₹ 200 ISSN - 2249-555X
Volume : 1 Issue : 9 June 2012

Journal for All Subjects

www.ijar.in

Listed in International ISSN Directory, Paris.

ISSN - 2249-555X

Indian Journal of Applied Research

Journal for All Subjects

Editor,
Indian Journal Of Applied Research
8-A, Banans, Opp. SLU Girls College, New Congres Bhavan, Paldi,
Ahmedabad-380006, Gujarat, INDIA
Contact.: +91-9824097643 E-mail : editor@ijar.in

INDEX

Sr. No.	Title	Author	Subject	Page No.
1	Cost of capital: an empirical case study of hindustan unilever limited	Dr. Vinod K. Ramani	Accountancy	1-2
2	Self Revolution	Mohanapriya.P	Arts	3-4
3	Wound healing activity of Cestrum elegans	V. Subhaa, Dr. D. Sukumarb, Dr. V. Elangoc	Chemistry	5-6
4	Anti Bacterial Activity of Apigenin 7-0-(6"caffeoyl) neohesperidoside from chrysanthemum indicum	M.Jerome Rozario, Dr.A.John Merina, Dr.V.Srinivasana	Chemistry	7-10
5	Adsorption Studies of Cu (II) and Cr (VI) from metal solution using crosslinked chitosan-g-acrylonitrile copolymer	Shankar.P, Gomathi T., Vijayalakshmi.K, Sudha P.N	Chemistry	11-13
6	An Insight into Derivative Markets: Indian Perspective	Dr. C.Shobha, Dr. T. Hanumantha raya	Commerce	14-16
7	Vision and Planning	Dr. J. K Sehgal	Commerce	17-18
8	An Analytical Study of Employee's Productivity in Some Selected Nationalized Banks of India	Dr. Jyotindra M. Jani, Manish B. Raval	Commerce	19-20
9	New Products of Tourism in India	Dr. M. K. Maru	Commerce	21-22
10	Inventory Management in Sugar Mills - A Comparative Study	Promila	Commerce	23-25
11	Price -Mix Straregy of Jammu and Kashmir Co-Operatives Supply and Marketing Federation Limited in Jammu District of J&K State	Tarsem Lal	Commerce	26-28
12	Warehouse Management Information System: A New Perspective in Supply Chain Management	Dr. Vipul Chalotra	Commerce	29-30
13	A Study on Consumer Satisfaction of Aavin Milk in Salem City	Dr.A.Vinayagamoorthy, Mrs. M.Sangeetha, C.Sankar	Commerce	31-33
14	Hybrid Attribute Selection Process for Decision Tree Based Classification Algorithms	Mr. A. Jebamalai Robinson, Mrs. S. C. Punitha, Dr. P. Ranjit Jeba Thangaiah	Computer Science	34-36
15	Visualizing the validation of UML diagrams	Lavleen Kambow	Computer Science	37-38
16	Effectiveness of coconut palm insurance scheme in the coastal belts of India-A SWOT analysis	Prof. (Dr.) D. Rajasenan, Bijith George Abraham	Economics	39-41
17	An Analysis of the Efficiency of Selected Public and Private Banks in India during 2005-2011	Dr.Dinesh Kumar, Sanjeev	Economics	42-44
18	Measurement of Emotional Development of the Students	Dr. Nivedita K. Deshmukh	Education	45-46
19	A comparative study of effect of method of lecture and dramatization of Marathi teaching	Dr. Nivedita K. Deshmukh	Education	47-48
20	Peer pressure-problems and solutions	V.Vaithyanathan, Dr.P.Sivakumar	Education	49-50
21	Language Anxiety In Indian L2 Learners: Male or Female Learners - Who Scores High?	S. Gandhimathi, Dr.R.Ganesan	Education	51-52

