

Investigation of photosynthetic pigments in the fiber obtained from the wet fractionation of soybean (*Glycine max* L.)

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Introduction

- Soybean in the world
- Use of soybean seeds
- The contents of soybean seed

Content parameter	Value (%)
Fat	~ 20
Carbohydrate	~ 33
Protein	~36
Fiber	~10

- Vegetative organs also represent value
 - amino acids (proteins)
 - macro and micro elements
 - **Pigments**

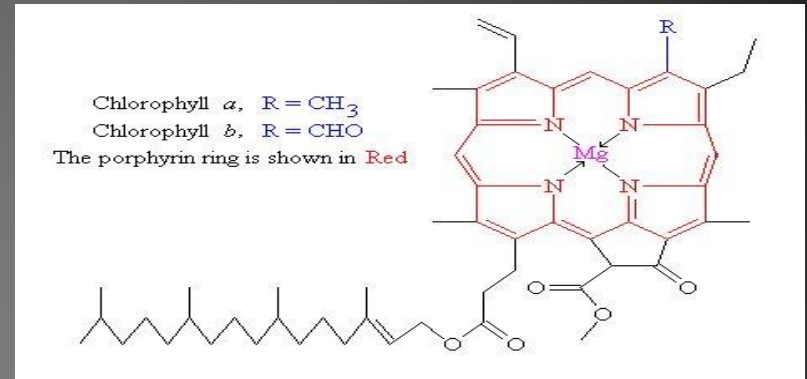


Introduction

The benefits of different pigments

Chlorophyll a / Chlorophyll b

- antioxidant activity
- antimutagenic activity
- apoptosis in tumor cell lines



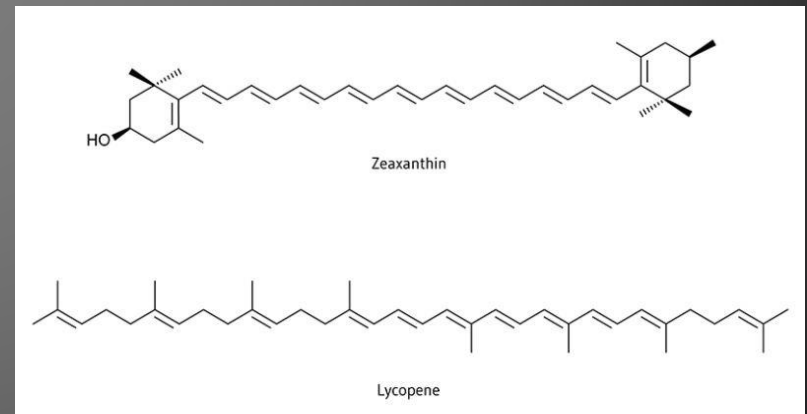
Source: <http://www.chm.bris.ac.uk/>

Carotenoids

- prevent of cancers
 - source of vitamin A
- hormonsynthesis, immun system

Xanthophylls

- protect the eye from ionizing light



Source: <https://lpi.oregonstate.edu/>

Hypothesis

- A large amount of by-product is generated in the field, which can be valueable
- → Pigments have a number of beneficial effects

Goals

- Determination of fiber yield obtained by wet fractionation of different soybean varieties
- Composition and the amount of pigments in soybean varieties

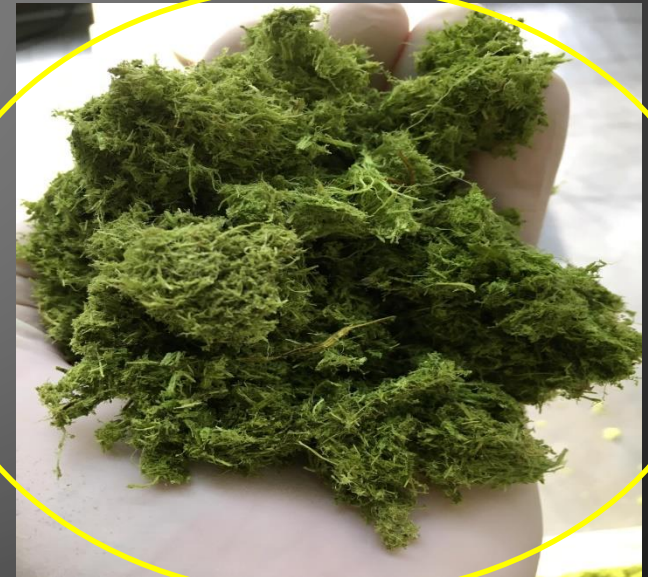
Method

Wet fractionation by
pressing



Green juice

Own photos



Fiber

Method

Soybean

- *University of Debrecen, Demonstration garden*
- *4 varieties: Bólyi 612, Isidor Pannónia kincse, Tenor*
- *Random block designe*
- *Irrigation*



