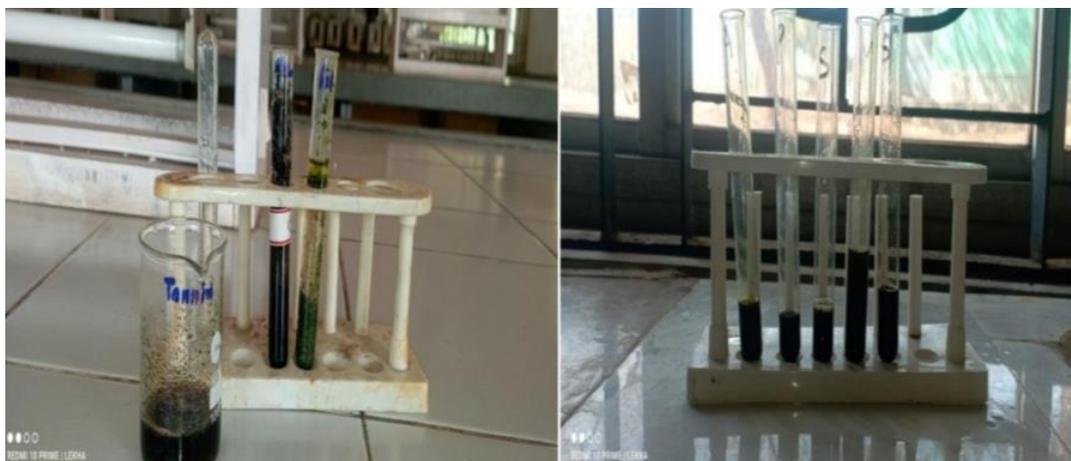


Fig. No. 4: Preliminary Phytochemical Analysis Of Tradescantia Spathacea.



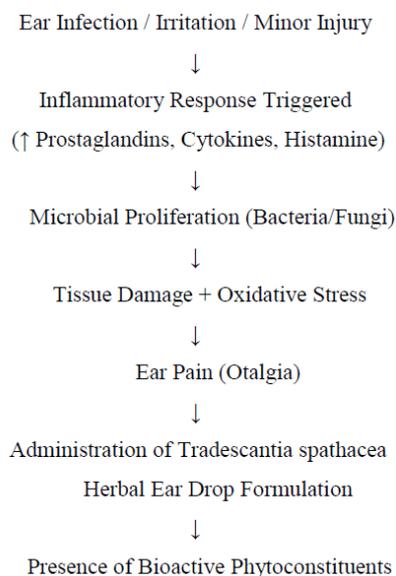
Fig No 9 Detection of flavonoids and alkaloids in the Extract of *Tradescantia spathacea*.

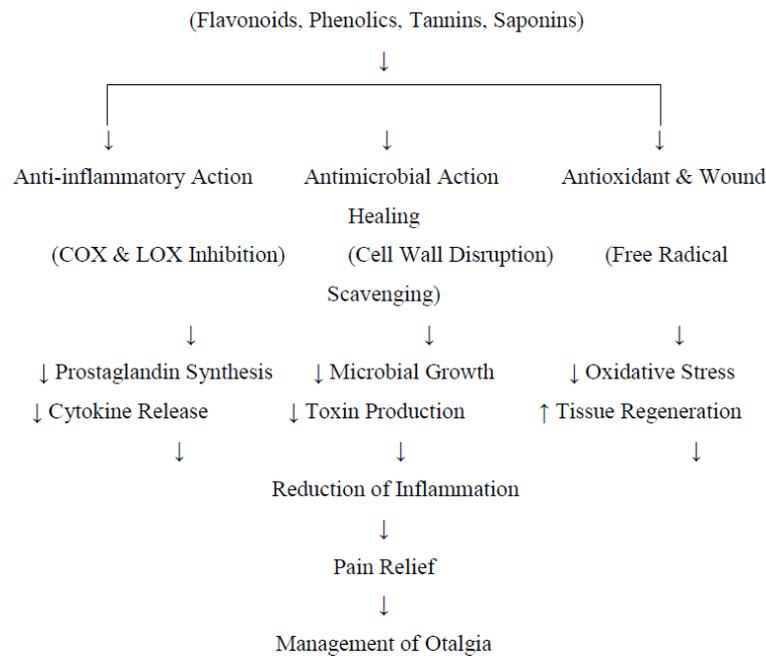
#### Formulation of Herbal Ear Drops

Sr.No.	Ingredients	Category	Pharmaceutical Function	Quantity
1	Tradescantia Spathacea Extract	Active Pharma-ceutical Ingredient(API)	Anti-inflammatory, wound healing, antimicrobial activity	10 ml
2	Neem oil	Herbal Adjuvant	Antibacterial, antifungal agent	1 ml
3	Clove oil	Herbal Adjuvant	Analgesic, mild antiseptic	1 ml
4	Coconut Oil	Vehicle/Carrier	Drug carrier, soothing agent, emollient	35 ml
5	Vitamin E Oil	Antioxidant	Prevents oxidative degradation, enhances stability	0.5 ml
6	Sodium Benzoate	Preservative	Prevents microbial growth	q.s.
7	Propylene Glycol	Co-solvents/ Stabilizer	Improves solubility and formulation stability	2.2 ml
8	Buffer System	PH Adjuster	Maintain ph stability	q.s.

