CHAPTER 2

LITERATURE SURVEY

1. “Estimation and Characterization of Flavonoids in Two Different Forma of Ocimum Tenuiflorum L.”,2014

The main objective of these research work is to isolate and characterize flavonoid extracted from leaves of two different forma of O. tenuiflorum using UPLC ESI MS. Total flavonoid content was found to be 547 and 251.1 mg/gm dry wt. in red and green forma respectively. Seven flavonoids were identified in the red forma of tulsi and six in green forma using UPLC –ESI MS but their concentrations differ in two forma. Comparision of feature extraction by image processing with flavonoids by spectral analysis is better than the existing system.

2 **COMPARATIVE STUDIES ON PHENOLIC CONTENT, FLAVONOID CONTENT AND ANTIOXIDANT ACTIVITY IN SELECTED SPECIES OF *OCIMUM* FROM CENTRAL REGION OF GUJARAT,2017**

In the existing system comparative studies on phenolic content, flavonids content and antioxidant activity of selected species of *Ocimum*. Crude methanolic extract of dried leaves of selected species viz., *Ocimum basilicum* L., *O. gratissimum* L. and *O. sanctum*  crude was determined using qualitative analysis. Methanolic leaves extracts of selected species of *Ocimum* showed phytochemical constituents and antioxidant activity were found to be present in good quantity. Among the tested species of *Ocimum*, maximum potential in terms of phytochemicals constituents was showed by *Ocimum gratissimum* L. In the existing system flavonoid content are found after comparing spectral analysis of flavonoid with the image processing of the leaves which gives accurate results.

3. **Estimation and Characterization of Flavonoids in two Different Forma of Ocimum**

**Tenuiflorum L. Estimation and Characterization of Flavonoids in Two Different Forma of Ocimum Tenuiflorum L.,2014**

In the existing system the research work was to isolate and

characterize flavonoid extracted from leaves of two different

forms of O. tenuiflorum using UPLC ESI MS. Isolation of flavonoids is done for Krishna tulsi and laxmi tulsi. Number of samples per species taken was less than 5 which will not give accurate values. And the extraction was found for sun dried leaves which leads to missing of some properties fromm the leaves. But in the current system 15 samples of each are taken and flavonoids were extracted from the leaves where the results obtained are accurate comparing to the existing system.

**4.Isolation and Identification of Flavonoid Fractions from the Leaves of Volkameria inermis and its In-vitro Cytotoxic Study,2016**

The existing system was to optimize the solvent for the isolation of flavonoid fractions and identification of flavonoid components through HPTLC and HPLC techniques and it’s in vitro cytotoxic study against Ehrlich Ascites Carcinoma (EAC) cell lines. In vitro cytotoxic assay tryphan blue dye exclusion was carried out against EAC cell lines. The results revealed that ethyl acetate was found as the best solvent for the isolation of flavonoid fractions and several kinds of flavonoids such as quercetin and kaempferol were found as the major flavonols in this plant. In the current study methanol solvent was used in soxlet apparatus for compound extraction in tulsi leaves and for filtering flavonoid which yielded accurate results.

<http://impactfactor.org/PDF/IJPCR/8/IJPCR,Vol8,Issue12,Article16.pdf>

# 5. Extraction and isolation of flavonoid quercetin from the leaves of Trigonella foenum-graecum and their anti-oxidant activity,2016

The existing study was designed for isolation of bioactive flavonoid molecule quercetin from the leaves of Trigonella foenum-graecum and their subsequent characterization. Crude extracts of fenugreek were prepared using various solvents such as hexane, ethyl acetate, and ethanol. The plant extracts were subjected for photochemical analysis and total flavonoid content. The extracts were then subjected to column chromatography followed by TLC. The isolated compound was subjected to FT-IR,1H NMR,13C NMR, mass spectroscopy and their free radical scavenging activity was studied. The ethanol extract showed the presence of higher flavonoid content when compared with other solvent extracts. The ethanol extract was subjected to fractionalization by column chromatography. The characterization techniques confirmed that the isolated compound was found to be quercetin.