22	Topological Characteristics of ECG Signal using Lyapunov Exponent and RBF Network	Abinash Dahal, Deepashree Devaraj, Dr. N. Pradhan	Engineering	53-55
23	Development of slicing package of solid model for cone and sphere in rapid prototyping	Dineshkumar M. Patel, Prof. P.D.Solanki	Engineering	56-58
24	Hardware modeling Simulation with COSSAP	Krunali Amrutlal Ratanpara, Devendra Soni, Shrenik Rajesh Golwelkar	Engineering	59-61
25	Coordination Of Pss And Statcom To Enhance The Power System Transient Stability	Lalit K. Patel, Kaushik M. Sangada, Sunil S. Changlani , Ankit M. Patel	Engineering	62-64
26	Cooling Performance Analysis of Heat Sink	Mr. Pritesh S. Patel, Prof. Dattatraya G. Subhedar, Prof. Kamlesh V. Chauhan	Engineering	65-57
27	Thermal Modeling and Analysis of Friction Stir Welding	Rankit Patel, Prof. Bindu Pillai	Engineering	68-70
28	Review on shrinkage defect – A case study	Mr. Ravi N. Kalotra, Mr. Gajanan Patange, Mr. J.K. Gohil	Engineering	71-75
29	Stream Function Formulation of Lid Driven Cavity	Mr. Zankhan C. Sonara, Prof. Dattatraya G. Subhedar, Mr. Kartik Patel	Engineering	76-78
30	Implementation of ABT (Availability Based Tariff) - its Treatment & Proceedings	Dilip m.Bhankhodiya, Dipak t. Vaghela	Engineering	79-82
31	Active Filters for Power Quality Improvement	Dipak t. Vaghela, Dilip m. Bhankhodiya	Engineering	83-87
32	Design and Analysis of Air Bearing using Orifice and Feed Hole Pocket	Nileshkumar T. Raval, Prof. M.Y.Patil	Engineering	88-90
33	Drip irrigation technique enhancing water and fertiliser use efficiency in cauliflower	Dr. S.S. Yadav, Dr. R.S. Meena	Engineering	91-92
34	Experimental and FEA Evaluation of Hybrid Joint Strength of Single Lap joint.	S. S. Kadam, P. A. Dixit	Engineering	93-96
35	CFD Analysis of Mixed Flow Submersible pump Impeller	Mitul G Patel, Subhedar Dattatraya, Bharat J Patel	Engineering	97-100
36	EVA: An Innovative Parameter for Shareholders' Wealth Measurement	Shri. Arvind A. Dhond	Finance	101-103
37	Profitability and consistency analysis of Textile Sector in India	Dr. K. S. Vataliya, Rajesh Jadav	Finance	104-107
38	Harmonious Relationship between Art and Music Critical vision (comparison)	Dr. Marwan Imran	Fine Arts	108-109
39	Land Use Pattern and Crop Combination Region in Satara District : A Geographical Study	Dr. Rathod S. B., Mane-Deshmukh R. S.	Geography	110-111
40	Garlic---Benefits and Uses	Dr. Sneh Harshinder Sharma	Geography	112-114
41	An Assessment of Thermal Comfort Zones in Terms of Tourists: A case study of Karveer Tehsil	Mr. Prashant Tanaji Patil, Miss. Mane madhuri maruti, Miss. Mugade Nisha Ramchandra	Geography	115-117

