

RESEARCH ARTICLE

Estimation of Gallic acid, Rutin and Quercetin in *Portulaca quadrifida* L. – A potential wild edible plant by HPTLC method

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Manuscript details:	ABSTRACT
<p>Received: 08.02.2016 Revised: 05.03.2016 Accepted :15.03.2016 Published : 11.04.2016</p> <p>Editor: Dr. Arvind Chavhan</p> <p>Cite this article as: Marathe Vishal R and Umate Satish K (2016) Estimation of Gallic acid, Rutin and Quercetin in <i>Portulaca quadrifida</i> L. – A potential wild edible plant by HPTLC method. <i>International J. of Life Sciences</i>, 4(1): 83-88.</p> <p>Acknowledgement The authors thankful to Dr. D. U. Gawai, Principal, NES Science College, Nanded for providing laboratory facilities and Dr. D. M. Jadhav, prof in-charge of Central Instrumentation Laboratory, for HPTLC facility.</p> <p>Copyright: © 2016 Author(s), This is an open access article under the terms of the Creative Commons Attribution-Non-Commercial - No Derivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.</p>	<p>HPTLC method was developed for the quantitative estimation of gallic acid, rutin and quercetin from methanolic extract of <i>Portulaca quadrifida</i> L. a potential wild edible plant. Precoated silica gel GF₂₅₄ used as stationary phase and mobile phase for gallic acid was Toulene: Formic acid: Ethyl acetate: Methanol [3:3:8:2, V/V/V/V] and Mobile phase for rutin and quercetin was Ethyl Acetate: Formic acid: Glacial Acetic acid: Water [10:0.5:0.5:1.3, V/V/V/V]. Detection and quantification were performed densitometrically at wavelength λ 254. The R_f values of gallic acid, rutin and quercetin are 0.41, 0.19 and 0.94 respectively. The total peak areas of the standards (gallic acid, rutin and quercetin) and the corresponding peak areas of extract were compared and the gallic acid, rutin and quercetin content were estimated to be 790.9, 2029.7 and 4326.0.</p> <p>Keywords: HPTLC, Nutraceuticals, <i>Portulaca quadrifida</i> Wild Edible Plant</p>
	<p>INTRODUCTION</p> <p><i>Portulaca quadrifida</i> L. is a small diffused, succulent annual herb found throughout the tropical part of India. It is said to be useful in asthma, cough, urinary discharges, inflammations, and ulcers, abdominal complaints (Kirtikar and Basu, 2001). It has been reported to possess antifungal activity (Hoffman <i>et al.</i>, 2004). Plant shows anti-diabetic properties (Khatun <i>et al.</i>, 2015). Fresh leaves of <i>P. quadrifida</i> slightly wormed and applied topically in joint swelling (Abbasi <i>et al.</i>, 2013), It shows depressant effect of ethanolic extract on CNS (Syed <i>et al.</i>, 2010). The leaves and tender shoots of plant are cooked as vegetables by tribal and local peoples in Maharashtra and rest part of India (Reddy 2012; Naik 1998; Raphel and Britto 2015).</p> <p>Wild edible plants play a very important role in the diet of tribal communities. They are major source of food for tribals of forest areas. Edible parts of wild plants are promising gift of nature to mankind, these are not only delicious and refreshing but also the chief source of vitamins, minerals, proteins and other nutrients.</p>

'Nutraceutical' the term coined in 1979 by Stephan De Felice. It is designed as a food or parts of food that provide medical or health benefits, including the prevention and treatment of disease (De Felice 1992). Nutraceutical may range from isolated nutrients, dietary supplements, herbal products and processed products. Nutraceutical play important role in physiological benefits or provide protection against the diseases (Rajsekaran *et al.*, 2008).

The major nutraceutical ingredients in plant are phenolic compounds mainly Flavonoids (Tapas *et al.*, 2008). Gallic acid (3, 4, 5,-tryhydroxybenzoic acid) is naturally occurring polyphenolic compounds posses astringent, antioxidative, antimicrobial activity (Prince *et al.*, 2009, Urizzi *et al.*, 1999, Verma *et al.*, 2013). They also constitute an unavoidable component of the diet. Rutin and quercetin are phenolic compounds exhibit antiulcer, anti-inflammatory, antioxidant, antimicrobial, antiallergic activity (Agnes *et al.*, 2008, Maalik *et al.*, 2014, Gupta *et al.*, 2014, Singh and Bilashini 2015). They have shown regulatory activity of hormones such as transport, metabolism and action of thyroid harmones (Ashok *et al.*,2010).