A herbal ear drop formulation was prepared using the crude extract of *Tradescantia spathacea* as the active pharmaceutical ingredient. The formulation also included neem oil and clove oil as herbal adjuvants for antimicrobial and analgesic activity. Coconut oil was

used as the carrier oil, while propylene glycol served as a co-solvent to enhance solubility. Vitamin E was incorporated as an antioxidant, and sodium benzoate was used as a preservative. A suitable buffer system was used to maintain pH stability of the formulation.





### Evaluation of Formulation

The formulated herbal ear drops containing *Tradescantia spathacea* were evaluated to ensure their quality, safety, and suitability for the management of Otolgia. The evaluation included organoleptic properties, pH determination, viscosity measurement, specific gravity, and stability studies in accordance with standard pharmaceutical guidelines.

### Organoleptic Evaluation

The formulation was visually examined to determine its physical characteristics such as color, odor, clarity, and overall appearance. A small quantity of the formulation was placed in a transparent glass container and observed under adequate lighting conditions. The formulation was assessed for uniform color, characteristic odor, clarity, and absence of turbidity, precipitation, or phase separation to ensure physical stability and acceptability.

### Determination of pH

The pH of the herbal ear drop formulation was determined using universal pH indicator paper at room temperature. A small quantity of the formulation was placed in a clean beaker, and a pH paper strip was immersed in the sample for a few seconds. The color developed on the strip was compared with the standard pH chart. The measurement was repeated three times and the average value was recorded. The acceptable pH range for otic formulations was maintained between 5.5 and 6.5 to ensure compatibility with the physiological environment of the ear canal.

### Viscosity Measurement

The viscosity of the formulation was determined using a Brookfield viscometer to evaluate its rheological behavior. Approximately 50 ml of the formulation was placed in a clean beaker and analyzed at room

temperature ( $25 \pm 2^\circ\text{C}$ ) using an appropriate spindle at a constant rotational speed. The viscosity value was recorded in centipoise (cP), and the measurement was performed in triplicate to obtain the mean value. Adequate viscosity is essential to ensure proper flow characteristics and sufficient retention time in the ear canal.

### Determination of Specific Gravity

The specific gravity of the formulation was determined using a pycnometer to evaluate the density and uniformity of the preparation. The weight of the empty pycnometer, pycnometer filled with distilled water, and pycnometer filled with the formulation were recorded. The specific gravity was calculated using the standard formula, and the experiment was performed in triplicate to obtain the average value.

### Stability Studies

Stability studies were conducted to evaluate the physical and chemical stability of the formulated ear drops under different storage conditions according to guidelines of the International Council for Harmonisation. The formulation was stored in sealed glass containers and evaluated under two conditions: long-term storage ( $25 \pm 2^\circ\text{C}$  /  $60\% \text{ RH} \pm 5\%$ ) and accelerated conditions ( $40 \pm 2^\circ\text{C}$  /  $75\% \text{ RH} \pm 5\%$ ). The study was carried out for a period of approximately 1–1.5 months. At predetermined intervals, the samples were analyzed for changes in pH, color, odor, viscosity, and microbial growth to ensure stability and formulation integrity.

## RESULTS AND DISCUSSION

The formulated herbal ear drops containing *Tradescantia spathacea* were evaluated for various physicochemical parameters to determine their suitability for the management of Otolgia. The results obtained from

organoleptic evaluation, pH determination, viscosity measurement, specific gravity, and stability studies demonstrated that the formulation met the basic requirements for otic preparations.

### Organoleptic Evaluation

The formulation exhibited a light green to pale brown color with a characteristic herbal odor. It was clear, homogeneous, and free from particulate matter or phase separation. These observations indicate good compatibility among formulation ingredients and suggest acceptable physical stability of the prepared herbal ear drops.



Fig. No. 10: Clarity Test Apparatus.

### Determination of pH

The pH of the formulation was found to be approximately 6.0. This value lies within the acceptable physiological range (5.5–6.5) for otic preparations, indicating that the formulation is unlikely to cause irritation or discomfort upon administration. Maintaining pH within this range also supports the chemical stability of the formulation.



Fig. PH Test Of Tradescantia Spathacea Drop.

### Viscosity Measurement

The viscosity of the prepared ear drops was recorded as approximately 33 cP at  $25 \pm 2^\circ\text{C}$  using a Brookfield viscometer. This moderate viscosity ensures easy instillation into the ear canal while providing adequate retention time for therapeutic action. The consistent readings obtained in repeated measurements indicate good uniformity and stability of the formulation.