42	Hematological changes due to the impact of Lead nitrate on economically important estuarine fish Mystus gulio	Dr.S.Palani Kumar	Horticulture	118-119
43	Stress Management level in the employees of Manufacture Industries By considering key parameters with reference to Bhavnagar city	Dr. K. S. Vataliya, Adv. Ajay H. Thakkar	Human Resource	120-122
44	The Case of ABC Group-A Case on Performance Appraisal System	Shivani Sah	Human Resource Management	123-124
45	A Study On Performance Appraisal of Employees in Health Care Industry in a Private Multi-Speciality Organization	Dr. C. Swarnalatha, T.S. Prasanna	Human Resource Management	125-126
46	(Upanyas - Jansi ki Rani Laxmibai (vrundavanlal varma)	Dr. Sneh Harshinder Sharma	Literature	127-128
47	“Educational Technology for Professional Development of English Teachers: A Case Study of the College Teachers of English in Jammu Province”	Dr. Wajahat Hussain	Literature	129-130
48	The Reality of Sultana’s Dream: A step towards success Rokeya Sakhawat Hossein	Riju Sharma, Ruchee Aggarwal	Literature	131-132
49	Road blocks of Match Industry in Andhra Pradesh: Certain Issues and Concerns	Anuradha Averineni	Management	133-134
50	Government’s Assistance Towards the Development of Small Scale Industries in India with Special Reference to Krishnagiri District	B. Mohandhas, Dr. G. Prabakaran	Management	135-140
51	Effects of Role Stress on Employee Job Satisfaction and Turnover	Dr. T.G.Vijaya, R.Hemamalini	Management	141-144
52	“MNP – A major concern of Telecom Operators in Gujarat”	Mohsinali Momin, Dr. Deepak H. Tekwani	Management	145-147
53	A Study on Fiscal Support Provided by Vijaya Bank to Msme in Coimbatore City	Mrs. G. Murali Manokari, Mr. G. Lenin Kumar, Mrs. G. Sathiya	Management	148-150
54	Competencies for HR Professionals	GAYATHRI. M	Management	151-153
55	Cost and Strategic Management - Application, Framework and Strategies for the Growth of Sme Sector	Manisha gaur	Management	154-156
56	Development of Management Education System in India	Mr. Goudappa Malipatil	Management	157-158
57	Study on Volatility and Return of Major Indices of Indian Stock Market with Reference to Sensex And Nifty	Mr. Mukesh C .Ajmera	Management	159-160
58	A Need for an Epitome Shift in Management Education A study on Conceptual Teaching practices	Mrs. Vanishree K. Jamashetti, Mr. Sanjeev Rathod	Management	161-162
59	Personal Social Responsibility – A novel thought	Parul Jain, Dr. N.C Pahariya	Management	163-164
60	Green Marketing – A Consumer’s Perspective in the Indian Scenario	Nidhi Srivastava, Preeti Pillai	Management	165-166
61	Challenges and Opportunities of Mobile Banking - An Indian Scenario	Sandhya.Ch.V.L	Management	167-169
62	A pragmatic study of civilizing amortment among The diverse countries	Mr. Vimal P. Jagad, Mr Mukesh .C Ajmera	Management	170-171
63	Celebrity Endorsement in India An Effective Tool of Sales Promotion	Piyush Shah, Dr. N C Pahariya	Management	172-176

64	A Study of Prominent Character Strengths and Their Relationship with Well Being Among Business Management Students	GarimaKamboj, DikshaKakkar	Management	177-180
65	Coffee Consumption in India: An Exploratory Study	Shri. Arvind A. Dhond	Marketing	181-183
66	Applicability of Retail Service Quality Scale (RSQS) in India	M. Ramakrishnan, Dr. Sudharani Ravindran	Marketing	184-186
67	Account Holders perceptions towards Self Service Technologies: a study of selected Private Sector Banks	Dr A Kumar, Prof Ankur Gangal	Marketing	187-189
68	Impact of Sales Promotion on Sales figures of Select International FMCG Brands	Dr.Sharif Memon	Marketing	190-193
69	Factors Affecting Green Product Design: Marketing Professional's Perspective	D. S. Rohini Samarasinghe	Marketing	194-196
70	The Impact of 'Ambience' and Variety on Consumer Delight: A Study on Consumer Behaviour in Ahmedabad	Dr A Kumar, Prof Vineeta Gangal	Marketing	197-200
71	Co-Relation of Social Justice with Human Rights: A Review	Dr. Monica Narang	Marketing	201-202
72	Study of Iron Status and Free Radical Activity in Plasmodium Falciparum and Plasmodium Vivax Malaria Infection	Sangita M. Patil, Ramchandra K. Padalkar	Medical Sciences	203-205
73	GOAL SETTING TENDENCIES, COMMUNICATION SKILLS AND WORK MOTIVATION VIS-À-VIS AGE DIFFERENCE – A STUDY ON PUBLIC SECTOR ORGANIZATION	Dr. Swaha Bhattacharya, Dr. Monimala Mukherjee	Psychology	206-208
74	Role of NGOs in Social Mobilization in the context of SGSY	Dr.Veershetty C. Tadalapur	Sociology	209-211
75	Age at menarche and its secular trend in rural and urban girls of bathinda district	Jyoti Sharma, Dr. Ajita	Sports Science	212-213
76	Effect Of Resin Finishing On Stiffness And Drape Of Khadi Fabric	Dr. Suman pant, Ms. Noopur Sonee	Textiles	214-216