<https://www.researchgate.net/publication/304952382_Extraction_and_isolation_of_flavonoid_quercetin_from_the_leaves_of_Trigonella_foenum-graecum_and_their_anti-oxidant_activity>

# 6. [Extraction and Antioxidant Activity of Flavonoids from Seed Coat of *Borassus flabellifer* Linn using Orthogonal Array (L16(4^4))](http://www.ijpsonline.com/articles/extraction-and-antioxidant-activity-of-flavonoids-from-seed-coat-of-iborassus-flabelliferi-linn-using-orthogonal-array-l1644-3428.html)

This current study was at optimizing the conditions required for maximal extraction of flavonoids from the seed coat of Borassus flabellifer and to evaluate antioxidant properties. Initially, the parameters like time, temperature, solvent concentration and material ratio were optimized using orthogonal design of experiments. Temperature was found to play a significant role in the maximum extraction of flavonoids and the optimum conditions were found to be 85°, 3 h, 70 % aqueous-ethanol and 1:20 material ratio. The crude samples were tested for antioxidant activity using the 1,1-diphenyl-2-picrylhydrazyl radical scavenging assay. Percent inhibition of the 1,1-diphenyl-2-picrylhydrazyl radical was found highest (95 %) at 50 μg/ml concentration of the extract of seed coat of B. flabellifer. Flavonoids were then purified using preparative thin layer chromatography. The purified sample did not reveal significant antioxidant activities.

<http://www.ijpsonline.com/articles/extraction-and-antioxidant-activity-of-flavonoids-from-seed-coat-of-iborassus-flabelliferi-linn-using-orthogonal-array-l1644-3428.html>

## 7. Extraction, isolation and identification of flavonoid from Euphorbia neriifolia leaves,2017

In the existing system [flavonoids](https://www.sciencedirect.com/topics/chemistry/flavonoid) contained in Euphorbia neriifolia leaves were extracted, identified and characterized. Direct and sequential soxhlet extraction and its concentrated fractions were subjected to thin layer chromatography and high performance thin layer chromatography. The results showed that maximum yield of the flavonoid (6.53 g) was obtained from ethanolic extract. The Rf value of isolated flavonoid and phytochemical screening has been compared with standard [Quercetin](https://www.sciencedirect.com/topics/chemistry/quercetin). Characterization of isolated flavonoid was done by IR, 1H NMR, and MS. On the basis of chemical and [spectral analysis](https://www.sciencedirect.com/topics/chemistry/spectral-analysis) structure was elucidated as 2-(3,4-dihydroxy-5-methoxy-phenyl)-3,5-dihydroxy-6,7-dimethoxychromen-4-one, a flavonoid. This compound was isolated for the first time from this plant.

<https://www.sciencedirect.com/science/article/pii/S1878535214001816>

# 8. Isolation and Identification of Flavonoids,2016

In the existing system flavonoids and their conjugates form a very large group of natural products were found in many plant tissues, where they are present inside the cells or on the surfaces of different plant organs. The chemical structures of this class of compounds are based on a C6-C3-C6 skeleton. They differ in the saturation of the heteroatomic ring C, in the placement of the aromatic ring B at the positions C-2 or C-3 of ring C, and in the overall hydroxylation patterns (Figure 2.1). The flavonoids may be modified by hydroxylation, methoxylation, or O-glycosylation of hydroxyl groups as well as C-glycosylation directly to carbon atom of the flavonoid skeleton. In addition, alkyl groups (often prenyls) may be covalently attached to the flavonoid moieties, and sometimes additional rings are condensed to the basic skeleton of the flavonoid core. The last modification takes place most often in the case of isoflavonoids, where the B ring is condensed to the C-3 carbon atom of the skeleton. Flavonoid glycosides are frequently acylated with aliphatic or aromatic acid molecules. These derivatives are thermally labile and their isolation and further purification without partial degradation is difficult. The multiplicity of possible this class were known in the end of the last century and this number continues to increase (Harborne and Williams, 2000). Condensed tannins create a special group of flavonoid compounds formed by polymeric compounds built of flavan-3-ol units, and their molecular weights often exceeding 1,000 Da. In the plant kingdom, different plant families have characteristic patterns of flavonoids and their conjugates. All these compounds play important biochemical and physiological roles in the various cell types or organs (seed, root, MACIEJ STOBIECKI AND PIOTR KACHLICKI modifications of flavonoids result in more than 6,000 different compounds from green part, fruit) where they accumulate. Different classes of flavonoids and their conjugates have numerous functions during the interactions of plant with the environment, both in biotic and abiotic stress conditions (Dixon and Paiva, 1995; Shirley, 1996). Additionally, flavonoid conjugates, because of their common presence in plants, are important components of human and animal diet. Due to the different biological activities of plant secondary metabolites, their regular consumption may have serious consequences for health, both positive and negative (Beck et al., 2003; Le March, 2002; Boue et al., 2003; Fritz et al., 2003; Nestel, 2003). For the mentioned reasons, methods for the efficient and reproducible analysis of flavonoids play a crucial role in research conducted in different fields of the biological and medical sciences. © 2006 Springer Science+Business Media, Inc. All rights reserved.