Own photos

Method

Determination of photosynthetic pigments

- Spectrophotometric method
 - 10 mg lyophilized and grounded fiber sample in a 2 ml Eppendorf tube
 - add 2ml 96% ethanol and mix
 - ultrasonic bath for 1 hour in dark, after centrifuge at max. speed for 2 minutes (13.000 r.p.m)

- **Measurement:**
- Measure absorbance at
- $\lambda=440, 480, 495, 649, 665$
- Use the following equation

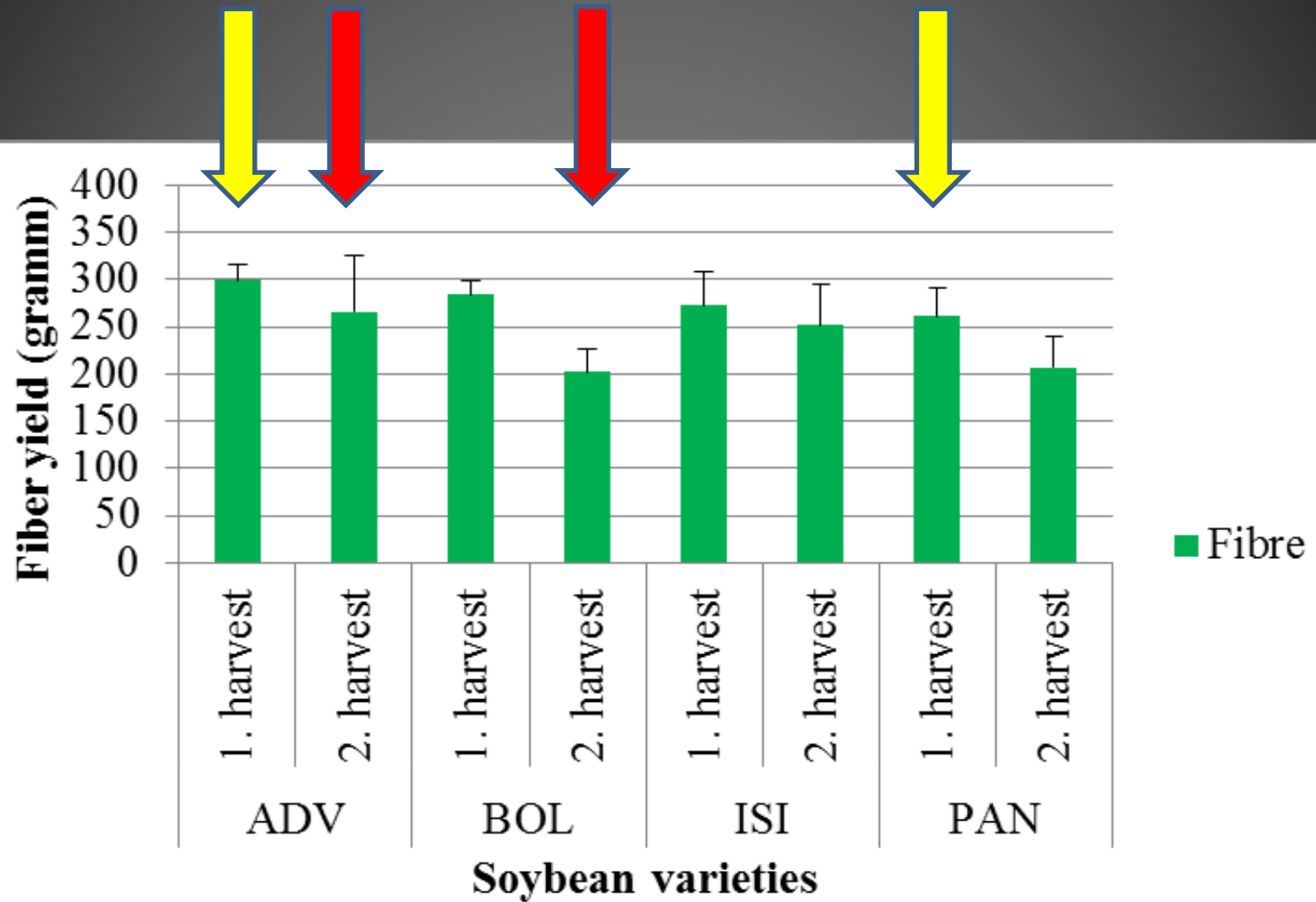
$$\text{Chlorophyll } a \text{ (mg} \cdot \text{g}^{-1}\text{)} = \frac{13.7A_{665} - 5.76A_{649}}{\text{mass} \cdot 200}$$

$$\text{Chlorophyll } b \text{ (mg} \cdot \text{g}^{-1}\text{)} = \frac{25.8A_{649} - 7.6A_{665}}{\text{mass} \cdot 200}$$

$$\text{Carotenoids (mg} \cdot \text{g}^{-1}\text{)} = \frac{4.7A_{440} - 0.263c_{chla+chlb}}{\text{mass} \cdot 200}$$

