Aliso: A Journal of Systematic and Floristic Botany

Volume 9 | Issue 3 Article 6

1979

5, 7-Dimethoxy-4'-hydroxyisoflavone from Fremontia (Sterculiaceae) Nectar

Ron Scogin

ALISO
9(3), 1979, pp. 479–480

5, 7-DIMETHOXY-4′-HYDROXYISOFLAVONE FROM *FREMONTIA* (STERCULIACEAE) NECTAR

Ron Scogin

Introduction

Thorp et al. (1975) reported the bright fluorescence of nectar under UV illumination from numerous species and speculated on the role of fluorescence as a possible visual cue in pollination ecology. Among the taxa reported exhibiting bright-blue fluorescent nectar were both species of the genus *Fremontia* Nutt., *F. californica* Torr. and *F. mexicana* (A. Davids.) Macbr. The present report establishes the identity of the fluorescent constituents of *Fremontia* nectar as a previously unreported isoflavone and its glucoside.

Materials and Methods

Fresh nectar was collected and pooled from flowering plantings of *Fremontia californica* and interspecific *Fremontia* hybrids "California Glory" and "San Gabriel" in cultivation at the Rancho Santa Ana Botanic Garden.

Standard methods (Mabry, Markham, and Thomas 1970) were followed in isolation and purification by paper chromatography, in acid and enzymatic hydrolyses, and in chromatographic and UV-spectroscopic characterization of compounds.

Results and Discussion

Two dimensional paper chromatography (PC) of nectar from *Fremontia californica, F. mexicana,* and their interspecific hybrids (named cultivars) "California Glory" and "San Gabriel" revealed the same two fluorescent, bright-blue spots (color unchanged in the presence of ammonia). The UV-spectroscopic and chromatographic properties of these compounds are presented in Tables 1 and 2.

Table 1. Spectral properties of *Fremontia* nectar isoflavones.

	λ_{max} (nm)	
In:	Compound 1	Compound 2
MeOH	254; 280sh	256; 274sh; 277sh
+NaOMe	254; 302sh	255; 274sh; 302sh
+$AlCl_3$	255; 279sh	257; 274sh
+$AlCl_3$/HCl	255; 279sh	257; 274sh
+NaOAc	254; 302sh	256; 274sh

Table 2. Chromatographic properties of *Fremontia* nectar isoflavones.

	R_f (×100)						
	BAW	TBA	30% HOAc	15% HOAc	H_2O	Forestal	TLC
Compound 1	90	79	72	62	26	84	58
Compound 2	54	56	83	86	68	—	07

Key-PC solvents: BAW, BuOH-HOAc-H_2O (4:1:5); TBA, t-BuOH-HOAc-H_2O (3:1:1); TLC on Silica gel in $CHCl_3$-MeOH (89:11).

Compound 1 was unchanged by acid hydrolysis. On the basis of fluorescence color, UV properties, and PC and thin-layer chromatography (TLC) characteristics in comparison with genistein, 5-methylgenistein, 7-methylgenistein, and 5,7-dimethoxyflavone (Harbone 1969; Mabry, Markham, and Thomas 1970), compound 1 was identified as 5,7-dimethylgenistein.

Compound 2 yielded compound 1 following acid or β-glucosidase hydrolysis. Correspondence of hydrolysis product and compound 1 was established by co-chromatography in one TLC and five PC solvents (see Table 2). On the basis of the hydrolysis product generated and comparison of PC and UV characteristics with genistein-4′-glucoside, compound 2 was identified as 5,7-dimethylgenistein-4′-glucoside.

This is the first reported occurrence of an isoflavone from the Sterculiaceae. Isoflavones were not reported from *Fremontia* leaves, whose most notable flavonoid constituent was gossypetin (Harborne 1973).

Literature Cited

Harborne, J. B. 1969. Chemosystematics of the Leguminosae. Flavonoid and isoflavonoid patterns in the tribe Genisteae. Phytochemistry 8:1449–1456.

———. 1973. Flavonoids as systematic markers in the angiosperms, pp. 103–115. *In* G. Bendz and J. Santesson, [eds.], Chemistry in Botanical Classification. Academic Press, New York.

Mabry, T. J., K. Markham, and M. B. Thomas. 1970. The Systematic Identification of Flavonoids. Springer-Verlag, New York. 354 p.

Thorp, R. W., D. L. Briggs, J. R. Estes, and E. H. Erickson. 1975. Nectar fluorescence under ultraviolet irradiation. Science 189:476–478.

Rancho Santa Ana Botanic Garden, Claremont, California 91711.