Volume : 1 | Issue : 9 | June 2012 ISSN - 2249-555X

Research Paper Chemistry

Anti Bacterial Activity of Apigenin 7-0-(6"caffeoyl) neohesperidoside from chrysanthemum indicum

* M.Jerome Rozario** Dr.A.John Merina *** Dr.V.Srinivasana

* Dept. Of Chemistry, RMK Engineering College, Chennai

** PG and Research Dept., of Chemistry, Govt. College for Women (Autonomous), Kumbakonam

*** Dept of Chemistry, RMK Engineering College, Chennai

ABSTRACT

The fresh florets of chrysanthemum indicum is examined to contain the flavonoid Apigenin 7-0-(6"caffeoyl) neohesperidoside) by Modern physical methods like UV, NMR and chemical reactions. PC and hydrolytic studies were used to ascertain the structure. The isolated Glycoside has been found to contain Anti-bacterial activity as it is compared with a standard.

Keywords : Antibacterial activity, Flavonoids, Apigenin 7-0-(6" caffeoyl) neohesperidoside

INTRODUCTION

Chrysanthemum indicum Linn is a wild shrubby plant belongs to Compositae family. It is used in ayurveda and yunani.1 Crushed leaves contain apigenin 7-O-glucoside. The yellow florets from Chrysanthemum indicum were chosen for phytochemical investigation and the results are presented below.

EXPERIMENTAL

Extraction and fractionation

Fresh yellow coloured flortes (2kg) of Chrysanthemum indicum collected from Bangalore during July – September were extracted with 85% methanol (5x500mL). The alcoholic extract was concentracted in vacuo. The aq. Concentrate was fractionated successively with light petrol (60-80oC x 250 ml), peroxide free Et2O (4x250ml) and EtOAc (8x250ml). The EtOAc fraction alone was taken up for the study.

EtOAc fraction : (Flavone glycoside : Apigenin 7-O-(6" caffeoyl) neohesperidoside)

The EtOAc fraction was contracted in vacuo and left in an ice chest for few days. The yellow solid that separated when subjected to PC revealed the presence of a single glycoside. A yellow solid on recrystallization from methanol was obtained. It developed a green colour with alc. Fe3+ and orange red colour with Mg-HCl, yellow colour with NaOH and appeared as purple spot under UV turning yellow on exposure to NH3. It responded to Wilson;'s boric acid and Gibb's test but did not answer the Horhammer-Hansel test It responded to Molisch's test showing that it could be a flavones glycoside. It had λmax. MeOH 265, 269sh 330; +NaOMe 245sh, 269, 301, 386; +AlCl3, 276, 300, 348, 386; +AlCl3,-HCl 277, 299, 341, 382; +NaOAc 267, 256sh, 355 386; and +NaOAc-H3BO3 267, 340mm. It had Rf values as recorded in Table - 1. It was identified as apigenin 7-O-(6" Caffeoyl) neohesperidoside and the identity was confirmed by co and mixed PC and with an authentic samples of apigenin from Chrozophora rotteri2.

Acid hydrolysis of the glycoside:

The glycoside (0.05g 0.1m mole) was dissolved in hot aq.MeOH was hydrolyzed with 7% H2SO4 at 100oC for about 2hr. The excess alcohol was distilled off in vacuo and the resulting aq. Solution was extracted with Et2O. The residue from Et2O fraction was studied as presented below.

Identification of the aglycone (Flavone : apigenin)

The aglycone recovered from the hydrolytic fraction of the glycoside on recrystallization gave yellow needles (m.p346-48OC,). It was soluble in organic solvents and sparingly soluble in hot water. It gave a red colour with Mg-HCl; brown colour with alc.Fe3+, golden yellow colour with NH3 and appeared deep purple under UV changing to yellowish green on exposure to NH3. It had λmax MeOH 267, 296sh, 336; +NaOMe 275, 324, 392; +A1Cl, 276, 301, 348, 384; +AlCl3-HCl 276, 299, 340, 381; +NaOAc 274, 301, 376; and +NaOAc-H3BO3, 268, 302sh, 338mm and had Rr values as recorded in Table-1 and could be identified as apigenin and the identity was confirmed by co and mixed PC with an authentic sample of apigenin from Chrozophora rottleri.