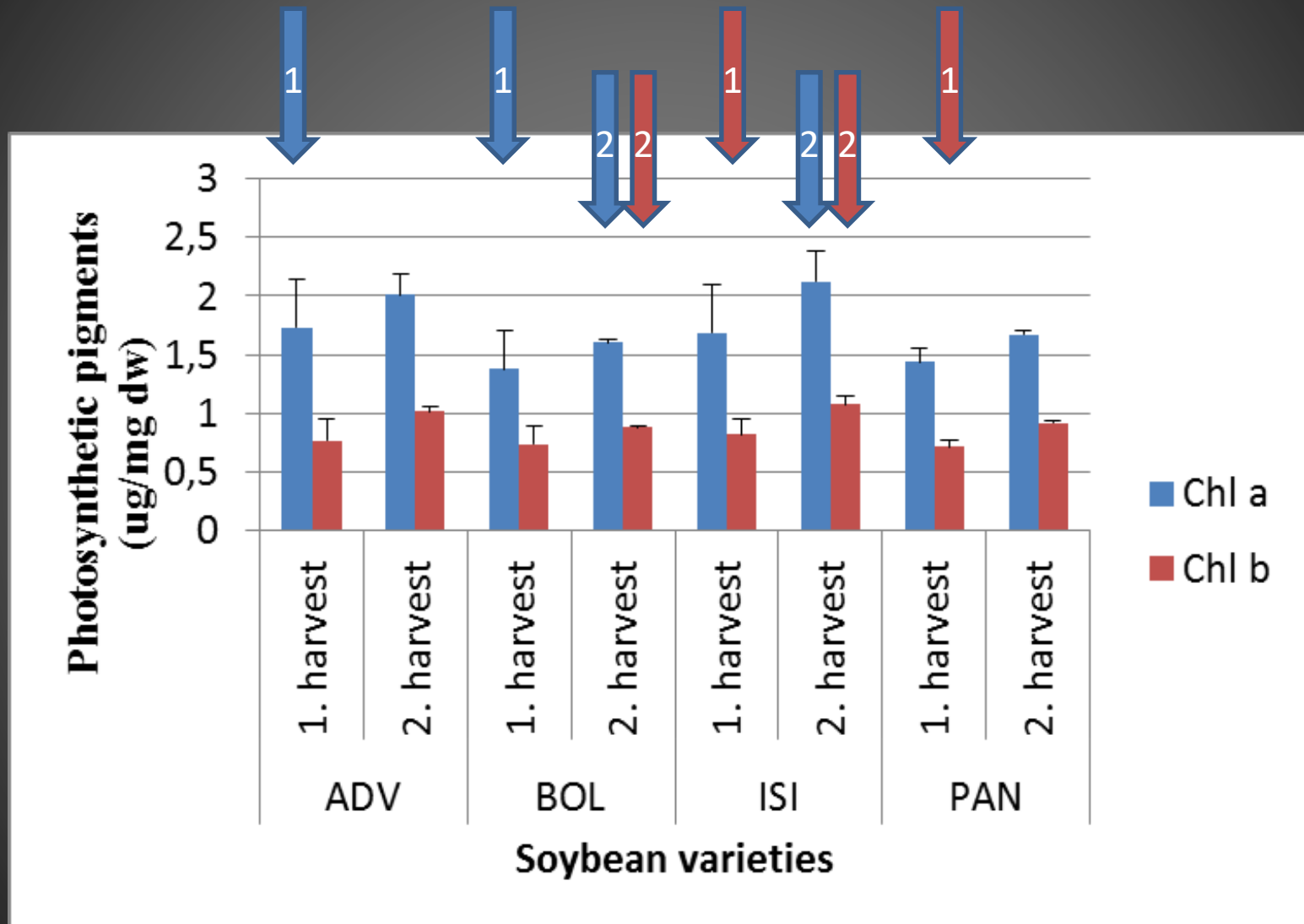
$$\text{Xantophylls (lutein) (mg} \cdot \text{g}^{-1}\text{)} = \frac{11.51A_{480} - 20.61A_{495}}{\text{mass} \cdot 200}$$

