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A Review on The Topical Pharmacological Action of Cynodon Dactylon and Aegle Marmelos

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Abstract:

Cynodon dactylon (L), an annual herb belonging to the Poaceae family, is widely distributed throughout India. There are distinct names for many Indian languages. Dhro means it in Gujarati, Arukampillu means it in Tamil, Durva means it in Marathi, Durba means it in Bengali, Garicaggaddi means it in Telugu, and Sataparva means it in Sanskrit. A phytochemical study of Cynodon dactylon revealed the presence of flavonoids, alkaloids, glycosides, terpenoids, triterpenoids, steroids, saponins, tannins, resins, phytosterols, lowering the number of proteins, Sugars, Carbohydrates, volatile oils, and fixed oils. These constituents contribute to its significant antioxidant, anti-inflammatory, antimicrobial, and wound healing properties. Topical formulation derived from Cynodon dactylon extract hove shown the ability to accelerate wound contraction, enhance epithelization, and protect against oxidative stress, thereby supporting tissue regeneration and repair.

Similarly, Aegle marmelos is one of the most importance plants in the medicinal filed, with different medicinal properties, belonging to the family Rutaceae. Is enriched with alkaloids (such as aegelin), tannins, phenolics, coumarins and essential oils, which play a key role in its pharmacology effects. When applied topically, extract of Aegle marmelos demonstrate strong antimicrobial, analgesic, and anti-inflammatory activity alongside potent antioxidant properties. These action not only protect skin tissues from microbial invasion and inflammation but also enhance healing in ulcer, cuts, and minor burns. Furthermore, the Synergistic use of both Cynodon dactylon and Aegle marmelos highlight their potential as safe and natural alternative in topical formulation. This review comprehensively explores the pharmacological action of Cynodon dactylon.

Keywords: Cynodon dactylon, Aegle marmelos, topical pharmacological action, wound healing, antimicrobial, antioxidant, anti- inflammatory.

Introduction:

Skin: The skin in the body first line of defense against the outside environment. It covers the whole body is the largest and most importance organ for protection. The skin helps the control body temperature and protect us from harmful substance, germs, injuries, and protects us from sunlight (UV rays).

The skin has three main layers: the epidermis, dermis, and hypodermis. These layers can develop problem like rashes, wrinkle, acne, and even skin cancer. (1)

Physiology of human skin:

Epidermis

The epidermis is the outermost layer of the skin. It is made up of many layers of flat, hard (keratinized) cells. Its thickness is not the same everywhere on the body – it is thickness on the palm of the hands of the soles of the feet. The epidermis does not have blood vessels or nerves. Instead, it gets oxygen and nutrients from a fluid that comes from the layer below it (the dermis). This fluid also carrier away waste, which drains out as lymph. (2)

The Dermis

The majority of the dermis is made up of fibroblasts, collagen, and elastin. The layer serves a number of functions;

Dermal blood and lymphatic vessels remove waste and pollutants from skin and supply the skin with nutrients. The dermis contains sweet gland. They cause your body to perspire, which cool your body and eliminates pollutants.

The dermis also contains the hair follicles, which are where your hair attaches, and the sebaceous gland, which secrete the oils that smooth and soften skin, occasionally acting overly enthusiastically and resulting in rashes and oily skin. (3)

Hypodermis

The hypodermis (also called subcutaneous fascia) is the layer under the dermis. It is the deepest part of the skin. It has fat cells, nerves, blood vessels, and a few skins structure like hair roots. (4) cushions bones and muscles: Hypodermis fat shield bones and muscles from harm in the events of another incident consists of connective tissue, which hold the skin strands to the muscles and bones.

