

**TEMULAWAK (*Curcuma xanthorrhiza* Roxb.) BOTANY, ETNOBOTANY,
CHEMISTRY, PHARMACOLOGY AND THERE BENEFIT.***

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ABSTRACT

Curcuma xanthorrhiza Roxb. (Zingiberaceae) family, commonly known as temulawak or javanese turmeric in Indonesia), which is found both wild and cultivated in Indonesia, has been traditionally used for medicinal purposes.

C.xanthorrhiza is also used as a tonic in Indonesia

Indonesia has been recognized to be country with biodiversity richness, in which > 3000 plant species grow.

More than 10.000 species have been reported during the last decades

to have pronounced biological activities may be used as herbal medicines. The I.H.M have long been utilized ethnically by the people, either living in the rural and urban areas, to maintain and promote health – to restore and cure various health disorders.

Temulawak a medicinal plant used in Indonesia, has been shown to exert diverse physiological function. Indonesian people have known Temulawak as:

Appetite stimulant, hepatoprotection, dismenorhae, antimicrobial, cholagogum, antiinflammation, analgesic, antipiretic, chloretic, galactagogue.

Temulawak is very important food and medicinal plant materials in terms of including not only curcuminoids but also xanthorrhizol. Temulawak is in reality indigenous medicine. Standardization of Temulawak , technology for extraction and removing the color or strong flavor, industrial application technology, and clinical test will be prerequisite to develop Temulawak as a global.

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INTRODUCTION

Temulawak (*Curcuma xanthorrhiza* Roxb.) has been traditionally used for medicinal plant purposes. Vernacular names Indonesia is koneng gede (Sundanese), temu lawak (Javanese), temo lawak (Madurese), temu lawas, temu raya (Peninsular), Thailand : wan chakmotluk (central). Vietnam: ngh[eej]r[eex]v[af]ng.

Temulawah is native to Java-Bali and the Moluccas. It is commonly cultivated in Java, Peninsular Malaysia, the Philippines and Thailand, occasionally also in India,

Rhizomes are used to treat various abdominal complaints and liver disorder (jaundice, gall stone, promoting the flow of bile). A decoction of the rhizome is also used as a remedy for fever and constipation, and taken by women as galactagogue and to lessen uterine inflammation after giving birth. Other applications are against bloody diarrhea, dysentery, inflammation of the rectum, haemorrhoids, stomach disorders caused by cold, infected wounds, skin eruptions, acne vulgaris, eczema, smallpox and anorexia. In Indonesia, rhizomes enter as an important ingredient into many “jamus”. They yield a starch, and a yellow dye. Young stems and rhizome parts are eaten as a vegetable either raw or cooked. The inflorescences are eaten cooked. In Java, a soft drink called “bir temulawak” is prepared by cooking dried pieces of rhizomes. Every ethnic in Indonesia , in fact has its own herbal recipe as a valuable cultural heritage which may be developed further to modernized products with higher acceptance

BOTANY

Temulawak is a herb with branched rhizome, outside dark yellow to reddish-brown, inside orange or orange-red; leaf sheaths up to 75 cm long, blades elliptical-oblong to oblong-lanceolate, 25 – 100 cm x 8 -20 cm, green with a reddish-brown band along the midrib; inflorescence on the separate shoot, bracts pale green, coma bracts purple; corolla 4-6 cm long; pale red; labellum 2-2,5 cm x 1,5-2 cm, yellowish with a darker yellow median band, other stamens longitudinally folded, yellowish-white, anther with long spurs. Temulawak is found in thickets and teak forest, mainly on moist, fertile, humus-rich soils, up to 750 m altitude.