Identification of sugar moiety :

The filtrate after the removal of the aglycone was neutralized with BaCO3. The concentrated filtrate when examined by paper chromatography gave Rf values corresponding to those of glucose and rhamnose. The running properties of the glycoside were also in favour of a bioside. The identity of the sugars was confirmed by comparison with authentic samples of glucose and rhamnose. (Table-2).

Enzymatic hydrolysis with pectinase:

The glycoside was resistant to hydrolysis by pectinase which indicates that it is a neohesperidoside and not a rutinoside.

Partial hydrolysis of the glycoside :

The glycoside was subjected to partial hydrolysis by treatment with 10% formic acid in cyclohexane and the resulting solution extracted with ethyl acetate and subjected to PC. The Rf values of the EtOAc fraction agreed with those of quercetin 3-O-glucoside (isoquercetin). The Rf values are indicated in Table-I. On this basis it can be concluded that glucose is directly linked to the aglycone moiety.

Alkaline hydrolysis of the glycoside :

The concentrated aqueous solution of the glycoside (G7) (2mL) was mixed with 2M NaOH(5ml) in a 10ml syringe and the mixture was left in the syringe (with all air exopelled) for two hours at room temperature. The mixture was ejected in to a vial containing 2M HCl (6ml) and evaporated to dryness in vacuo. The dried mass was extracted with warm ether. The residue from the other solution fluoresced green on PC under UV, had Rf (BAW) 0, 91, (water) 0.42, 0.85 and λmax. MeOH 245, 325 and +NaOMe 306 sh, 334 nm. It was identified as caffeic acid2. The remaining residue containing deacylated

glycoside exhibited the same λmax.in MeOH. Its Rf values are depicted in Table-1.

RESULTS AND DISCUSSIONS

From the fresh yellow florets of Chrysanthemum indicum apigenin-7-0-(6"-caffeoy1) neohesperidoside has been isolated. During a chemical investigation of Chrysanthemum indicum, neohesperidoside was identified based on 1H, 1H-1H NOESY, 1H-13C HSQC and 13C-NMR. The UV spectrum of the glycoside apigenin-7-0-(6"-caffeoy1) neohesperidoside showed two absorption maxima at 330 (band I) and 265nm (band II) indicating the presence of a flavone skeleton. A bathochromic shift of 56nm in band I observed in its NaOMe spectrum indicated the presence of free OH group at C-4'. The A1Cl3-HCl spectra of the glycoside as well as the aglycone consist of 4 major absorption peaks which indicates the presence of a free –OH group at C-5 in both. It was also confirmed by a bathochromic shift of AlCl3-HCl. No change was observed in absorption characteristic in band II of the glycoside on the addition of NaOAc. This is indicative of the absence of free –OH group at C-5 in both 441. It was also confirmed by a bathochromic shift of AlCl3-HCl. No change was observed in absorption characteristic in band II of the glycoside on the addition of NaOAc. This is indicative of the absence of free –OH group at C-7. The corresponding aglycone however showed a bathochromic shift of 7nm, indicating the presence of a free –OH at C-7 (as a result of hydrolysis). In both glycoside and in the aglycone no additive bathochromic shift was noticed in AlCl3 spectrum (band I) with respect to AlCl3-HCl spectrum which confirms the absence of O-dihydroxyl grouping in the B ring. No change was noticed in band I of the glycoside and the aglycone on the addition of NaOAc-H3BO3 thereby revealing the absence of O-dihydroxyl grouping in the B ring.