Supports blood vessels and nerves: The dermis (middle layer) supports blood vessels and nerves in the hypodermis layer body out. Controls body temperature fat prevents you from becoming overly hot or cold. (1)

Skin infection- Skin infection can be defined as the invasion and multiplication of microorganism such as bacteria, fungal, viral or parasites on the skin, which are usually absent within the body, infection of the skin can be classification into primary infection and secondary infection. Primary infection is usually caused by a single pathogen which usually enters through a break on a normal, healthy skin, and these types of infection will have a characteristics morphology and disease course. Example include B-hemolytic streptococcus aureus, and coryneform bacteria are some of the pathogens causing primary infection. The most prevalent that result in secondary infection are pseudomonas aeruginosa and gram-positive rods such as Escherichia coli, mycobacterium species and pseudomonas. Skin infection is mainly treated with antimicrobial such as antibiotics, antiparasitic, antiviral and antifungal. (5)

Taxonomical Classification

Cynodon Dactylon (Durva Grass) (6)

Kingdom-Plantae

Division-Magneliophyta

Class-Magnoliopsida

Order-Cyperales

Family-Poaceae

Genus- Cynodon dactylon

Species-Cynodon dactylon

Aegle marmelos (Beal) (7)

Kingdom-Plantae

Subkingdom-Spermatophyta

Division-Magnoliopsida

Subclass-Rosidae

Order-Sapindale

Family-Rutaceae

Genus-Aegle

Species-Cynodon dactylon

Synonyms

Cynodon dactylon

Hindi- Doob, Dob, Dubra, Khabbal, Kaligas, Neelee Doob.

English- Creeping panic grass, Couch grass, Bahama grass, Bermuda grass, Dun grass, Devil's grass, Doab grass, Doorwa.

Sanskrit- Sataparva, Satavalli, Niladurva.

Bengali- Durva, Dub, Dubla, Durba, Doorva, Neel Doorva.

Gujarati- Khadahro, Lilidhro, Dhro, Dhrokad Gharo.

Marathi- Doorva, Harali, Dhurva, Karala.

Kannad- Garike hullu, Kudigarike, Kudigarikai.

Punjabi- Dubada, Daurva, Dun, Durbra, Khabbael, Dhub.

Tamil-Aruvam pillu, Harili, Muyalphul, Arugam pullu

Telgu- Garika, Pacchgaddi, Ghericha, Garicaggaddi, Garike, Harvali.

Urdu- Doob ghas, Doob. (8)

Aegle marmelos

Hindi-Bel, beal, Sripal

Sanskrit-Bilva, Sriphal, Shivadruma, Shivapala.

Telugu-Maredu

Bengali Combodia- Phneou, Pnoi.

Malayan-Modjo, Bel

Gujrati- Bil

Kannada- Bilpatra, Kumbala, Malura.

Tamil- Kuvalum (9)

Cynodon dactylon

There are many medicinal plants on earth. Many weeds in our surrounding are actually quite potent medicinal plant that can help with of the major health issues we suffer today. (10) The two words duhu and avam are the source of the durva words. Hindu make use of durva. To bring GOD pure spiritual particles (pavitraks), which represent shiva, shakti, and Ganesha principal, medicinal use of this grass, it has importance in hindu ritual. (8) Eighty percent of the world's Traditional medicinal are used by a lot of people for primary care, the majority of which calls for of exteacts from plants in India, nearly 95 percent of homeopathy and sidda. (11) Doob grass first appeared from the African savannas and is the most common name for all cynodont species found in East Africa. In the United States, Bermuda grass is its name due to the fact that it originated on Bermuda island. (12) its rhizomes and aerial parts possess properties such as antibacterial, antimicrobial, antioxidant, and wound healing effect, along with cardioprotective benefits. (13)

Skin disease- Ayurveda acharyas have grouped durva grass-friendly herbs under the skin it aids in wound healing. Fast and restore the colour of skin. Utillization of Durva grass is recommended in psoriasis, herpes, Unhealed wound, allergic rashes and haemorrhoids.it repairs normal skin colour. This herb reduced itchiness, repairs Scaly Skin, and restores normal skin to colour. (14)