CHEMISTRY

Temulawak Compound

Major and characteristic compounds of the essential oils of Temulawak

No	Compound	Essential oil
1	Tricyclene	0,73
2	Camphene	0,56
3	Sabinene	0,80
4	1.8-cineol	0,75
5	Campher	3,01
6	Borneol	0,25
7	β -elemene	0,24
8	α -zingiberene	1,06
9	ar-curcumene	41,41
10	Isofuranogermacre	0,85
11	β -curcumene	2,09
12	Sesquiphellandrene	0,67
13	Curzerenone	4,19
14	Ar-turmerol	1,15
15	Ar-turmerone	0,56
16	Turmerone	0,58
17	Germacrone	3,86
18	Turmerol	0,60
19	xanthorrhizol	21,45

Extraction, fractionation, isolation, structure elucidation

On this stage it is carried out natural chemical research concluding:

Simplisia extraction:

Extraction with ethanol solvent, it may be done in heating (Soxhletation) for the plant whose the content resists to the heating. It may be done by a cool extraction that is maceration (submersion with organic solvent) or percolation that is extraction with organic solvent flowed. From the extraction it is obtained total extract. Furthermore, it

is done phytochemical screening to identify the content of merited substance being in the extract.

Fractionation of extract:

Fractionation is done by using various solvents from non-polar to polar. What are often used are n-hexane, ethyl acetate, butanol and water.

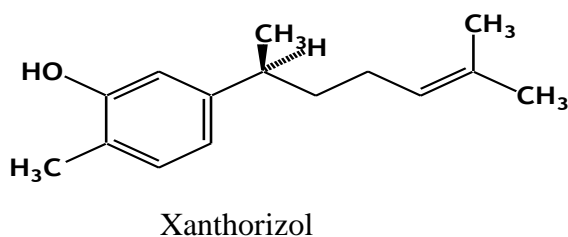
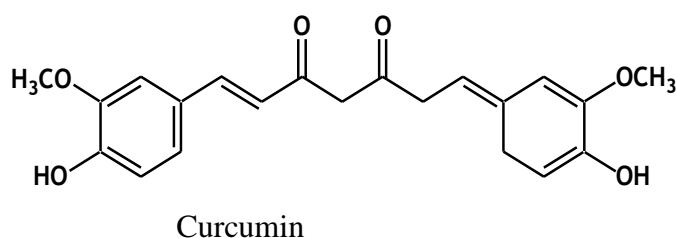
Isolation:

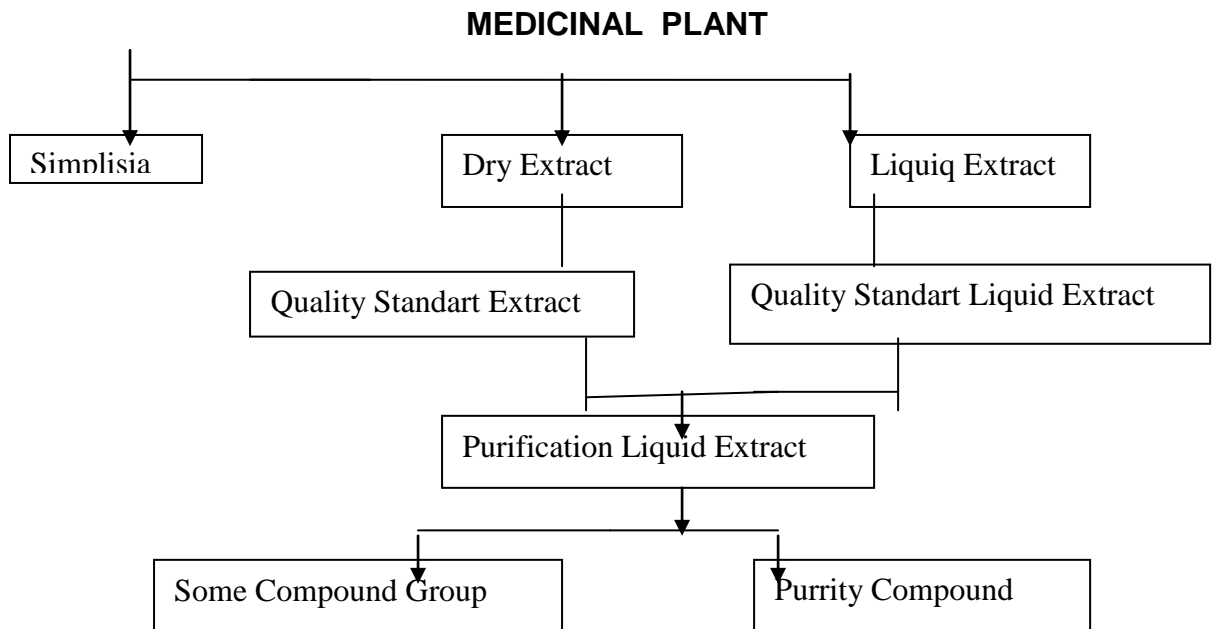
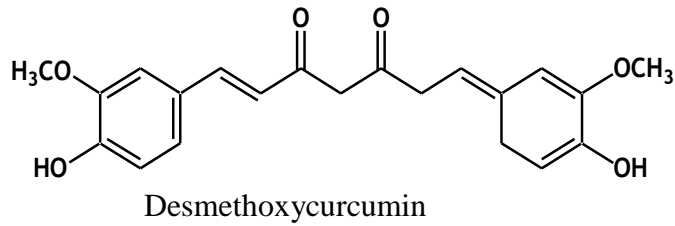
It is done a separation of marked compounds group with thin-layered chromatography, so it will seen various groups of dominant compounds from the emerging spot. Furthermore it is done two-dimension TLC, that is from two-way for obtaining a most dominant single spot. And then it is conducted preparative TLC so that it is obtained a tape-formed node and then it is curried. The result of the currying is done a column chromatography for separating the compounds from the dominant compounds group into a single compound. And then it is done a purifying by repeated recrystallization.