In the 1H-NMR spectrum (400MHz, DMSO-d6, TMS) of the glycoside, the signal at δ13ppm indicates the presence of –OH at C-5. The absence of the signal δ10ppm indicates the absence of free –OH at C-7. The two pair of ortho coupled doublets of C-2, C-6 appear at δ7.99 ppm and C-3, C-5 protons appear respectively at δ7.4ppm (d, J=8Hz). The doublet due to C-3' and C-5' protons occur upfield from that of C-2' and C-6' due to the shielding effect of the oxygen substituents and to the deshielding influences of C-ring functions on C-2' and C-6' protons. The protons C-6 and C-8 resonated respectively at 6.2ppm (d-J=2.5Hz) and 6.7ppm (d, J=2.5Hz). The C-3 proton singlet overlaps with the C-6 proton doublet δ6.5ppm. H-1" of glucose and H-1" of rhamnose resonate at 5.15ppm and 4.5ppm. The remaining sugar protons appear in the region of 3.00-3.8ppm. The methyl protons of the rhamnosyl unit can be seen at δ1.25ppm. The α, β protons of caffeoyl group resonate at δ7.53ppm (d, J=15.9 Hz and δ6.29 ppm (d, J=15.9 Hz). The remaining protons of C-2, C-5 and C-6 resonate at δ7.16 (d, J=2.3Hz), δ 6.86 (d, J=8.3Hz) and δ7.03ppm.

1H-1H NOESY spectrum is very similar in appearance to the COSY spectrum. In the case of NOESY spectrum off-diagnol peaks indicate NOE interactions (exchange of magnetization) rather than spin-spin coupling interactions. 2D NMR Noesy shows a diagonal strong NOE cross peaks C-8 at δ6.8ppm. This contour peak shows the cross peak and correlation to a doublet located at δ5.2ppm which is assigned to anomeric proton of the sugar moiety. The 2D NMR reveals steric proximity of anomeric proton of sugar moiety with C-8 proton. This clearly indicate that glycosylation has been at C-7 in Apigenin 7-0-(6" caffeoyl) neohesperidoside compound.

Supporting evidence for the structure of the glycoside is also provided by the analysis of the H1 and C13 NMR spectral data presented in Table-3 & Table-4. As a result of glycosylation the signal of C-7 is shifted upfield and appears at δ162.9ppm. The C-1" of glucose appears at δ99.5ppm and C-1" of rhamnose of δ99.52ppm. The downfield shifts of the signals of the two anomeric corbons indicate their involvement in glycosylation. The appearance of C-6" signal at δ21.8ppm and the signal of C-6" at 60.60ppm (not at δ66.0ppm) show that the glycoside is a 7-O-(6"-cafeoyl) neohesperidoside. The signal at δ164.26ppm represents the caffeoyl carbonyl group. As a result of attachment of the carbonyl group at C-6" of glucose the signal of carbonyl group is shifted upfield and appears at δ164.26ppm (not at 266.3). On the basis of the above mentioned physical and chemical evidences, the glycoside obtained from Chrysanthemum indicum has been characterized as apigenin 7-O-(6"-caffeoyl) neohesperidoside.

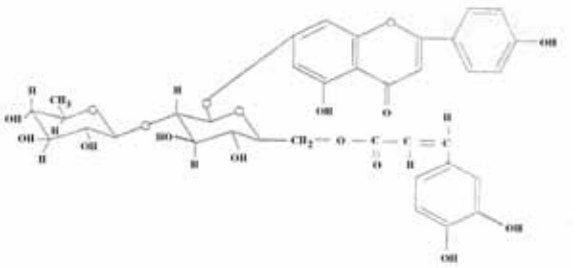


Table-1
Rf(x100) values of the APIGENIN 7-O-(6" CAFFEOYL) NEOHESPERIDOSIDE from the yellow florets of Chrysanthemum indicum
(Whatman No.1, Ascending, 30±2°)

Compound	*Developing solvents								
	a	b	c	d	e	f	g	h	I
Glycoside Apigenin 7-O-(6" caffeoyl) neohesperidoside	56	34	23	48	78	40	56	86	86
Deacylated Glycoside Apigenin 7-O-(6" caffeoyl) neohesperidoside	58	37	25	49	80	42	56	88	88
Aglycone from APIGENIN 7-O-(6" caffeoyl) neohesperidoside (complete hydrolysis)	-	-	10	32	66	90	90	73	-
Apigenin	-	-	10	32	66	90	91	73	-
Glycoside Apigenin 7-O-(6" caffeoyl) neohesperidoside from Partial hydrolysis	11	12	47	70	84	74	70	80	-
Apigenin 7-O-glucoside	12	13	47	70	85	77	70	80	68

