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Formulation and Evaluation of Antibacterial Cream from Mimosa Pudica and Tridax Procumbenz)

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Abstract: *The study was carried out to identify through scientific methods the active ingredients and the pharmacological activities of the shoot and root extracts of Mimosa pudica Linn. The Mimosa pudica shoot methanolic extract (MSME),Mimosa pudica root methanolic extract (MRME) showed very good wound healing activity when compared to the standard drug Gentamicin. Tridax procumbens L. (Compositae) is a common weed that grows in the rice fields of India. Traditionally the juice from leaves of Tridax procumbens has been used for healing dermal wound. However, in experimental studies, equivocal pro and anti-healing action of T. Procumbens has been demonstrated. It has been studied previously that stage of wound healing involves acute inflammatory phase followed by the synthesis of collagen and other extra cellular macromolecules, which is later removed to form a scar.*

Keywords: Mimosa pudica, Burn wound, Excision wound, collagen fibers, phytochemicals, anti-cancer activity, anti bacterial activity, wound healing activity.

I. INTRODUCTION

Any plant with leaves, stem, flowers, roots, and seeds that can be utilized for food, medicine, perfume, or flavouring. The Sumerians are the first people in Mesopotamia to have written about plants about 5000 years ago. Around 1000 formulas for remedies employing over 600 medicinal plants were recorded by the Greek physician "Discorides" in "De Materia Medica" in 60 AD while he was serving in the Roman army. This book served as the foundation for pharmacopoeias for approximately 1500 years. "A loss or breaking of cellular and anatomic or functional continuity of living tissue" is a clinical entity that has existed for as long as humanity and frequently causes issues with clinical practice. Since the beginning of time, medicinal plants have been utilized to treat a wide range of skin conditions and dermatological disorders. Natural resources have provided therapeutic agents for Around the world, people have been using a variety of medicinal plants to treat illnesses for many years. Damage to the skin that affects other soft tissues results in wounds. The complex and ongoing process of tissue remodelling and repair in response to injury is known as wound healing. Studies conducted both in vitro and in vivo have shown that M. Pudica and Tridax procumbens contain bioactive components with a wide range of pharmacological activities, including antioxidants, antimicrobial, antibacterial, anti-cancer, and wound healing qualities.

It is an annual or perennial plant, native to Central and South America and occurs throughout India as a weed, commonly known as 'Coat buttons' and Tridax daisy in English. Its leaves have antiseptic, insecticidal and antiparasitic properties.

The inflammatory phase begins as soon as the injury Usually lasts between 24 and 48hrs will continue for up to Two weeks in some cases. They started a haemostatic method To prevent blood loss in the wound area. An important Clinical manifestation of inflammation, ribbon, calories, Tumor, heart failure and fuction-laesa is seen as a result. This Stage is characterized by inhibition and consolidation of the Protoplasm to cause thickening and after vasodilation and The process of the body giving inflammation to the wound Area.

Growth Stage :-The expansion phase mainly involves the production of Repair kits and the majority of solid muscle damage .

Redesign Phase :-This is a necessary part of tissue repair and is often Overlooked as the end result of those mixed events that Broken tissue will be repaired with a scar .

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II. LITERATURE REVIEW

AN IN-VITRO STUDY ON ANTIBACTERIAL ACTIVITY OF MIMOSA PUDICA (Authors:-Seema Kemble, SushmaNadgoudar, Nayana Deshapande,)
From the study it is concluded that the antibacterial activity and its active components of three medicinal plants extracts would be helpful in treating various diseases caused by the three pathogens (E. Coli, P. Aeruginosa and B. Subtilis). It also revealed that alcoholic extracts have broad spectrum of activity against both gram negative and gram positive bacteria. Further investigation of their activity against a wider range of bacteria.

THE SENSITIVE PLANT MIMOSA PUDICA: A USEFUL WEED.(Authors:-Chinmoy Bhuyan,Nongmaithem Randhoni Chanu)
From above discussion we can conclude that the Mimosa pudica plant shows various pharmacological and biological activities with Different aspect of treating the diseases and disorders with help of herbal therapy using above plant also indicating the least adverse Reactions as the benefit of natural therapy Herbal therapies applied worldwide to reduce adverse drug reaction, improve patient Compliance, improve quality of life, and also enables its use in future research for treating different medical conditions.