Aegle marmelos

Today, people use herbal or natural products more than allopathic medicines. This is because people are becoming more aware of the benefits of natural medicine. These nature products come from trees and plants with many healing properties, which makes them very popular among different communities in India. (15) beal (Aegle marmelos) is a native fruit of India that belongs to the Rutaceae family.it is also called Bengal quince, bilva, Indian quince, Golden apple Holy fruits, Bel, Belwa, sriphal, stone apple, and maredo in India. Hindu consider the Aegle marmelos tree sacred and offer its leaves and fruits in prayer to lords shiva and goddess paravati. Because of this it is called shivaduma (The Tree of shiva) (16) Beal is an ayurvedic medicinal plant, it is aromatic and all parts of tree are medicinal importance like fruit, leaves, bark, root, and seed's use in ayurvedic for treating various disease. Beal fruit have high nutrient components as like mineral: (phosphorous, potassium, calcium, iron, copper, zinc) protein, carbohydrate, vitamin (B1, B2, B3, C) fatty acid. (17)

Importance, use and medicinal significance

In ayurvedic medicine, the fruits are highly prized. The past few years, reseachers are increasingly identifying and verifying the treatment – relevant plant – derived substance of various human disease. Various parts of the plant have been in the ento-medicine as astringent, antidiarrheal, antipyretic antiulcer, antidiabetic, antiviral, antifungal, anticancer, analgesic, radioprotective, antimicrobial. Compound purified from different parts of beal tree have also shown repressive effect against several condition. (18)

Phytochemical constituent

Cynodon dactylon

Plant's therapeutic properties come from there phytochemical, secondary metabolites. Properties Enzyme, ash and proteins make up 28.17 percent of C. dactylon composition. Ash possesses calcium, manganese, phosphours, sodium and potassium content of 0.77' percent ,0.55%, 0.34% and 2.08% respectively. (10) The phytochemical analysis showed that the plant contained flavonoid, alkaloid, glycosides, terpenoids steroids, saponins, tannins, resins, phytosterols, reducing sugar, carbohydrates, proteins, volatile oils and fixed oils. (19)

Aegle marmelos

Beal leave has many natural substances and contains tannins, flavonoids, alkaloid, sugars, proteins, fats, vitamins, and minerals. They also have compound like steroids, terpenoids, saponins, glycosides. (20) A. marmelos is contain various active phytoconstituent mainly marmenol, marmin, marmelosin, d marmalade, psoralen, isoimperarorin, rutaretin, scopoletin, aegelin, marmelin, fagarin, anhydromarmelin, limonene, a-phellandrene, betulinic acid, marmesin, imperatorin, marmelosin, luvangentin and auraptene. D-limonene, A- D-phellandrene, Cineol, Citronellal, Citral, P-Cymene, and cumin are all found in the beal seed. Aldehydes are essential oils; alkaloids are found in bark, fagarine, marmin, and furoquinoline, and alkaloids are found in root terpenes, halopine, coumarins, and alkaloid. (21)

Traditional use

Cynodon dactylon

The plant was traditional used to treat diarrhea, dysentery, wound, hyperdipsia and hemorrhages. The fresh juice of the plant was used as treatment for secondary syphilis anasarca, catarrhal ophthalmia, and dysentery. (22)

As per the ayurvedic system of medicine, it works an as appetizer, deworming agent, fever reducer, and protective tonic. traditional ayurvedic formulation of the plant include Durvadi Kwatha, Durvadya ghrita, Durvadya taila and Durvadi yoga. Homeopathic System, it employed for managing various types of bleeding issues and skin disorder. (23)

Aegle marmelos

Drug is very popular in ayurveda and is used in diarrhea and dysentery. Action is attributed to mucilage. Leaves contain alkaloids and considered useful in diabetes. The oil obtained from seed possesses antibacterial, antiprotozoal and antifungal properties. (2)

The leaves are used as a mild laxative or to treat mucous membrane inflammation with a free asthma and discharge. The leaves decoction is febrifuge or it help get rid of fever and is an expectorant, which means tubes get rid of mucus.