High performance thin layer chromatography (HPTLC) has emerged as an useful analytical method for qualitative and quantitative estimation of chemical constituents present in plant materials (Sethi, 1996). Present study deals with estimation of important nutraceuticals and antioxidants like gallic acid, quercetin and rutin in *Portulaca quadrifida* L. by HPTLC method.

MATERIAL AND METHODS

Preparation of extract

The aerial part of wild edible plant *Portulaca quadrifida* L. were collected from different parts of Nanded district. The plant was identified and authenticated. Edible part of plants were dried and made into coarse powder and stored in sealed container. Powder then extracted with methanol by Soxhlet apparatus and concentrated.

Reagents and other materials

Gallic acid, rutin and quercetin [Sigma Aldrich] toluene, formic acid, ethyl acetate, methanol, glacial acetic acid, [all reagents of analytical grade, E-Merck] and silica gel F₂₅₄ TLC aluminium plates [E-Merck].

Preparation of standard and sample solutions

Gallic acid, rutin and quercetin 10mg were accurately weighed into 10mL volumetric flask dissolved in 10 mL of methanol [1mg/mL]. The 100 mg of extract was dissolved in methanol [10mL] then solution was filtered through whattman filter paper No. 42.

Development of HPTLC Technique

The sample were spotted in the form of bands with micro litre syringe on pre-coated silica gel plates F₂₅₄ [10 cm x 10 cm with 0.2 mm thickness] using CAMAG Linomat 5 applicator automatic sample spotter of band width 6mm. The plates were developed in a solvent system in CAMAG glass twin through chamber previously saturated with the solvent for 30 min. The distance was 8 cm subsequent to the scanning, TLC plates were air dried and scanning was performed on a CAMAG TLC Scanner in absorbance at 254 nm and operated with win CATS Planar chromatography Manager.

Gallic acid estimation in *P. quadrifida* L.

Stationary phase- silica gel F₂₅₄ plates, Mobile phase- Toluene: Ethyl acetate: Formic acid: Methanol [3:3:8:2 v/v/v/v/v], standard Gallic acid 1 mg/ml [5 µl], sample Methanol extract 10mg/ml [10 µl], Migration distance 80 mm, scanning wavelength 254 mm, Mode of scanning Absorption [deuterium].

Rutin and Quercetin estimation in *P. quadrifida* L.

Stationary phase- silica gel F₂₅₄ plates, Mobile phase- Ethyl acetate: Formic acid: Glacial acetic acid: Water [10:0.5:0.5:1.3 v/v/v/v/v], standard Rutin and Quercetin 1 mg/ml [5 µl], sample Methanol extract 10mg/ml [10 µl], Migration distance 80 mm, scanning wavelength 254 mm, Mode of scanning Absorption [deuterium].

RESULTS AND DISCUSSION

The R_f value of standard gallic acid was found to be 0.39 and the peak area 18780.5 [fig. 1]. Methanolic extract of *P. quadrifida* L. showed seven peaks [fig.2], the third peak R_f value 0.41 was coinciding with standard R_f values and its peak area was 790.9. The R_f values of standard rutin and quercetin was found to be 0.14 and 0.92 and peak area was 16522.0 and 8088.1 respectively [fig.3, 4]. Methanolic extract of plant showed eight peaks the third and seventh peaks of R_f values 0.19 and 0.94 was coinciding with standard R_f value, peak area was found 2029.7 for rutin and 4326.0 for quercetin [fig.5].