EXTRACT OF TRIDAX PROCUMBENS LINN LEAVES CAUSES WOUND HEALING .(Authors:-Alankar Shrivastav , Arun Kumar Mishra , M. Abid , Aftab Ahmad ,).
Flavonoids and tannin were accountable for wound healing. The findings confirmed the ethanomedicinal claim of Tridax procumbens(L.) in wound healing in diabetic and nondiabetic conditions.

REVIEW ON WOUND HEALING PROPERTY OF TRIDAX PROCUMBENS .(Authors:-Mrs. Rajalakshmi P, Dr. M. Sakthivel, Dr. S. Mohaed Halith)
This review article is about Tridax Procumbens which have been used to treat wounds, Skin disorders and to stop blood clotting in Traditional medicines. It also has various Pharmacological activities like hepatoprotective Activity, anti-inflammatory, antidiabetic activity, Hypotensive activity, immunomodulatory activity, Dysentery, prevent falling of hair, promotes hair Growth and antimicrobial activity against both Gram-positive and gram-negative bacteria.

REVIEW ON WOUND HEALING ACTIVITY. (Authors:-Pandurangan P)
Tridax daisy has a long history of traditional use but The isolation and testing of each phytochemical has not Been properly associated with its medicinal properties and May indicate difficulty in reproduction after separation and Testing. Various drugs are used to classify metabolites and to Treat various diseases.

EVALUATION OF WOUND HEALING ACTIVITY OF ROOT OF MIMOSA PUDICA.(Authors:-Dnyaneshwar D. Kokane, Rahul Y. More, Mandar B. Kale)
The basic principle of optimal wound healing is to minimize Tissue damage and provide an adequate tissue perfusion and oxygenation, proper nutrition and moist wound healing environment To restore the anatomical continuity and function of the affected Part.

A REVIEW ON THE PHARMACOLOGICAL AND TRADITIONAL PROPERTIES OF MIMOSA PUDICA .(Authors: Ndanusa Abdullahi Hassan, Rohini karunakaran.)
This review shows that M. Pudica is rich with different bioactive Compounds that possess several pharmacological properties. M. Pudica, commonly seen in the wastelands and along roadsides, is an Ethnomedical plant that may be used in managing various types of Disease. Different phytoconstituents responsible for the activities Were isolated. This proves the medicinal importance of the plant. Few studies had been done on the stem, roots and flower. Therefore, Advanced research studies are required to validate the therapeutic Potential of the roots, stem and flower of M. Pudica.

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III. PATHOPHYSIOLOGY OF WOUND HEALING

The normal wound repair process consists of fourPhases that occur in a predictable sequence:

- Hemostasis
- Inflammation
- Proliferation
- Remodelling

Hemostasis phases: Hemostasis is the mechanism That leads to cessation of bleeding from a blood Vessel. It is a process that involves formation of Fibrin that clots the blood. This cascade culminates Into the formation of a "plug" that closes up the Damaged site of the blood vessel controlling the Bleeding.

Inflammation phase: Inflammatory Phase focuses On destroying bacteria and removing debris that Prepare the wound bed for the growth of new Tissues. During this phase, Neutrophils enter the Wound to destroy bacteria and remove debris. These cells often increase between 24 and 48 hours After injury. As the white blood cells leave after Three days, specialized cells called macrophages Arrive to keep on clearing debris. These cells also Secrete growth factors and proteins that attract Immune system cells to the wound to facilitate Tissue repair. This phase lasts four to six days and is Often associates with edema, erythema, heat and Pain.

Proliferation phase: This phase focuses on filling And covering the wound. The proliferative phase Consists of three distinct stages: filling the wound, Contraction of the wound margins and covering the Wound which is also known epithelization. This Phase lasts from 4 to 24 days.

Maturation phase: During the maturation phase The new tissue slowly gains strength and flexibility. In this phase, collagen fibers reorganize and Increase in tensile strength of the tissues.

Mechanism of action of wound healing:-

If these wounds are left untreated, bacteria can multiply, causing pain, redness, swelling and itching, and oozing. Topical antibacterial work in the following ways: They slow down or stop the growth of the bacteria. They reduce the swelling, redness, and itching by activating natural substances in the skin.

There are six major modes of action:

- interference with cell wall synthesis,
- inhibition of protein synthesis,
- interference with nucleic acid synthesis,
- inhibition of a metabolic pathway,
- inhibition of membrane function,
- inhibition of ATP Synthase.

