ABSTRACT

Wound healing is a vital physiological process that helps to retain the integrity of the skin after it has been damaged, whether by accident or by a deliberate operation. In Tinsukia district, Assam, tribal people and folklore traditions employ a wide variety of plants/plant extracts/decoctions or pastes to cure wounds. This study is designed to explore the ethnomedicinal plants used for the wound healing properties by the people of Tinsukia district, Assam. The Documentation of potential ethnobotanical information of traditionally used medicinal plant with wound healing activity will facilitates the scientific evaluation to look forward into a leading scientific prospect for the development of new herbal therapy for wound healing.

Keywords: Medicinal plants; ethnomedicine; wound healing; traditional healthcare; Tinsukia district.
1. INTRODUCTION

A wound is a disruption of the skin’s normal state as a result of damage to its continuity caused by a pathological process, whether internal or external. Wounds are common in everyday life, and they can lead to serious complications. If not treated properly, significant consequences can occur [1].

More than 1.2 million people have died in automobile accidents around the world, with 20-50 million individuals suffering non-fatal injuries such as wounds [2]. Trauma (48.00 percent), foot ulcers (28.00 percent), and pressure sores are the leading causes of acute and chronic injuries in the global population (21.00 percent) [3]. Acute wounds develop quickly and the healing process can be predicted. For instance, injuries sustained as a result of trauma or surgery. The healing process for persistent wounds, such as pressure ulcers, cancer-related lesions, and others, cannot be predicted [4]. In underdeveloped countries, it is estimated that 1-2 percent of the population may experience a chronic injury at some point in their lives [5].

Wound treatment and management are important for both acute and chronic wounds. But chronic wounds are a major source of concern for both patients and clinicians; chronic wounds impact a huge number of patients and significantly diminish their quality of life. According to current estimates, almost 6 million people worldwide suffer from chronic wounds [6].

Wound healing agents research is one of the burgeoning fields in modern biomedical science. Many traditional healers around the world, particularly in countries like India and China, have important knowledge of many lesser-known, previously undiscovered wild plants that are utilized by traditional healers to cure wounds. Several medications of plant, mineral, and animal origin are described in old texts of Indian systems of medicine like Ayurveda for their therapeutic characteristics as 'Vranaropaka.' In addition to the classical systems of Indian medicine, folk and tribal medicine uses a variety of herbs and animal products to treat cuts and wound. Some of these plants have been experimentally examined for wound healing action in various pharmacological models and human patients, but the potential of the majority of them has yet to be discovered [7].

2. WOUND HEALING PROCESS

All of the body’s tissues and organs experience wound healing. Many of these repair mechanisms are found in all tissues of the body. While the healing process is continual, it is divided into stages at random to better explain the physiological processes occurring in the wound and surrounding tissue [8]. Healing is a dynamic procedure involving coordinated interactions between many immunological and biological systems. Various stages of the healing process necessitate a series of carefully and precisely managed processes and activities that correspond to the appearance of various cell types in the wound bed. The numerous processes that occur in acute tissue recovery as a result of tissue damage can be grouped into four time-dependent phases: hemostasis, inflammation, proliferation, and remodelling (Table 1) [9].

2.1 Hemostasis

When the skin is wounded, the body’s natural reaction to stop bleeding is to constrict the artery walls. Following that, primary and secondary hemostasis are aided by two contemporaneous and mechanistically related mechanisms [8]. For primary hemostasis, platelet aggregation and the formation of platelet plugs inside the sub-endothelial matrix are required. The activation of the coagulation cascade, in which soluble fibrinogen is converted into insoluble strands that make up the fibrin mesh, is referred to as secondary hemostasis. The platelet plug and fibrin mesh unite to create a thrombus, which stops bleeding, releases accompaniments and growth factors, and acts as a temporary scaffold for infiltrating wound-healing cells [10].

2.2 Inflammation

The inflammatory process begins soon after the injury and can persist anywhere from 24 to 48 hours, with some cases lasting up to two weeks. The inflammatory phase quickly starts hemostatic pathways to control the bleeding at the wound site. As a result, clinically discernible cardinal indications of inflammation, skin redness, colour, tumour, pain, and functio-laesa appear [11]. This process is defined by vasoconstriction and platelet aggregation to cause blood clotting and, as a result, vasodilation and phagocytosis to cause inflammation at the wound site [12].
2.3 Proliferation

After persistent damage has stopped, hemostasis has been achieved, and an immune system has been successfully established, the acute wound advances toward tissue repair [13]. On the third day after the damage, the proliferative process begins and lasts for about two weeks. It is defined by fibroblast migration and the deposition of newly produced extracellular matrix, which acts as a replacement for the fibrin and fibronectin provisional network. The macroscopic stage of wound healing can be noticed as an abundance of granulation tissue formation [14].

2.4 Remodeling

In this final stage of wound healing, the granulation tissue goes through a steady decline. The epidermis of skeletal muscle, dermal vasculature, nerves, and myofibers are modified, resulting in the development of functional tissue [15]. The granulation tissue fibroblast and myofibroblast's vascular components are reduced, and PBMC cells die or leave the site. Similarly, the levels of structural and hydration-related glycosaminoglycans and proteoglycans are decreasing. Collagen metalloproteinases produced by fibroblasts and macrophages destroy Type III collagen in granulation tissue and replace it with Type I collagen, which is then rearranged into parallel fibrils, resulting in a low-cellularity scar. This final stage will take months to complete [16].

3. PHYSIOLOGY OF WOUND HEALING

Wound healing is a critical but difficult process in humans and animals, involving a diverse process driven by successive yet overlapping phases such as hemostasis/inflammation, proliferation, and remodelling [24]. Following a skin injury, the exposed sub-endothelium, collagen, and tissue factor activate platelet aggregation, resulting in degranulation and the release of chemotactic factors (chemokines) and growth factors (GFs) to form the clot, and all of the above procedures will achieve successful hemostasis [25]. The first cells to emerge at the injury site, neutrophils, sweep up debris and bacteria to provide a favourable environment for wound healing. Following this, macrophages amass germs and enhance phagocytosis, causing tissue injury. The hemostasis and inflammatory phases can take up to 72 hours to complete [26].

The first cells to emerge at the injury site, neutrophils, sweep up debris and bacteria to provide an ideal environment for wound healing. Macrophages collect germs and facilitate phagocytosis, causing tissue injury. The hemostasis and inflammatory phases usually take 72 hours to complete [27]. The transforming growth factor-b family (TGF-b, which includes TGF-b1, TGF-b2, and TGF-b3), the interleukin (IL) family, and angiogenesis factors (i.e., vascular epidermal growth factor) are all involved in this phase. This stage lasts for days or weeks [28].

