

# Comparative study of microscopic, phytochemical, and thin layer chromatography analyses of *Curcuma longa* L. and *Zingiber cassumunar* Roxb. rhizomes of Cambodia

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**Abstract:** This study aims at comparing the evaluation of microscopic cellular elements, phytochemicals and thin layer chromatography (TLC) fingerprints between the *Curcuma longa* L. and the *Zingiber cassumunar* Roxb. rhizomes cultivated in Cambodia. The plants were subjected to microscopic study, Ultrasonication-Assisted Extraction (UAE) and TLC analyses. The powder microscopic studies of *Curcuma longa* L. and *Zingiber cassumunar* Roxb. rhizomes showed that starch granules, reticulate vessel, fibres, pigment cells, parenchyma and oleoresins were present in both plant rhizomes. The starch granules in *Zingiber cassumunar* Roxb. rhizomes were more abundant than those of *Curcuma longa* L. rhizomes. The phytochemical screening unveiled the positive tests of alkaloids, tannins, steroids, terpenoids, cardiac glycosides, essential oils and resins in both plant rhizomes. The TLC layouts investigated under 254-366 nm UV light and 10%-H<sub>2</sub>SO<sub>4</sub> reagent gave good separation with the mobile phase ratio Toluene:Ethanol (9:1). This study provides the scientific data of cellular elements, phytoconstituents and TLC fingerprints of Cambodian *Curcuma longa* L. and *Zingiber cassumunar* Roxb. These profiles exhibit significant roles in the areas of the plant standardization and novel drug isolation.

## Introduction

*Curcuma longa* L. (Khmer name: Romeat) and *Zingiber cassumunar* Roxb. (Khmer name: Poenley) is extensively used as a spice and grown widely in Asia. These plants have been used in traditional medicine as a remedy for various diseases including cough, diabetes and hepatic disorders (Vasavda *et al.*, 2013; Singh *et al.*, 2015). This study aims at comparing the evaluation of microscopic cellular elements, phytochemicals and thin layer chromatography (TLC) fingerprints between the *Curcuma longa* L. and the *Zingiber cassumunar* Roxb. rhizomes cultivated in Cambodia.

## Materials and Methods

The powder of *Curcuma longa* L. and *Zingiber cassumunar* Roxb. rhizomes were purchased from the local plant drugstore and authenticated by University of Puthisastra (UP)-Herbarium (*Curcuma longa*: UPFPH-210019; *Zingiber cassumunar*: UPFPH-210033). The powder microscopic study was performed in accordance with the WHO protocol in 1998. The powder of these plants were extracted with methanol by using Ultrasonication-Assisted Extraction (UAE) method. The extracting yields of each plant were subjected to phytochemical tests and TLC analysis.

## Results and Discussion

This observation was in accordance with Duraisankar & Ravindran (2015), Rajesh *et al.* (2013), Akshada & Magdum (2017), WHO (1998) and Amel (2015).

Table 1: Extracting yield (%) of *Curcuma longa* L. and *Zingiber cassumunar* Roxb. Rhizomes extracted with methanol

Methanolic Plant Extracts	Extracting Yields (%)
Rhizomes of <i>Curcuma longa</i> L.	11.45
Rhizomes of <i>Zingiber cassumunar</i> Roxb.	13.46

Table 2: Phytochemical evaluation of the methanolic extracts of *Curcuma longa* L. and *Zingiber cassumunar* Roxb.

Phytochemicals	Chemical Tests	Methanolic Extracts of <i>C. longa</i> rhizomes	Methanolic Extracts of <i>Z. cassumunar</i> rhizomes
Alkaloids	Drapendorff	Positive	Positive
	Mayer	Positive	Positive
	Wagner	Positive	Positive
Tannins	Ferri Chloride	Positive	Positive
	Liebermann Burchard	Positive	Positive
Steroids	Salkowski	Positive	Positive
	Salkowski	Positive	Positive
Terpenoids	Salkowski	Positive	Positive
Cardiac glycosides	Keller Killim	Positive	Positive
Essential oils	NaOH-HCl	Positive	Positive
Resins	Turbidity	Positive	Positive

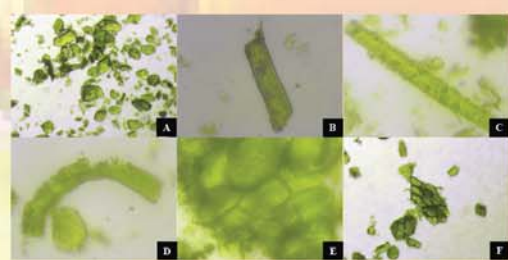


Figure 1: Powder microscopy of *Curcuma longa* L. A: starch granules; B: fragment of a fibre; C: fibre with adherent oleoresins; D: reticulate thickened vessel; E: thin walled parenchyma and oleoresins; F: oleoresins.

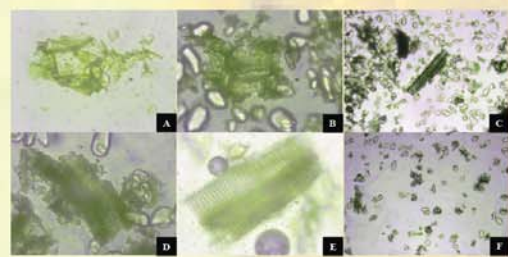


Figure 2: Powder microscopy of *Zingiber cassumunar* Roxb. A: parenchyma; B: parenchyma and oleoresins; C: reticulate vessel and starch grain; D: fragment of reticulate vessel with adherent pigment; E: compound reticulate vessel; F: starch grain.



## Conclusion

This study provides scientific data of cellular elements, phytoconstituents and TLC fingerprints of Cambodian *Curcuma longa* L. and *Zingiber cassumunar* Roxb. These profiles exhibit significant roles in the areas of plant standardization and new drug isolation.

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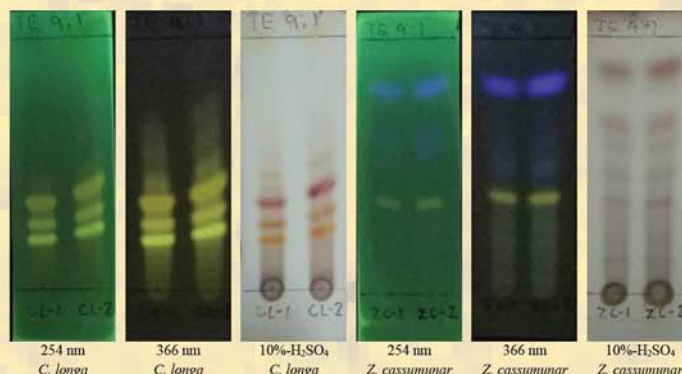


Figure 3: TLC analysis of methanolic extracts of rhizomes of *Curcuma longa* L. and *Zingiber cassumunar* Roxb. under the mobile phase of Toluene:Methanol (9:1). Note: TE = Toluene:Methanol. CL-1 = *Curcuma longa* 1; CL-2 = *Curcuma longa* 2; ZC-1 = *Zingiber cassumunar* 1; ZC-2 = *Zingiber cassumunar* 2