TABLE-2
Rf(x100) values of the Apigenin 7-O-(6" caffeoyl) neohesperidoside from the florets of Chrysanthemum indicum
(Whatman No.1, Ascending, 30±2°)

Compound	Developing solvents				
	f	g	h	i	J
Sugar from Apigenin 7-O-(6" caffeoyl) neohesperidoside	18	38	37	-	25
Glucose authentic	17	38	37	-	24
Sugar from Apigenin 7-O-(6" caffeoyl) neohesperidoside	34	58	58	55	-
Rhamnose authentic	34	58	59	55	-

TABLE-3
2D NMR Values of the Compound Apigenin 7-O-(6" caffeoyl) neohesperidoside 1H-13C[HSQC] for confirmation of assignment

Protons chemical shift (δ)	Correlated carbon (δ)	Assignment
7.99 (H-2')	128.54	C-5'
7.99 (H-6')	128.5	C-6'
6.4 (H-5')	115.9	C-2'

6.7 (H-8)	94.7	C-8
6.2 (H-6)	99.8	C-6
5.15 (H-1" Glu)	99.8	C-1"
4.48 (H-'" rham)	100.5	C-1'"
3.35 (H-2'")	70.3	C-2'"
3.20 (H-3'")	70.1	C-3'"
3.20 (H-5'")	68.3	C-5'"
3.20 (H-3")	76.7	C-3"
3.20 (H-4")	70.7	C-4"
3.20 (H-2")	76.7	C-2"

2.99 (H-4")	72.2	C-4"
2.99 (H-5")	77.3	C-5"
1.2 (H-6")	21.8	C-6"
7.4 (α - H)	121.4	α -C
6.2 (β - H)	144.7	β -C
7.1 (H-2)	113.5	C-2
6.8 (H-5)	114.8	C-5
7.0 (H-6)	115.7	C-6
3.6 (H-6"β)	60.60	C-6"

TABLE-4
13C – NMR spectral data and their assignments for the aglycone and glycoside Apigenin 7-O-(6" caffeoyl) neohesperidoside from the yellow florets of Chrysanthemum indicum

Compound	C-2	C-3	C-4	C-5	C-6	C-7	C-8	C-9	C-10
Apigenin from the literature (δ ppm)	163.5	102.85	181.8	161.23	98.91	164.28	94.02	157.34	103.68
Glycoside Apigenin 7-O-(6" caffeoyl) neohesperidoside (δ ppm)	164.46	103.15	181.88	161.12	99.8	162.9	94.71	156.93	105.35
Apigenin 7-O- neohesperidoside from literature (δ ppm)	165.2	103	182.1	161.68	99.8	163	94.9	157.3	105.7

Compound	C-1'	C-2'	C-3'	C-4'	C-5'	C-6'
Apigenin from literature (δ ppm)	121.18	128.52	116.0	161.47	116.0	128.52
Glycoside Apigenin 7-O-(6" caffeoyl) neohesperidoside (δ ppm)	121.36	128.52	115.99	161.2	115.99	128.52
Apigenin 7-O- neohesperidoside from literature (δ ppm)	121	129.1	116.0	161.6	116.0	129.1

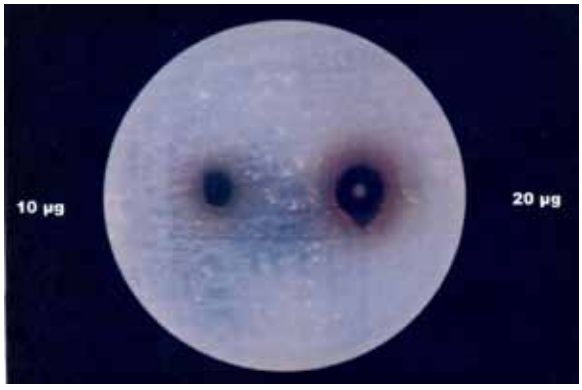
Compound	C-1'	C-2'	C-3'	C-4'	C-5'	C-6'
Glycoside Apigenin 7-O-(6" caffeoyl) neohesperidoside (δ ppm)	99.88	76.79	76.79	70.7	77.1	60.60
Apigenin 7-O-neohesperidoside from literature (δ ppm)	99.5	77.0	77.0	70.9	77.3	61.0

