

CHEMOTAXONOMICAL RESEARCHES IN HIGHER PLANTS

XII. RESEARCHES CONCERNING THE PIGMENTS AND GLUCIDES OF
 PHYTOLAGCA AMERICANA L.

G. Neamțu, Gh. Ilyés, T. László, E. Ticoi

Abstract:

NEAMȚU G., ILLYÉS GH., LÁSZLÓ T., TICOI E., 1979, Chemotaxonomical researches in higher plants. XII.- Researches concerning the pigments and glucides of *Phytolacca americana* L. Not. Bot. Hort. Agrobot. Cluj., 1979, X, 101-104. The paper presents the results of biochemical analyses of *Phytolacca americana* plants grown in the Agrobotanical Garden Cluj-Napoca. Carotenoid pigments (neoxanthin, violaxanthin, zeaxanthin, lutein, cryptoxanthin, α -carotene and β -carotene) chlorophyll pigments (a, b) and glycoside pigments (betalaines, quercetin) have been analyzed in fruits and leaves respectively.

Index words: *Phytolacca americana*, carotenoid pigments, glycozid pigments

Address: Inst. Agr. "Dr. P. Groza", Chimie, 3400 Cluj-Napoca, Mănăştur 3, R.S. România.

Amongst the plants cultivated in the Botanical Garden of "Dr. Petru Groza" Agronomy Institute, Cluj-Napoca, *Phytolacca americana* L. deserves a special attention.

This species has a high productivity of foliage and is also important from a pharmaceutical point of view, as its roots contain the alkaloid phytolaccacine, which is used in some countries (United Kingdom, Democratic Republic of Germany, Federal Republic of Germany) for preparing antirheumatic drugs as well as for treating the respiratory tract. In its seeds, leaves and roots, there are great amounts of C, B and PP vitamins; sponines, essential oils and substances having an emetic effect (2,3), and also mitogenic substances (4).

In spite of its value Phytolacca americana L. has not been studied yet either from the view point of liposoluble and hydrosoluble pigments, nor of its content of glucides sufficiently.

The present paper deals with the carotenoid and chlorophyll pigments in leaves and fruits, and with the glycoside pigments, total and reductive glucides in mature fruits.

Material and method

Reasearches were carried out in 1978 on fresh material (leaves and fruits), harvested from the plants cultivated in the Agrobotanical Garden of the Agronomy Institute of Cluj-Napoca.

The extraction, identification and determination of carotenoid pigments was fulfilled by the very same methods already described in previous papers (5-6).

The chlorophyll pigments were extracted and determined in accordance with the method of I. MAROTI and EVA GABNAI (7).

The glycoside pigments (betalaines and flavones) were determined by means of thin-layer chromatography, using as absorbant microcrystalline cellulose (8,10). Glucides were determined by Bertrand's method.

Results and discussion

The content of carotenoid and chlorophyll pigments from fresh leaves and fruits is given in Table 1.

The pigments are listed in Table 1 in decreasing order of their absorption on the chromatographic column, made up of magnesium and sand in weight ratio of 2:1.

It resulted from the effected determinations that the leaves had a higher total content of carotenoids and of chlorophylls than the fruits. In leaves and fruits there were found the common carotenoids frequently present in plants. The principal pigments were lutein and β -carotene. A characteristic aspect was the presence in leaves of relatively great amounts of zeaxanthin and cryptoxanthin, as well as of epoxy-carotenoids: violaxanthin and neoxanthin. Though the mature fruits were black cherry-coloured, there still were not found either ketonic carotenoids or carotenoids with an acyclic or γ -ionone structure. The unidentified pigments had no ketonic groups.

In flowers - which are small and white in colour - only β -carotene and lutein were identified.

The ratio between the content of a chlorophyll and b chlorophyll was 3,7 in leaves and 1,3 in fruits, similar to other cultivated plants.

Table 1

Contents of carotenoid and chlorophyll pigments, in leaves and mature fruits of Phytolacca americana L., in mg/100 g of fresh material

Pigments	Leaves	Fruits
<u>a) Carotenoid pigments</u>		
Neoxanthin	0'16	0'13
Violaxanthin	0'21	0'15
Zeaxanthin	0'54	0'11
Unidentified pigment	0'25	-
Lutein	1'36	0'28
Unidentified pigment	-	0'03
Cryptoxanthin	0'27	-
α -carotene	1'16	0'31
β -carotene	0'05	traces
<u>Total carotenoids</u>	4'00	1'01
<u>b) Chlorophyll pigments</u>		
b Chlorophyll	17'7	3'2
a Chlorophyll	67'2	4'2
<u>Total chlorophylls</u>	84'9	7,4

In the mature fruits, besides the liposoluble, carotenoid pigments there were also glycoside pigments (hydrosoluble). The content of glycoside pigments is shown in Table 2.

