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# Capillary Liquid Chromatographic Fingerprint for Identification and Authentication of *Zingiber Montanum* from Its Related Species

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*Zingiber montanum* (ZM) is known as cassumunar ginger and in Indonesia it is locally known as *bangle*. The rhizome of ZM is known for its use in folk medicines to treat various diseases such as asthma, carminative, colic, diarrhea, stomachic, muscle and joint pain [1,2]. Some related species from the genus of *Zingiber* also available in local Indonesia market and could be potential adulterants for ZM such as *Z. americans* (ZA) and *Z. zerumbet* (ZZ). In Indonesia, ZA and ZZ are known as *lempuyang emprit* and *lempuyang gajah*, respectively, and they are also reported to have some similar use like ZM. These three rhizomes look similar in having a pale yellow color, the differences are found in their smell and the size of the rhizome. So physically, to differentiate them is not difficult but it will become challenging if they are present in powdered forms. Moreover, the price of ZM normally is higher than ZA and ZZ, thus ZA and ZZ are sometimes found as adulterants for ZM. Therefore, an accurate analytical method for the identification and authentication of ZM is crucial in order to prevent an adulteration and also to ensure the quality of herbal medicines that use ZM. Fingerprint analysis was recently introduced for this purpose. Identity and authenticity as a part of quality can be derived from fingerprint chromatograms. So far, fingerprint analysis is widely used as a feasible and useful method for species identification and authentication [3]. Since fingerprint chromatograms are complex and they represent the chemical characteristics of a sample, it will contain a large amount of data. To deal with it, we need the help from multivariate analysis. Multivariate analysis is used for data handling such as exploratory data analysis or pattern recognition to build an identification, authentication, or classification of the samples. In this study, we developed for the first time a fingerprint analysis using capillary liquid chromatography for identification and authentication of ZM. Fingerprint chromatograms of each sample were obtained by using C18 stationary phase with 60% acetonitrile used as the eluent and was supplied at flow rate 5 μL/min, and the detection was monitored at 254 nm. By comparing the fingerprint chromatograms of ZM, ZA and ZZ (Fig. **1**), we could identify and authenticate ZM samples using their marker peaks. Combination of the CLC fingerprint and multivariate analysis such as principal component analysis (PCA) and discriminant analysis (DA) also could differentiate them successfully. The result indicated that CLC fingerprint analysis was successfully applied for identification and authentication of ZM in combination with PCA and DA.

## REFERENCES

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