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RESEARCH PAPER

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A Flavanone from *Alhagi pseudalhagi*

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ABSTRACT

Alhagi pseudalhagiis a shrub distributed throughout India. It is known as Yavasaka in Ayurveda and Camelthorn in English. The herb is bitter, diaphoretic, diuretic and is used as antirheumatic, antibacterial, antiprotozoal, antiarrhythmic, spasmolytic and anticancer in Indian system of Medicine. A number of chemical constituents e.g.: alkaloids, flavonoids, steroids, glycerides, fatty acids have earlier been reported from this species. In view of the above facts, a detailed chemical investigation of Alhagi pseudalhagi was taken up by the present investigator to isolate and characterize further chemical constituents.
Keywords: Alhagi pseudalhagi, Leguminosae, Yavasaka, Flavanone and antirheumatic.

INTRODUCTION

Alhagi pseudalhagi (Bieb.)Desv. (Leguminosae) is distributed throughout India where it is used as traditional herbal medicine. It is a much branched rigid shrub armed with axillary spines (abortive branches or peduncles). Leaves simples, quite entire, usually small. Flowers red, usually few, in axillary racems, calyx campanulate, teeth short, sub equal. Corolla exerted, standard abovate, with a short claw; wings falcate oblong, free; keel incurved, obtuse, about equalling the standard and the wings. Stamens diadelphous; anthers uniform. Ovary stalked, ovules many, style filiform, incurved, glabrous; stigma small, terminal. Pod linear, jointed, somewhat thick, subterete or compressed, smooth, indehiscent, usually contracted between seeds; joints not separating Seed reniform.

It is distributed in Mediterranean region, Western Asia, S.M. Country, Gujarat, Sind, Baluchistan, N. and N.W. India, Persia Arabia, Egypt.

The genus *Alhagi* is bitter and acrid with distinct flavor, alexeteric, maturant, apericant, attenuate; refrigerant, digestible, antipyretic, tonic, laxative, diuretic; removes “vata”, “kapha”, excess of fat; cures brain affection, leprosy, skin diseases,, opacities of cornea, bronchitis, allays thirst and improves appetite; useful in epistaxis. Oil from the leaves is used for rheumatism. The flowers are good for piles. In Konkan, the plant is smoked along with black datura, tobacco and ajwan seeds as a remedy for asthma. In Ormara a decoction of

the root is made and used externally for swelling, abscesses, and put the water for bathing. A sugary secretion (manna) obtained from *A. camelorum*is said to be collected in Persia and exported to India. It occurs in small round grains, which adhere to form an opaque mass, and has been found to consist of mostly of sugar: melizitose, 47.1; sucrose, 26.4 and invert sugar, 11.6 percent. There is no record of Indian plant yielding the manna. The manna is a mild laxative. An infusion of the plant is used on affection of chest. The manna is aperients, expectorant, diuretic, aphrodisiac, purifies blood; good in vomiting, small pox eruption and piles; it has a slightly bad taste.

A number of chemical constituents were previously reported from this plant. The plant contains tannins, flavonoids, coumarin derivatives, ascorbic acid and essential oils. Rutin and quercetin are the main alkaloids. Stem and root gave alkaloids – β-phenethylamine, N-methyl- β-phenethylamine, hordenin, 3,4-dihydroxy-β-phenethyltrymethyl ammonium hydroxide, N-methylmescaline, salsolidine, N-methyltyramine and 3-methoxy-4-hydroxy-β-phenethyltrimethyl ammonium hydroxide. Alhagain, a neutral proteinase has been isolated from the shrub. Phenolic constituents previously reported from this plant include: (+) – catechin (⁻) - epigallocatechin, (±) - gallocatechin & l eucodelphinidin, tamarixetin, isorhamnitin -7-α-L- rhamnofuranoside -3-β-D glucofuranosyl -6-β-D glucopyranoside, isorhamnitin -3-β-D- glucopyranoside, rutine, quercetin, cholesterol. We report here the isolation of naringenin 5- methyl ether from the whole plant of *Alhagi psuedalhagi.*

This is the first report of the occurrence of this compound in *Alhagi psuedalhagi.*

