Phytochemistry, 1972, Vol. 11, pp. 2571 to 2572. Pergamon Press. Printed in England.

SHORT COMMUNICATION

FLAVONOLS FROM THE LEAVES OF *CATHESTECUM PROSTRATUM*

D. J. CRAWFORD and D. L. LANKOW

Department of Botany, University of Wyoming, Laramie, WY 82070, U.S.A.

(*Received* 2 *December* 1971, *in revised form* 4 *February* 1972)

Key Word Index—*Cathestecum prostratum*; Gramineae; *C*-glycosylflavone; quercetin; kaempferol.

Abstract—The major flavonoids of the leaves of *Cathestecum prostratum* are a series of *O*-glycosides of the flavonols quercetin and kaempferol, compounds which rarely occur in grasses. The only *C*-glycosylflavone detected appears to be a vicenin derivative, and it is present in trace amounts.

THE CHARACTERISTIC flavonoids of grass leaves are *C*-glycosylflavones.[1] The occurrence of flavonol *O*-glycosides as leaf constituents is rare in the Gramineae. Harborne[1] reported their presence in *Festuca pratensis*, *Poa pratensis*, *Lolium perenne*, and *Panicum bulbosum*. The first three species are members of subfamily Festucoideae, tribe Festuceae, while *Panicum* belongs to subfamily Panicoideae, tribe Paniceae. Bate-Smith[2] indicated the presence of quercetin and kaempferol in *Glyceria fluitans*, and he found quercetin in *Melica altissima*. Both species are assigned to the tribe Meliceae of subfamily Festucoideae. Bate-Smith (unpublished) has detected flavonols in the genus *Andropogon*, a member of subfamily Panicoideae, tribe Andropogoneae. More recently, Saleh *et al.*[3] have stated that certain flavonols are present in the leaves of *Stipa lemmonii* (Festucoideae, tribe Stipeae).

The genus *Cathestecum* (subfamily Eragrostoideae, tribe Chlorideae) is primarily Mexican in distribution, and it has been treated traditionally as consisting of the following 6 species: *C. annuum* Swallen, *C. brevifolium* Swallen, *C. erectum* Vasey & Hack., *C. prostratum* Presl, *C. varium* Swallen, and *C. multifidum* Griffiths. *Cathestecum multifidum* has presented few taxonomic problems and is clearly distinct from the other 5 taxa. These 5 species, however, have always been difficult to distinguish morphologically. One of us (DLL), from a taxonomic study of the genus, has concluded that the plants which have been placed in these taxa really represent one highly variable species. The name which must be applied to them is *C. prostratum*, and the genus is now regarded as consisting of 2 species, *C. multifidum* and *C. prostratum*.

A survey of the leaf flavonoids of *Cathestecum* has shown that plants which are now referred to *C. prostratum* differ markedly from *C. multifidum* in their flavonoid constituents. Whereas the latter species produces a series of *C*-glycosylflavones, the leaves of *C. prostratum* contain a number of flavonol *O*-glycosides as the major flavonoids. Specifically, *C. prostratum* leaves contain 7 flavonoids, three of which are quercetin 3-*O*-glycosides, two are

[1] J. B. HARBORNE, *Comparative Biochemistry of the Flavonoids*, Academic Press, New York (1967).
[2] E. C. BATE-SMITH, *J. Linn. Soc. Bot.* **60**, 325 (1968).
[3] N. A. M. SALEH, B. A. BOHM and J. R. MAZE, *Phytochem.* **10**, 490 (1971).

quercetin 3,7-*O*-glycosides, one is a kaempferol 3-*O*-glycoside, and there are trace amounts of what appears to be a vicenin derivative.

The chemical data are of interest from the following standpoints. The chemistry supports the interpretation of *C. prostratum* as one species instead of the previously recognized 5. The flavonoids also reaffirm the fact that *C. multifidum* and *C. prostratum* are quite distinct. Lastly, this represents the first report of flavonol *O*-glycosides in any member of the subfamily Eragrostoideae.

EXPERIMENTAL

Plant material was obtained from voucher specimens (collected by J. R. and C. G. Reeder) deposited in the Rocky Mountain Herbarium. Dried and ground leaves were extracted for 24–48 hr in MeOH. Flavonoid profiles were determined by two-dimensional paper chromatography using sheets (46 × 57 cm) of Whatman 3 MM paper with TBA–HOAc–H_2O (3:1:1) and 15% HOAc as solvents. Individual compounds were isolated by standard procedures of PC, and UV spectral analyses were performed with the usual diagnostic reagents.[4] Glycosides were hydrolyzed with acid according to the procedure of Harborne,[5] and the resulting aglycones were co-chromatographed with authentic quercetin and kaempferol, on TLC plates coated with microcrystalline cellulose, in at least two solvents. Insufficient mtaerial was available for sugar determinations.

[4] T. J. MABRY, K. R. MARKHAM and M. B. THOMAS, *The Systematic Identification of Flavonoids*, Springer, New York (1970).

[5] J. B. HARBORNE, *Phytochem.* **4**, 107 (1965).