The rips fruits aids in the treatment of rectal inflammation and aids in digestion. The sweet pulp of ripe fruit freshly consumed, it is coolinga, aromatic, and nutrients. (24)

Topical pharmacological activities:

Cynodon Dactylon

Anti-inflammatory activity

In Ayurveda, Cynodon dactylon is one of the ten lucky plants that make up the Dasapushpam group. In India Cynodon dactylon L. has historically been used to treat a wide range of chronic inflammation illnesses. (25) Cynodon dactylon aqueous extracts Anti- inflammation properties (200,400,600, mg /kg of carrageenan, serotonin, dextran, and histamine-induced rat paw edema were used to evaluated bw taken orally. The in models, the result showed that all doses had significant anti-inflammation effect (19) This research examine the ability of Cynodon dactylon extract to reduces inflammation. Traditionally, this plant is used to relive pain and swelling. Teste showed that the extract was safe at all given doses, even up to 4000 mg of body weight, with no deaths observed. (26) when rats with arthritis were given Cynodon dactylon (20 mg per kg of body weight) by month, it reduced swelling and stress caused by inflammation. The treatment improved their joint condition and brought it close to normal. This shown that Cynodon dactylon extract may help protect against arthritis. (27)

Anti-microbial effects

The water extract of Cynodon dactylon (50-400 / ml) was tested to check its ability to kill or stope the growth of germs. It showed activity against pseudomonas aeruginosa, Escherichia coli streptococcus aureus, klebsiella Pneumoniae, and proteus mirabills. (28)

Staphylococcus Aureus and are two Gram -positive bacteria. Pseudomonas and Staphylococcus albus, both gram-negative bacteria Escherichia coli and p. aeruginosa were examined for their antimicrobial properties. By microdilution and well agar diffusion of its hydro-alcoholic extract. Effectively demonstrating that all microbial strains were profoundly receptive to the effect of the extract (29) The broadest definition of an antibiotic states that it is a substance that inhibit the growth and reproduction of bacteria. Despite the fact that both antibiotics and antimicrobial kill microorganism, these terms have come to mean two disinfect concept: antibiotic is currently most commonly referred to as instruments require to disinfect and eliminate Surface. Potentially harmful organism. (30) considered the anti-bacterial activity of Synthetic gold nanoparticle, also known as AuNPs;0.625-100g /ml containing an aqueous Dactylon extract against staphylococcus aureus and Enterobacter cloacae hemolytic, Staphylococcus petrasii subsp. Disc – using Bacillus cereus and progenesis diffusion assay. AuNPs had antibacterial properties. Effect with zone inhibition 13,12,13 and 12 mm for the tested microbial stains, respectively. (31)

Wound healing

The Cynodon dactylon extract helps in wound healing, testes were done using cut and removed -Skin wound model. Research studied how strong the healed cut becomes, how quickly the wound closed, and how long it took for the skin to fully cover the wound again. The result showed that the extract had a strong wound healing effect. (32) The products extract of Cynodon dactylon and the presence of curcuma longa in a cationic ointment for wound healing. (13) wound healing can be classified into any one of three categories: first- line healing intension, the edges are smoothly closed that no scar is left. On the other hand, wound second -degree healing require the formation of tissues of granulation that fill in the space between the wound edges and is with significance loss of tissues, leaving little scars. Wound healed by third intention are usually those left open for three to five days until before they are statured, granulation bed falls generally resulting in extensive scar formation. (33)

Antioxidant

Cynodon dactylon (durva grass) has strong antioxidant power. It works in two ways -by using enzymes and without enzyme. In a study on mice (Swiss albino mice with Ehrlich Lymphoma Ascites), the plant extract increased the level of important. This includes Enzyme antioxidant. Superoxide dismutase, catalase, glutathione peroxide. Non- enzyme antioxidant: reduced glutathione, vitamin C. (34) The study found that mice treated with the ethyl acetated of Cynodon dactylon had higher level of natural antioxidant (like vitamin A, vitamin C, vitamin E and glutathione) compared to normal mice. This means that the extract of C. dactylon works as a strong antioxidant and help protect the liver from damage caused by oxidative stress in mice. (14) Cynodon dactylon has potential antioxidant properties. Particularly in combating oxidative stress include by various pathological condition. It is impossible to overstate the significance of antioxidant for health; these substance aid scavenges reactive oxygen species, which are also through to be involved in cell damage, and aging. (35) The grass has many natural chemicals like flavonoid and phenols. These act as antioxidant, which means fight against harmful free radicle in the body. By doing this, they reduce stress on the body (oxidative stress) and protect the cells from getting damaged. (36)

Aegle marmelos

Anti-inflammatory.

