INFLUENCE OF MATURITY GROUP AND CLIMATIC CONDITIONS ON PROTEIN CONTENT IN SOYBEAN VARIETIES

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INTRODUCTION

Soybean (*Glycine max* (L.) Merr.), is in the first 5 most widely grown crop throughout and has become more and more interesting to researchers being studied in many worldwide breeding programs (Adamič and Leskovšek, 2021) such as the one from Research and Development Station for Agriculture Turda (RDSA Turda), initiated in 1969.

The major breeding programs for *G. max* aimed at improving the yield, seed-oil, protein and seed-oil composition and quality and tolerance to the major biotic and abiotic stresses (Andersen et al., 2019). Soybean protein, being qualitatively very similar to animal-derived protein, plays an essential role both in human nutrition and in animal feeding. Increasing protein content is a priority objective in soybean breeding (Abdelghany et al., 2025). Recent studies (Xu et al., 2022; Choi et al., 2021) have shown that photoperiod response and development duration, both influenced by the maturity group, can substantially alter the patterns of the protein accumulation.

Located in the center of Transylvania, in a representative area for this part of the country RDSA Turda has established over time, a high-level research center, creations and knowledge were disseminated to farmers. This study contributes to a better understanding of the genetic variability of soybean varieties developed at ARDS Turda and provides valuable information for future breeding programs aimed at improving genotypes with specific purposes (food industry and animal feed), adapted to the pedoclimatic conditions of the Transylvania region (Figure 1).

Figure 1. Location of Research and Development Station for Agriculture Turda (ARDS Turda) and field view

MATERIALS AND METHODS

The present study was conducted at RDSA Turda, in the experimental field of Soybean Breeding Laboratory during 2020-2024, in order to assess the performance of the new conventional soybean varieties.

The biological material consists of 22 Turda soybean varieties from different maturity: very early (Perla, Carla TD, Bia TD, Isa TD, Potaissa TD, Romina TD), early (Onix, Eugen, Felix, Darina TD, Cristina TD, Mălina TD, Caro TD, Ilinca TD, Miruna TD, Nicola TD, Teo TD, Iris TD, Ziana TD) and semi-early (Larisa, Ada TD, Felicia TD, Raluca TD).

Quality parameters were determined using NIR infrared equipment (Tango Bruker Optik Gmbh, Ettingen, Germany). Experimental data was prepared and processed with Microsoft Excel and statistical program Past4.

RESULTS AND DISCUSSIONS

Table 1

Temperature and rainfall deviation during soybean seed filling period (July and August) compared 65-year means, RDSA Turda 2020-2024

		2020	2021	2022	2023	2024
Temperature (°C) deviation in soybean seed-filling period compared to 65-year average	July	0,5	3	3,3	2	1,8
	August	2,2	0,4	2,8	2,6	1,4
Rainfall (mm) deviation in soybean seed-filling period compared to 65-year amount	July	9,7	46	-52,8	8	-62,2
	August	1,5	-3,6	38,5	42,4	30,9

Source of primary data: Turda meteorological station (longitude: 23 ° 4´; latitude: 46 ° 35´; altitude: 427m)

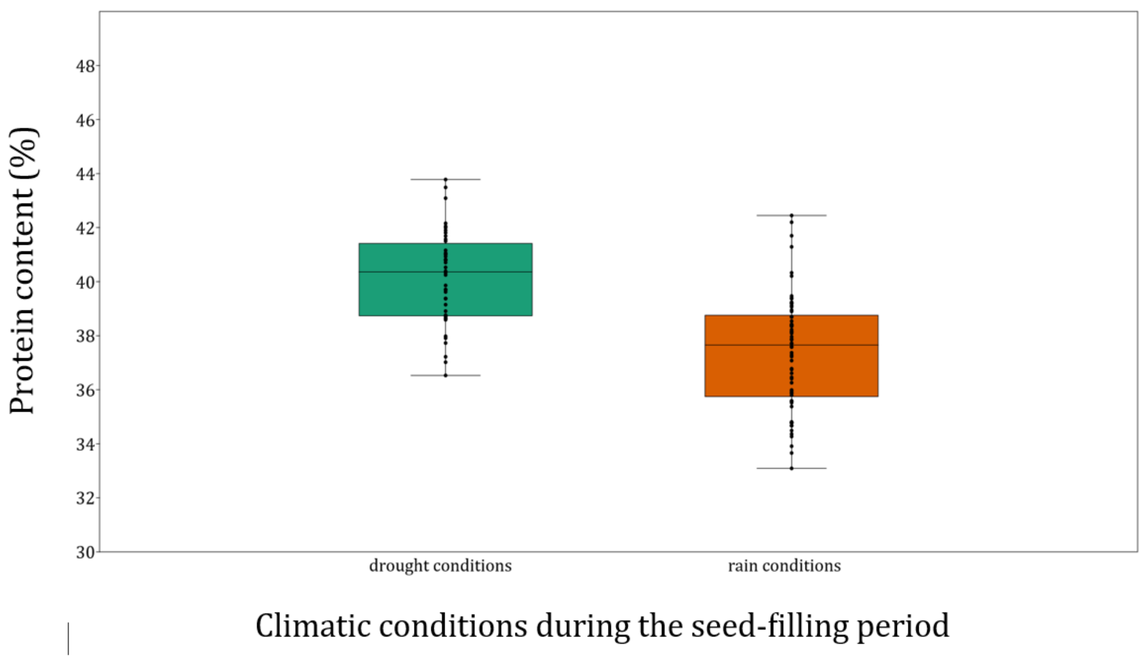

Figure 2. Variation of protein content (%) depending of the climatic conditions during seed-filling period, Turda 2020-2024

