

**ETHNOPHARMACOLOGICAL STUDY OF WOUND-HEALING IN  
THE CARIU REGION, BOGOR, WEST JAVA, INDONESIA**

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**ABSTRACT**

Cases of skin injuries are increasing in hospitals requiring efficient treatment. Reliance on antimicrobials is expensive and sometimes less effective, requiring other alternatives. Medicinal plants that have wound-healing properties could be an alternative. This research aims to document and preserve the use of ethnomedicinal to treat wound-healing by people in the Cariu Region, Bogor, West Java, Indonesia. Fieldwork was carried out from March to April 2024 using direct interviews, questionnaires and discussions. Plant species are identified based on standard taxonomic methods, flower morphological characteristics, and where possible, using samples for comparison, as well as consultation with experts and the literature. The plant types obtained were grouped into families according to the Cronquist classification system. Plant names were checked against the Plant List ([www.plantlist.org](http://www.plantlist.org)) and the International Plant Name Index ([www.ipni.org](http://www.ipni.org)). This research reports that 30 plant species are commonly used by people in the Cariu Region to treat wounds. Among the various parts of the plant used, leaves (60%) are most often used in making wound medicine, followed by stem (16.7%), fruit (10%), rhizome (6.7%), seed, and rind (3.3% respectively). Meanwhile, the most frequently used preparation method is topical (83.3%), followed by decoction (13.3%), and infusion (3.3%). The results of this research confirm that people in the Cariu Region still rely heavily on medicinal plants for their health care system, especially for treating wounds with the most frequently used parts of the leaves and their use topically.

**KEYWORDS:** Traditional medicine, Ethnomedicinal plants, Cariu Region, Wound Healing.

**INTRODUCTION**

Skin is the largest organ in humans which functions as the first barrier between organisms and the external environment, aiming to protect organisms from harmful substances, regulate body temperature, and maintain water and electrolyte balance. The morphological structure of the skin consists of two main layers, namely the epidermis and dermis. The epidermis is the outermost layer of skin which is divided into four or five sub-layers, depending on the location in the body. The main cells that make up the epidermis are keratinocytes, along with melanocytes, Langerhans cells, and Merkel cells. The dermis is a layer of connective tissue that supports the epidermis, consisting of extracellular matrix proteins (such as collagen, elastin, proteoglycans and glucosaminoglycans) produced by fibroblasts. When damage occurs to one or both layers of the skin, organisms initiate a wound healing process to repair the injured area, involving cellular, molecular and biochemical mechanisms which are divided into three

healing phases, namely inflammation, proliferation and remodeling.<sup>[1]</sup>

Wound-healing is a complex process that aims to restore damaged skin to maintain tissue homeostasis. This process involves interactions between different types of cells, growth hormones, cytokines, and a steady supply of metal ions, such as calcium, zinc, and magnesium. Homeostasis, inflammation, proliferation, and remodeling are four overlapping phases in normal wound healing. When tissue injury occurs, blood clotting pathways are activated, resulting in the formation of a temporary fibrin matrix that allows cells to migrate to the wound site. At the same time, platelet-derived factors attract leukocytes, thereby activating the inflammatory response. Then, platelets and immune cells secrete growth factors and cytokines, which promote wound re-epithelialization, extracellular matrix (ECM) deposition, and angiogenesis. Disruption of the normal wound-healing process results in the formation of chronic wounds that are more difficult to heal.<sup>[2]</sup>

Medicinal plants are the most important and sometimes the only source of wound treatment. This is because medicinal plants are culturally acceptable, easy to access, and cheap compared to modern medicine.<sup>[3-5]</sup> Indonesia is the second largest country in the world with forest biodiversity, where there are 28,000 plant species and 2,500 of these species are medicinal plants.<sup>[6-8]</sup> Currently, research to obtain new anti-wound drugs derived from natural ingredients continues to be carried out, one of which is through exploring active compounds from natural ingredients, especially medicinal plants which have traditionally been used by people to treat wounds in various regions in Indonesia.<sup>[9-11]</sup> One of the Region in Indonesia that still uses herbal plants as an alternative treatment, especially for treating wounds, is the Cariu Region. This research aims to obtain detailed information about the use of herbal plants for alternative wound therapy in Cariu Region, Bogor, West Java, Indonesia using a field survey method.

## MATERIALS AND METHODS

### Study area

Cariu is located in Bogor Regency, West Java, Indonesia, with an area of 84.81 km<sup>2</sup>. This area has an altitude of 173 meters above sea level with an average maximum air temperature of 29°C and a minimum of 23°C. Cariu is located between 06°29' 56.43" South Latitude and 107°8' 17.92" East Longitude. This region is a tropical climate area that is mostly inhabited by Sundanese tribes (90%) and other tribes (10%). Vegetation in the study area is in humid conditions with an average rainfall of 3,000 mm/year.

### Data collection

An extensive field survey was carried out to obtain information about medicinal plants from the Sundanese tribe in the study area. To document existing information about medicinal plants from tribal practitioners, several field visits were conducted from March to April 2024 in the Cariu Region, Bogor, West Java, Indonesia. During the research, ethnomedicinal information was collected

from middle-aged and older tribal practitioners in their local language (Sundanese), through direct interviews, questionnaires, and discussions. Information about local plant names, plant parts used, preparation methods and administration methods (e.g., infusion, topical, and decoction) of all ethnomedicinal plants collected were recorded during the survey period.