MATERIAL AND METHODS

Mps were uncorrected. CC was carried out on silica gel (BDH, 60-120 mesh), TLC on silica gel and PC on Whatman No 1 paper. Solvent used for TLC were C_6H_6-$CHCl_3$ (1:4, solvent A),$CHCl_3$-MeOH (3:1,solvent B) and MeOH- H_2O (10:1, solvent C)and for PC: n-BuOH-HOAc-H_2O (4:1:5,solvent D). Liebermann-Burchard reagent was used for developing TLC plates. PCs were developed with acetonic $AgNO_3$-NaOH and washed with $Na_2S_2O_3$ solution. ^{1}H NMR and ^{13}C NMR spectra were recorded on 300 and 100 MHz. Varian spectrometers, respectively. TMS was used as int. standard and chemical shift values were recorded in ***δ***ppm. EIMS and FAB-MS were performed on a Kratos MS-50 instrument at 70 eV with evaporation of sample in the ion source. Whole plant of *Alhagi pseudalhagi* were collected from the Varanasi District, U.P., India and the identification verified by the Department of Botany, Banaras Hindu University, Varanasi.

The whole plant (3kg) was dried, powdered & repeatedly extracted with MeOH by could percolation at 25^0. MeOH extract afforded a green semi-solid (60g) which was chromatographed over a silica gel column eluting with solvents of increasing polarity. The eluants from C_6H_6-$CHCl_3$, (1:2), $CHCl_3$- MeOH (1:1) & (1:2) furnished respectively, apigenin (30mg), hespiredin (28mg) and naringenin 5-methl ether. This compound obtained as color less needle, mp. 257-59^o, $C_{16}H_{14}O_5$

(M^+ 286.0846,HRMS); UV λ_{max}^{MeOH}285,322 sh nm;(fig.1),^{1}HNMR(CCl_4, δ): 2.70 (2H, m,H-3), 3.78 (3H, s, -OCH_3), 5.40 (1H, m, H-2), 6.12 (1H, d,J=2 Hz,H-6),6.32(1H, d, J=2Hz,H-8), 6.80 (2H, d, J=8Hz H-2' and H-3'), 7.30 (2H, d, J=8Hz H-5' and H-6'), 9.10(1H,br s 4'-OH, exchangeable with D_2O), 10.00 1H ,br,s,7-OH, exchangeable with D_2O(fig.3).^{13}C NMR($DMSO_6$, δ) (fig.5) : see table 1, HRMS: m/z 286.08466 (M+, 100%), 286 (30) , 258 (58) , 179 (10) , 166 (75), 138 (65) , 135 (14), 134 (16), 120 (22), 119 (26), 108 (62), 98 (24), 73 (22), 57 (22) (fig.4).

On acytelation with Ac_2O/triethylamine , this compound furnished naringenin 5-methyl ether 7, 4'-diacetate as colourless needless, mp 171-73^o;IR ^{V}max (KBr cm^{-1}): 1743, 1682; ^{1}HNMR ($CDCl_3$, δ) : 2.25(6H,s, 2 x OAc), 2.72(2H, m, H-3), 3.70 (3H, s, -OCH_3) 5.42 (1H, m, H-2), 6.31 (1H, d, J=2Hz,H-6), 6.44 (1H, d, J=2Hz, H-8), 7.10 (2H, d, J=8Hz, H-2' and H-3'), 7.44 (2H, d, J=8Hz, H-5' and H-6'). Found: C, 64.66, H, 5.28% calcd. for $C_{20}H_{18}O_7$: C, 64.86, H, 4.90%.