The final stage of wound healing is the remodelling phase, which requires a precise balance of existing cell death and new cell creation [29]. In this phase, which lasts a few months or years, the gradual destruction of abundant ECM and immature type III collagen, as well as the formation of mature type I collagen, are crucial. Any deviations during this phase could result in excessive wound healing or chronic wounds [30].

Table 1. Stages of wound healing

| S.N. | PHASES     | Time of phase | Cells involved     | Functions                        | Ref       |
|------|------------|---------------|--------------------|----------------------------------|-----------|
| 1    | Hemostasis | Instantaneous | Platelets          | Haemorrhage control              | [17]      |
| 2    | Inflammation | 2-5 days Some cases (2 weeks) | Neutrophils Macrophages | Removal of cell debris and infection causing agents | [18, 19] |
| 3    | Proliferation | 3 days to 2 weeks | Lymphocytes Fibroblasts Keratinocytes | Formation of granulation tissue, angiogenesis | [20, 21] |
| 4    | Remodelling | 21 days to 2 years | Fibroblasts | Collagen formation & scar maturation | [22, 23] |
4. WOUND HEALING MANAGEMENT BY MEDICINAL PLANTS

Classical systems of Indian medicine, particularly Ayurveda, Siddha, and Unani, a large number of medicinal plants were used for the treatment of skin diseases such as cuts and wounds. Medicinal plants have been used for centuries to treat a variety of skin and dermatological disorders, particularly cuts, and wounds [31]. The Indian epic Ramayana describes a traditional application of plant-based medicine in the treatment of injuries. When Lord Rama’s brother Lakshman was mortally wounded on the battlefield in Lanka, medicinal plants from the Himalayas were used to treat him and return him to fighting strength [32].

People in developed countries are also seeking alternatives to modern wound healing therapies such as antibiotics, corticosteroids, and so on, owing to their side effects. In the case of chronic wound pathogenesis that does not heal, more understanding is required. Pathogenesis and failure to heal are two inseparable aspects that have guarded and heightened the use of herbal drugs as wound healing agent [33].

Various information regarding ethnomedicinal plants with wound healing activity is widely disseminated, with reports in leading journals devoted to ethnobotany and traditional medicine. In this review, we have presented plants that are widely used in traditional in Tinsukia District, Assam and have been reported in ethnobotanical literature for use in wound healing, classifying these plants based on their use in wounds. We have also indicated the same along with the part that have been reported to be used in the healing of the wound. The part used becomes even more important because, in order to provide ethnopharmacological evidence for these plants, researchers must ensure that they use the specific part mentioned in traditional medicines rather than random screening. Table 2 lists some lesser-known plants indigenous to Tinsukia District that are widely used in traditional medicine. It describes the plant, the part used, and the mode of preparation.
Table 2. Ethnobotanical information on wound healing plants available in Tinsukia District, Assam