Structural elucidation:

From the purified compound it is done an analysis using and instrument, that is spectrometry UV-Vis, for identifying the presence of double bound. Infra Red spectrometry for identifying the presence of functional group. And then it uses spectrometry Nucleus Magnetic Resonance for identifying a chemical structure of the compound obtained.

Mayor Phytochemical Temulawak





PHARMACOLOGY

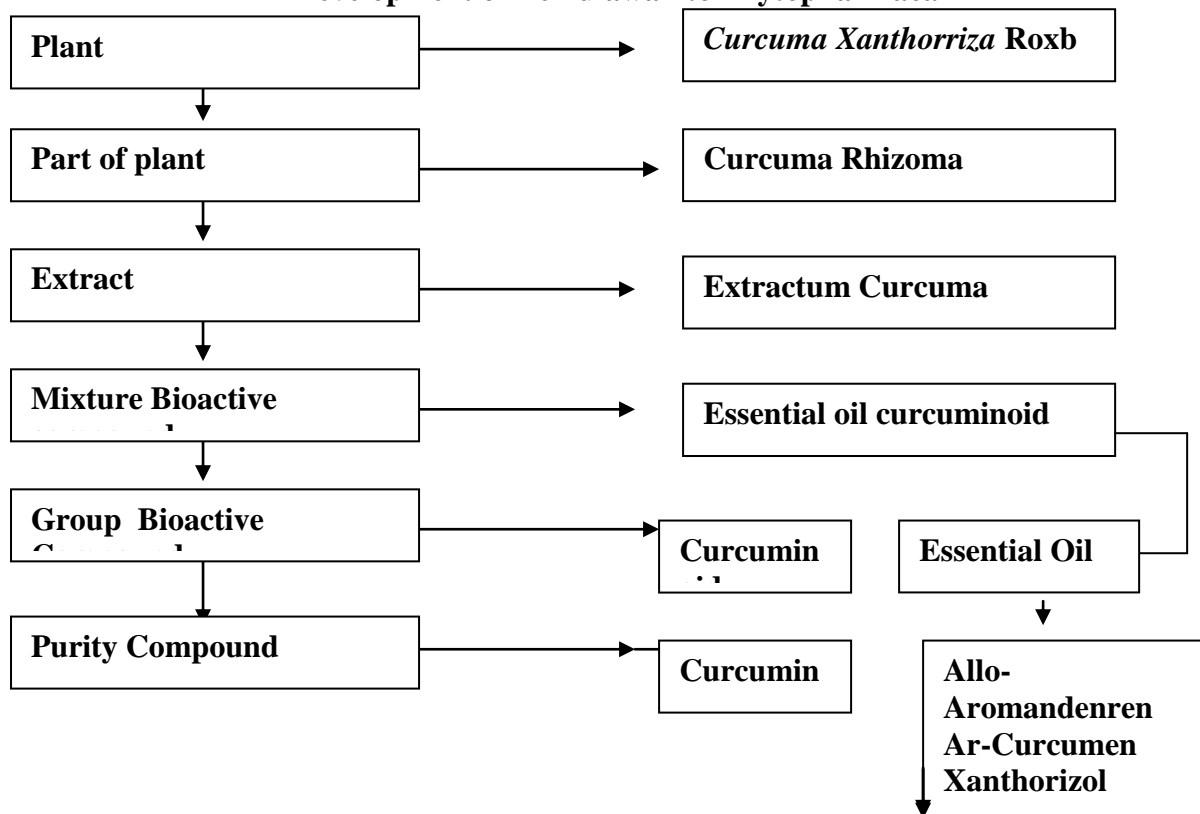
On this stage it must be conducted a pharmacological screening from the total extract as well as its fractions. The testing of pharmacological activity is initiated from the indication used empirically by the society. Each stage passed though on the isolating process must be done a testing of pharmacological activity. From the most strong fraction it is its pharmacological activity is continuously isolated such that it is outcome an active compound.