RESULTS AND DISCUSSION

Chromatographic resolution of the methanolic extract of the whole plant of *Alhagi pseudalhagi* yielded a compound naringenin 5 – methyl ether $C_{16}H_{14}O_5$. The compound developed a magenta color with Mg/HCl and exhibited UV absorption bands typical of flavanone (Imperato, 1978).This compound showed peaks in its IR spectrum (fig.2) at 3000-3400 cm^{-1} (br) for a polyhydroxy system and at 1640 cm^{-1} for a conjugate carbonyl group. UV spectrum (fig.1) of this compound in MeOH showed characteristics absorption band at ʎmax 285 and 322 (sh) like that of flavanone nucleus, it showed no bathochromic shift with $AlCl_3$ and $AlCl_3$/HCl which indicated that there is no free 5-OH or 3-OH group in the compound. A bathochromic shift at 10 nm has observed with NaOAc indicated that there is a free -OH group at the C-7 position of the compound. The UV spectrum with NaOAc showed bathochromic shift of 30 nm in band 1 which indicate a free hydroxyl group at C-4′ position. The ^{1}HNMR spectrum showed methoxyl group signal (δ3.78), a typical four peak pattern doublet (δ6.80, 7.30, j= 8.5 H_z each), two meta coupled protons merged as a broad singlet (δ5.91), and an ABX pattern of proton.

The mass spectrum (fig.4) showed a molecular ion peak at m/z 286.0846 and had characteristic ion peaks (m/z 166and 120) due to retro Diel's-Alder type fragmentation indicating the presence of a methoxyl group in a ring A. These data suggest that this compound is naringenin 5-methl ether and was further corroborated by ^{13} CNMR data.

Table 1. CNMR spectral data in δ value of the compound.

Carbon number	***value***
C-2	*78.2*
C-3	*42.0*
C-4	*196.0*
C-5	*163.0*
C-6	*95.8*
C-7	*166.0*
C-8	*94.8*
C-9	*162.8*
C-10	*101.8*
C-1'	*128.33*
C-2'	*115.0*
C-3'	*128.0*
C-4'	*157.0*
C-5'	*128.0*
C-6'	*115.0*
-OCH_3	*55.2*