| S.N. | Scientific Name              | Family          | Local Name | Part used | Mode of preparations                                      |
|------|------------------------------|-----------------|------------|-----------|----------------------------------------------------------|
| 1    | Abies webbianm Linn.         | Pinaceae        | Talish     | Leaves    | The paste of the leaves is applied to wounds.            |
| 2    | Abroma augusta Linn.         | Sterculiaceae   | Gorokhia korai | Roots   | Roots paste is applied on the wounds.                    |
| 3    | Abrus precatorius Linn.      | Leguminosae     | Kunchmoni  | Seeds     | Dry the seeds in the shade, powder it and powder is applied in wounds. |
| 4    | Acacia catechu Wild.         | Leguminosae     | Kher       | Stem bark | Stem barks are cut and its juice is applied on the wounds. |
| 5    | Acalypha australia Linn.     | Euphorbiaceae   | Kachugaon  | Leaves    | The paste of the leaves is applied to wounds.            |
| 6    | Achyranthus bidentata Blure  | Amaranthaceae   | Apamarga   | Whole plant | Plant is first grind into paste and then applied on the wounds. |
| 7    | Acorus calamus Linn.         | Aracaceae       | Boch       | Rhizome& leaves | A paste of rhizome and leaves is applied to wounds.     |
| 8    | Adiantum lunulatum Burm.     | Polypodiaceae   | Sharujeena | Leaves    | The paste of the leaves is applied to wounds.            |
| 9    | Aegle marmelos Linn.         | Rutaceae        | Bel        | Leaves & seeds | Leaves are grind into paste along with black pepper, slightly heated and applied on the wounds. |
| 10   | Ageratum conyoides Linn.     | Asteraceae      | Gundhua bon | Leaves & young shoots | Paste and juice is applied to wounds.                     |
| 11   | Albizia lebbeck Benth.       | Leguminosae     | Sirish     | Roots     | Roots paste is applied on the wounds.                    |
| 12   | Alocasia denudate Linn.      | Araceae         | Bon kochu  | Stems     | Stems are cut and its juice is applied on the wounds.    |
| 13   | Aloe vera Linn.              | Asphodelaceae   | Sal Kuwori | Leaves    | Gel is applied to wounds.                               |
| 14   | Amaranthus tricolor Linn.    | Amaranthaceae   | Bishalya karani | Leaves | Leaf paste is mixed with spit and applied to wounds for quick heal. |
| 15   | Amomum subulatum Roxb.       | Zingiberaceae   | Dangor-elachi | Seeds  | Dry the seeds in the shade, powder it and powder is applied in wounds. |
| 16   | Anthocephalus cadamba Miq    | Rubiaceae       | Kadam      | Stem bark | Stem barks are cut and its juice is applied on the wounds. |
| 17   | Aquilaria agalocha Roxb.     | Thymelaeaceae   | Agar       | Latex     | Latex is directly applied to wounds.                     |
| 18   | Argemone maxicana Linn.      | Papaveraceae    | Siyal kata | Roots     | Roots paste is applied on the wounds.                    |
| 19   | Artemesia vulgaris Linn.     | Compositae      | Nilum      | Stems     | Stems are cut and its juice is applied on the wounds.    |
| 20   | Azadirachta indica Linn.     | Meliaceae       | Neempat    | Leaves    | Boiled Leaves water are used for washing the wounds. And Leaves paste mixed with mustard oil is also used for wound healing. |
| 21   | Baliospermum monatanum       | Euphorbiaceae   | Donti      | Leaves    | The paste of the leaves is applied to wounds.            |
| 22   | Bambsa balcooa Roxb          | Poaceae         | Bhakukaban | Culm      | Paste of culm are applied directly on wounds.            |
| 23   | Bassia longifolia Linn.      | Sapotaceae      | Mahua      | Seeds     | Dry the seeds in the shade, powder it and powder is applied in wounds. |
| 24   | Bauhinia purpurpura Linn.    | Leguminosae     | Kanchan    | Gum       | Gum is directly applied to wounds.                       |
| 25   | Blechnum Orientae Linn.      | Blechnaceae     | Bonoria dhekia | Fronds | Fronds are crushed and is applied on the wounds.         |
| 26   | Boerhaavia diffusa Linn.     | Nyctaginaceae   | Purnana    | Whole plant | Plant is first grind into paste and then applied on the wounds. |
| 27   | Bridelia retusa Spreng.      | Euphorbiaceae   | Kunhi      | Bark, fruit | Juice is applied to wounds.                             |
| 28   | Bryophyllum pinnatum Kuntz.  | Crassulaceae    | Dupor Tenga | Leaves   | The paste of the leaves is applied to wounds.            |
| 29   | Caesalpinia bonducella F.    | Leguminosae     | Letaguti    | Seeds     | Dry the seeds in the shade, powder it and powder is applied in wounds. |
| 30   | Caesalpinia sappan Linn.     | Leguminosae     | Baggam     | Seeds     | Dry the seeds in the shade, powder it and powder is applied in wounds. |
| 31   | Calamus floribundus         | Arecaceae       | Lejai bet  | Shoots & roots | Paste is applied to wounds.                             |
| S.N. | Scientific Name | Family | Local Name | Part used | Mode of preparations |
|------|----------------|--------|------------|-----------|----------------------|
| 32   | Callicarpa arborea Roxb. | Verbenaceae | Bonmola | Barks | The bark is powdered and mixed to form a paste with its juice and applied to wounds. |
| 33   | Calotropis gigantea Linn. | Asclepiadaceae | Akon | Milky juice | The milky juice is applied to wounds. |
| 34   | Camellia sinensis Linn. | Theaceae | Sahpat | Leaves | The paste of the leaves is applied to wounds. Decoction also used to heal wounds. |
| 35   | Capparis sepiaria Linn. | Capparidaceae | Gobindaphal | Roots | Roots paste is applied on the wounds. |
| 36   | Carica papaya Linn. | Caricaceae | Omita | Latex | Latex is directly applied to wounds. |
| 37   | Catharanthus roseus Linn. | Apocynaceae | Nayantara | Leaves | The paste of the leaves is applied to wounds. |
| 38   | Cedrus deodara Roxb. Loud. | Pinaceae | Devdaru | Seeds | The paste of the leaves is applied to wounds. |
| 39   | Celastrus panniculatus Wild. | Celastraceae | Politai | Seeds | Dry the seeds in the shade, powder it and powder is applied in wounds. |
| 40   | Centella asiatica Linn. | Apiaceae | Bormanuni | Leaves | Leaf paste is applied to wounds. |
| 41   | Cissampelos pareira Linn. | Celastraceae | Garialota | Leaves & Stems | Paste of leaves mixed with that of stem is applied in wounds. |
| 42   | Citronella odorata Linn. | Rutaceae | Bagh Dhaka bon | Leaves | Leaves paste is applied to wounds. |
| 43   | Citrus medica Linn. | Rutaceae | Biratenga | Fruits | Fruits juice is applied on the wounds. |
| 44   | Clitoria ternatea Linn. | Leguminosae | Aparajita | Seeds, Roots | Paste is applied on the wounds. |
| 45   | Curcuma longa Linn. | Zingiberaceae | Haladhi | Rhizomes | Rhizome is grind into paste and mixed with mustard oil and applied on the wounds. |
| 46   | Curcuma zedoaria Linn. | Zingiberaceae | Kochura | Rhizomes | Rhizome is grind into paste and mixed with mustard oil and applied on the wounds. |
| 47   | Cynodon dactylon Linn. | Poaceae | Dubari bon | Whole plant | Plant is first grind into paste and then applied on the wounds. |
| 48   | Datura fastuosa Linn. | Solanaceae | Dhutara | Leaves | The paste of the leaves is applied to wounds. |
| 49   | Drymaria cordata Linn. | Cucurbitaceae | Jabor | Roots | Roots paste is applied on the wounds. |
| 50   | Eclipta prostrata Linn. | Asteraceae | Laj Bador | Leaves | Leaves are crushed with spit and applied on the wounds. |
| 51   | Embelia ribes Burm.f. | Myrsinaceae | Vidang | Fruits | Fruits juice is applied on the wounds. |
| S.N. | Scientific Name             | Family          | Local Name | Part used | Mode of preparations                                      |
|------|-----------------------------|-----------------|------------|-----------|---------------------------------------------------------|
| 61   | Emblica officinalis Gaertn. | Euphorbiaceae   | Amlokhi    | Barks     | The crushed bark is applied to wounds.                  |
| 62   | Eryngium foetidum Linn.     | Apiaceae        | Man dhania  | Leaves    | Leaves juice is applied to wounds.                      |
| 63   | Euophorbia nerifolia Linn.  | Euphorbiaceae   | Sarausiju  | Latex     | Latex is directly applied to wounds.                    |
| 64   | Eupatorium odoratum Linn.   | Asteraceae      | Jarmani bon| Leaves, young shoots | Leaf paste is mixed with spit and applied to wounds for quick heal. |
| 65   | Euphorbia hirta Linn.       | Euphorbiaceae   | Paal chedi | Whole plant| Plant is first grind into paste and then the paste is slightly heated and applied on the wounds.  |
| 66   | Euphorbia thymfolia R.Br.   | Euphorbiaceae   | Gakhiroti-bon| Whole plant| Plant is first grind into paste and then applied on the wounds.  |
| 67   | Ficus bengalensis Linn.     | Moraceae        | borgos     | Stem bark  | Stems are cut and its juice is applied on the wounds.   |
| 68   | Ficus hispida Linn.f.       | Moraceae        | Kheksha-dimoru| Stem bark  | Stems are cut and its juice is applied on the wounds.   |
| 69   | Ficus lacor Buch.Ham.       | Moraceae        | Pakori     | Stem bark  | Stems are cut and its juice is applied on the wounds.   |
| 70   | Firminia coloranta (Roxb.R. Br.) | Sterculiaceae | Odal       | Bark & leaves | The paste of the barks and leaves is applied to wounds.  |
| 71   | Gloriosa superba Linn.      | Liliaceae       | Ulat-chandal| Roots     | Roots paste is applied on the wounds.                   |
| 72   | Glycyrrhiza glabra           | Gabaceae        | Jeshimadhu | Roots     | Roots paste is applied on the wounds.                   |
| 73   | Grewia serrulata DC.        | Tiliaceae       | Kukurhuta  | Leaves    | The paste of the leaves is applied to wounds.           |
| 74   | Grewia tiliaefolia Vah.Linn.| Tiliaceae       | Huktapata  | Stem bark  | Stems are cut and its juice is applied on the wounds.   |
| 75   | Gymnema sylvestre R.Br.     | Asclepiadaceae  | Madhunashini| Leaves    | The paste of the leaves is applied to wounds.           |
| 76   | Heliotropium indicum Linn.  | Boraginaceae    | Hati-huria | Leaves    | The paste of the leaves is applied to wounds.           |
| 77   | Hemidesmus indicus R.Br.    | Asclepiadaceae  | Anantamul  | Roots     | Roots paste is applied on the wounds.                   |
| 78   | Holarrheena antidysenterica | Apocyanaceae    | Dudhkuri   | Stem bark  | Stems are cut and its juice is applied on the wounds.   |
| 79   | Hydrocotyle sibthorpioides Lamk. | Apiaceae    | Khoru manimuni| Leaves    | Leaves are grind into paste and mixed with coconut oil and applied to wounds before going to bed at night.  |
| 80   | Hydrocolea zeylanica Vah.Linn.| Hydrophyllaceae| Leheti-sak | Roots     | Roots paste is applied on the wounds.                   |
| 81   | Icorrhiza kurroa Royle exBenth.| Scrophulariaceae| Katki     | Rhizomes  | Powdered dry rhizome is applied in wounds               |
| 82   | Imperata cylindrica (Linn.) Raesch. | Poaceae | Ulu-bon   | Fruits    | The powdered dry fruits is applied on wound.            |
| 83   | Jasminum auriculatum Vah.Linn.| Oleaceae   | Khorika jai| Flowers   | Paste is applied on the wounds.                         |
| 84   | Jasminum sambac At.         | Oleaceae        | Jasmeen    | Leaves    | The paste of the leaves is applied to wounds.           |
| 85   | Justicia gendarussa         | Acanthaceae     | Tita bahak | Leaves    | The paste of the leaves is used for wound healing.      |
| 86   | Kaempferia rotunda LINN.     | Zingiberaceae   | Bluhmichampa| Tubers    | Paste is applied on the wounds.                         |
| 87   | Lippia nodiflora Mich.      | Verbenaceae     | Jal-pipali  | Fruits    | Fruits juice is applied on the wounds.                  |
| 88   | Lufta acutangula Linn.      | Cucurbitaceae   | Jika       | Leaves    | The leaf juice is applied to wounds.                    |
| 89   | Luvunga scandens Buch.Ham.  | Rutaceae        | Long-phul  | Roots     | Roots paste is applied on the wounds.                   |
| 90   | Melastoma malabathricum Linn.| Melastomataceae| Phuluki    | Barks & roots| The bark and the roots are used for curing wounds       |
| 91   | Melocanna baccifera (Roxb). Kurz. | Poaceae | Tavai     | Stems     | The glossy surface of stem or cortex is applied to cure wounds. |