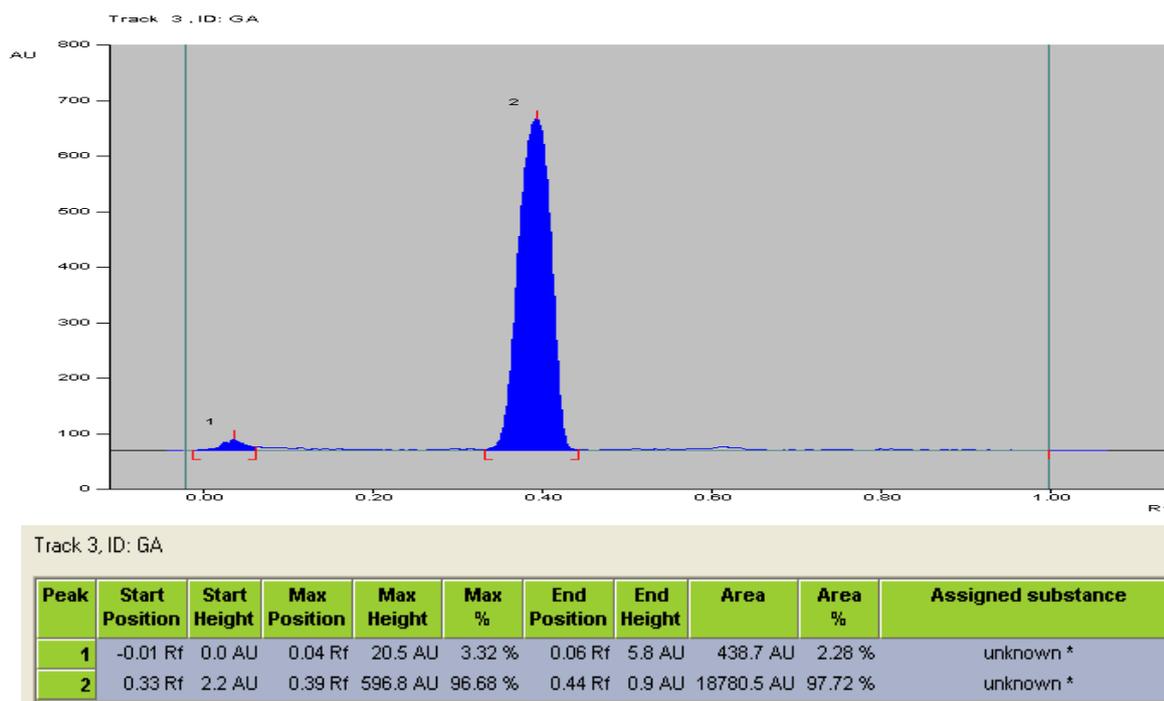


Figure 1: HPTLC Profile for Gallic acid standard