Results



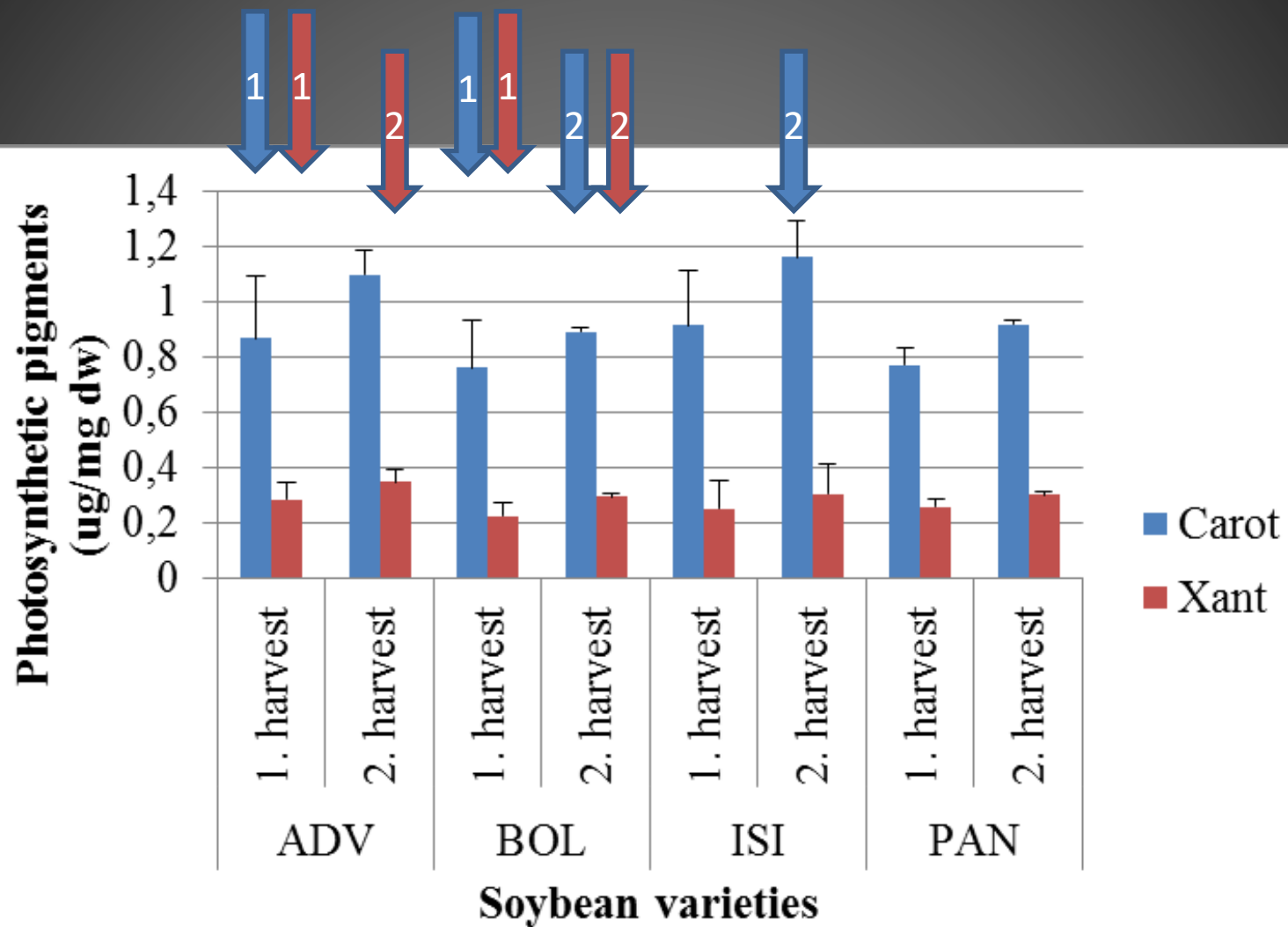
Fiber yield of soybean varieties (average $\pm$ SD)

Results



The amount of pigment in soybean varieties (average $\pm$ SD)

Results



The amount of pigment in soybean varieties (average $\pm$ SD)

Conclusions and suggestions

- During the first and second harvests, the Advisor variety stands out in fiber yields over the others
- Based on our results, the Advisor and Isidor varieties stand out in the case of pigment content
- Advisor and Isidor varieties can be a potentially good choice, soybean is known as a seed crop, but our experiments show that it also has value as a green biomass crop
- In the future our task is to reach economical and safe food production using the values inherent in green biomass (e.g. food supplements, functional foods etc.)

