LIGNANS FROM THE WOOD OF Picea koraiensis

V. G. Leont'eva, L. D. Modonova, and N. A. Tyukavkina

UDC 547.639

Continuing a study of the phenolic compounds of the genus Picea [1, 2], the comminuted wood (2.7 kg) of P. koraiensis Nakai (Korean spruce) was extracted with acetone at an elevated temperature (40-45°C). This gave a total extract (0.016 kg) with a yield of 1.7% on the weight of the absolutely dry wood (adw). The extract was separated into two fractions by treatment with cyclohexane. From the insoluble fraction (49.8% of the total extract) by preparative chromatography on silica gel eight lignan compounds were isolated (Table 1). The silica gel was previously impregnated with 2% of sodium metabisulfite. Elution was performed with chloroform–acetone (90:10).

The compounds isolated were identified by IR, UV, and PMR spectroscopy and by comparison with authentic samples obtained by us from the wood of the Siberian and Jeddo spruces [1, 3-5].

The Korean spruce, like the Siberian, belongs to the Morinda section (genus Picea) [6], and the Jeddo spruce belongs to the Casicta section. The Korean, Siberian, and Jeddo spruces are similar with respect to the yield of acetone extract (1.7, 1.1, and 1.8% of the weight of the adw, respectively), but the Jeddo spruce has a larger amount of total phenols than the other two species (48.0, 47.5, and 61.0% of the extract, in the order given above). Hydroxymatairesinol predominates among the lignans of the woods of all three species.

As can be seen from Table 1, the wood of the Korean and Jeddo spruces contains the same lignan compounds. However, the amount of gudiamonoepoxylignans (3,4-divanillyltetrahydrofuran, liovil, lariciresinol) in the Korean spruce is higher.

The Jeddo spruce differs from the species of the Morinda section by the larger amount of cyclic lignans. The guaiacycloliganan isolariciresinol found in it was not found in either the Korean or the Siberian spruce.

All the lignan compounds have the guaiacyl type of substitution. The same structure is also found in vanillin, which is characteristic for the wood of all three species of Picea studied.

TABLE 1. Amounts of Lignans in Various Species of Picea*

Compound	Percentage of the acetone extract		
	P. Koraiensis Nakai	P. obovata Ledeb	P. ajanensis Fisch
3,4-Divanillyltetrahydrofuran	1,2	Traces	9,3
Liovil	8,7	4,5	2,8
Lariciresinol	6,2	Traces	1,2
Pinoresinol	0,4	0,7	5,3
Matairesinol	1,3	2,6	2,8
Hydroxymatiresinol	16,2	15,5	15,1
Ketomatairesinol	0,3	0,16	—
Isolaricylresinol	—	—	2,0
α-Conidendrin	1,7	3,8	6,9
Vanillin	1,8	2,9	2,0

* The specimens were taken during the summer period from trees 30 to 35 years old.

Irkutsk Institute of Organic Chemistry of the Siberian Branch of the Academy of Sciences of the USSR.
Translated from Khimiya Prirodnykh Soedinenii, No. 3, pp. 399-400, May-June, 1974. Original article submitted December 12, 1973.

© 1975 Plenum Publishing Corporation, 227 West 17th Street, New York, N.Y. 10011. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, microfilming, recording or otherwise, without written permission of the publisher. A copy of this article is available from the publisher for $15.00.

LITERATURE CITED

1. L. D. Modonova, V. K. Voronov, V. G. Leont'eva, and N. A. Tyukavkina, Khim. Prirodn. Soedin., 165 (1972).
2. V. G. Leont'eva, L. D. Modonova, and N. A. Tyukavkina, Khim. Prirodn. Soedin., 268 (1973).
3. L. D. Modonova, N. A. Tyukavkina, and M. F. Shostakovskii, Khim. Prirodn. Soedin., 67 (1969).
4. L. D. Modonova, V. G. Leont'eva, and N. A. Tyukavkina, Khim. Prirodn. Soedon., 477 (1970).
5. S. A. Medvedeva, L. D. Modonova, V. G. Leont'eva, V. N. Glazkova, and N. A. Tyukavkina, Khim. Prirodn. Soedin., 113 (1971).
6. M. Schants, Planta Medica, 13, 369 (1965).