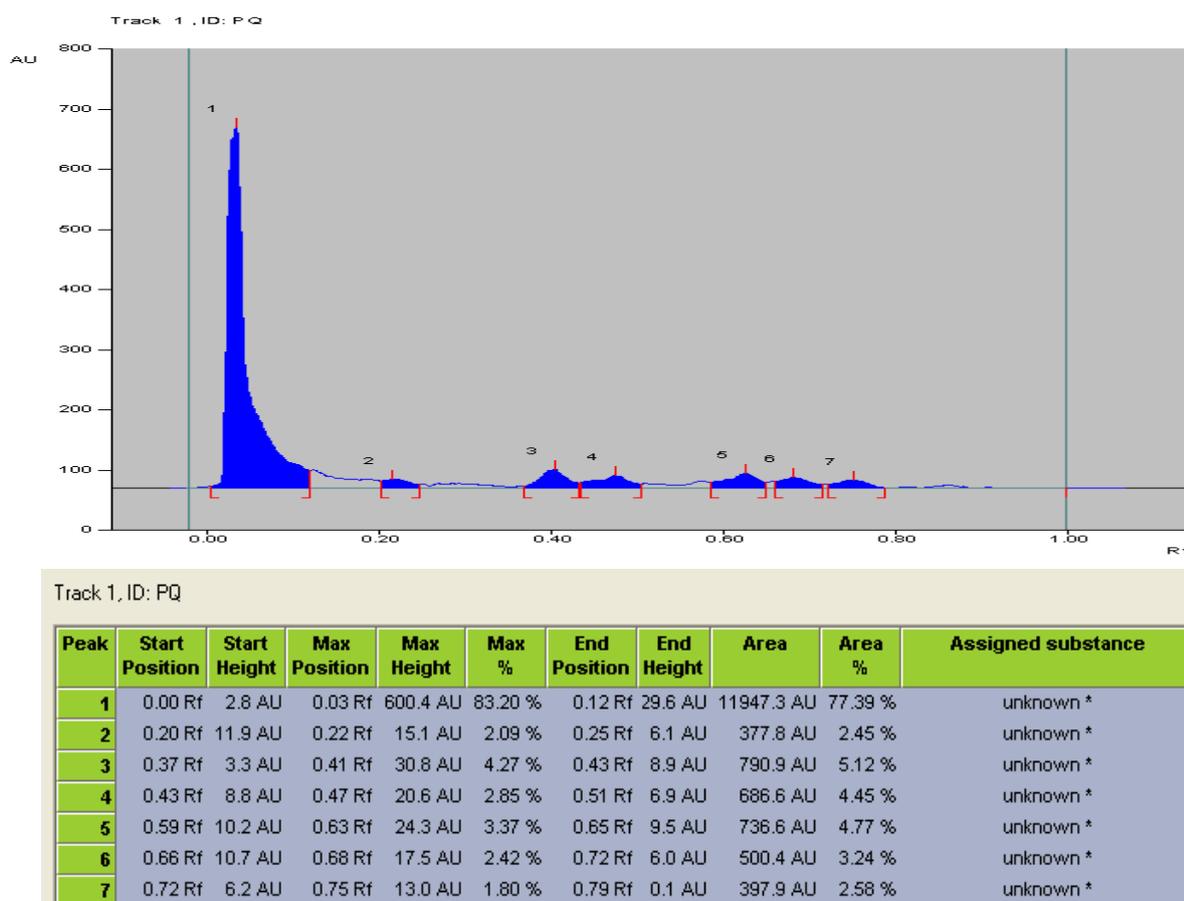


Figure 2: HPTLC Profile for MeOH Extract of *P. quadrifida* L.