Inflammation happens in many diseases. Aegle marmelos (Beal) has been shown in studied to studies to reduced inflammation. This because its nature compound, like coumarins and flavonoids, blank the chemical (such as prostaglandins and cytokines) that cause inflammation Along with this, Aegle marmelos also helps reduce pain, marking it useful for problems like arthritis and inflammatory bowel disease. (37) The review studied the possible anti – inflammatory effects of extract from Aegle marmelos (Beal) leaves. in animal tests (mice), the extract showed pain -relieving and fever -reducing effects. This was observed in models such as carrageenan – induced paw swelling and cotton pellet granuloma. It increased GSH (an antioxidant), decreased MDA (a marker of oxidative stress) and protected against mast cell damage. (38) Cytokine analysis of the 44-extract showing inhibition of COX-2 suggested that only 17 extracts modulated the cytokines by increasing the anti-inflammatory cytokine IL -2 and reducing the proinflammatory cytokines like IL-1B, MIP1-a and IL-6. Bilva plants young (2-and 3- year – old) roots Gujarat and young (1yr) roots from Odisha showed the most potent anti- inflammatory activity by suppressing the pro – inflammatory cytokines and inducing anti- inflammatory cytokines. These three extracts have also demonstrated comparable anti – inflammatory activity in vivo to that in adult stem and root barks. (39)

Anti- microbial

The antimicrobial effects of aegle marmelos have been widely have been widely studied Salmonella typhi, staphylococcus aureus and candida albicans. Because of this, A marmelos is considered useful for treating infection and for developing natural antimicrobial medicines. (37) In plaque inhibiting assays that were carried out for 96 hours, marmelide extracted from beal exhibited antiviral activity against coxsackieviruses B1 -B6 without causing any harmful effects on host cells. Bael extracts inhibition rate various depending on the concentration: a dose of 0.05 % can kill all fungi, while dose of 0.04 % and 0.03 % can kill 90 % and 75 % respectively. (40) Extract of Aegle marmelos Show strong antiviral and antimicrobial effects. They work against several harmful microbes such as staphylococcus aureus, S. The plant has also been tested for activity against the Ranikhet disease virus and intestinal parasites. The essential oil from its leaves demonstrates antifungal properties. it Can inhibit spore germination in different fungi in a way that depend on both concentration and exposure time. Even the most resistant fungus tested, Fusarium udum, was

affected. (24) Using the spore germination assay rana B.K (1997) assessed the antifungal properties of essential oil extracted from Beal leaves. The oil's effectiveness against various fungal isolated varied, and at 500 ppm, 100% inhibition of spore germination was seen for all tested fungus, and they suggested that the essential oil of beal leaf might disrupt the metabolism of Ca2+-dipicolonic acid. Pathway and possibly half the spore production. (41)

Wound healing

There are numerous phases. involved in wound healing, which include the proliferation of cells, inflammation, and rigidity during the formation of a collagen matrix. Swelling, reddening, and soreness are some one of the most prevalent symptoms associated with wound, as well as being present when there is inflammation there. (42) Effects of intraperitoneal and topical administration of methanolic Aegle marmelos ointment extract

The plant essential oils and tannins (from its leaves and fruit) shown strong activity against bacteria, viruses and fungi. They are effective against harmful microbes like E. coli and two types of injection were studied separately. of rats wound models, including the incision and excision model. Both the injection and ointment of the methanolic extract of aegle marmelos produced a substantial response in both. (43) The extract helps in the healing process, which can be seen by the increase in tensile strength (the ability of the skin to stretch without breaking) in the incision wound model. The result was also compared with the standard drug, nitrofurazone. (44)