IV. IDENTIFICATION AND NOMENCLATURE

Identification

Mimosa pudica L

Organoleptic properties

Colour:- (Root) Fibrous /white/orange
(Leaves) dark green
(Flower's) lilac pink

Odour:- Pungent , Unpleasant, Sulphurous

Texture:- the leaflet are elongated in shape .Both surface of leaflet are sparsely hairy . The leaves are very sensitive and folden when touch.

Taste:- Bitter and Astringent

Shape :- Elongated or Oblong

Size :- 6 -15 mm long,1 -3 mm wide

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MACROSCOPY
(M.Pudica)

Fig No.3. M.Pudica root

Fig No.4. M.Pudica Stem

1. Root: Tapering dependent, cylindrical, with secondary branches. Length up to 2 cm thick, somewhat wrinkled or rough on the surface
2. Stem: cylindrical, 2.5 cm in diameter, vermillion or purple in colour, sparsely to densely prickly, slightly hairy, well-branched, with branches reaching up to 2 m in length.
3. Leaf: Dihydrately complex, with one or two stalked leaflets per pair, 0.6 to 1.2 cm long, rectangular or narrow, and rounded at the base
4. Flower: prickly peduncles, a tiny calyx, a pink corolla, four lobes, four stamen, and a long, white filiform style that runs between the stamens are all present.
5. Fruit: 2 to 2.4 mm in length, 4 stamen, persistent sutures, 2 to 5 seeds, straw-coloured, and yellowish spreading bristles at sutures.
6. Seed: The seeds are brown to grey in colour, oval to orbicular in shape, and measure 2.5 to 3 mm in diameter and 1 to 1.2 mm thick.

Fig No.5. M.Pudica Leaves.

Fig. No. 6 .M. Pudica Flower

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Fig. No. 7. M. Pudica Fruits

Fig. No.8. M. Pudica seeds

MICROSCOPY:-

Root shows cork 5-12 layer with tangentially elongated cells . The secondary cortex consisting 6 – 10 layered which tangentially elongated with thin walled cells . Secondary phloem composed of sieve elements, fibers crystal fibers and phloem parenchyma travellersed by phloem rays phloem fibers single or in group .

The typical components of the secondary xylem are crossed by xylem rays, and the vessels that are dispersed throughout it have boarded pits and reticulate thickening. starch grains, phloem and xylem rays, parenchyma, and prismatic crystals of calcium oxalate and tannin found in secondary cortex. Both simple and compound starch grains, each with two to three components, are rounded to oval

shapes with diameters of 6 to 20 mm and 16 to 28 mm, respectively.

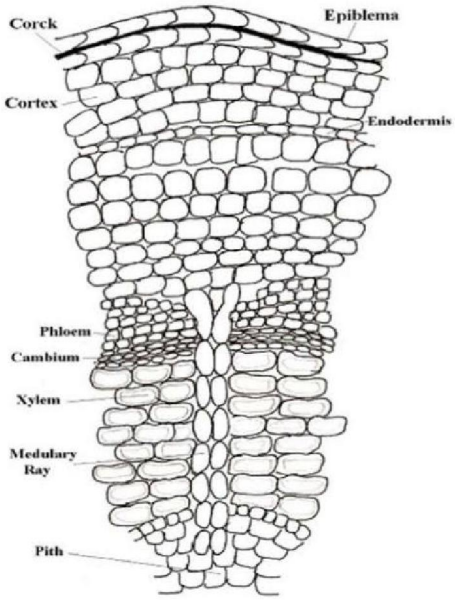

Fig. No.7 . T.S of roots of mimosa pudica

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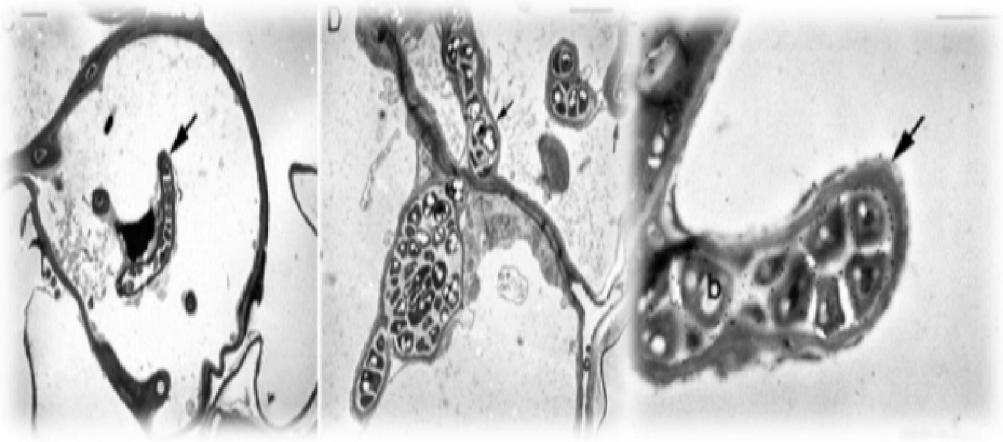