9. Isolation and Purification of Flavonoids from the Leaves of Mitracarpushirtus Plant.,2015

Abstract: n- Hexane defatted leaf of Mitracarpushirtus was extracted with Methanol. The extracts were screened for the active components present. The N-hexane extract showed the presence of Flavonoids, Alkaloids, Saponin, Tannin, Glycoside, Anthraquinone, Resins and Steroids while the Methanolic extract showed the presence of Flavonoids, Saponin and Tannin. Methanolic extract (6g) was chromatographed. The flavonoid fraction was isolated using Column Chromatography over Silica gel Column (230-400 mesh) and eluted with the solvent mixture of CH3C1/CH3OH/H2O in the ratio (70:30:1 V/V). The Flavonoid fraction collected was purified using re-crystallization method and a yield of 17.90% was obtained. Key Word: Isolation, Flavonoids, Mitracarpushirtus

10. Extraction and Isolation of Flavonoids Present in the Methanolic Extract of Leaves of Acanthospermum HispidiumDc,2013

The leaves of Acanthospermum hispidium dc was extracted with polar and non-polar solvents. The active components (.i.e. flavonoids) were found in methanol, chloroform, ethyl acetate and n-butanol while methanol, chloroform, ethylacetate and n-butanol contained steroids. From the chromatographic analysis, it was observed that the component 1and 2 have RF values of 0.61 and 0.48. The identification of the components and the specific absorption band were determined by spectroscopic analysis. In this paper we shall extract and isolate flavonoids present in the methanolic leaf extract of Acanthospermum hispidium DC

<http://www.aensiweb.com/old/GJMPR/2013/111-123.pdf>

11. Optimization of the Extraction of Flavonoids Compounds from Herbal Material using Experimental Design and Multi-response Analysis,2007

SUMMARY. Statistical analysis such as experimental design, regression and multi-response analyses are powerful tools for the characterization and optimization of the pharmaceutical process by studying the effects of variables affecting them and their possible interactions. In this paper, these analyses were detailed presented during the development and optimization of a process for the extraction of flavonoid compounds (active markers) from Bauhinia forficata Link leaves by hydro-ethanolic solutions. The results permitted the determination of the variables affecting the extraction process and allowed the determination of the best conditions for the extraction of active compounds from the leaves of Bauhinia forficata Link. RESUMEN. “Optimización de la Extracción de Flavonoides de Hierbas empleando Diseño Experimental y Análisis Multi-respuesta”. El análisis estadístico, así como el diseño experimental, el análisis de regresión y el análisis multi-respuesta son potentes herramientas para la caracterización y la optimización de los procesos farmacéuticos, permitindo el estudio de los efectos de variables que afectan el proceso y sus posibles interacciones. En este trabajo, los métodos estadísticos fueron utilizados en el desarrollo y la optimizacion del proceso de extracción de los compuestos flavonoides (marcadores activos) de hojas de Bauhinia forficata Link por soluciones etanol:agua. Los resultados permitieron la determinación de las variables que afectan el proceso de extracción y de las mejores condiciones para la extracción de compuestos activos de las hojas de Bauhinia forficata Link.

<http://www.latamjpharm.org/trabajos/26/5/LAJOP_26_5_1_6_UZB1B52YFH.pdf>

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