Chemical and Biological Investigation of Certain Species Belonging to Genus *Cassia* Family (Caesalpiniaceae)

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To the memory of my dear father

Abdel Raouf Hafez Ali

And to my beloved mother

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Safaa

Table of Contents

List of Abbreviations

AcOH-6%	6% acetic acid
ANOVA	Analysis of variance
Ag NPs	Silver nanoparticles
AR	Aldose Reductase
AO	Acridine orange
ASP	Aspartate
^{13}C-NMR	Carbon-13 Nuclear Magnetic Resonance
CC	Column chromatography
CrI	Crystallinity index
CID	Collision-induced dissociation
d	Doublet
dd	Doublet of doublet
DMF	Dimethylformamide
DMSO-d_6	Deutrated Dimethylsulfoxide-d_6
DOX	Doxorubicin
eq.	Equatorial
ESI-MS	Electro-Spray Ionization Mass Spectrometry
ESI	Electrospray ionization
ELISA	Enzyme linked immunosorbent assay
EB	Ethidium bromide
FTIR	Fourier-transform infrared spectroscopy
FTMS	Fourier transform MS
FBS	Fetal bovine serum
GLU	Glutamine
HepG2	Hepatocellular carcinoma cell line
^{1}H-NMR	Proton Nuclear Magnetic Resonance
HPLC	High-performance liquid chromatography
HESI	Heated electrospray ion source
HR	High resolution
IC_{50}	Inhibitory concentration by 50 %.
***J* value**	Coupling constant
LYS	Lysine
LEU	Leucine

LIT	Linear ion trap
MIC	Minimum inhibitory concentration
MS	Mass spectrometry
MCF-7	Human breast adenocarcinoma cell line
MPa	Megapascal
MF	Molecular formula
MSn	Tandem mass spectra
NMR	Nuclear Magnetic Resonance Spectrometer
NCC	Nano crystals cellulose
PC	Paper Chromatography
PDB	Protein data bank
PDA	Photodiode-array
PHE	phenylalanine
q	quartet
$\mathbf{R_f}$	Retardation factor
$\mathbf{R_t}$	Retention time
RP	Reversed phase
s	singlet
SEM	Scanning electron microscopy
SPR	Surface plasmon resonance
SER	Serine
t	triplet
TLC	Thin Layer Chromatography
TEM	Transmission Electron Microscope
UV	Ultraviolet
UHPLC-MS	Ultra-high performance liquid chromatographtandem mass spectrometry
XRD	X-ray diffraction
2D-PC	Two dimensional paper chromatography

LIST OF FIGURES

List of Tables

Introduction

Since ancient times, several societies have resorted to nature, mainly to plants as medical and health sources. Today, a great percentage of the world population, in particular in developing countries, uses plants for facing primary needs of medical assistance (Tene *et al.*, 2007).

Family Leguminosae is one of the largest families of the flowering plants. It comprises about 650 genera and 18000 species (Hu *et al.*, 2000). The family is divided into three sub-families: Caesalpinioideae, Papilionoideae and Mimosoideae. These sub-families are now treated as independent families due to their large size and named, Caesalpiniaceae, Papilionaceae, and Mimosaceae (Gledhill, 2008). The name Caesalpinioideae is derived from the generic name *Caesalpinia*. The Caesalpinioideae are mainly trees distributed in the moist tropical areas.

Caesalpinacae represents approximately 11% of the known legume flora, with 152 genera and 2800 species (Willis, 1973).

The members of this family are characterized by the legume type of fruits (pods), in which the seeds are housed. They are distributed throughout the world in almost all habitats; however the greatest diversity of the legumes is in the tropical and subtropical areas (Ali *et al.*, 2001).

Phenolic compounds are commonly found in both edible and non-edible plants of family Leguminosae and they have been reported to have multiple biological effects. The flavonoids and other phenolics