Fig No.8. Root of M.Pudica

Tridax Procumbens :-
Organoleptic properties
Colour :- Dark Green.
Odour ;- Characteristics .
Taste :- Acrid.
Texture :- Short, stiff ,erect hairs.
Appearance :- Rough and Scabrous .
Shape :- Lanceolate to ovate.
Size :- 3 -7 cm length ,1- 4 cm width.

MACROSCOPY:-
1. Stem: Sub erect, branching, densely hairy, creeping at the base, or trailing above.

Fig. No. 9 Tridax procumbens leaf, stem, flower

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2. leaf: Cuneate base, patently hispid, elliptic-rhomboid, ovate, opposite, acute apex, serrated to the coarsely dentate margin 2.5–7 cm in length.

Fig.No.10 Tridax Procumbens Flower

3. Flowers: Each bisexual, pentamerous, actinomorphic solitary head has several yellowish tubular-campanulate disc florets that are 1.2–1.5 cm in diameter. The peduncles measure between 10 and 30 cm.
4. Calyx: A pappus-like structure with scales.
5. Fruit: Achene's are hard fruits with stiff hairs covering them, and at one end they have white pappus that resembles feather

Fig. No.11. Tridax procumbens fruit

6. Seed: There is no endosperm in plant seeds because the embryo is pendulous.

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7.Root : The system Taproot.

Fig. No. 12. Tridax procumbens Root

Microscopy of Tridax Procumbenz :-

Petiole :-

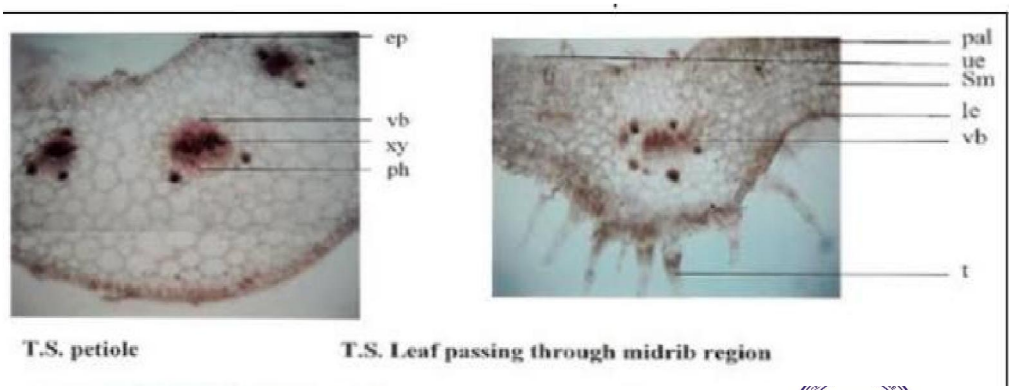
kidney-shaped on the laminal side and crescent-shaped on the distal end. cuticle-covered, single-layered epidermis that is broken up by basic, multicellular, three-to five-celled trichomes. The hypodermis 1-2 cell colony-forming tissue. Ground tissue is parenchymatous; there are five vascular bundles, ranging in size from large to small from the centre to the periphery. These are centripetal, meaning that the phloem encircles the xylem.

Leaf :-

The epidermis of a T.S. leaf is single layered on both surfaces, dorsiventral, and coated with thick cuticle. T.S. passing through the mid rib region shows slight depression on ventral side and slightly protuberated on dorsal size. Trichomes are simple, multicelled (3-6 celled) and more in number on dorsal side. The basal cells of the Trichome are swollen and Trichome looks like claw. Meristeelconsists of a single collateral vascular bundle positioned in the centre, encircled by several dark-colored parenchymatous cells. T.S. across the laminar zone reveals single-layered palisade cells immediately beneath the surface, succeeded by 5-7-celled mesophyll parenchyma that is primarily devoid of intercellular gaps.

