Supercritical fluid extraction of tagitinin C from *Tithonia diversifolia*: Comparison of extraction yield and selectivity between supercritical fluid and classical methods of extraction

E. Ziémons[a *], E. Goffin [b], R. Lejeune[a], L. Angenot [b], L. Thunus [a]

[a]*Laboratory of Analytical Chemistry, Bioanalytical and Pharmaceutical Research Center, Institute of Pharmacy, University of Liège (ULg), CHU, Tour 4, Avenue de l'Hôpital 1, B-4000 Liège, Belgium ; Fax: +32 (4) 3664324 ; e-mail : eziemons@ulg.ac.be.

[b] Laboratory of Pharmacognosy, Natural and Synthetic Drugs Research Center, Institute of Pharmacy, University of Liège (ULg), CHU, Tour 4, Avenue de l'Hôpital 1, B-4000 Liège, Belgium.

Supercritical fluid extraction is known as efficient method for the extraction of non polar compounds from plant matrices. Carbon dioxide is the most widely used solvent for extraction of natural products for foods and medicines, under mild conditions. It is inert, inexpensive, odourless, tasteless and environment-friendly solvent. Further, there is no solvent residue in the extract, since it is a gas in the ambient condition

Tagitinin C, an active sesquiterpene lactone against *Plasmodium falciparum,* was extracted from the aerial parts of *Tithonia diversifolia* using supercritical carbon dioxide and was quantified by FTIR spectroscopy.

An experimental design was carried out to map the effects of pressure (at 20.3, 30.4 and 40.5 MPa) and temperature (at 40, 60 and 80 °C) on the extraction yield of the active component and to determine the optimal conditions for its extraction. The best conditions are met for a pressure of 35.0 MPa and a temperature of 67.8 °C. The addition of 1-3 % (v/v) methanol as modifier does not increase the extraction yield of tagitinin C.

The optimized supercritical fluid extraction was compared to Soxhlet extraction with dichloromethane (S) and to maceration followed by lixiviation with ether (ML). The results demonstrated that the optimized SFE is an effective and selective extraction method for tagitinin C. Soxhlet extraction with dichloromethane and maceration and lixiviation with ether gave similar extraction yields but the tagitinin C concentration in S extract (15.6% w/w) and in ML extract (30.7% w/w) was lower than that in the optimized SFE extract (52.8% w/w).

Under low conditions of pressure and temperature, unfavourable to the yield, a clear improvement of the purity of the SFE extract (70% w/w) was observed. In order to combine yield and selectivity, the particle size of the leaves powder must be lowered. So a particle size analysis by laser diffractometry was performed (size range 0.02-63, 63-125,125-250 μm).