### Determination of Specific Gravity

The specific gravity of the formulation was determined to be 0.97 using a pycnometer. This value is close to that of water, suggesting suitable density for liquid otic formulations. The result indicates uniform distribution of the active components and proper flow characteristics during administration.

### Stability Studies

Stability studies conducted under both long-term ( $25 \pm 2^\circ\text{C}$  / 60% RH) and accelerated conditions ( $40 \pm 2^\circ\text{C}$  / 75% RH) showed no significant changes in pH, color, odor, or viscosity over a storage period of 1–1.5 months. The formulation remained physically stable without any evidence of phase separation or microbial contamination. These results suggest that the formulated herbal ear drops possess satisfactory short-term stability.

Overall, the evaluation results demonstrate that the herbal ear drop formulation containing Tradescantia spathacea possesses appropriate physicochemical properties, stability, and compatibility, indicating its potential suitability for the topical management of Otagia.

### CONCLUSION

The present study on Phytopharmacological Investigation and Formulation and Evaluation of Tradescantia spathacea Drops for the management of Otagia aimed to explore the medicinal potential of the plant and develop a suitable herbal ear drop formulation. Preliminary phytochemical screening confirmed the presence of important bioactive constituents such as flavonoids, tannins, phenolic compounds, saponins, and alkaloids, which are known for their anti-inflammatory, antimicrobial, and analgesic properties. Based on these findings, a herbal ear drop formulation was successfully prepared using the plant extract along with suitable pharmaceutical excipients.

The prepared formulation was evaluated for various physicochemical parameters including organoleptic properties, pH, viscosity, and stability. The results showed that the formulation possessed acceptable physical characteristics, appropriate pH compatible with the ear canal, and good stability without turbidity or phase separation. These findings indicate that the developed herbal ear drops are safe, stable, and suitable for topical otic application.

Overall, the study suggests that *Tradescantia spathacea* has promising potential as a natural therapeutic agent for the management of otalgia. However, further pharmacological and clinical studies are required to confirm its efficacy and safety in human subjects.

#### REFERENCE

1. Dhingra, P. L., & Dhingra, S. (2017). *Diseases of Ear, Nose and Throat-EBook*. Elsevier Health Sciences.
2. Hall, J. E., Hall, M. E., & Guyton, A. C. (2011). *Textbook of medical physiology*.
3. Tortora, G. J., & Derrickson, B. H. (2018). *Principles of anatomy and physiology*. John Wiley & Sons.
4. Prakash, R., & Rajesh, R. Aberrant expression of WNT/Beta-catenin signaling pathway and in-vitro cytotoxic activity of *Tradescantia Spathacea* medicinal plant used to treat human breast adenocarcinoma (MCF-7 Cell Lines). *Int. J. of Pharm Sciences and Research*, 2014; 5(12): 5230-5234.
5. Bercu, R. Histoanatomical study on the vegetative organs of *Tradescantia spathacea* (Commelinaceae). *Botanica Serbica*, 2013; 37(2): 121-126.
6. Mohamed, A. M. F. (2018). Pharmacognostical study of some species of *Tradescantia* family Commelinaceae cultivated in Egypt. *CU Theses*.
7. Oloyede, F. M., Illoh, H. C., & Oloyede, F. A. Taxonomical studies of selected ornamental plants. *IFE Journal of Science*, 2007; 9(2): 167-171.
8. Pulipaka, S., Suttee, A., Kumar, M. R., & Sriram, P. A REVIEW ON PHYTOPHARMACOLOGICAL ACTIVITIES OF ALPINIA MUTICA AND TRADESCANTIA SPATHACEA. *Plant Archives*, 2020; 20(2): 9011-9018.
9. Kumar, S., & Pandey, A. K. Chemistry and biological activities of flavonoids: an overview. *The scientific world journal*, 2013; 2013(1): 162750.
10. Calixto, J. B., Campos, M. M., Otuki, M. F., & Santos, A. R. Anti-inflammatory compounds of plant origin. Part II. Modulation of pro-inflammatory cytokines, chemokines and adhesion molecules. *Planta medica*, 2004; 70(02): 93-103.
11. Nikam, M. B., Mundada, P. S., Kadam, D. A., Jadhav, S., & Aparadh, V. Comparative screening of various solvent for phytochemical testing using some Commelinaceae members. *Int. Res. J. Pharm. Appl. Sci.*, 2013; 3(2): 18-20.
12. Kadam, P. M., & Kakde, N. P. Phytochemical study of *Tradescantia spathacea*. *Int Res J Biological Sci.*, 2017; 6: 48-51.
13. Tan, J. B. L., Lim, Y. Y., & Lee, S. M. Antioxidant and antibacterial activity of *Rhoeo spathacea* (Swartz) Stearn leaves. *Journal of Food Science and Technology*, 2015; 52(4): 2394-2400.