276
| S.N. | Scientific Name | Family | Local Name | Part used | Mode of preparations |
|------|----------------|--------|------------|-----------|----------------------|
| 92   | Mesua assami Linn. | Calusiaceae | Nahar | Flowers & barks | Paste is applied on the wounds. |
| 93   | Microsorum punctatum (Linn.) CopeLinn. | Polypodiaceae | Kapau dhekia | Leaves | Leaves juice is applied to wounds. |
| 94   | Mikania micrantha H. B. K | Asteraceae | Japaniota | Leaves | The paste of the leaves is applied to wounds. |
| 95   | Mimosa pudica | Mimosaceae | Nilaij bon | Leaves | Leaves are crushed along with Eupatorium odoratum and applied on the wounds. |
| 96   | Mimusops elengi Linn. | Sapotaceae | Bokul | Stem bark | Stems are cut and its juice is applied on the wounds. |
| 97   | Morinda citrifolia Linn. | Rubiaceae | Nuni | Leaves & fruits | The paste of the leaves and fruits is applied to wounds. |
| 98   | Moringa oleifera Lam.Syn. | Moringaceae | Sajina | Roots | Roots paste is applied on the wounds. |
| 99   | Mucuna pruriens Bak. | Leguminosae | Bandor-kekua | Roots | Roots paste is applied on the wounds. |
| 100  | Mussaenda roxburghii Hook. f. | Rubiaceae | Sonarupa | Leaves | Leaves paste is applied to wounds. |
| 101  | Myrica nagi Thunb. | Myricaceae | Nagatenga | Stem bark | Stems are cut and its juice is applied on the wounds. |
| 102  | Naravelia feylavica(D.C) | Ranunculaceae | Goropsoi | Leaves | The paste of the leaves is applied to wounds. |
| 104  | Nelumbo nucifera Wild. | Nymphaeaceae | Padam | Stem bark | Stems are cut and its juice is applied on the wounds. |
| 105  | Nicotiana tabacum Linn. | Solanaceae | Dhatap-goch | Leaves | Leaf is crushed and the juice is applied to wounds. |
| 106  | Ocimum sanctum Linn. | Lamiaceae | Tulsi | Leaves | The paste of the leaves is used for wound healing. |
| 107  | Olea europaea Linn. | Oleaceae | Jolphi | Leaves | The paste of the leaves is applied to wounds. |
| 108  | Oroxyllum indicum Linn. | Bignoniaceae | Bhat ghila | Seeds & barks | Dry the seeds in the shade, powder it and powder is applied in wounds. |
| 109  | Oxalis corniculata Linn. | Oxalidaceae | Tengechi-tenga | Leaves | Leaves are grinded into paste and are applied in wounds. |
| 110  | Papaver somiferum Linn. | Papaveraceae | Afing | Seeds | Dry the seeds in the shade, powder it and powder is applied in wounds. |
| 111  | Parkia roxburghii G. Don | Mimosaceae | Khorial | Fruits | The green portion of the fruit is mixed with little amount of water and applied to wounds. |
| 112  | Phragmites maxima Blatte. | Gramineae | Nalkhagari | Roots | Roots paste is applied on the wounds. |
| 113  | Piper betle Linn. | Piperaceae | Paan | Leaves | The paste of the leaves is applied to wounds. |
| 114  | Piper longum Linn. | Piperaceae | Pigil | Roots | Roots paste is applied on the wounds. |
| 115  | Pluchea lanceolata Oliver &Hiern. | Compositae | Rasnapat | Leaves | The paste of the leaves is applied to wounds. |
| 116  | Plumbago zeylanica Linn. | Plumbaginaceae | Bogaagetcha | Roots | Roots paste is applied on the wounds. |
| 117  | Pogostemon benghalensis (Burm.) Kuntze. | Lamiaceae | Sukloti | Leaves | The paste of the leaves is applied to wounds. |
| 118  | Pongamia glabra Vent. | Leguminosae | Koroch | Seeds & Leaves | The paste of the leaves is applied to wounds. |
| 119  | Pouzolzia zeylanica (Linn.Benn. & R. Br. | Urticaceae | Borali bukua | Whole plant | Plant is first grind into paste and then applied on the wounds. |
| 120  | Prunus mahaleb Linn. | Rosaceae | Cherry | Roots | Roots paste is applied on the wounds. |
| S.N. | Scientific Name                  | Family           | Local Name | Part used            | Mode of preparations                                                                 |
|------|---------------------------------|------------------|------------|----------------------|--------------------------------------------------------------------------------------|
| 121  | *Psoralia corylifolia* Linn.    | Leguminosae      | Habucha    | Seeds                | Dry the seeds in the shade, powder it and powder is applied in wounds.               |
| 122  | *Rannunculus scleratus* Linn.   | Rannunculaceae   | Bon-dhonia | Whole plant          | Plant is first grind into paste and then applied on the wounds.                    |
| 123  | *Rhynchostylis retusa* Linn.    | Orchidaceae      | Kopouphool | Leaves, stems &      | The paste of the leaves is applied to wounds.                                       |
|      |                                 |                  |            | barks                |                                                                                     |
| 124  | *Rubia cordifolia* Linn.        | Rubiaceae        | Majathi    | Roots                | Roots paste is applied on the wounds.                                               |
| 125  | *Salix tetrasperma* Roxb.       | Salicaceae       | Bhe        | Stem bark & flowers  | Stems are cut and its juice is applied on the wounds.                               |
| 126  | *Salmalia malabarica* Schott & EndLinn. | Pedaliaceae   | Simolu     |                      | Stems are cut and its juice is applied on the wounds.                               |
| 127  | *Santalum album* Linn.          | Santalaceae      | Chandan    | Wood                 | Powder is mixed with water and applied to wounds.                                  |
| 128  | *Saraca indica* Linn.           | Leguminosae      | Ashok-goch | Stem bark            | Stems are cut and its juice is applied on the wounds.                               |
| 129  | *Semecarpus anacardium* Linn.   | Anacardaceae     | Bor-bhola  | Roots                | Roots paste is applied on the wounds.                                               |
| 130  | *Sesamum indicum* Linn.         | Pedaliaceae      | Til        | Seeds                | Dry the seeds in the shade, powder it and powder is applied in wounds.               |
| 131  | *Shorea robusta* Gaertn.f.      | Dipterocarpaceae | Sal-goch   | Resin                | Collected resin is applied to wounds.                                               |
| 132  | *Sida cordifolia* Linn.         | Malvaceae        | Bor Sonborial | Roots             | Roots paste is applied on the wounds.                                               |
| 133  | *Smilax perfoliata* Lour.       | Smilaceae        | Tikoniborua| Roots                | Root paste is used in the treatment of quick healing of wound.                      |
| 134  | *Spaeranthus indicus* Linn.     | Compositae       | Bhu-kadam  | Flowers              | Paste is applied on the wounds.                                                    |
| 135  | *Spermactyton suaveolens* Linn. | Rubiaceae        | Bon champa  | Roots                | Roots paste is applied on the wounds.                                               |
| 136  | *Spilanthes acmela* (auct.nonLinn. Mert.) | Asteraceae  | Bonoria    | Fruits               | Infusion of fruits is applied to wounds.                                            |
| 137  | *Spilanthes paniculata* DC.     | Asteraceae       | malkathi   |                      |                                                                                        |
| 138  | *Strebulus asper* Lour.         | Moraceae         | Shoura     | Leaves               | Leaves are cooked and taken as food, helps in healing wounds.                       |
| 139  | *Swertia chirata* Buch.Ham.     | Gentianaceae     | Chirta     | Roots                | Roots paste is applied on the wounds.                                               |
| 140  | *Tagetes erecta* Linn.          | Asteraceae       | Narji      |                      | The paste of the leaves and stems juice is applied to wounds.                      |
| 141  | *Terminalaira belerica* Roxb.   | Combreaceae      | Bauri      | Fruits               | Fruits juice is applied on the wounds.                                              |
| 142  | *Thespesia populnea* Soland Ex Correa. | Malvaceae | Paras pipal |                      | The paste is applied to wounds.                                                      |
5. ETHNOPHARMACOLOGICAL VALIDATION