Where :-

Xy :-xylem
Ph :- phloem
Ep :- epidermis
Vb :-vestibules
Pal :- palisade



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Sm :- secondary metabolites
T :- trichomes
ue :- upper epidermis
Le :- lower epidermis

Extraction :-

M.pudica :-

Collect the roots of M.Pudica .
Wash under the running water . Dry at room temperature then in hot air oven for 15 min at 60°C to 70°C.
Cut into small piece of roots and then make a fine powder by using mortar and pestle .
Weigh and transfer the 4 gm fine powder of M. Pudica and 40 ml of ethanol into the round bottom flask .(4: 40 respectively)
Cover the opening of Round bottom flask by using cotton to avoiding the evaporation of ethanol.
Place RBF on the heating mantle at 25°c to 30°c for 20 minutes.
Stop the heating and let it cool down at room temperature.
Filer the extract by using filter paper .Collect the extract and stored it properly.

Fig. No. 13. Filtration process (M. Pudica)

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Tridax Procumbenz :-

Collect fresh leavesof Tridax Procumbenz .
Then wash it into running water and dry at room temperature .
Crush the leaves and make a fine paste with the help of mortal and pestle.
Filter the extract by using filter paper, collect the extract and stored it properly.

Fig No.14 Extraction process (Tridax Procumbenz)

Identification test of tannin (M. Pudica)

Tests	Reagents	Colour appearance
Fecl3 test	Alcoholic solution of extract +1 % fecl3 Solution	Brownish Green colour
Gelatine test	Aqueous solution of extract + 1% Gelatine solution + 10% NaCL solution	White buff colour ppt form
Vanillin -HCL test	1 gm vanillin +10 ml alcohol +10 ml conc.HCL + extract	Pink or red colour appears
Matchstick test	Matchstick deep in aqueous plant extract dried near burner + moistened with conc.Hcl + warm near the flame	Matchstick wood turns to pink or red

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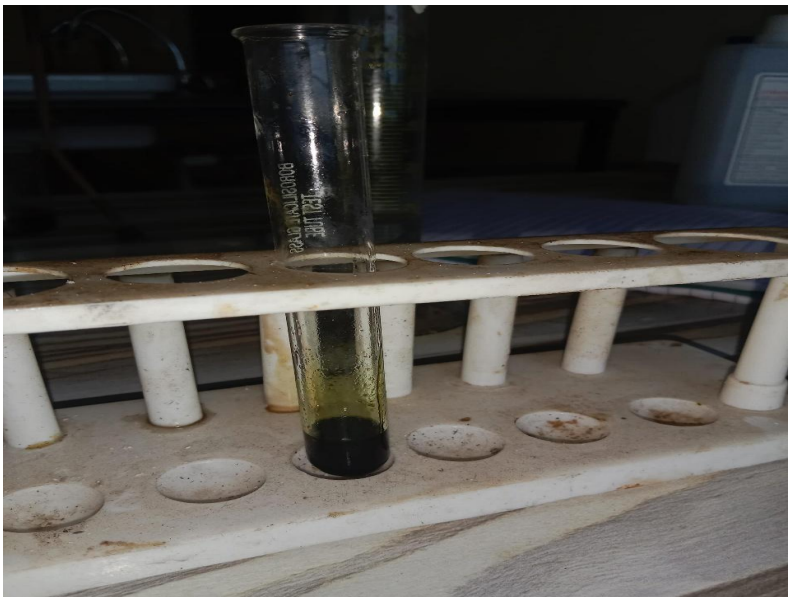

Fig No.15 . Identification test for tannin

Identification test for Tridax procumbens :-

Saponin Test: 5ml of plant extract was taken in test tube Containing 10 ml of water and was shaken Vigorously. This led to the formation of foam that Shows the presence of saponin.

Flavonoid Test: 1 ml of plant extract and 6ml of lead acetate Solution was mixed together. Yellow color Precipitate occurs which shows the presence of Flavonoid.

Alkaloid Test: Plant extract was taken and 4ml saturated picric was added. Yellow precipitate occurred that Shows the presence of alkaloid.

Flavonoid Test: Take the dry plant powder and excess amount of Sodium hydroxide was added. Yellow color appears Which disappears on addition of concentrated Hydrochloric acid. This shows the presence of Flavonoid

Tannin Test: Take 0.5ml of plant extract and add 1% lead acetate Solution into it. Yellow precipitate confirms the Presence of tannin.

Amino acid Test: 0.5ml of plant extract was taken and 3ml of Ninhydrin solution was added. Boil it for 15 Minutes. No bluish color appears which confirms The absence of amino acid.

