ANTI FUNGAL ACTIVITY OF FLAVONES AND FLAVANONES ISOLATED FROM *ALHAGI PSEUDALHAGI*

Dr. Bineeta Yadav,
Department of chemistry, D.A.V.P.G.College,
Lucknow, India

ABSTRACT

A review of literature revealed that the several flavones and flavanones possess antifungal activity. The positive response of flavones and flavanone glycosides with high efficacy against pathogens prompted us to investigate the effect of flavonoids and flavanones, viz. apigenin, naringenin, naringenin-5- methylether-4'-O-D-glucoside, hesperidin and alhagidin isolated from Alhagi pseudalhagi on ascospore germination of Alternaria tenuissima, A. carthammi, A. alternata, A.mali, A. malogina, Fusarium lini, F. udam, f. naveli, F. oxyporum, Ustilago sp., botrytis cinerea.

Key Words: *Alhagi pseudalhagi; Leguminosae; whole plant; flavonoids; favanones.*

INTRODUCTION

*Alhagi pseudalhagi (*Bieb.) Desv. (Fam. Leguminosae) is low erect shrub, armed with copious hard sharp spines reaching some times 3.8 cm long; branches terete, striate, glabrous or nearly so. Leaves simple coriaceous 6-10 by 3-45 mm, obviate, oblong ,obtuse apiculate, glaberous or puberculous, base cuneate; petiols very short; stipules minute, subulate. Flowers 5-8 on a spine; pedcles short, slender. Calyx glaberous , 4 mm long; teeth short, triangular. Corolla little more than twice as long as the calyx; standard 8 mm. long by 5 mm broad, obviate oblong, auricled at the base above the claw, glaberous. Ovary glaberous. Pods 2.32 cm long , usually falcate, more or less contracted between the seeds, glabrous. Seed blackish brown, smooth, polished.

It is distributed in Gujarat, Punjab, U.P. Delhi, Central and South India.

The herb is bitter, autibilous in chest affection. The twig is bechic, diaphoretic, diuretic and inpacities of cornea, leaf is antireumatc and antibacterial. The plant is antiprotozoal antiarrhythmic, spasmolytic and anticancer. Detailed pharmacological screening of the total alkaloids from the stems was conducted which showed essentially sympathomimetic activity. The results would further seem to indicate that the therapeutic properties ascribed to the plant extracts are due to the contained alkaloid. Proanthocyanidin isolated from *A. pseudalhagi* had no effect on general hemodynamics and cardial contractility of intact rats and rabbits. The agent given to animal with myocardial infarction reduced serum creatinine phosphate levels and lipid peroxidation in the myocardium and serum as established by the amounts of malonic dialdehyde and dienic conjugates. Proanthocyanidin normalize the free acid content and cardiac phospholipid spectrum. The size of the myocardial necrotic zone decreased.

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-phenethyl trymethyl 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.

There are a few reports available in the literature regarding the chemical and pharmacological study on *A. pseudalhagi* . Preliminary pharmacological screening (DHAR et al 1968) with a 50 percent alcoholic extract of the whole plant showed antiprotozoal, spasmolytic, cardiotonic and anticancer (Sarcoma 180 in mice) activities (8, 25). The reported medicinal use of *Alhagi* species have been described earlier which are helpful in the present investigation for systematic chemical investigation of *Alhagi pseudalhagi.*

Material and Methods

The flavonoids, apegenin, naringenin, naringenin-5-methylether-4'-O-D-glucoside, hesperidin, alhagidin isolated from *Alhagi pseudalhagi* have been used in the present study.

The sclerotia were produced & harvested from the medium following the method of Singh. The mature apothecia were obtained according to the procedure of Singh & Singh. They were planted individually in water agar (1.5 % agar) in glass vials (35x14 nm in size) slightly below their neck. Each glass vial was later kept inverted on the glass slides & incubated at 25±2^{0}C . The ascospores were discharged on the glass surface just below the apothecium. The flavones and flavanones were dissolved in small amount of methanol & a stock solution of the same was prepared in sterilized distilled water to give 0.1% concentration of MeOH. The MeOH was further evaporated at room temperature & the final volume of the stock solution was made up with sterilized distilled water. Required Concentrations (200, 500, and 1000 mg/ml) were prepared from the stock solution of each compound in sterilized distilled water before use. A single drop of each concentration was kept separately on sterilized glass slides. About 200 ascospores picked up with the help of an inoculating needle were mixed in such drops & incubated for 24 h at 25±2^0. Percent inhibition was noted in each treatment after 24h. A control set consisting of ascospores in a drop of sterilized distilled water & methanol. Methanol was removed completely before the experimentation.