A number of plants such as Tagetes erecta, Ageratum conyzoides have been reported to offer wound-healing properties. The majority of these investigations include screening plants or extracts for wound healing efficacy on a random basis. We have tabulated (Table 3) some of the plants, which have been pharmacologically validated for their wound healing activity. The models in which these plants and the extracts have been reported for activity are also included in Table 2. This information becomes useful when one considers coming out with a modern medication or formulation utilizing conventional wisdom. Almost all of the plants that have been studied pharmacologically are also used traditionally. Some very common plants like Aloe vera, Azadirachta indica have been extensively reported in Ayurveda, Siddha and Unani systems of medicines for their wound healing potential.

In animal models (in vivo), a number of secondary metabolites/active chemicals derived from plants have been shown to be active principles responsible for wound healing. Some of the most important ones include asiaticoside, Asiatic acid, and madecassic acid from *Centella asiatica* (Ref 58), curcumin from *Curcuma longa* (Ref 64), phenolic acids (protocatechuic, p-hydroxybenzoic, p-coumaric, ferulic and vanillic acids) from *Chromolaena odorata* (Ref 59).
Fig: *Bryophyllum pinnatum* (Dupor tenga)
Fig: *Camellia sinensis* (Sah)
Fig: *Carica papya* (Amita)

Fig: *Catharanthus roseus* (Nayantora)
Fig: *Centella asiatica* (Bor manimuni)
Fig: *Spilanthes paniculata* (Huhoni Bon)

Fig: *Tagetes erecta* (Naeji ful)
Fig: *Smilax perfoliata* (Tikoni Borua)
Fig: *Rhyncostylis retusa* (Kopou ful)
Fig: Pogostemon benghalensis (Sukloti))
Fig: Piper betle (Pan)
Fig: Ocimum sanctum (Tulshi)

Fig: Mimosa pudica (Nilai Bon)
Fig: Mesua assami (Nahor)
Fig: Hydrocotyle sibthorpioides (Horu Manimuni)

Fig: Eclipta prostrata (Keheraj)
Fig: Datura fastuosa (Dhotura)
Fig: Dillenia indica (Otenga)
Fig: *Eryngium foetidum* (Man dhonia)

Fig: *Justicia gendarussa* (Tita Bahok)

Fig: *Santalum album* (Chandan)

Fig: *Amaranthus tricolor* (Bishalyakarni)

Fig: *Calamus floribundus* (Lejai Bet)

Fig: *Jasminum auriculatum* (Khorika Jai)

Fig: *Mikania micrantha* (Japani Lota)

Fig: *Mimusops elengi* (Bokul)

