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SHORT COMMUNICATION

OCCURRENCE OF LONG-CHAIN ALDEHYDES IN PLANT CUTICULAR WAXES*

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Abstract—The isolation and analysis of long-chain aldehydes occurring in the cuticular wax of six plants is reported.

LONG-CHAIN aldehydes of plant origin were reported first as constituents of sugar cane wax[1] and grape wax.[2] Subsequently, aldehydes from several other plant sources have been analysed[3–8] and recently they have been detected chromatographically in the surface waxes of leaves or fruit of 18 out of 24 species investigated.[9] During a study concerned with the host specificity of the spurge hawkmoth, *Celerio euphorbiae* L., aldehydes were found among the surface lipids of six plants examined by us. Although the number of plants investigated is still relatively small, it appears that these compounds are common constituents of plant waxes. Table 1 presents the results of GLC analysis of these substances which were isolated in amounts, depending on the plant source, ranging from 0·2–3·3% of the total wax. It is anticipated that in the future the analysis of aldehydes will provide useful taxonomic information, especially when coupled with a study of alkanes and other plant wax components, some of which have been investigated quite extensively already.[9,10]

EXPERIMENTAL

Isolation

Fresh foliage, collected in September and early October in the Belleville area, was extracted by dipping into $CHCl_3$ at room temp. for 30 sec. The solvent was removed and the wax separated partially by column chromatography (silicic acid–celite, 4:1). TLC on Kieselgel (Camag) with benzene as developer was used to monitor the separation. A fraction was obtained from each wax, by elution with light petroleum

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TABLE 1. % COMPOSITION AND YIELD OF MAJOR LONG-CHAIN ALDEHYDES FROM SIX PLANT WAXES

Plant	Total Waxes		Distribution of Aldehydes (%)									
	Yield (g/kg fresh foliage)	Aldehydes %	C_{14}–C_{23}	C_{24}	C_{25}	C_{26}	C_{27}	C_{28}	C_{29}	C_{30}	C_{31}	C_{32}
Apocynaceae												
Apocynum androsaemifolium L.	2 55	2·9				2·5		15·5	7·2	74·8		
A. cannabinum L.	1·09	1·1		1·2	trace	5 6		18 1	6·6	68·5		
Euphorbiaceae												
Euphorbia cyparissias L.	8·76	2 8	trace		4·1	8·5		75·6		11·8		
E. esula L.	3·23	0 5				11 3		73·5		15 2		
Scrophulariaceae												
Linaria vulgaris Mill.	1·75	3 3	trace	6·1	1·7	20 8	6·8	8·2	11 6	22 5	trace	22·3
Lythraceae												
Lythrum salicaria L.	2·08	0·2	trace	2·3	3 9	16·4	9·6	21 8	12 0	32·9	1·1	

(30–60°)–benzene (9:1), which contained a major component that gave a yellow colour when sprayed with 2,4-dinitrophenylhydrazine reagent. Aldehydes, identified by IR ($CHCl_3$; carbonyl absorption at 1720 cm^{-1}), NMR ($CDCl_3$; triplet for the aldehydic proton at δ 9·86), and TLC (co-chromatography with standards), were isolated from these fractions by preparative TLC (Kieselgel; benzene). Bands were located by observing the plates in UV light after spraying with 2′,7′-dichlorofluorescein.

Analysis

The aldehydes were analysed by GLC on a 5′ × 0·25″ column packed with 20% SE-30 on Chromosorb W using an Aerograph A90-P3 instrument equipped with a thermal conductivity detector. The instrument was operated at 285° with a flow rate of 60 ml/min helium gas. Hexacosanal and octacosanal as well as a mixture of aldehydes isolated from cabbage[3,4] were used as standards. Peak areas were determined by triangulation. The results were confirmed by reduction of the aldehydes ($LiAlH_4$), acetylation, and analysis of the derived acetates by GLC on the same column operated at 298°.

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