All the experiments were done in triplicate. Results are presented in Tables 1, 2, 3, 4 and 5.

Results & Discussion

Antifungal Activity of apigenin

As evident from the table-1, apigenin exhibited significant antifungal activity against the fungi *Helminthosporium oxyzae* and *Fusarium lini*, at the concentration of 200, 500 and 1000 mg/ml.

Antifungal Activity of Naringenin:

As evident from the table-2, naringenin exhibited significant antifungal activity against the fungi *Alternaria alternata* and *Fusarium lini*, at the concentration of 200, 500 and 1000 mg/ml.

Antifungal Activity of Naringenin -5-methyl ether -4-0-D-glucoside:

As evident from the table-3, Naringenin -5-methyl ether -4-0-D-glucoside exhibited significant antifungal activity against the fungi *Fusarium udum* and *Ustilago* species at the concentration of 200, 500 and 1000 mg/ml.

***Antifungal Activity of hesperidin*:**

As evident from the table-4, hesperidin exhibited significant antifungal activity against all the fungi. The best result was observed against the fungus *Botrytis cinerea* at the concentration of 200, 500 and 1000 mg/ml.

Antifungal Activity of Alhagidin:

As evident from the table-5, alhagidin exhibited significant antifungal activity against the fungi

Alternaria carthami and *Helminthosporium oxyzae* at the concentration of 200, 500 and 1000 mg/ml.

Table 1: Antifungal activity of apigenin.

	Fungal name	***ControlH2O/MeOH***	***Apigenin %Inhibition (Conc.mg/ml)***		
			200	*500*	*1000*
1	*Alternaria tenuissma*	*17.40*	*39.00*	*40.50*	*43.00*
2	*Alternaria carthami*	*20.50*	*26.00*	*27.44*	*30.55*
3	*Alternaria alterata*	*30.55*	*41.85*	*43.53*	*44.00*
4	*Helminthosporium fureicum*	*19.30*	*27.34*	*28.50*	*31.54*
5	*Helminthosporium oxyzae*	*20.35*	*77.84*	*84.52*	*87.00*
6	*Fusarium lini*	*22.24*	*69.15*	*76.95*	*81.54*
7	*Fusarium Udam*	*23.52*	*25.60*	*29.30*	*26.55*
8	*Ustilago sp.*	*22.40*	*26.95*	*30.50*	*31.46*

Table 2: Antifungal activity of naringenin.

	Fungal name	***ControlH2O/MeOH***	***Naringenin %Inhibition (Conc.mg/ml)***		
			200	*500*	*1000*
1	*Alternaria tenuissma*	*16.90*	*27.90*	*30.93*	*42.00*
2	*Alternaria carthami*	*18.85*	*39.00*	*35.55*	*38.90*
3	*Alternaria alterata*	*17.43*	*73.25*	*91.94*	*92.56*
4	*Helminthosporium fureicum*	*18.92*	*25.94*	*28.56*	*26.75*
5	*Helminthosporium oxyzae*	*13.75*	*21.70*	*23.73*	*25.50*
6	*Fusarium lini*	*21.25*	*63.25*	*86.80*	*88.00*
7	*Fusarium Udam*	*22.40*	*31.56*	*33.20*	*32.64*
8	*Ustilago sp.*	*17.55*	-	-	-

Table 3: Antifungal activity of Naringenin-5 methylether-4'-O-D-glucoside

	Fungal name	***ControlH2O/MeOH***	***Naringenin-5 methylether-4'-O-D-glucoside %Inhibition (Conc.mg/ml)***		
			200	*500*	*1000*
1	*Alternaria tenuissma*	*13.50*	*36.55*	*40.00*	*37.85*
2	*Alternaria carthami*	*18.20*	*25.95*	*28.75*	*32.95*
3	*Alternaria alterata*	*16.95*	*26.30*	*28.80*	*33.60*
4	*Helminthosporium fureicum*	*22.75*	*44.00*	*45.00*	*52.50*
5	*Helminthosporium oxyzae*	*21.60*	*32.45*	*42.50*	*46.00*
6	*Fusarium lini*	*18.95*	*27.50*	*35.40*	*37.65*
7	*Fusarium Udam*	*22.14*	*68.00*	*74.57*	*82.50*
8	*Ustilago sp.*	*17.75*	*84.85*	*92.60*	*97.90*