Fig: *Olea europaea* (Jolphai)
Fig. 2. Following are some picture of the ethnomedicinal plants available in Tinsukia District, Assam with high efficacy towards wound healing
| Name of the plant          | Active constituents                                                                 | Extract/Fraction     | Pharmacological profile                                      | Ref  |
|---------------------------|-------------------------------------------------------------------------------------|----------------------|--------------------------------------------------------------|------|
| *Abroma augusta* Linn.    | Alkaloids, abromine, sterol, friedelin, β-sitosterol, abromasterol, taraxeryl acetate, taraxerol | Alcoholic root extract | In-vivo (Wistar rats) In-vivo, excision & dead space wound model | [34] |
| *Acacia catechu* Wild.    | Glycosides, carbohydrates, proteins, saponins, gums, phytosterols, tannins          | Aqueous and alcoholic bark extract | In-vivo (Rats) Incision & excision wound model               | [35] |
| *Acorus calamus* Linn.    | Acorenone, monoterpene hydrocarbons, sequestrate ketones, b-gurjunene, isoshyobunine, alpha-asarone, beta-asarone, calamendiol, a-selinene, a-calacorene, calamusenone, camphone, shyobunone | Ethanolic leaf Extracts | Topical (Wistar albino rats) Incision & excision wound model | [36] |
| *Aegle marmelos*          | Marmesin, marmin, psoralen, scopoletin, umbelliferone, xanthotoxin                  | Methanolic and aqueous seeds extract | Topical (Male Wistar rats) Incision & excision wound model   | [37] |
| *Ageratum conyzoides*     | Terpenes, sterols, chromenes, flavoines                                             | Ethanolic leaf extract | Topical (Male Wistar rats) Incision wounds model (tensile strength) | [38] |
| *Albizia lebbeck*         | Flavonoids, saponins, phenols, and tannins                                         | Ethanolic root extract | In-vivo (foster albino rats) Incision, excision & dead space wound model | [39] |
| *Alocasia denudata*       | Steroid, Beta-Sitosterol, Levoglucosan, Beta.-D-Galactofuranose, Alpha.-D-Glucopyranose, D-Glucopyranose, D-Xylose | Aqueous stem juice | Topical (Male Wistar rats)                                   | [40] |
| *Aloe vera*               | Vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids, amino acids | Gel                  | Topical (Female Sprague Dawley rats)                         | [41] |
| *Anthocephalus cadamba*   | Triterpenes, tripernoid glycosides, saponins, indole alkaloids cadamidine,3a-dihydrocadamidine, cadamine, isocadamine, ethanehydrophydacadamine | Aqueous and ethanolic plant extract | Topical (Wistar rats) Incision & excision wound model (tensile strength) | [42] |
| *Artocarpus communis*     | Alkaloids, flavonoids, terpenoids, steroids and tannin                              | Ethanolic leaf extract | Topical (Guinea Pig)                                         | [43] |
| *Azadirachta indica*      | Glycosides, diterpenes, triterpenes, flavonoids, steroids                           | Methanolic leaf extract | Topical (Sprague Dawley male rats) Incision & excision wound model | [44] |
| *Balsamopera monanatum*   | Flavonoids, alkaloids, tannins, phenolic compounds and steroids                     | Methanolic root extract | In-vivo (Albino rats) Incision wound model                    | [45] |
| *Blechnum orientae*       | Alkaloids, Tannins, Sapopins, Quinones, Terpenoids, Steroids, Flavonoids, Phenol, Coumarins | Methanolic leaf extract | Topical (Sprague-Dawley rats)                               | [46] |
| *Boerhaavia diffusa*      | Amino acids, fatty acids, flavonoid, glycosides, isoflavonoids (rotenoids), steroids (ecdysteroids), alkaloids | Methanol and chloroform leaf extract | In-vitro (cell viability and wound scratch assays) In-vivo excision wound assays in rat models. | [47] |
| *Bridelia retusa*         | Tannins, alkaloids, amino acids, flavonoid, glycosides, steroids, Terpenoids       | Methanol and aqueous bark extract | Topical (Wistar albino rats) Incision & excision wound model | [48] |
| Name of the plant                        | Active constituents                                                                 | Extract/Fraction | Pharmacological profile                                                                 | Ref  |
|----------------------------------------|--------------------------------------------------------------------------------------|------------------|------------------------------------------------------------------------------------------|------|
| Bryophyllum pinnatum                   | Polyphenols, tannins, glycosaponins, flavonoids, steroidal glycosides                 | Petroleum ether, alcohol and water leaf extract | In-vivo (albino rats) Excision, resutured incision & Dead space wound model              | [49] |
| Caesalpinia bonducella F.              | Alkaloid, phenol, flavonoid, tannin, lignin                                          | Ethyl acetate and methanol leaf, bark and root extract | Topical (Male Wistar albino rats) Excision wound model                                  | [50] |
| Caesalpinia sappan Linn.               | Phanginin F, phanginin G, phanginin H, phanginin I, phanginin J, phanginin K, phanginin L, phanginin M, 1maringenin, homoeriodictyol, steric acid, serlyticin A, kaempferol | Ethanol extract  | In-vivo (Swiss albino mice) Cell proliferation and viability                           | [51] |
| Callicarpa arborea.                    | Bauerenol, β-sitosterol and betulinic acid                                            | Methanolic barks extracts | Topical (rats) Incision, excision & dead space wound model                             | [52] |
| Calotropis gigantea Linn.              | Cardiac glycosides, flavonoids, terpenoids, alkaloids, tannins, & resins             | Ethanol root bark extract | In-vivo (Wistar albino rats) Incision, excision & dead space wound model               | [53] |
| Camellia sinensis Linn.                | Caffeine, gallic acid, catechin, epicatechin, epigallocatechin, epigallocatechin-gallate, epicatechingallate | Methanolic leaf infusion | Topical (male Sprague Dawley rats) Excision wound model                                | [54] |
| Carica papaya Linn.                    | Saponins, Tannins, Triterpenes, Sterols, Alkaloids, Flavonoids                      | Ethanol seed extract | Topical (Sprague-Dawley rats) Excision wound mode                                      | [55] |
| Catharanthus roseus Linn.              | Linolenic acid, ethyl ester, stearic acid, phytol, hexadecanoic acid, limonene, geraniol, citral | Ethanol flower extract | Topical (Sprague Dawley rats) Incision, excision & dead space wound model               | [56] |
| Celastrus panniculatus Wild.           | Alkaloids, glycosides, amino acids, phenolic compounds, tannins, fixed oil, carbohydrates, phenolic compounds, flavonoids, saponins, sterols, triterpenoids | Seed oil gel     | Topical (Wister albino rats) Excision and burn wound model                              | [57] |
| Centella asiatica Linn.                | Terpenes (monoterpenes, sesquiterpenes, diterpenes, triterpenes, tetraterpenes), phenolic compounds (flavonoids, phenylpropanoids, tannins), polyacetylenes group, alkaloids, carbohydrates, vitamin, mineral and amino acid | Isolated asiaticoside sterile saline dosage form | In-vivo & In-vitro (Guinea pig & Sprague Dawley male rats) Chick choioallantoic membrane and excision wound model | [58] |
| Chromolaena odorata                    | Alkaloids, flavonoids, tannins, saponins, terpenoids, anthraquinones, cardiac glycosides and carbohydrates | Aqueous and ethanolic leaf extracts | Topical (Wistar albino rats) Excision wounds model                                     | [59] |
| Citrus maxima Linn.                    | Colocynthin, 2,4-di-tert butyl phenol, squalene, δ-tocopherol                        | Methanolic leaves, stem, root, fruit pulp and seed extract | Topical (Wistar rats) Excision wounds model                                               | [60] |
| Clitonia ternatea                      | Flavonol glycoside, phenolic compounds                                              | Seed and root extracts | In-vivo & topical (rats) Incision, excision & dead space wound model                    | [61] |
| Crocus sativus.                        | Crocin, crocetin, picrocrocin, safranal, zeaxanthin                                 | Aqueous ethanolic peel extract | Topical (Male Wistar rats)                                                             | [62] |
| Name of the plant                  | Active constituents                                                                 | Extract/Fraction               | Pharmacological profile                                         | Ref |
|-----------------------------------|--------------------------------------------------------------------------------------|--------------------------------|-----------------------------------------------------------------|-----|
| Curculigo orchioides.             | Phenols, tannins, alkaloids, saponin, flavonoids                                     | Methanolic root extract        | In-vivo (Male Swiss albino mice) Excision wounds model          | [63 ]|
| Curcuma longa Linn.               | Curcuminoinds, curcumin, demethoxycurcumin, bisdemethoxycurcumin.                   | Ethanaloc root extract         | Topical (Rats) Excision wounds model                             | [64 ]|
| Cynodon dactylon Linn.            | Carbohydrates, glycosides, flavonoids, saponins, alkaloids, phenolic compounds, tannins, fixed oil, mucilage | Hydroalcoholic whole plant extract | Topical (Male Albino Wistar rats) Excision wounds model          | [65 ]|