Compound	C-1'	C-2'	C-3'	C-4'	C-5'	C-6'
Glycoside Apigenin 7-O-(6" caffeoyl) neohesperidoside (δ ppm)	99.52	70.3	70.1	72.2	68.31	21.8
neohesperidoside from literature (δ ppm)	100.6	70.6	70.2	72.3	68.4	20.9

Compound	CO	CH	CH	C1	C2	C3	C4	C5	C6
Caffeoyl literature	166.3	121.1	144.7	128.3	113.3	145.5	148.2	114.6	115.6
Caffeoyl	164.5	121.4	144.7	128.5	113.5	145.5	148.4	114.8	115.7

MATERIALS AND METHODS
5% w/v test solution of each extract was prepared by dissolving 250mg of each extract separately in 5ml of sterile dimethyl formamide.

Nutrient agar medium was prepared and sterilized by an autoclave. In an aseptic room, they poured into sterile petridishes to a uniform depth of 4mm and then allowed to solidify at room temperature. After solidification, the test organisms were inoculated with the help of a sterile swap soaked in a bacterial culture or suspension. Thus provides the uniform surface growth of bacterium and is used for antibacterial sensitivity studies. Then the sterile filter paper discs (6mm) containing sample (100µl) were immersed in plant extracts and was placed over the solidified agar in such a way that there is no overlapping of zone of inhibition4 Plates were kept at room temperature for half an hour for the diffusion of the sample into the agar media. The organisms inoculated pertidishes were incubated at 37°C for 48 hours. After the incubation period is over, the zone of inhibition produced by the sample with different organisms in different plates were measured and recorded immediately by using a zone reader.5



Anti Bacterial Activity of
Apigenin 7-0-(6"caffeoyl) neohesperidoside

TABLE-5
Anti Bacterial activity of Apigenin 7-O-(6"caffeoyl) neohesperidoside

Drug	Concentration	Micro-Organism used			
		S.aureus	% of inhibition	E.coli	% of inhibition
S1	2mg/mL(Penicillin)	19mm	100	-	-
S2	2mg/mL(Norfloxacin)	-	-	21mm	100
Apigenin 7-O-(6" caffeoyl) neohesperidoside	100µg	17mm	89.47	-	-
	200µg	17mm	89.47	19mm	90.48

RESULTS AND DISCUSSION

The isolated compound Apigenin 7-0-(6" caffeoyl) neohesperidoside was screened for its antibacterial activity at two different concentrations (100&200g) against the Gram positive organism S. aureus and Gram negative organism E. coli. Table-5 shows of inhibition along with the standard antibiotics namely Penicillin against the S. aureus and Norfloxacin against the E. coli.

The % of inhibition of the growth of the S.aureus was found to be inhibited by 89.47% at 200g concentration with a least inhibition at its lower concentration by Apigenin 7-0-(6" caffeoyl) neohesperidoside. The E.coli was inhibited by 90.48% at it's a higher concentration with least inhibition at its lower concentration by the same drug.

REFERENCES

1. Anjanikumar and P.Tandon, Phytomorphology, 1990, 40, 113. | 2.K.Subraman, "A study of polyphenolic on certain south Indian medicinal plants with special reference to flavanoids" Dept of chemistry, Pondicherry, 2001,119. | 3.K.R.Markham and T.J.Mabry and T.G.Giessman, Ed., "The chemistry of flavonoid compounds", rergeman press, London, 1952,69. | 4.J.C.Maruzzella and A.H.Practical,J.Am.Pharm.Assoc.,1958,47,471. | 5. T.G.Marian, P.N.Murthy,P.Ranganathan,A.Hynepe and K.Daka,the Eastern pharma chemist,1993,39(3),131;

Sara Publishing Academy
Indian Journal Of Applied Research
Journal for All Subjects

Editor,
Indian Journal Of Applied Research
8-A, Banans, Opp. SLU Girls College,
New Congres Bhavan, Paldi, Ahmedabad-380006.
Contact.: +91-9824097643 E-mail : editor@ijar.in

Printed at Unique Offset, Novatsing Rupam Estate, Opp. Abhay Estate, Tavdipura, Shahibaug, Ahmedabad