### Botanical identification

Plant species are identified based on standard taxonomic methods, flower morphological characteristics, and where possible, using samples for comparison, as well as consultation with experts and the literature.<sup>[12]</sup> The plant types obtained were grouped into families according to the Cronquist classification system, except for Pteridophyta and Gymnospermae.<sup>[13]</sup> Plant names were checked against the Plant List ([www.plantlist.org](http://www.plantlist.org)) and the International Plant Name Index ([www.ipni.org](http://www.ipni.org)).

### Ethics statement

All participants provided verbal consent before the interview and gave consent to publish the information they provided.

## RESULTS AND DISCUSSION

This research revealed that 30 plant species are commonly used by local people to treat wounds (Table 1). This shows that the study location is affordable in terms of biodiversity. Among the various parts of the plant used, leaves (60%) are most often used in making wound medicine, followed by stem (16.7%), fruit (10%), rhizome (6.7%), seed, and rind (3.3% respectively). The use of leaves is reported to be easier to prepare and easier to extract active substances from them for treatment. At the same time, leaves have less effect on the mother plant.<sup>[14]</sup> Meanwhile, the most frequently used preparation method is topical (83.3%), followed by decoction (13.3%), and infusion (3.3%). These results are in line with previous research which reported that the form of traditional medicine for wound treatment that is most widely used by the community is topical.<sup>[15]</sup>

**Table 1: Ethnomedicinal plants, local name, part used, mode of administration, and dosage uses in Cariu, Bogor, West Java, Indonesia.**

No	Species	Family	Local name	Parts used	Mode of administration	Dosage of use
1	<i>Aloe vera</i> L.	Xanthorrhoeaceae	Lidah buaya	Stem	Topical	10 milligrams once a day
2	<i>Annona muricata</i> L.	Annonaceae	Sirsak	Leaf	Infusion	100 grams once a day
3	<i>Anredera cordifolia</i> (Ten) Steenis	Basellaceae	Binahong	Leaf	Topical	40 grams once a day
4	<i>Areca catechu</i> L.	Arecaceae	Pinang	Fruit	Topical	3 milligrams once a day
5	<i>Averrhoa carambola</i> L.	Oxalidaceae	Belimbing	Fruit	Topical	20 milligrams once a day
6	<i>Carica papaya</i> L.	Caricaceae	Pepaya	Stem	Topical	3 grams once a day
7	<i>Centella asiatica</i> (L.) Urban	Apiaceae	Pegagan	Leaf	Topical	20 grams once a day
8	<i>Chromolaena odorata</i> L.	Asteraceae	Balakacida	Leaf	Topical	30 grams once a day

9	<i>Colocasia esculenta</i> L.	Araceae	Talas	Stem	Topical	2 grams once a day
10	<i>Coriandrum sativum</i> L.	Apiaceae	Ketumbar	Seed	Topical	30 grams once a day
11	<i>Curcuma longa</i> L.	Zingiberaceae	Kunyit	Rhizome	Topical	10 grams once a day
12	<i>Curcuma mangga</i> Val.van Zip.	Zingiberaceae	Kunyit Putih	Rhizome	Topical	10 grams once a day
13	<i>Cymbopogon nardus</i>	Poaceae	Sereh Wangi	Stem	Topical	10 grams once a day
14	<i>Diplazium esculentum</i> (Retz.) Sw.	Athyriaceae	Pakis	Leaf	Topical	4 grams once a day
15	<i>Garcinia mangostana</i> L.	Clusiaceae	Manggis	Rind	Topical	200 grams once a day
16	<i>Hemigraphis colorata</i> Hall.f.	Acanthaceae	Remek Daging	Leaf	Topical	3 grams once a day
17	<i>Jatropha curcas</i> L	Euphorbiaceae	Jarak Pagar	Stem	Topical	2 grams once a day
18	<i>Kalanchoe pinnata</i> Pers	Crassulaceae	Cocor Bebek	Leaf	Topical	10 grams once a day
19	<i>Matricaria chamomilla</i> L.	Asteraceae	Kamomil	Leaf	Decoction	10 grams once a day
20	<i>Melaleuca leucadendra</i> (L.) L	Myrtaceae	Kayu Putih	Leaf	Topical	5 milligrams once a day
21	<i>Mikania micrantha</i> Kunth	Asteraceae	Sembung Rembat	Leaf	Topical	4 grams once a day
22	<i>Nephelium lappaceum</i> L.	Sapindaceae	Rambutan	Leaf	Topical	45 milligrams once a day
23	<i>Ocimum sanctum</i> L.	Lamiaceae	Kemangi	Leaf	Topical	6 grams once a day
24	<i>Persea americana</i> Mill.	Lauraceae	Alpukat	Leaf	Topical	2 grams once a day
25	<i>Physalis angulata</i> L.	Solanaceae	Cecendet	Leaf	Topical	6 grams once a day
26	<i>Piper betle</i> L.	Piperaceae	Sirih	Leaf	Decoction	15 grams once a day
27	<i>Piper crocatum</i> Ruiz & Pav	Piperaceae	Sirih Merah	Leaf	Decoction	25 grams once a day
28	<i>Psidium guajava</i> L.	Myrtaceae	Jambu biji	Leaf	Topical	10 grams once a day
29	<i>Rivina humilis</i> L.	Phytolaccaceae	Getih-getihan	Fruit	Topical	30 grams once a day
30	<i>Sansevieria trifasciata</i> Hort. ex Prain	Asparagaceae	Lidah Mertua	Leaf	Decoction	150 mL once a day

## CONCLUSIONS

The results of this research confirm that people in the Cariu Region still rely heavily on medicinal plants for their health care system, especially for treating wounds with the most frequently used parts of the leaves and their use topically.

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