Table 2

Contents of glycoside pigments in the fruits of Phytolacca americana L., in mg/100 g of fresh material

Pigments	Amounts
Betalaines	0'18
Quercetrin	0'05
Unidentified pigments	0'03
<u>Total of glycoside pigments</u>	0'26

The mature fruits of *Phytolacca americana* L. contain a relatively scarce number of glycoside pigments (betalaine and flavones), but in a relatively high content.

The principal pigments are the betalaines which impart to the fruits their black-cherry colour. Owing to the presence of these pigments, the mature fruits might be used in dyeing works.

The alimentary and pharmacological value of fruits is further enhanced by the presence of quercetin, which is a component of P vitamin.

The flavonoid pigments are found in fruits under the form of glycosides.

Mature fruits have a sweet taste due to their content of glucides. The content of total and reducing glucides, expressed in mg/100 g of fresh fruits, was as follows:

Total glucides	8,13 mg/100 g
Reducing glucides	7,77 mg/100 g

Mature fruits have a high content of reducing glucides and are consequently adequate to be used obtaining tonic and dietetic preparations (juice, jam, syrup, candied fruitjelly etc.). The unreducing glucides have but a low content of 0,36 mg/100 g of material.

REFERENCES

1. GURJULEAC M., 1952, *Phytolacca*, in "Flora Republici Populare Române", I, 607, Bucureşti
2. CRĂCIUN, F., BOJOR O., ALEXAN M., 1976, *Farmacia Naturii*, 110, Bucureşti.
3. SUGA Y., MARUYAMA Y., KAWANISHI S., SHOJI I., 1978, *Chem. and Pharm. Bull.*, 26 (2), 520.
4. WAJDAL, MIRON J., 1974, *Biochemistry*, 13 (18), 3671.
5. NEAMTU G., BILAU C., LĂZĂR T., SIMPSON K.L., 1976, *Rev. roum. Biochim.*, 13 (3), 203.
6. NEAMTU G., HAGY Z., LEE, T.C., 1978, *Not. Bot. Horti Agrobot. Cluj*, IX, 93.
7. MARGYI I., GABNAT E., 1971 *Acta Biol. Szeged.* 17, 67.
8. HARBORNE J.B., 1973, *Phytochemical Methods*, London.
9. SWAIN T., 1976, in *Chemistry and Biochemistry of Plant Pigments* (ed. Goodwin T.W.), London, New York, San Francisco, 166.
10. MARRY T.J., 1976, *Comparative Phytochemistry* (Ed. T. SWAIN), London, New York, 231.

BODENÖKOLOGISCHE BEDINGUNGEN SELTENER PFLANZEN AUS S.R.
RUMÄNIEN. *TOFIELDIA CALYCVLATA* (L.) WAHLBG.

V. Miclăuş, A.T. Szabó

Abstract:

MICLĂUŞ V., SZABÓ T.A., 1979, *Bodenökologische Bedingungen seltener Pflanzen aus S.R. Rumänien. Tofieldia calyculata* (L.) Wahlbg. (Pedo-ecological conditions of rare plant species in R.S. Romania. *Tofieldia calyculata* /L./Wahlbg.). *Not. Bot. Hort. Agrobot. Cluj.*, 1979, X, 105-113. The paper presents data on the pedo-ecological conditions which preserved the endangered species *Tofieldia calyculata* (L.) Wahlbg. on a restricted territory in Valea Morii near Cluj-Napoca (Transilvania, R.S. Romania). Valea Morii represents an isolated point on the distribution map of the species in Europe, and the single point where this species have been preserved till now in Roumania. *Tofieldia calyculata* is integrated here mainly in communities dominated by *Schoenus nigricans*.

Index words: *Tofieldia calyculata*, ecology, chorology, endangered plant species.

Address: Inst. Agr. "Dr. P. Groza", 3400 Cluj-Napoca, Pedologie, Str. Mănăştur 3, R.S. Romania.

Tofieldia calyculata (L.) Wahlbg., syn. *Anthericum calyculatum* L., ist ein europäisches (nordisches) Voralpenelement, das in den Gebirgen aus den Pyrenäen, Alpen und Karpaten verbreitet ist. (MUSEL und Mitarbeiter 1965). In Rumänien wurde diese Art in Transsilvanien im Fogarascher Gebirge und im Bezirk Sibiu neben Boița gefunden; aber später wurde sie nicht mehr an diesen Stellen wiedergefunden (ZAHARIADI 1966, RATIU 1979, E. SCHNEIDER-BINDER, mündlich).

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