In order to become a standardized herbal preparation in addition to do a testing of pharmacological activity it must be done an acute toxicity test, sub-chronic toxicity test and special toxicity test such as teratogenic test using experimental animal. Curcumin is the main biologically act compound of Temulawak. It is extracted and researched for its renowned range and disease-preventing medical properties. Some pharmacological properties and action of Curcuminoid researched are: Antihepatotoxic, analgesic, anti inflammatory, chloretic, anti

cancer, anti oksidant, anti platelet agregasi, anti diabetic, anti cholesterol, anti bacterial and anti fungal.

Some pharmacological action of xanthorizol researched are: Appetite stimulant, anti inflammatory, anti cancer, and anti bacterial.

Development of Temulawak to Phytoparmaca



Antimicrobial Activity of Xanthorrhizol

Microorganism	MIC (µg/mL)
- <i>Streptococcus mutans</i>	2
- <i>Streptococcus sabrinus</i>	4
- <i>Streptococcus salivarius</i>	4
- <i>Streptococcus sanguis</i>	4
- <i>Actinomyces viscous</i>	16
- <i>Porphyromonas gingivalis</i>	32
- <i>Candida albicans</i>	125
- <i>Lactobacillus casei</i>	250
- <i>Lactobacillus acidophyllus</i>	250

The extract of Temulawak has been shown to protect the liver from hepatotoxins such as carbon tetrachloride and acetaminophen. Hepatoprotective Effects of *C.Xanthorrhiza* carbon tetrachloride- induced serum GOT and GPT elevations. Hepatoprotective Effects of *Curcuma xanthorrhiza* and extracts on acetaminophen (Pam L)- induced serum GOT and GPT elevations.

CONCLUSION

- Xanthorizol is a strong bioactive compound present in Temulawak and shows higher activity than curcuminoids in many experiments.
- Curcuman-X isolated from Temulawak is a strong immunomodulating polysaccharide
- Temulawak will have dramatic potential as food and medicinal plant material in the future
- Further studies for clinical evidence are required to develop temulawak as a global brand

The main objective of current research on Indonesian medicinal plants has focused attention primarily on the following aspects:

- To improve the quality of jamu product
- Selection of plant species of reported therapeutic value and suitable for industrial processing.
- Assurance of quality and consistency in the plant material.
- Validation of claims of traditional therapies using modern methodologies.
- Development of standards of quality assessment and analytical methods and pharmacological evaluation.
- To promote the integration of proven knowledge of herbs into modern medicine (phytopharmaca)
- Investigation leading to development of new drugs
- Empirical knowledge of the use of *Curcuma* species rhizomes in traditional medicine for various kinds of diseases indicated that *Curcuma* species belong to the important medicinal plants. *Curcuma* rhizomes are proven to have many biological and pharmacological properties.
- *Curcuma* species are of benefit as ingredient for health food & drink.

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