

OBTAINING AND DERMATOLOGICAL UTILIZATION OF A MAIZE CAROTENOIDIC EXTRACT

Delia-Gabriela Dumbravă¹, Floare Bogdan², I. Ianculov³, Camelia Clep¹, Patricia Istodor²

¹Banat's University of Agricultural Sciences and Veterinary Medicine, Faculty of Food Products Technology;

²Timișoara's Clinical Municipal Hospital, Dermato-venereology Clinic;

³Banat's University of Agricultural Sciences and Veterinary Medicine, Faculty of Agriculture

Abstract

This work presents the obtaining of a maize carotenoidic extract and the efficiency of an ointment prepared with this extract, on some dermatological diseases. The extract and the ointment were obtained in laboratory (Faculty of Agrofood Products Technology Timișoara) and dermato-logical tested at the Dermato-venereology Clinic from Clinical Municipal Hospital, Timișoara, on a lot of 126 patients.

Key words: *maize, carotenoids, extract, dermatology.*

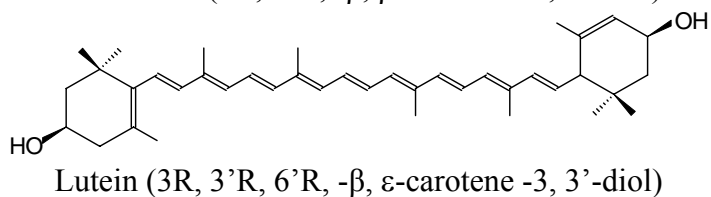
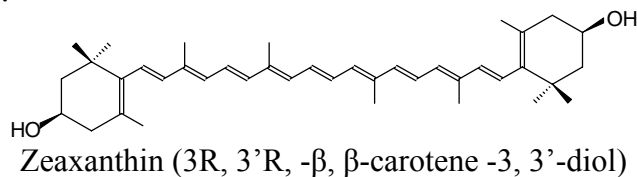
Introduction

Carotenoids are natural pigments with a polyisoprenic structure, universally spreading both in the vegetable and animal tissues. There are two major types of carotenoids: the hydrocarbon class (carotines) and the oxygenated class (xanthophylls). These pigments impart a yellow, orange or red colour to the tissues in which they are presents. Due to their remarkable properties, the carotenoidic compounds are used more and more in different domains: medicine, pharmace-utics, dermatology, food industry, agriculture, animal breeding (Tămaș, 1986; Britton, 1995).

Maize (*Zea mays*) contains in the seeds a great number of carotenoids from which the most ointment spreading are: zeaxanthin, lutein, β -carotene, α -carotene, β -zeacarotene, α -cryptoxanthin, β -cryptoxanthin, violaxanthin. The major carotenoids in the seeds of most maize varieties are zeaxanthin and lutein (Sommerburg, 1998).

More researches standing out that the photoprotective and cells membrane stabilizer effect of xanthophylls is much more strong than that of hydrocarbon carotenoids (Milon, 1986; Havaux, 1998). For

studies, Havaux incorporated carotenoids into artificial membranes (liposomes). Their orientation within the bilayer influences on the thermodynamical and mechanical carotenoids structure. Thus, β -carotene remains entirely within the hydrocarbon inner part of the membranes, without any preferred, well-defined orientation, and it retains a substantial degree of mobility (Gabrielska, 1996). In the case of zeaxanthin is oriented in the lipid bilayer with the long axis of the carotenoid almost perpendicular to membrane surface and the two polar end-groups anchored in the head-group regions on both sides of the membrane.



The membranous that contain carotenoids are protected against lipids peroxidation. This effect could be explained by the well known action as preventive antioxidants of xanthophylls on membranes is combined with a decrease of molecular oxygen (O_2) penetration into the lipid bilayer and this effect have a great importance in the protection against lipid photochemical degradation.

Experimental

For carotenoidic extract preparation the maize flour (PR35P17 variety) was moisten with distilled water and then treated with ethanol (96%) and let at rest for 30 minutes. For carotenoids degradation prevention was added antioxidant (ascorbic acid) 0.1% and calcium carbonate. Carotenoidic pigments were extracted with petroleum ether for many times until colourless. This extract was concentrated under vacuum to soft extract firmness, and then treated with 50 ml of 25% KOH solution in view of saponification (16 hours, in dark, at room temperature). Then the carotenoids were re-extracted with petroleum ether, washed for many times with a saturated NaCl solution and then with distilled water, to complete removing of soaps and alkalies. The

organic layer containing carotenoids was dried over anhydrous Na₂SO₄ and evaporated to dryness.

