

SPECIALIA

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Composition of epicuticular wax of rice, *Oryza sativa*

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Summary. The epicuticular wax of rice, variety *Ribe*, comprised n-alkanes, esters, aldehydes and free alcohols. The n-alkanes contained 4 major chain lengths, C₂₇, C₂₉, C₃₁ and C₃₃. Triacontanal and dotriacontanal were the major aldehydes. Octacosanol comprised 89% of the free alcohols. The esters were mainly esters of C₁₆ to C₂₄ acids with C₂₂ to C₃₀ alcohols.

The importance in the behaviour towards environmental agents and internal water balance of the epicuticular waxes of plants of agricultural importance has been recognized². Pursuing our studies on the epicuticular waxes of cereals, namely maize, wheat and sorghum³⁻⁵, we planned to investigate a possible chemical basis for the variable resistance towards diseases, drought and pesticides shown by cultivars of rice, the major food cereal cultivated in the world, which is also extensively grown in the Po valley of Northern Italy. With this aim in mind, we have analyzed the epicuticular wax isolated from rice, variety *Ribe*. To our knowledge, rice waxes have never been analyzed previously.

Material and method. Plants grown in the rice field near Vercelli were collected at the early boot stage in the first days of August 1978. The wax was extracted by immersion

of the plants in cold chloroform for 60 sec. The total wax extracted from 95 culms was of 0.14 g. TLC, column chromatography and GC were carried out as previously described³⁻⁵. Structural and functional confirmation of all classes of compounds were obtained by mass spectrometry and IR spectroscopy.

The resulting wax contained n-alkanes 14.8%, esters 35.2%, aldehydes 10.4% and free primary alcohols 39.6%. The homologous composition of the fractions (esters were previously transformed into methyl esters and alcohols by treatment with CH₃OH-HCl) was determined by gas chromatography (table). The dominating chain lengths of n-alkanes have 27, 29, 31 and 33 carbons. The larger of these are C₂₉ and C₃₁.

2 chain lengths are prominent components of the normal aldehydes, namely those having 30 and 32 carbons. The complete spectrum of free alcohols is quite different from the biosynthetically⁶ correlated aldehydes in being dominated by the C₂₈ chain. The acids and alcohols obtained from esters show that the ester homologues were derived mainly from the even C₂₀, C₂₂ and C₂₄ acids and C₂₂ to C₃₀ alcohols.

Chemically, epicuticular waxes present on the rice plant are qualitatively similar to those found on maize seedlings³. The greatest difference with 2 other important cereals, that is wheat⁴ and sorghum⁵, at comparable growth, is the absence of β -diketones and free fatty acids.

Composition* of fractions of rice wax, *Ribe* variety

Carbon number	n-Alkanes	Aldehydes	Free alcohols	Esterified acids	Esterified alcohols
14				Traces	Traces
15				–	–
16	Traces			1.2	Traces
17	–			–	–
18	7.0			7.0	Traces
19	Traces			–	–
20	4.1			16.7	–
21	Traces			–	–
22	1.9		Traces	45.0	18.7
23	Traces		–	–	–
24	1.2	1.4	1.4	30.1	43.0
25	2.5		–	–	–
26	1.4		6.6	–	13.5
27	11.5		–	–	–
28	3.0	10.3	89.2	–	7.3
29	29.9	–	–	–	–
30	3.3	53.5	2.8	–	17.5
31	24.0	–	–	–	–
32	1.1	32.5	–	–	–
33	9.1	–	–	–	–
34	Traces	3.7	–	–	–

* In % by wt, obtained by GLC.

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