Chromatography of M. Pudica

TLC Chromatography :- It is a separation and identification method that is widely used for both qualitative and quantitative sample analysis is called as thin layer chromatography.

In which mobile phase is always liquid and stationary phase is always solid.

Sample preparation

Selection of chromatographic plate

Selection of mobile phase

Application of sample on plate

Development

Drying of chromatographic plate and detection

Visual examination and documentation

Mobile Phase:- Toluene : ethyl acetate (9.3 : 0.7 respectively)

Stationary phase :- Silica gel G

Sample :- M. Pudica extract

Rf value :- the ratio of the distance travelled by solute to the distance travelled by solvent

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Formula :-

Rf value :- distance travelled by solute or sample / distance travelled by solvent

Rf value :- 3.6 / 5

:- 0.72

Procedure :-

Take required quantity of liquid paraffin and bees wax in a beaker. Heat on water bath up to 70°C to obtain molten mass (oil phase).

In another beaker heat water up to 75°C and add borax (aqueous phase).

Mix extract in the aqueous phase.

Mix oil phase in aqueous phase by rapid mixing. Cool to 40 °C .

Add preservative, methyl paraben and rose water.

Mix well and allow contents to stand aside before filling.

Transfer the preparation into suitable wide mouth container, label it properly, evaluate and submit.

Pharmacological uses :-

M.Pudica

1) wound healing :- Aqueous ethanolic extract of M. Pudica roots shows high antibacterial activity against gram negative bacteria.

They treat a boil wound , chronic wound ,and reduce inflammation and also treat UTI infection.

2) Other uses :-

Antimicrobial

Neuroprotective potential

Skin health

Reproductive strategy

Smallpox

Ulcers

Dysentery

Fever

Asthma

Jaundice

Haemorrhoids

Tridax Procumbenz

Wound healing:- the aqueous ethanolic extract of T . Procumbenz have high antibacterial activity.

It reduces inflammation and stop the blood clotting .

And works in epidermal and dermal layer of skin .

Other uses :-

- Blood clotting
- Antifungal
- Antidiabetic
- Anti-cancer
- Anthelmintic
- Detox the body
- Itching & rashes
- Arthritis
- Antiseptic
- Immunomodulatory agent
- Insecticidal properties

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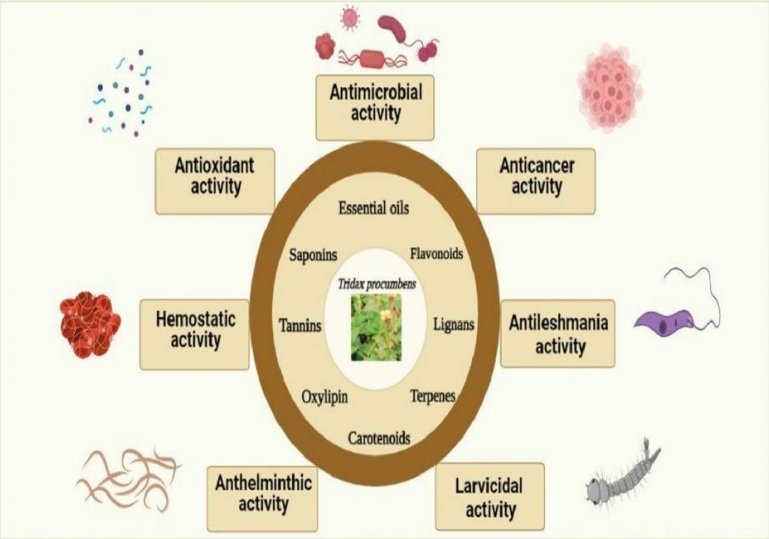

Fig.No.16. Uses of Tridax Procumbens

V. CONCLUSION

T. Procumbens predominantly shows wound healing, antimicrobial, anti-inflammatory properties traditionally. It is not further supported by the isolation of chemical compounds i.e. lack of bioassay-guided isolation strategies is observed. Several main active chemical compounds are present in the T. Procumbens. The pharmacological effects of plant active secondary metabolites of this plant may help to defeat dangerous diseases such as diabetics, cancers, respiratory disorders like the current corona virus COVID -19 upsurge. The present treasury of traditional uses, chemical compounds, and pharmacological activities will be helpful in the future for researchers on T. Procumbens in the search for new leads for drug discovery. The ethanolic extract exhibited good wound healing activity probably due to tannins constituents.

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