PARTIAL PHYSICOCHEMICAL CHARACTERIZATION OF YELLOW PIGMENT PRODUCED IN CELL CULTURES OF *Amaranthus hypochondriacus*

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Introduction. Due to rising environmental costs and adverse health effects in terms of production and consumption of colorful synthetic additives applied in foods, beverages, pharmaceuticals, cosmetics and detergents, it is necessary to look for alternative sources of natural dyes. *Amaranthus hypochondriacus*, annual herb endemic to Mexico, may be a viable option, since they are biosynthesized betalains betaxanthins type pigments (yellow) and betacyanins (red). These water-soluble nitrogen compounds have antioxidant and anticarcinogenic, recognized as nutraceutical substances (1). Its content in the plant is less than 1%, in addition to the agronomic management of the crop of amaranth is poor and only intended for the production of grain and not obtaining dyes (2).

The objective of this work was the production of betalains in cell cultures (callus and suspension cells) of *A. hypochondriacus* and your partial physicochemical characterization.

Methods. Plant Seeds (INIFAP-2011) were sterilized and sown under aseptic conditions in MS medium. Sheets 1 cm long were seeded in 50% MS supplemented with 2,4-D and CPA (0.0 - 3.0 mg / L) and BAP and KIN (0.0 - 2.0 mg / L). Each treatment consisted of lots of 5 tubes in triplicate. Cultures were incubated under a photoperiod of 16 h light at an irradiance of 50 mol m-2 s-1 and a temperature of 25 ± 2 º C. The answer to callus record at 30 d of cultivation. Cell cultures were established in suspension (inoculum: 5% fresh weight). Aqueous extracts of callus and the culture medium in suspension were analyzed by thin layer chromatography, UV-visible spectrophotometer and colorimetry, using aqueous extracts of sugar beet by reference. Using fluorescence microscopy was analyzed yellow pigment present in cells in suspension. The results were analyzed by ANOVA and Tukey test P <0.05 (SPSS-17).

Results. The type of plant growth regulators had no effect on the time, type and percentage of induction observed in amaranth leaf explants. Generally, in all cases observed the formation of callus. Treatment with 2,4-D (1.5 mg / L) and BAP (1.5 mg / L) was chosen to establish the cell line (Fig. 2-A), introducing a high percentage of friable callus induction (96%) and yellowing after 30 d of culture. Cell line suspension cultures were established with an inoculum of 5% fresh weight (Fig. 2-B). Aqueous extracts of callus tissue, cells in suspension and the culture medium and reported a mean Rf value of 0.7, the maximum absorption peaks at 445 nm (Fig. 1) and b* values of 7.61 and 10.39 (callus and suspension respectively) in the CIELAB scale; autofluorescence was detected in cells exhibiting yellowing (Figs. 2-C and 2-D).

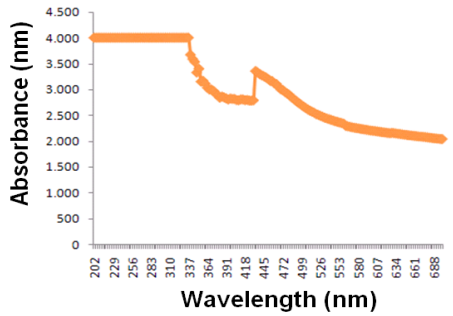

Fig. 1: Absorption spectra of the culture medium of cells in suspension of *A. hypochondriacus.*

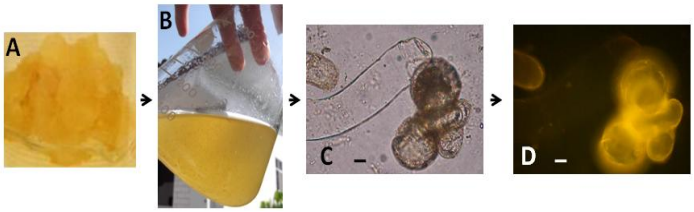

Fig. 2. *In vitro* cell line *A. hypochondriacus.* (A) Phenotypic callus (B) Phenotypic suspension culture (C) Cell cultures in liquid medium with yellow (D) representative of the pigment autofluorescence detected in cells in suspension. The bars correspond to 10 µm.

Conclusions. The above results demonstrate that the cell line Amaranth obtained with 2,4-D (1.5 mg / L), BAP (1.5 mg / L) produces betaxanthins.

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