Antioxidant

The antioxidant properties of a methanolic root and leaf extract and stem bark of plant Aegle marmelos. (7) Organic complexes known as antioxidant can safely interact with free radicals to half the chain reaction before it begins. harming fundamental molecules. free radicals are highly reactive molecular species containing one or more unpaired electron. they are generated from regular metabolism while using O2 to burn food for energy. (45) Beal (Mar Melos) has antioxidant properties. These are because it contains natural chemicals like flavonoids, alkaloids, sterols tannins, glycosides, beta -carotene, and vitamin C (ascorbic acid). studied found that a compound called marmelosin has stronger antioxidant effects than gallic acid. different tests, such as the DPPH method (used to measure free radical scavenging), have been done to confirm its antioxidant activity. (20) During normal body processes and due to outside factors like pollution and chemicals, harmful molecules called free radicles are formed. These free radicals can damage important parts of the body like DNA and fat. A substance that can reduce or stop this damage is called an antioxidant. Antioxidant work in two ways -either by getting used up themselves to stop free radicals, or by forming a protective shield around body cells. The plant Aegle marmelos has antioxidant activity, which also explain its ability to protect the liver (hepatoprotective effect). (46)

Conclusion

C. dactylon has widely been used in Indian ayurvedic medicines since ancient times for curing several human diseases. The interpretation of blades representing the principles of primal Shiva, primal Shakti and Genesh is a symbolic aspect in Hindu rituals. A marmelos is a member of the Rutaceae family and is used in ayurvedic. Cynodon dactylon and Aegle marmelos (Beal) show strong topical pharmacological action like wound healing, anti -inflammatory, antioxidant, and antimicrobial effects. Together, both demonstrate significance potential for the formulation of topical herbal product such as ointment, gel, cream, and wound dressing. They offer safe, natural, and affordable alternatives to synthetic topical agent with minimal side effect, Cynodon dactylon and Beal represent promising herbal candidates in dermatology and wound management, bridging traditional medicine with modern topical therapeutics.

References

1) Rutuja S Rokade, Sakshi R Vidhate, Disha S Kale and Shravan J Somni, Formulation and development of herbal facewash using Beal leaves: Aegle marmelos, World Journal of Biology Pharmacy and Health Science,2024,17(01): 061-074.

2) Adity Institute of Pharmaceutical, Telgaon Naka Beed, Formulation and Evaluation of Herbal Moisturizing Cream, Internation Jornal of Creative Research Thoughts,2023, (11).

3) Vaishnavi Tayade, Jayshree Tiwari, Prashant Vayde, Srushi Wagh, Mohit Yadhav, professor Sonali Uppalwar, Formulation and Evaluation of herbal facewash, Internation Journal of Research Publication and Review,2024 (5):11191-11206.

4) Barkat Ali Khan, Naveed Akhtar, Akhtar Rasul, Haroon Khan, Human Skin, aging and antioxidant, Journal of Medicinal plants Research, 2012, 6(1): 1-6.

5) Jayshalene Balakrishnan, Jamuna Rani Appalasamy, Skin Infection and the Global Challenges: A Review, International Journal of Pharmacy and Pharmaceutics Science. 2016, (8).

6) Arun K, Shivaraman V, Shvaranjini S, Anupriya G, Cynodon Dactylon – A Review of Review of Pharmacology Activities, International Journal of Pharmacy and pharmaceutical Research. 2024, (30):138-143.

7) R.R kanawade, R.L Bhusal, Beal (Aegle Marmelos L.) As A Potential Medicinal Tree of India, World Journal of Pharmaceutical and life Science, 2024, 10(1): 18-21.

8) Savita S. Shalaka V, Dr. Vilasrao J. Kadam, A Review on Doob Grass (Cynodon Dactylon): A Hidden Potential Plant, World Journal of Pharmaceutical Research, 2021, 10(9): 638-644.