Table 4: Antifungal activity of hesperidin

	Fungal name	***ControlH2O/MeOH***	***Hesperidin %Inhibition (Conc.mg/ml)***		
			200	*500*	*1000*
1	*Alternaria tenuissma*	*22.90*	*37.70*	*68.86*	*87.60*
2	*Alternaria mali*	*24.50*	*44.80*	*75.80*	*88.85*
3	*Alternaria malongena*	*15.35*	*35.60*	*62.90*	*84.88*
4	*A. carthami*	*17.95*	*37.65*	*73.30*	*80.39*
5	*A. solani*	*15.60*	*18.50*	*53.55*	*96.50*
6	*Fusarium lini*	*18.65*	*35.56*	*70.65*	*90.56*
7	Botryus cinerea	*11.56*	*86.96*	*96.90*	*99.80*
8	F. naveli	*22.40*	*33.59*	*74.60*	*86.78*
9	*F. oxyporum*	*24.90*	*35.78*	*72.70*	*88.44*

Table 5: Antifungal activity of alhagidin

	Fungal name	***ControlH2O/MeOH***	***Alhagidin %Inhibition (Conc.mg/ml)***		
			200	*500*	*1000*
1	*Alternaria tenuissma*	*17.50*	*29.80*	*31.85*	*32.70*
2	*Alternaria carthami*	*17.60*	*77.89*	*83.65*	*86.45*
3	*Alternaria alterata*	*21.80*	*31.40*	*36.55*	*36.60*
4	*Helminthosporium fureicum*	*19.85*	*42.50*	*45.59*	*44.90*
5	*Helminthosporium oxyzae*	*13.45*	*83.90*	*86.50*	*98.49*
6	*Fusarium lini*	*14.70*	*29.55*	*32.52*	*42.62*
7	*Fusarium Udam*	*14.50*	*34.60*	*39.63*	*43.40*
8	*Ustilago sp.*	*16.95*	*39.65*	*38.30*	*44.90*

References

1. Biswas, P., Bhattacharya, A., Bose, P.C., Mukherjee, N. and Adityachoudhary, N., Experentia 37 397(1981)
2. Chowdhury, A., Mukherjee, N. and Adityachoudhary, N., Experientia, 30 1022(1974)
3. Geisman, T.A., The chemistry of Flavonoid compounds. Pargamon Press, oxford, London, New York, Paris, 666(1962).
4. Ghoshal, S., Srivastava, R.S., Bhattacharya, S.K., Debnath, P.K.(Dep. Pharm. Pharmacol., Banaras Hindu Univ. Varansi, India) Planta Med.(1974, 26(4), 318-26 (Eng.).
5. Khushbaktova, Z,A., Syrov, U.N., Kuliev, Z., Bhasirova, N.S., Shadieva, Z.Kh., Gorodetskaya, Ye. A., & Medvedev, O.S. (Inst. Chem. Plan.t Subst. Tashkent, Uzbekistan 700170) Eksp. Klin. Farmakol (1992). 55, (6),16-21 (Russ).
6. Kirtikar, K.R. and Basu, B.D. "Indian Medicinal Plants", Vol. I, p. 742-744(1984) Second edition.
7. O'neil, T.M. and Mansfield, J.W., Trans.Br. Mycal. Soc., 79, 229(1982).
8. Singh, R. B., Studies on sclerotinia wilt and root of gram (Cicer arietinum L.) Ph. D. Thesis, Banaras Hindu University, India (1983).
9. Singh, R. B. and Singh, U.P. Mycologia, 71, 646, (1979).
10. Singh, U.P., Pandey, V.B., Singh, K.N. and Singh, R.D.N., can. J. Bot., 66, 1901 (1988).
11. Viramani, O.P., Popli, S.P., Mishra, L.N.,Gupta, M.M., Srivastava, G.N., Abraham, Z., Singh, A.K., Dictionary of Indian Medicinal Plants, p.23, 1992. Central Institute of Medicinal and Aromatic Plant, Lucknow (India).