DETERMINATION OF THE CONTENT OF BIOACTIVE COMPOUNDS AND ANTIOXIDANT ACTIVITY IN A SYNTHETIC BLUE-GRAINED WHEAT AMPHIPLOID

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INTRODUCTION

The biochemical composition of wheat grains can be improved by exploiting wild species and by introgression of genes involved in anthocyanin synthesis. Due to their antioxidant activity, anthocyanins are contributing to the prevention of diseases associated with oxidative stress.

The synthetic amphiploid E-31 A developed at NARDI Fundulea by crossing durum wheat variety Condur with *Triticum monococcum subsp. boeoticum* is characterized by blue grains, a trait determined by the distribution of anthocyanins in the aleurone layer.

This study aimed to evaluate the antioxidant activity and determine the content of bioactive compounds (polyphenols, flavonoids and anthocyanins) in blue wheat grains, compared with two modern wheat cultivars – Pitar and Columna.

MATERIALS AND METHODS

The total polyphenol content (TPC) was determined by using a modified Folin-Ciocâlteu method as described by Arlet et al. (2023).

Total flavonoid content (TFC) was quantified using the aluminum chloride colorimetric method according to Pękal and Pyrzynska (2014) and Giurescu et al. (2023), with modifications adapted to the studied matrix.

Total anthocyanin content (TAC) was estimated using the method described by Maia et al. (2025).

Antioxidant activity was determined using a protocol adapted from Irimescu et al. (2021), based on the reduction of the stable 1,1-diphenyl-2 picrylhydrazil (DPPH) radical by antioxidants (DPPH Free Radical Scavenging Assay in the IC_{50} value of the methanol 80% extract from whole grains grounded). To calculate the inhibitory concentration, the IC_{50} value, represents the concentration of the sample required to inhibit 50% of the radical (DPPH). The antioxidant activity of samples increases as the IC_{50} value decreases.

RESULTS AND DISCUSSIONS

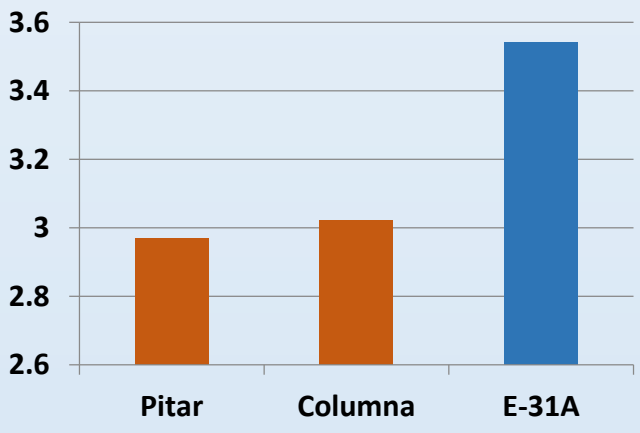

Fig.1 Total polyphenol content (mg GAE/g DM)

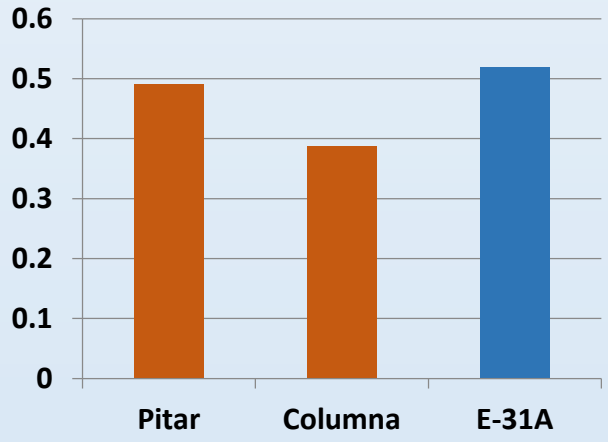

Fig.2 Total flavonoid content (mg RE/g DM)

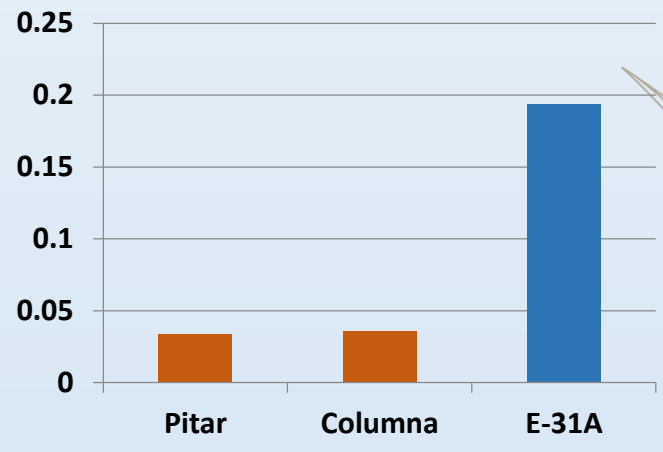

Fig.3 Total anthocyanin content (mg cyd-3-glu/g DM)

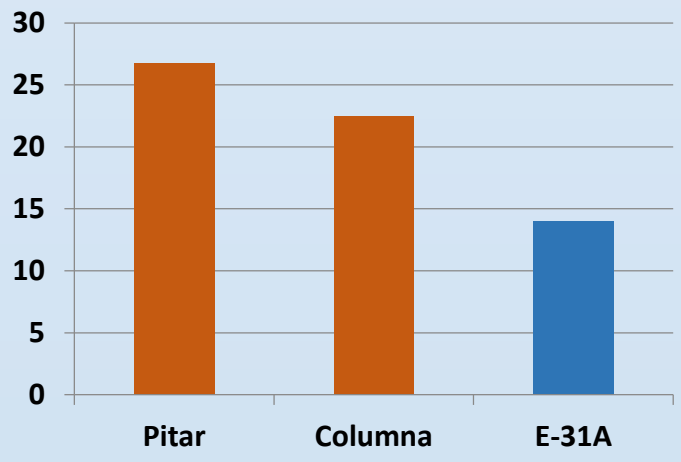

Fig.4 Antioxidant activity (DPPH IC_{50} mg/ml)

- **The results indicated that the blue-grained synthetic amphiploid exhibited the highest total polyphenol content, 3.543 mg GAE/g DM, followed by Columna (3.021) and Pitar (2.968) (Fig.1).**
- **The total flavonoid content expressed as mg RE/g DM was highest in E-31 A (0.520) followed by Pitar (0.491) and Columna (0.388) (Fig.2).**
- **Furthermore, the blue grains showed a higher total anthocyanin content, 0.194 mg Cyd-3-glu/g DM compared to Columna (0.036) and Pitar (0.034) (Fig.3).**
- **Antioxidant activity, measured as DPPH IC_{50} mg/mL, was greatest in the blue aleurone genotype (14.011), followed by Columna (22.473) and Pitar (26.783) (Fig.4).**

CONCLUSIONS

- **The synthetic amphiploid E-31 A exhibits significantly higher levels of bioactive compounds, highlighting the potential of blue wheat as a functional food. The highest antioxidant activity was also recorded in the blue grains.**
- **These studies provide a strong basis for the pre-breeding program aimed at developing wheat lines with increased bioactive compound content and enhanced health benefits.**

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