

UPLC-qTOF-MS profiling of pharmacologically important chlorogenic acids and associated glycosides in *Moringa ovalifolia* leaf extracts

C. Makita , L. Chimuka , E. Cukrowska , P.A. Steenkamp , M. Kandawa-Schutz , A.R. Ndhkala , N.E. Madala ,

a Molecular Sciences Institute, School of Chemistry, University of the Witwatersrand, P/B 3, 2050, Johannesburg, South Africa

b Department of Biochemistry, University of Johannesburg, P.O. Box 524, Auckland Park, 2006 Johannesburg, South Africa

c CSIR Biosciences, Natural Products and Agroprocessing Group, Pretoria 0001, South Africa

d School of Chemistry, University of Namibia, P/B 13301 Windhoek, Namibia

e Agricultural Research Council, Vegetable and Ornamental Plants (VOP), Private Bag X293, Pretoria 0001, South Africa

Keywords

Moringa ovalifolia ,UPLC-qTOF-MS, Chlorogenic acids, Dicafeoylquinic acids, p-Coumaroylquinic acids, Feruloylquinic acids, Caffeoylquinic acid glycosides

abstract

Moringa ovalifolia Dinter & A. Berger (Moringaceae) is a succulent-stemmed plant, endemic to the desert and semi-desert areas of central Namibia and southwestern Angola. Just like other species in the Moringaceae family, *M. ovalifolia* is believed to be rich in health-promoting phytochemicals. However, there are very limited scientific reports on the phytochemical composition and associated biological activities of this plant. Chlorogenic acids (CGAs), major phenolic compounds of *Moringa* species, have been shown to be effective natural remedies for the management of chronic ailments such as diabetes and cardiovascular diseases. Using a UPLC-ISCID-MS/MS method optimized to mimic the MSⁿ fragmentation of an ion trap-based MS but generating accurate mass data, various isomers of chlorogenic acids and their associated derivatives in the leaves of *M. ovalifolia* were profiled. *M. ovalifolia* was shown to contain cis and trans isomers of 3-acyl, 4-acyl and 5-acyl p-coumaroylquinic (pCoQA), caffeoylquinic (CQA) and feruloylquinic acids (FQA) (1–18), a single isomer of 3,5-diCQA (19), 3-CQA-glycoside (20) and two regional isomers of the (3' and 4') glycosides of 4-CQA (21, 22). To the best of our knowledge, this is the first report on the presence of these compounds in *M. ovalifolia*. The results of the current study confirmed the richness of an underutilized *M. ovalifolia* as a source of pharmacological relevant metabolites with potential medicinal applications.