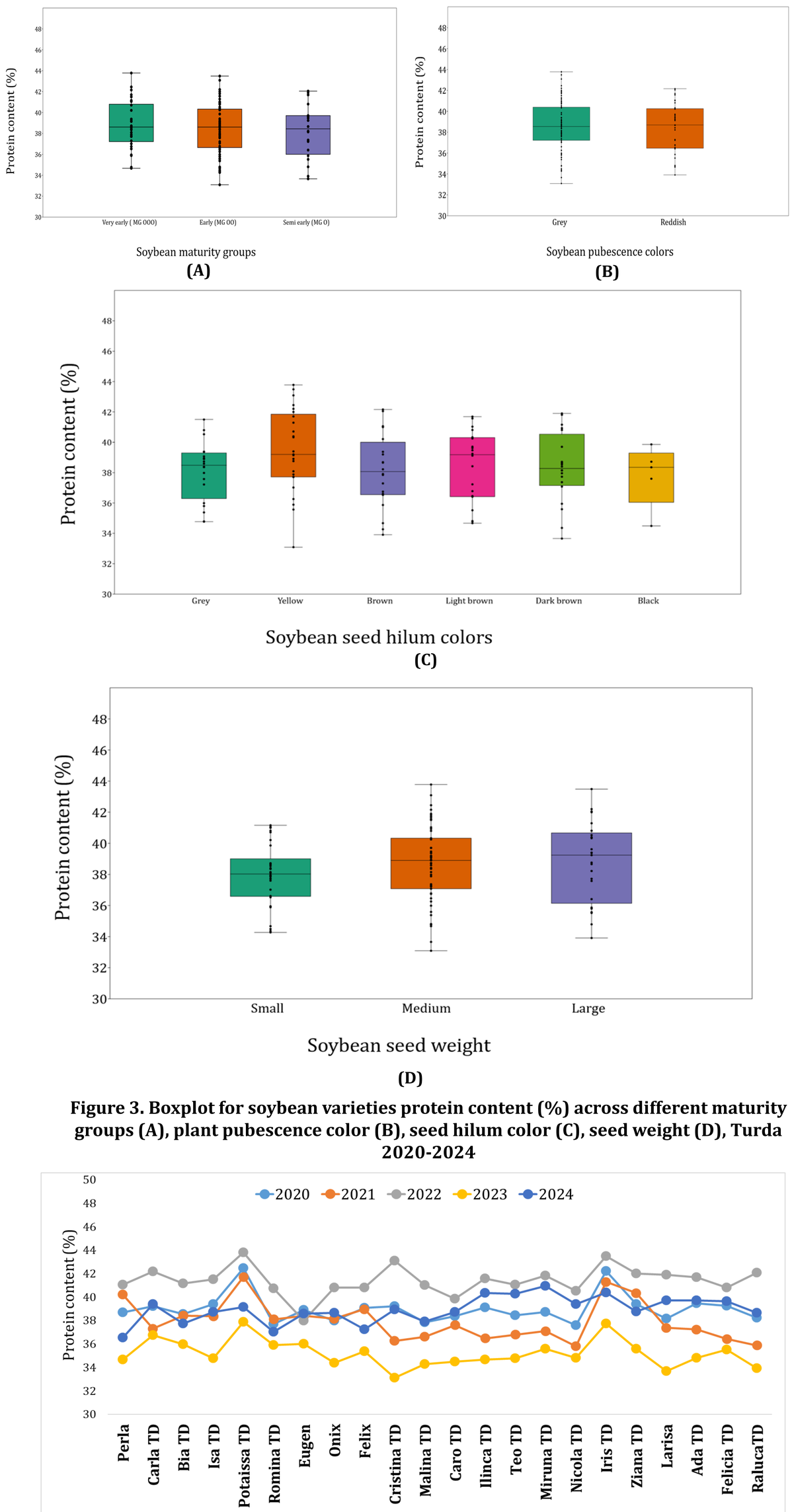

Figure 3. Boxplot for soybean varieties protein content (%) across different maturity groups (A), plant pubescence color (B), seed hilum color (C), seed weight (D), Turda 2020-2024

Figure 4. Soybean varieties protein content (%) in the experimental years, Turda 2020-2024

CONCLUSIONS

- ✓ The results revealed significant differences among varieties and maturity groups regarding protein content.
- ✓ The top four soybean varieties with the highest protein content, regardless of year, are Iris TD, Potaissa TD, Ziana TD, and Carla TD.
- ✓ It was observed that early-maturing varieties, in general, have higher protein content, while drought conditions during the seed-filling period led to an increase in protein percentage.
- ✓ Overall, ARDS Turda soybean varieties with very early maturity, medium seed size, grey pubescence, and yellow or brown hilum color are associated with higher protein content.

Selective bibliography

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