

## NOTE

**A Flavonoidal-glycoside from *Andrographis paniculata* (Nees.)**

V. K. SAXENA\* and SHRUTI UPADHYAY

Natural Product Laboratory, Department of Chemistry

Dr. H.S. Gour Vishwavidyalaya, Sagar–470 003, India

The isolation and identification of flavonoidal glycoside from the plant *Andrographis paniculata* have been reported in the present paper.

**Key Words:** *Andrographis paniculata* (Nees.), 4,5-Dihydroxy-7-O- $\alpha$ -(L-arabinose pyranosyl-(1 $\rightarrow$ 4))-O- $\beta$ -D-glucopyranoside)

*Andrographis paniculata*<sup>1–4</sup> (family Acanthaceae) occurs throughout India especially in the plains of North India. It is a bitter herb and commonly known as “Kalmegh” forming a principal ingredient of household medicine. The plant is very useful for treating dysentery and certain forms of dyspepsia. The roots and leaves of this plant are effective in stomachic ailments, as a tonic and as an antidote for cobra venom. It is also found effective against hepatotoxicity. Because of its significant importance it was found worthwhile to investigate it further phytochemically.

The present paper deals with the isolation and structure elucidation of a flavonoidal glycoside from the plant of *Andrographis paniculata*. The flavonoidal glycoside was 4,5-dihydroxy-7-O- $\alpha$ -(L-arabinose pyranosyl-(1 $\rightarrow$ 4))-O- $\beta$ -D-glucopyranoside which was identified by chemical degradations and spectroscopic techniques<sup>5–7</sup>

The air-dried and powdered plants of *Andrographis paniculata* collected locally were exhaustively extracted with ethanol (95%). The ethanolic extract was concentrated under reduced pressure. The greenish-yellow gummy mass so obtained was fractionated by extracting it successively with petroleum ether, benzene, chloroform, ethylacetate and acetone. The benzene-soluble fraction was concentrated and then on TLC over silicagel showed two spots; then the fraction was subjected to column chromatography over silica-gel and eluted with various solvents with increasing polarity. The benzene-ethyl acetate (5 : 5) fraction on removal of solvent and recrystallization with acetone yielded a yellow amorphous powder which showed homogeneity on TLC over silica-gel (CHCl<sub>3</sub> : MeOH = 9 : 1) and assigned the name SU-I.

## SU-I

It was obtained as a yellow amorphous powder on recrystallization with acetone m.p. = 170–171°C, and its aglycone SU-I ‘A’, m.f. C<sub>15</sub>H<sub>10</sub>O<sub>5</sub>, m.p. 190–191°C, gave a diacetylated derivative<sup>8,9</sup>, m.p. 210–211°C.

The  $\nu_{\max}$  (KBr, IR) spectrum showed bands at 3401 cm<sup>-1</sup> showing the presence of hydroxyl group, 1790 cm<sup>-1</sup> of characteristic band for flavonoidal nucleus.

<sup>1</sup>H-NMR (DMSO-d<sub>6</sub>, 300 MHz):  $\delta$  6.52 (s, 1H, H-3),  $\delta$  6.79 (d, J = 2.5, 1H, H-6),  $\delta$  7.49 (d, J = 2.5, 1H, H-8),  $\delta$  7.40 (d, J = 2.5, 2H, H-2', H-6'),  $\delta$  7.20 (d, J = 2.0, 1H, H-3', H-5').

$^{13}\text{C}$ -NMR (DMSO,  $d_6$ , 300 MHz): 43.5 (C-3), 78.3 (C-2), 96.1 (C-8), 97.2 (C-6), 118.1 (C-3'/5'), 130.1 (C-2'/6'), 131.1 (C-1'), 158.3 (C-4'), 166.2 (C-7), 195.1 (C-4), 163.1 (C-9), 160.2 (C-10), 169.1 (C-5); MS data  $m/z$   $[M]^+$  at 566  $m/z$ : 565, 433, 270, 242, 153, 124.

On acid hydrolysis SU-I yielded aglycone SU-I 'A', m.f.  $\text{C}_{15}\text{H}_{10}\text{O}_5$ ,  $M^+$  270 (FAB). It responded to all characteristic colour reactions of flavanoids<sup>10,11</sup>. The aqueous hydrolysate produced due to acid hydrolysis of glycoside SU-I when worked up revealed the presence of L-arabinose and D-glucose on conducting paper chromatography<sup>12</sup>.

On enzymatic hydrolysis of SU-I with diastase yielded L-arabinose ( $R_f$  0.21) showed that L'-arabinose is linked to SU-I Aa by  $\alpha$ -linkage and also that it is a terminal sugar. Further when SU-I Aa hydrolysed with emulsion it yielded aglycone SU-IA and D-glucose ( $R_f$  0.18) showed that D-glucose was linked to SU-IA by  $\beta$ -linkage.

Thus on the basis of abovestudies, SU-I was identified as 4,5-dihydroxy-7-O- $\alpha$ -(L-arabinose pyranosyl-(1 $\rightarrow$ 4)-O- $\beta$ -D-glucopyranoside).

#### ACKNOWLEDGEMENTS

Thanks are due to the Head, Regional Sophisticated Instrumentation Centre (CDRI Lucknow) for recording various spectra and to the Head Department of Chemistry of Dr. H.S. Gour University for providing facilities.

#### REFERENCES

1. R.N. Chopra, S.C. Nayar and I.C. Chopra Glossary of Indian Medicinal Plants, CSIR Publication, New Delhi, p. 18 (1956).
2. K.R. Kirtikar and B.D. Basu, "Indian Medicinal Plants", Vol. III, Lalit Mohan Publication, Allahabad, pp. 1884-1885 (1935).
3. R.N. Chopra, S.C. Nayar and I.C. Chopra. "Glossary of Indian Medicinal Plants Supplement", CSIR Publication, New Delhi, (1968).
4. J.B. Harborne and T.J. Mabry, "The Flavonoids: Advances in Research", 1st Edn., Chapman & Hall Publication (1982).
5. A.D. Cross, "An Introduction to Practical Infrared Spectrum", Butterworth, London (1959).
6. R.M. Silverstein and G.B. Clayton, "Spectrometric Identification of Organic Compounds," John Wiley, New York (1964).
7. L.J. Bellamy, The Infrared Spectroscopy of Complex Organic Molecules, John Wiley, New York (1957).
8. E. Weisenberger, *Microchemie Ver Microchim Acta*, 33 (1947).
9. R. Belcher and A.L. Godbert, *Semimicro Quantitative Organic Chemistry*, Longman Green & Co., New York (1954).
10. S.B. Harborne and T. Swain (Eds.) *Perspective in Phytochemistry*, Academic Press, New York (1969).
11. T.J. Mabry, K.R. Markham and T.B. Tomass, *The Systemic Identification of Flavonoids*, Springer, Heidelberg-New York (1970).
12. E. Lederer and M. Lederer, *Chromatography*, Elsevier, New York (1957).