| Cyperus rotundus                  | Sesquiterpene, cyperene-1, cyperene-2, cyperenone, α-cyperone12, mustakone, β-selene, sugretol triacetate, sugenol, copadiene, epoxyguaienerotundone, cyperenol, cyperolone, eugenol, cyperol, isocyperol, | Ethanaloc tuber extract        | Topical (Male Wistar rats) Incision, excision & dead space wound model | [66 ]|
| Datura fastuosa                   | Hyoscyamine, hyoscyine, atropine, daturinl, cholesterol, sterol, baimantuoluoline A, baimantuoluoline B, daturataturin A | Ethanaloc aerial parts extract | Topical (Wistar Albino rats) Incision, excision & dead space wound model | [67 ]|
| Delonix regia                    | Saponins, alkaloids, carotene, hydrocarbons, phytoxins, flavonoids, tannins, steroids, carotenoids, galactomannon, lupeol, β-sitosterol, terpenoids, glycosides, carbohydrates | Water and ethanol leaf and bark extracts | In-vivo ( Albino rats) Incision wound model                      | [68 ]|
| Embelia ribes.                   | Embelin (3-undecyl 2,5- dihydroxy, 1,4-benzoquinone), an alkaloid christembleine, vialing, 2,5-dihydroxy-4-undecyl-3, 6-benzoquinone | Ethanaloc leaf extract         | Topical (Male Wistar rats) Incision, excision & dead space wound model | [69 ]|
| Emblica officinalis.             | Phyllaemblicin acid, phyllaemblicin a, phyllaemblicin b, phyllaemblicin c, corilagon, geraniin, galic acid, phyllaemblicin, ellagic acid, vitamin C | Aqueous and ethanaloc bark extract | In-vivo (Wistar rats) Incision & excision wound model            | [70 ]|
| Euphorbia nerifolia             | Flavonoids, saponins, tannins, alkaloids, euphol, nerifoliol, nerifolenine, euphorbon, resin, gum, caoutchouc, malate of calcium | Ethanaloc leaf extract         | In-vivo (Wistar albino rats) Excision & dead space wound model   | [71 ]|
| Euphorbia hirtaLinn.             | Tannins, triterpenoids, flavonoids and alkaloids.                                    | Ethanol, methanol and water whole plant extract | Topical (Male Wistar rats) Incision & dead space wound model          | [72 ]|
| Ficus bengalensis.               | Alkaloids, flavonoids, saponins, phenols, tannins, diterpenes, phytosterols, proteins, resins | Aqueous leaf extract           | In-vivo (Male Sprague dawley rats) Excision wounds model         | [73 ]|
| Ficus hispida                    | Glycosides, Carbohydrates, Sterols, Saponins, Tannins, Flavonoids, Triterpenoids   | Methanaloc leaf extract        | In-vivo (Wistar Albino rats) Excision wound model                | [74 ]|
| Ficus lacor.                    | Carbohydrates, phenolic, protein,terpenoids, , free amino acids                     | Aqueous leaf extract           | Topical (Albino Wister rats) Excision wound model               | [75 ]|
| Grewia tiliaeolia.               | Tannins, terpenoids, flavonoids, steroids, saponins,                                | Methanaloc bark extract        | In-vivo (Wistar rats) Incision, excision & dead space wound model | [76 ]|
| Gymnema sylvestre.               | Tannins, flavonoids, phytosterols, cardiac glycosides                               | Alcoholic leaf extract         | In-vivo (Wistar rats) Incision, excision & dead space wound model | [77 ]|
| Heliotropium indicum             | Alkaloids, Carbohydrates, Gums, mucilages, Proteins, amino acids, Tannins, phenolic compounds, Steroids, sterols Triterpenoids, Saponins ,Flavonoids | Petroleum ether, chloroform, methanol, and aqueous leaf extract | Topical (Wistar albino rats) Incision, excision & dead space wound model | [78 ]|
| Name of the plant               | Active constituents                                                                 | Extract/Fraction                  | Pharmacological profile                                                                 | Ref  |
|--------------------------------|-------------------------------------------------------------------------------------|----------------------------------|----------------------------------------------------------------------------------------|------|
| *Hemidesmus indicus*           | Phenols, alkaloids, flavonoids, glycosides, saponins, tannins, phytosterols,         | Methanolic and aqueous root      | Topical (Wistar rats)                                                                    | [79] |
|                                | terpenoids                                                                           | extract                          | Excision wound model                                                                    |      |
| *Hydrolea zeylanica*           | Alkaloids, flavonoids, phenols and phenolic compounds, tannins, glycosides,         | Methanolic leaf extract          | In-vivo (Wistar albino rats)                                                             | [80] |
|                                | triterpenes, steroids, saponins                                                      |                                  | Excision and incision wound model                                                        |      |
| *Jasminum auriculatum*         | Alkaloids, carbohydrates, tannins, flavonoids, steroids, terpenoids, saponins,       | Petroleum ether, chloroform,     | Topical (Albino rats)                                                                    | [81] |
|                                | phenolic compounds                                                                    | ethanol and water leaf extract    | Excision and incision wound model                                                        |      |
| *Jasminum sambac*              | Carbohydrates, flavonoids, steroids, saponins, proteins, amino-acids, glycosides    | Aqueous and ethanol leaf extract  | Topical (Albino mice)                                                                    | [82] |
|                                |                                                                                     |                                  | Excision wound model                                                                    |      |
| *Kaempferia rotunda*           | Flavonoids, crotepoxid, chalcones, quercetin, siostosterol, stigmosterol, syringic   | Aqueous and methanol leaf        | Topical (Wister Albino rats)                                                             | [83] |
|                                | acid, protocatechic acid                                                             | extract                          | Excision and incision wound model                                                        |      |
| *Melastoma malabathricum*      | Flavonoids, tannins                                                                  | Aqueous leaf extract              | Topical (Sprague Dawley rats)                                                           | [84] |
|                                |                                                                                     |                                  | Excision wound model                                                                    |      |
| *Mikania micrantha*            | Sesquiterpene lactones, phenolic compounds, tannins, flavonoids,                    | Ethanolic leaf extract            | In-vitro                                                                                | [85] |
|                                |                                                                                     |                                  | Cytotoxicity activity & cell cycle analysis                                              |      |
| *Mimosa pudica* Linn.          | Amino acid (d-Alanin, 1-Alanine ethylamide), Carbohydrates, Quercetin, D-            | Ethanolic leaf extract            | Topical (Sprague Dawley rats)                                                           | [86] |
|                                | Pinitol, L-Mimosine, Mimosanic acid, Mimosaminine, P-coumaric acid                   |                                  | Excision & burn wound models                                                            |      |
| *Mimusops elengi* Linn.        | Taraxerol, taraxerone, ursolic acid, betulinic acid, V-spinosterol, W-sitosterol,   | Methanolic stem bark extract      | Topical (Albino mice)                                                                    | [87] |
|                                | lupeol, mixture of triterpenoid,saponins, alkaloid isoretronecyltiglate              |                                  | Incision, excision & dead space wound model                                              |      |
| *Morinda citrifolia*           | Phenols, alkaloids, triterpenoids, steroids, carboxylic acids                        | Ethanolic leaf extract            | In-vivo (Sprague Dawley male rats)                                                       | [88] |
|                                |                                                                                     |                                  | Excision & dead space wound model                                                        |      |
| *Moringa oleifera*             | Fatty acid, vitamin E, carotenoid, amino acid, glycoside like niazin, niacin,       | Aqueous leaf extract              | In-vivo (Male Swiss Albino Mice)                                                         | [89] |
|                                | niadin, niazimin, niaziminin                                                         |                                  | Excision, resutured incision & dead space wound model                                   |      |
6. CONCLUSION