9) Savita, Amar Pal Singh, Aegle marmelos (L) (Beal): A Systematic Review, Journal of Drug Delivery and Therapeutics, 2021, 11(3):131-136.

10) Vandita Vishwakarma, Deeksha Sonkar, Rakesha Bharatia, A Review on Phytochemical and Biological Activity of Cynodon Plant, Journal of Emerging Technology and Innovative Research, 2024, 11(1).

11) Zabin K. Begewadi, Praveen G. Baligar, Phytoconstituents Investigation By LC-MS and Evaluation Microbial and Anti- Pyretic Properties OF Cynodon dactylon, International Journal Pharmaceutical Science and Research, 2014, 5(7):2874-2889.

12) Pankaj H. Chaudhary, Tejaswini S. Bayaskar, Cynodon dactylon -A Systemic Review Of Pharmacognosy, Phytochemistry and pharmacology, International Journal of Pharmacognosy 2023, 10(40:260-264.

13) Shruti Amritkar, Amit Kakad, Phytochemical and pharmacology review of Cynodon Dactylon grass with its Potential effects, Journal of Pharmaceutical and Biology Sciences ,2023,11(2);112-116.

14) Papia Khatun, Shonkar Kumar Das, Medicinal and Versatile Uses of Amazing, Obtainable and Voluble Grass: Cynodon dactylon, International Journal of Pharmaceutical and Medicinal Research ,2020,8(5):1-11.

15) Deepak Garg, Amit Sharma, Beal (Aegle marmelos) an Astonishing herb of India: A review, International Journal of Pharmaceutical Science and Research, 2022,13(11):4363-4372.

16) Neeraj, Vinita Bisht, Vishal Johar, Beal (Aegle marmelos) Extraordinary Species of India: A Review, International Journal of Current Microbiology and Applied Sciences,2017, 6(3):1870-1887

17) Sonali Ajinath Shirsat, Rameshwar Bhaskar, A Review on Aegle Marmelos: A Potential Medicinal Tree, International Journal of Pharmaceutical Research and Application, 2024, 9(1): 346-359.

18) A k Singh, Sanjay Singh, R S Singh, Research Status Of beal (Aegle marmelos) in India: A Review, India Journal of Agriculture Science 2019 (10):1563-71

19) Prof Dr Ali Esmail Al-Snafi, Chemical Constituent and Pharmacological effect of Cynodon dactylon - A Review, IOSR Journal of Pharmacy, 2016, 6(7):17-31

20) Yuvaraaj Munot, Shweta Gavit, Praful Rajpurohit, The Medicinal Wonder and Formulation of Beal (Aegle marmelos): a comprehensive, International Journal of Therapeutics innovation, 2025,3(1):0293-0305

21) Gayatri Changdev Pote, Jyoti Pingle, Aditya Ragir, A Review Article on Aegle Marmelos: Pharmacology Activity, International Journal OF Creative Research Thoughts,2024, 12(1)

22) Mahesha Kalsane, Formulation and Evaluation of Herb Powder Cynodon dactylon, International Journal of Creative Research Thoughts, 2021,9(12).

23) Badri Prakash Nagori, Renu Solanki, Cynodon dactylon (L) Pers: A Valuable Medicinal Plant, 2011, 5(5):508-514

24) Dipak Sanjay Borse, prof Rajendra M. Kawada, Beal (Aegle marmelos) An Astonishing Herb of India, International Journal of Creative Research Thoughts, 2024, (12)

25) Ramakrishna. S, Vishwas, Review on Cynodon Dactylon, International Journal for Research in applied science and Research technology,2023, (11)

26) Mokal Abishek B, Wagh Prathamesh B, Wagh Aditya G, Formulation Prospective: Cynodon dactylon, European Journal of Biomedical and Pharmaceutical Science, 2024, 11(3):113-116.

27) Amrita Asthana, Sumit Gangwar, Pharmacology Perspective of Cynodon dactylon, Research Journal of Pharmaceutical, Biology and Chemical Science: 0975-8585.