A part of this extract dissolved in petroleum ether was subjected to column chromatography on magnesium oxide: fine sand (1:2). The fractions collected from column was further subjected to TLC on silica thin layer plates and on magnesium oxide thin layer plates in view of individual carotenoids separation. The bands separated were scratched out and the individual carotenoids were re-dissolved for spectrophotometric analysis in view of quantitative determination (Dumbravă, 2002). From this extract was prepared a therapeutic ointment.

Results and discussions

Carotenoids content of maize flour (PR35P12 variety) is presented in the table 1. Is observed the prevalence of dihydroxy-xanthophylls (zeaxan-thin and lutein) in the maize grains, xanthophylls with a great importance in dermatology for harmed epithelium recovery, prevention of photo-oxydation and others (Roberts, 2002). Also, they are macular pigments.

Table 1 - Maize (PR35P12 variety) carotenoids content

Compound	µg/g flour
Zeaxanthin	30.67
Lutein	21.45
β-Carotene	2.26
β-Zeacarotene	1.18
α-Cryptoxanthin	1.48
β-Cryptoxanthin	2.60
Total carotenoids	72.05

The ointment with maize carotenoidic extract was tested at the Dermato - venerology Clinic from Timișoara, in the period: 15.06.2003 - 30.30.2004 on a lot of 126 patients (52 mens and 74 womans, between 18 and 70 years old) with following dermatological diseases:

- Shank ulcer: 38 cases;
- After electrocauterization lesions: 43 cases;
- Basocellular epithelium: 7 cases;
- Erythematos lupus: 3 cases;
- Mixed intertrego: 5 cases;

- Impetigo: 4 cases;
- Psoriasis: 12 cases;
- Chronic eczema: 8 cases;
- Photodermatosis: 6 cases.

The ointment was applied of 2 times/day on the lesion. After 3-4 days was observed the disappearance of erythema, of pruritus, the lesions having a favourable evolution after 1-2 weeks. The ointment is very efficient in all investigated diseases and don't determine secondary effects such as: atrophies, telangiectasias, how are observed in casa of treatment with corticoides. Even in the case of skin cancer (basocellular epithellium) after about 20 days of treatment with the ointment, the lesions were almost completely healing.

Conclusions

The major carotenoids from maize grains are the zeaxanthin and lutein, xanthophylls with a great importance for human health because they are the macular pigments and due to their chemical structure have a very good efficiency in different dermatological diseases. The clinical tests proved that the ointment with maize carotenoidic extract could be successful used in dermatology for: epithelization, cicatrisation skin, photoprotection, without undesirable secondary effects. The ointment with maize carotenoidic extract is efficient on dermatological diseases such as: shank ulcer, chronic eczema, psoriasis, skin cancer, erythematous lupus, after electrocauterisation lesions and other.

References

- Britton, G., Liacen-Jensen, S., Pfarder, H. (1995). *The Carotenoids Series*, Vol. 1A, Birkhauser Verlag, Basle, (Internet: <http://deb-carot.unibe/carbook.htm>).
- Dumbravă Delia-Gabriela., Ianculov, I., Lupea, Alfa-Xenia. (2002). Izolarea și dozarea carotenoidelor din făina de porumb (*Zea mays*). *Al IV-lea Simpozion Internațional Cercetare Multidisciplinară*, Timișoara, Ed. Sudura, 452-458.
- Gabrielska, J.; Gruszecki, W. I. (1996) *Biochim. Biophi. Acta*, 1285, 167-174.
- Havoux, M. (1998) *Trends in plant science*, 3(4), 147-151.
- Milon, A. (1986). *Helvetica Chimica Acta*, 69, 12-24.
- Roberts, D. (2002). *Lutein and Zeaxanthin*. www.mdsupport.org/library/lutzean.html.
- Sommerburg, O; Keunen, J.E.E.; Bird, A.C; van Kuijk, F.J.G.M. (1998). *Br. J. Ophthalmol*, 82, 907-910.
- Tămaș, V., Neamțu, G. (1986). *Pigmenți carotenoidici și metaboliți*, Vol. I, Ed. Ceres, București