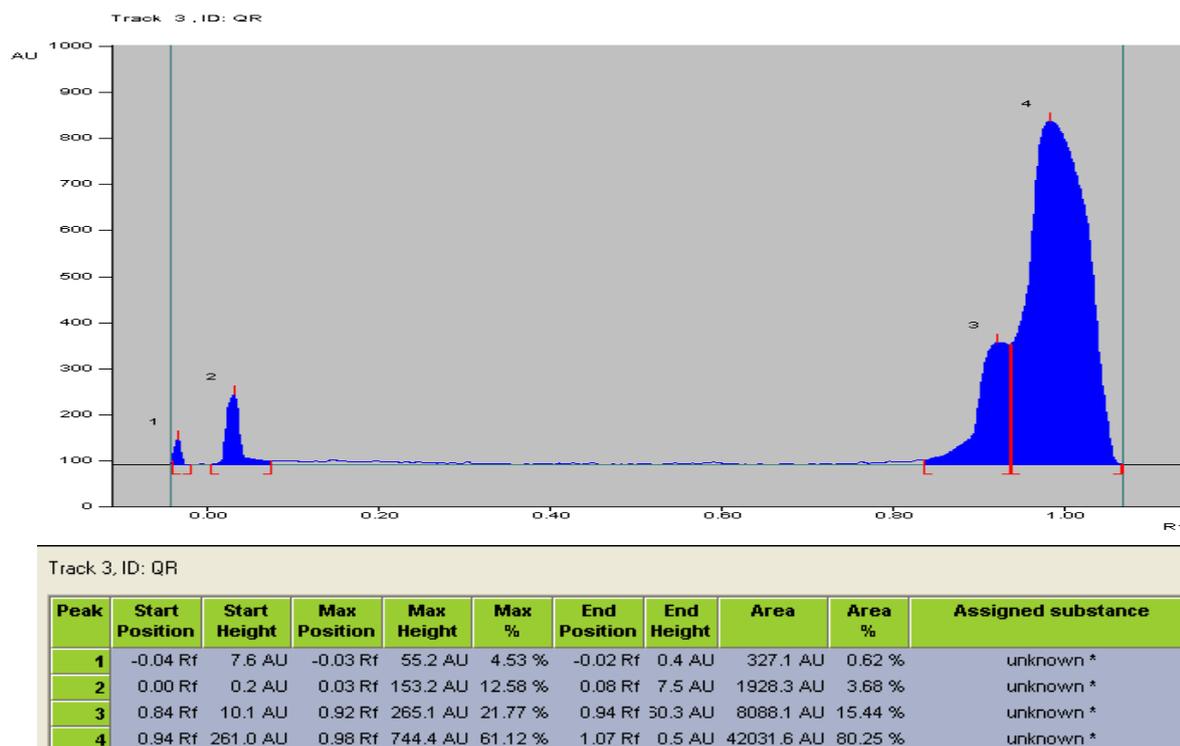


Figure 3: HPTLC Profile for Quercetin standard

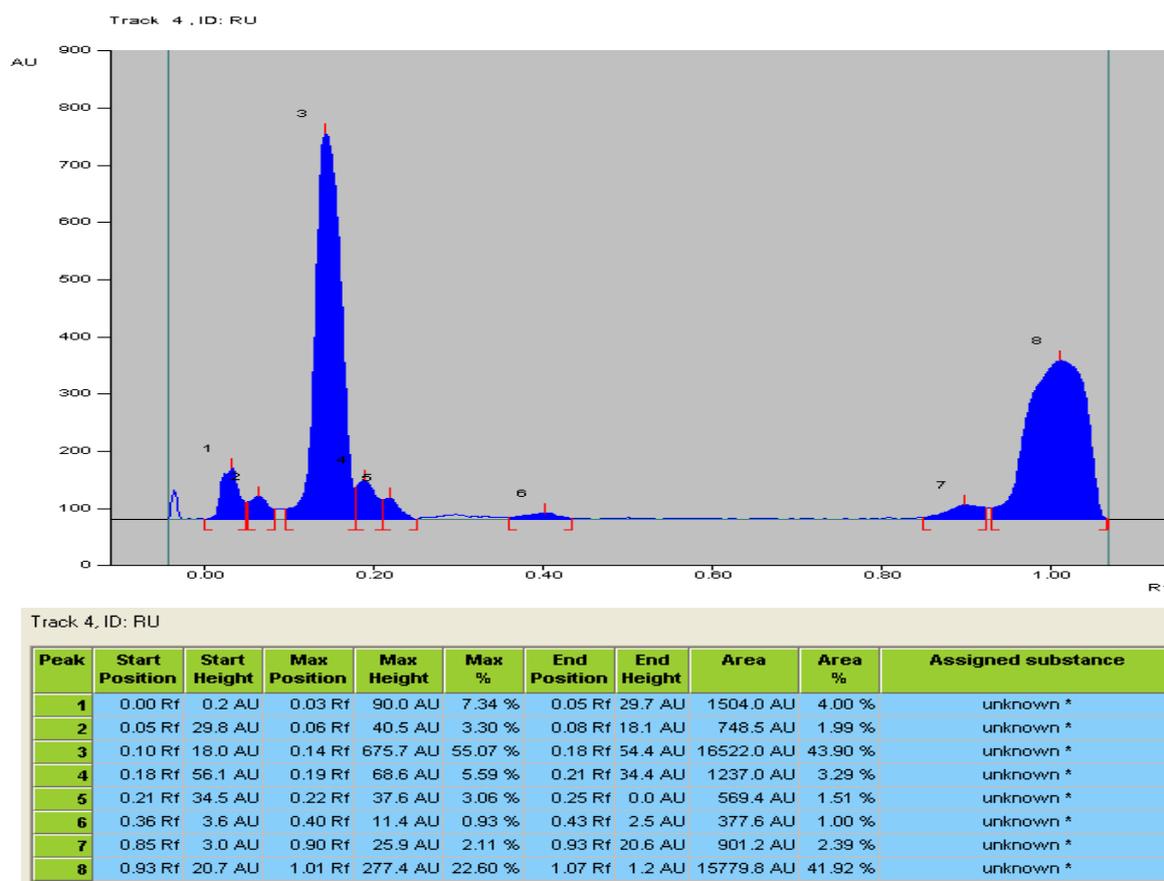


Figure 4: HPTLC Profile for Rutin standard

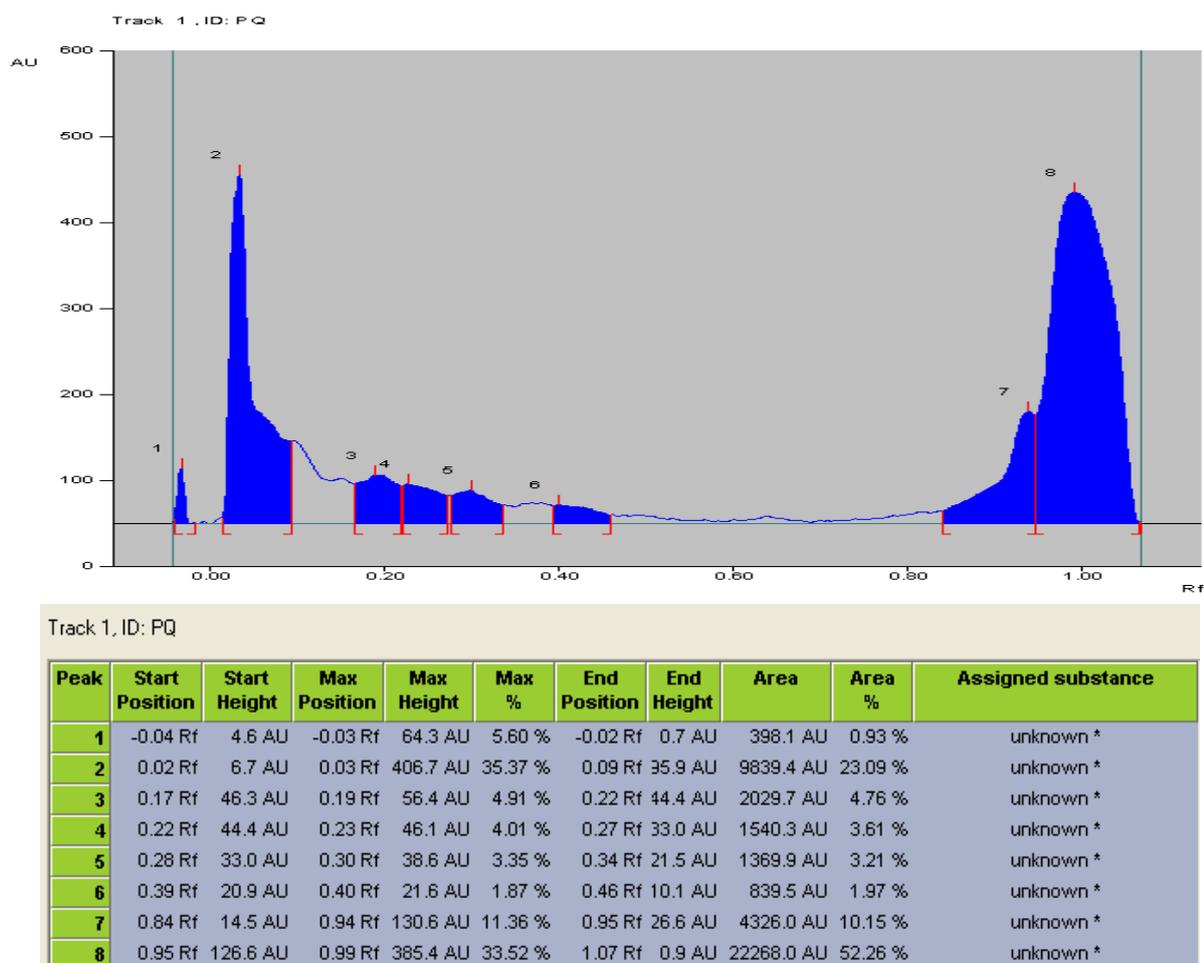


Figure 5: HPTLC Profile for MeOH Extract of *P. quadrifida* L.

CONCLUSION

HPTLC Analysis of *P. quadrifida* shows good concentration of gallic acid, quercetin and rutin which proves its antioxidant nature. The results of present study support its edible nature and it could be potential source of nutraceutical and natural antioxidant.