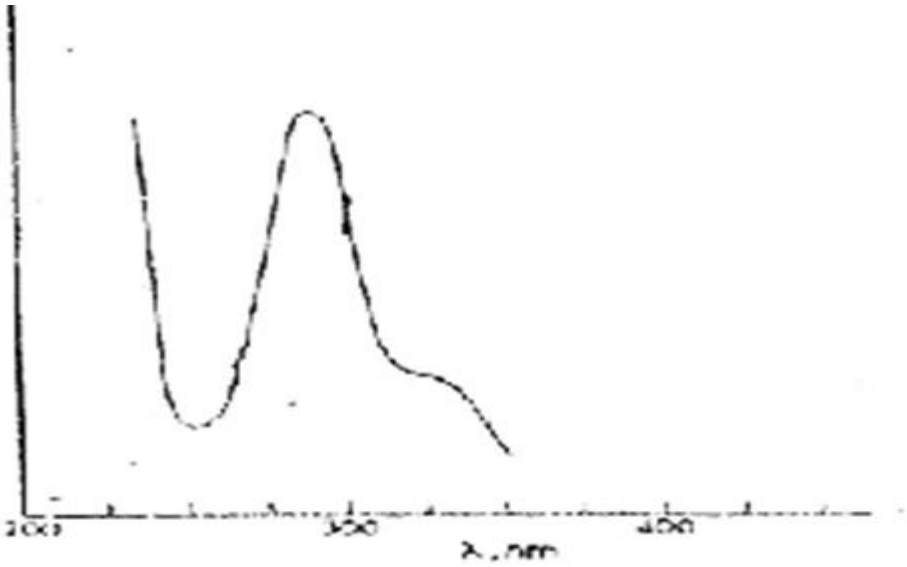


Figure 1. UV spectrum (in MeOH) of the compound

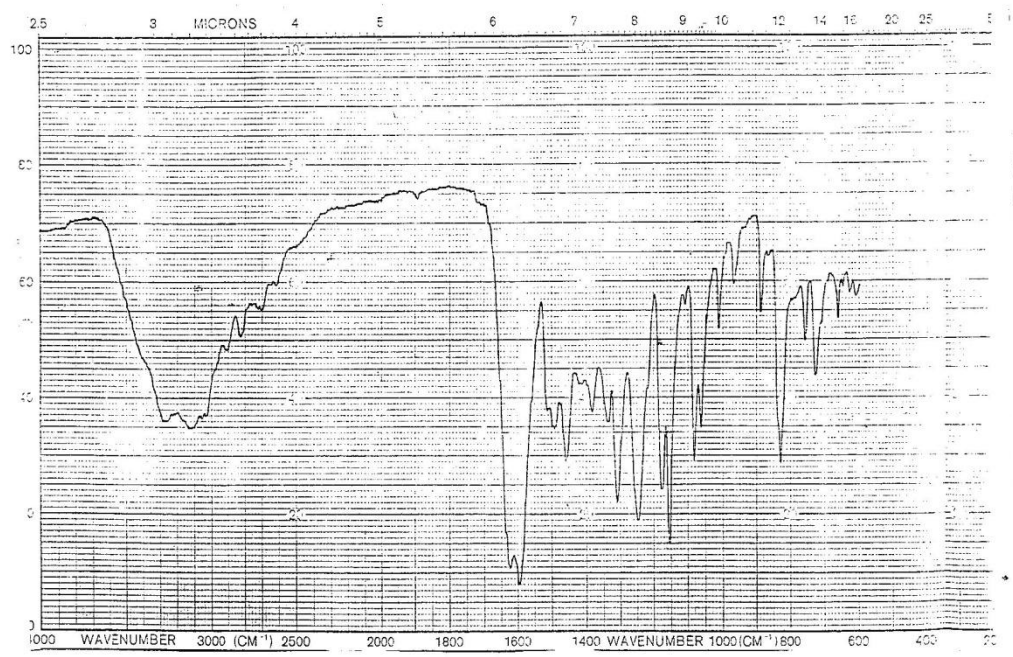


Fig. 2 : IR spectrum(in KBr) of the compound

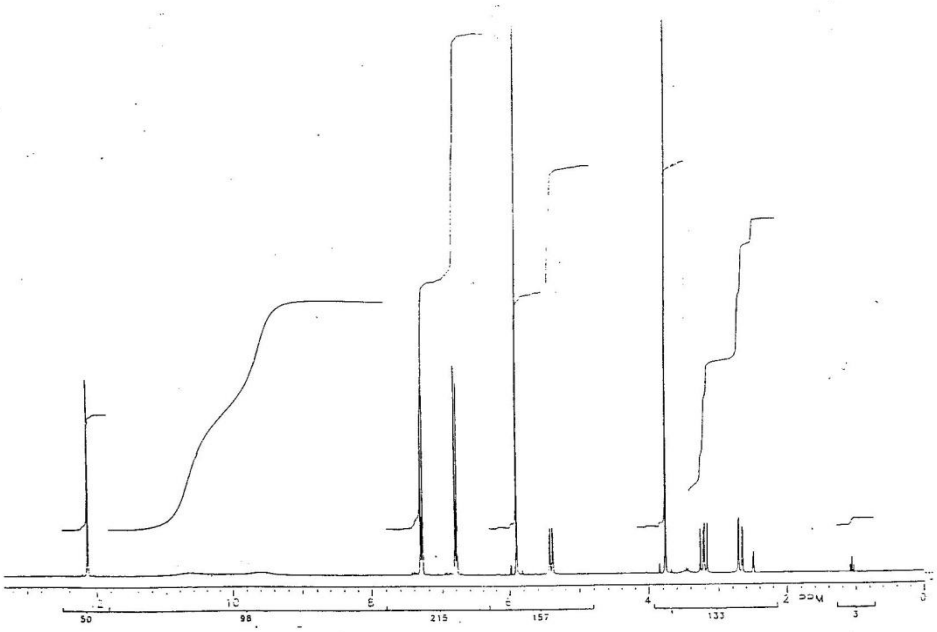
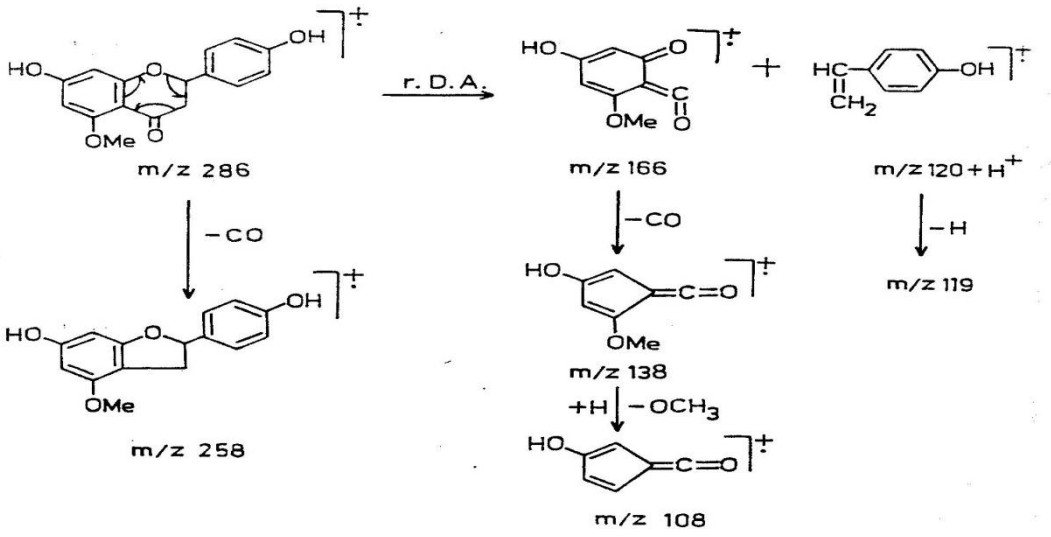