28) Manikandan S, Sampathkumar T, Pradeep B, Pharmacognostical and Pharmacological Profile of Cynodon dactylon: A review, International Journal of Pharmaceutical Research and application ,2023, 8(4):810-817

29) Shweta Das, Sonia Morya, Arno Neumann, A Review of the Pharmacological and Nutraceutical Properties of Cynodon dactylon, A Multifaceted Journal in the field of natural product and Pharmacognosy, 2021, 13(3):104-112.

30) Pooja kute, Vishakha Nagare, Sakshi Pagar, Formulation and evaluation of Antimicrobial Herbal Face Wash of Cynodon dactylon, International Research Journal, 2023, 10(5)

31) Patanjali Organic Research Institute Private Limited, Cynodon Dactylon (L) Pers, 2024, (2)

32) Surendra Kumar M, Vairamuthu C, Sneha R, A Precise Review on the Pharmacognostical and Pharmacological Imputes of Bermuda Grass: Cynodon dactylon Linn, Journal of Chemical Health Risk ,2023, (13):396-400.

33)V.M. Thakare, R.Y Chaudhari, Wound healing Evaluations of Same herbal Formulation Containing Curcuma longa and Cynodon dactylon extract, International Journal of Phytomedicine,2011, (3):325-332.

34) Shilpa Kamathe, Om Surana, Sanika Tekawade, Review on Morphological and Pharmacological Action of Cynodon dactylon, International Journal of Novel Research and Development, 2025, (10).

35) Shradda Ekhande, Dr. Shrutika Patil, Sourabh Patil, Dhanashree Kasar, A Brief Review: Therapeutic Potential of Cynodon Dactylon in Skin infection, international Journal of all Research Education and Scientific Method, 2024, 12(11).

36) Banshidhar Behera, Sanjay Kumar, Cynodon dactylon (L.) Pers: a medicinal grass of India, medicinal Poaceae of India, 2024, (1)

37) Priyanka Pisal, Rajendran Patil, A Review OF the Phytochemical and Pharmacological Properties of Aegle Marmelos Plants, International Journal for Research in applied Science and Engineering Technology, 2024, (12).

38) Harshata Dilip Kantale, Pavan Prkashrao Dokekar, A Review on Aegle Marmelos (Beal): International Journal of Creative Research Thoughts,2024, 12(8).

39) Harkesh Kushawaha, Dr. Akhlesh Kumar Singhai, Aegle Marmelos: A Medicinal Plant from A Traditional Indian Perspective, African Journal of Biomedical Research, 2024, 27(4s).

40) Sanika Khot, Dr. Nilesh Chougule, Beal (Aegle Marmelos) Extract, Pharmacological Insights, & Clinical Potential, International Journal of Pharmaceutical Science.2(12).

41) Miss. Vaishnavi Satrankar, Miss. Nikita M. Wakchaware, A Comprehensive Review on Medicinal Values of Aegle marmelos (Beal tree),2024,9(11).

42) Nevedita, Anil Kumar, A Critical Review on the Medicinal Herb Aegle Marmelos (LINN.) Correa, Internation Journal of Pharmaceutical Science and Research,2023,14(5):2087-2103.

43) Pushpendra K. Patel, Jyoti Saku, Lokesh Sahu, Narendra K, Aegle marmelos: A Review on its Medicinal properties. International journal of pharmaceutical and phytopharmacological research, 2012, 1 (5): 332-341.

44) Gutte Sakshi Hanumant, Shinde Prajakta kailas, Shinde Aishwara Avinash, Aegle Marmelos: Multieffective Medicinal Tree, International Journal of Creative Research Thoughts, 2020, 8(9).

45) S Monika, M Thirumal and PR Kumar, Phytochemical and biological review of Aegle Marmelos linn. Future Science OA ,2023.

46) Ankita Dadasaheb Rokade, Mr Abhijit Rode, Mr Akshay Jadhav, A Review on Aegle marmelos: A Multieffective Medicinal Tree for Holistic Healing, International journal of Novel Research and Development. 2024, 9(12).