REFERENCES

- Abbasi AR, Khan MA, Shah MH, Shah MM, Parvez A and Ahemad M (2013) Ethanobotanical appraisal and cultural values of medicinally important wild vegetables of lesser Himalayas-Pakistan.: *J. Of ethnobotany and ethnomedicine* 9: 66.
- Agnes WB, Guido RMM, Haenen, AaltBast (2008) Health Effects of Quercetin: From Antioxidant to Nutraceutical: *Euro.J. Of Pharmaco.* 585, 325-337.
- Ashok Kumar, Lakshman K, Jayaveera KN, Mani Tripathi SN and Satish KV (2010) Estimation of Gallic acid, Quercetin and Rutin in *Terminalia chebula* by HPTLC. *Jordan J. Of Pharmaceutical Sci.*, Vol.3, No.1, 63-67.
- De Felice SL (1992) Nutraceuticals: Opportunities in an emerging market., *Scrip. Mag.*: 9.
- Gupta N, Chauhan RS, Pradhan JK (2014) Rutin: A Bioactive Flavonoids; *Handbook of Medicinal Plants and Their Bioactive Compounds*, 51-57.
- Hoffman BR, DelasAtlas H, Bianco K, Wiederhold N, Lewis RE, Williams L (2004) Screening of antibacterial and antifungal activities of ten medicinal plants from Ghana. *Pharmaceutical Biolog*, 42 (1): 13-17.
- Khatun M, Shariful H, Md. Abdul H, Sheikh NI (2015) Medicinal value of some edible leafy vegetables from Bangladesh. *World Journal of Pharmaceutical Research*. 4 (2): 139-151.
- Kirtikar VR and Basu BD, 2001. *Indian Medicinal plants*, IInd edition, Vol. 6, Prakashan publications, Mumbai; 1447.
- Maalik A, Khan FA, Amara Mumtaz, Adeem Mehmood, Saira Azhar, Muhammad A, Sabiha Karim, YasirAltaf and Imran Tariq (2014) Pharmacological applications of Quercetin and its derivatives: A Short Review. *Tropical J. of Pharma. Res.* 13(9):1561-1566.

- Naik VN (1998) The Flora of Marathwada Vol. I and Vol. II, Amrut Prakashan, Aurangabad, M.S. (India).
- Prince PSM, Priscilla H, Devika PT (2009) Gallic acid prevents lysosomal damage in isoproterenol induced cardiotoxicity in Wistar rats. *Eur. J. Pharmacol.* 615(1):139-143.
- Rajasekaran A, Sivagnanam G, Xavier R (2008) Nutraceuticals as therapeutic agents: A Review, *Research Journal pharm. and tech*, 1(4), 328-340.
- Raphael RM and Britto JS (2015) Medicinal properties of edible weeds of crop fields and wild edible plants eaten by Oraon tribals of Letehar District, Jharkhand, *International Journal of lifesci. And pharma. Re.* 5(2): 9-20.
- Reddy BM (2012) Wild Edible Plants of Chandrapur district, Maharashtra, India, *Indian Journal of Natural Products and resources*, 3(1):110-117.
- Sethi PD (1996) HPTLC, CBS Publishers and distributors 1st edition, New Delhi, 39.
- Singh S, Mayanglambam BD (2015) Vegetables as a potential source of Nutraceuticals and phytochemicals: A Review; *Int. J. Of Medicin and Pharmace. Sci.*; 5(2), 1-14.
- Syed KM, Ahmed LD and Paramjyothi S (2010) Neuropharmacological effects of ethanolic extract of *Portulaca quadrifolia* Linn. In mice, *Int. J. of pharma Res.* 2(2): 1386-1390.
- Tapas AR, Sakarkar DM, Kakde RB (2008) Flavonoids as Nutraceuticals: A Review; *Tropical Journal of pharmaceutical Research*, 7(3): 1089-1099.
- Urizzi P, Monje MC, Souchard JP, Abella A, Chalas J, Lindenbaum A, Vergnes L, Labidalle S, Nepveu F (1999) Antioxidant activity of phenolic acid and esters present in red wine on human low density lipoproteins. *J Chem. Phys.* 96:110-115.
- Verma S, Singh A, Mishra A (2013) Gallic acid: Molecular rival of cancer, *Environ. Toxicol. Pharma J.*, 35(3): 473-485.