Fig. 3 : 300 MHz ^{1}H NMR spectrum(in CCl_4) of the compound



Mass fragmentation pattern of the compound

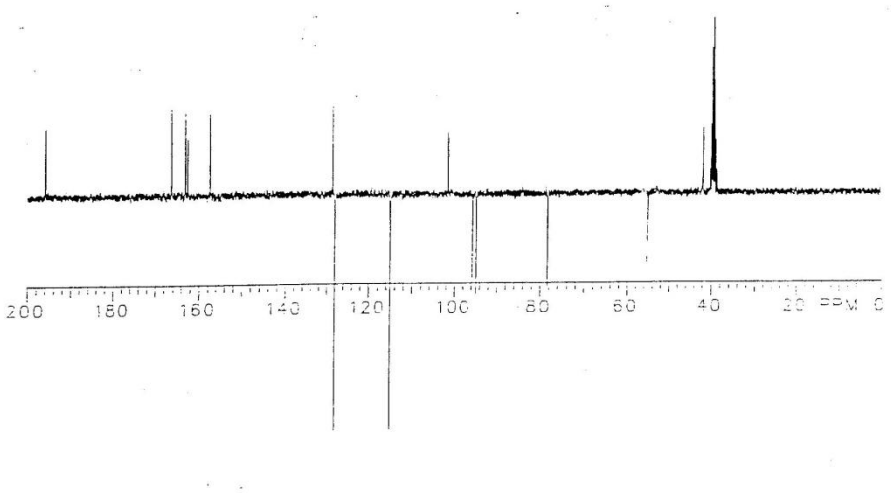
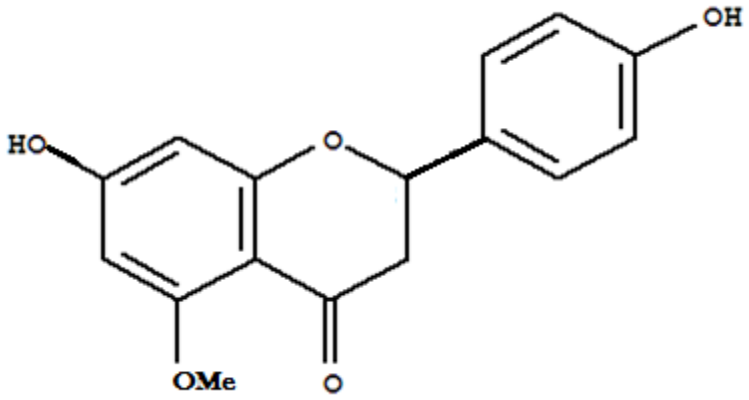


Fig. 5 : 100 MHz ^{13}C NMR spectrum of the compound



Naringenin 5-methyl ether

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