A number of plants used traditionally and by indigenous peoples have not been validated or examined in light of the traditional claim. The majority of plant/plant extract pharmacological reports test the organic soluble extracts of dried plants for their ability to heal wounds in rats and mice, but the main concern is that the most traditional claims of plants as wound healing agents involve the use of fresh plants as pastes in water. When it comes to wound healing medicines, this is a huge issue because the organic solvent extract of dry plant material is validated, while the aqueous extract of fresh plants is employed; the chemical components will be quite different in both circumstances. In this review, we found that leaf is the most commonly utilized in traditional and tribal medicine to treat wounds (51%), followed by bark and root (19%), flowers and seeds(2%) (Table 1).

Another important issue with pharmacological validation is that the exact mechanism of the wound healing process is unknown; as a result, most researchers limit their plant screening to simple wound healing and do not get into the specifics. It's important to remember that a variety of factors play a role in wound healing, including epithelization, antioxidant defence, and metabolic changes (hydroxyproline). This review will assist pharmacologists in understanding the particular component of the plant and its exact function in traditional medicine, thereby bolstering Ethnopharmacological claims and increasing global acceptance of plant-based wound healing agents.

In addition, there hasn't been a concentrated attempt by researchers to investigate the concept of synergism in wound healing. The synergism of the prospective plants described in this analysis can be used to build a universally accepted wound healing formulation, if properly tested and proven scientifically, can operate as a substitute for or even replace modern wound healing medicines. As a result, the primary goal of this study is to identify and forecast plants, particularly those of Indian origin, that have the potential to become modern medication substitutes.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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