



## RESPONSES OF POTATO VARIETIES TO CLIMATIC FLUCTUATIONS: VARIABILITY IN PRODUCTIVITY AND PHYSICAL QUALITY TRAITS

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**Abstract:** This study assessed the response of five potato varieties under contrasting weather conditions in 2023-2024-2025. The results highlight the fact that the performance and quality of potato production are determined predominantly by climatic conditions and by the relationship between the genetic factor and the temperature and precipitation conditions during the potato growing period.



### • Introduction

Increasing climatic variability, characterized by frequent extreme events, strongly influences potato yield formation, tuber size distribution and key quality attributes. The purpose of this study was to evaluate the response of five potato varieties to interannual climatic variability over the 2023–2025 growing seasons in the Brașov area, with emphasis on yield performance, tuber size distribution, physicochemical quality traits, and the incidence of physical defects under contrasting temperature and precipitation conditions.

### • Material and method

For five potato varieties: Castrum, Cezarina, Darilena, Sevastia, Ervant, in addition to total yield (t/ha), number of tubers per m<sup>2</sup> were graded by tuber diameter into four size classes. Tuber dry matter, starch content and specific gravity were determined, and physical quality characteristics were assessed. The evaluation of physical quality indicators determined the proportion of shrivelled, mechanically damaged and peeled tubers, as well as defects such as deformation, cracking, sprouting and greening.

### • Results and discussions

The analysis of climatic data for the April–September period in 2023–2025, compared with the multiannual average (1993–2022) (Figure 1), highlights significant deviations in both thermal and rainfall regimes.

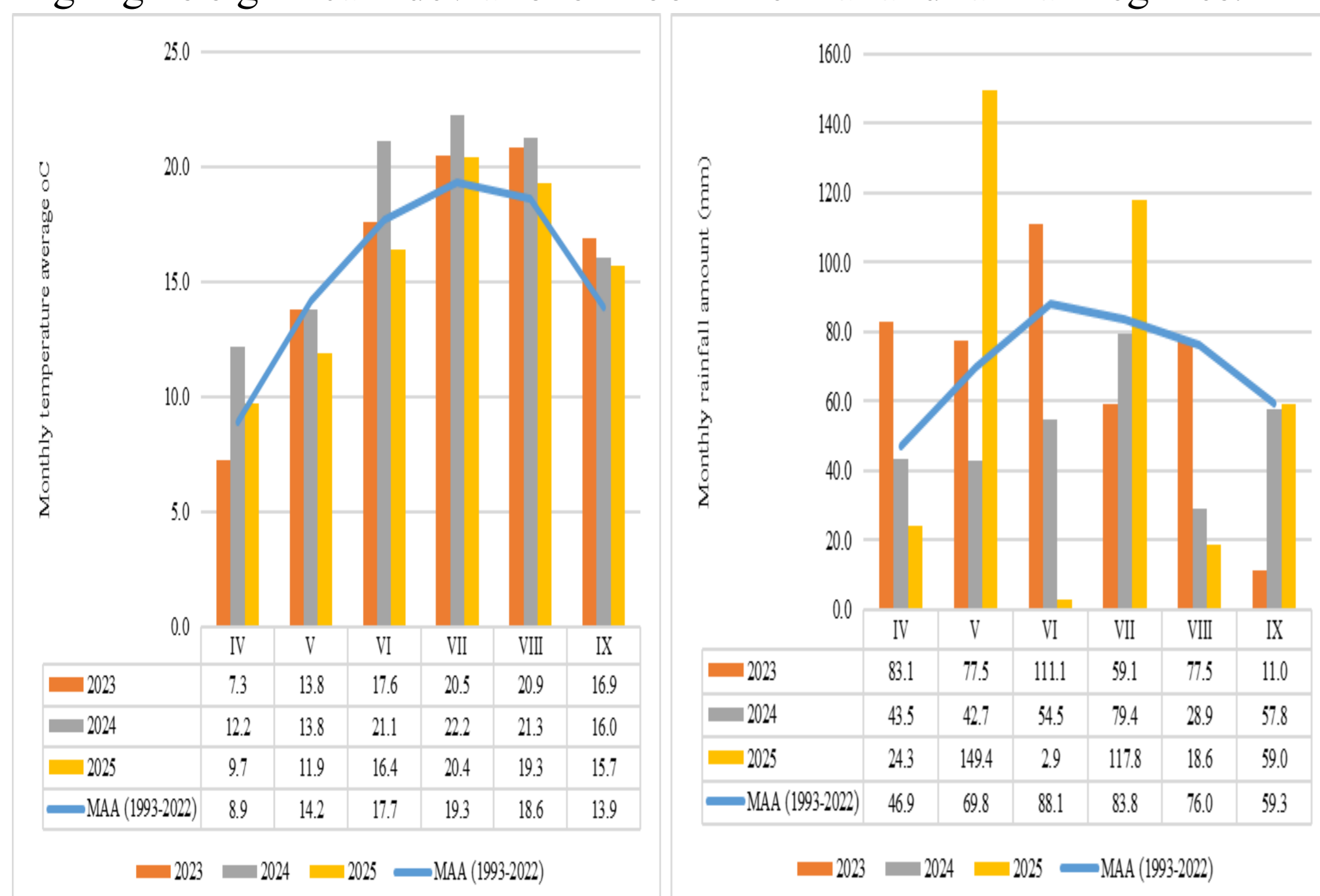


Figure 1. Monthly temperatures average and rainfall amount during the potato growing season in 2023-2025 (April-September) and multiannual average (1993-2022), Brașov

Strong positive correlations were identified between the three quality indices analysed (starch, dry matter and specific gravity). Drought in July contributes to tuber deformation and greening, while reduced precipitation in the same period, correlated with high temperatures during the summer months, leads to an increase in the percentage of sprouted and cracked tubers (Figure 2).

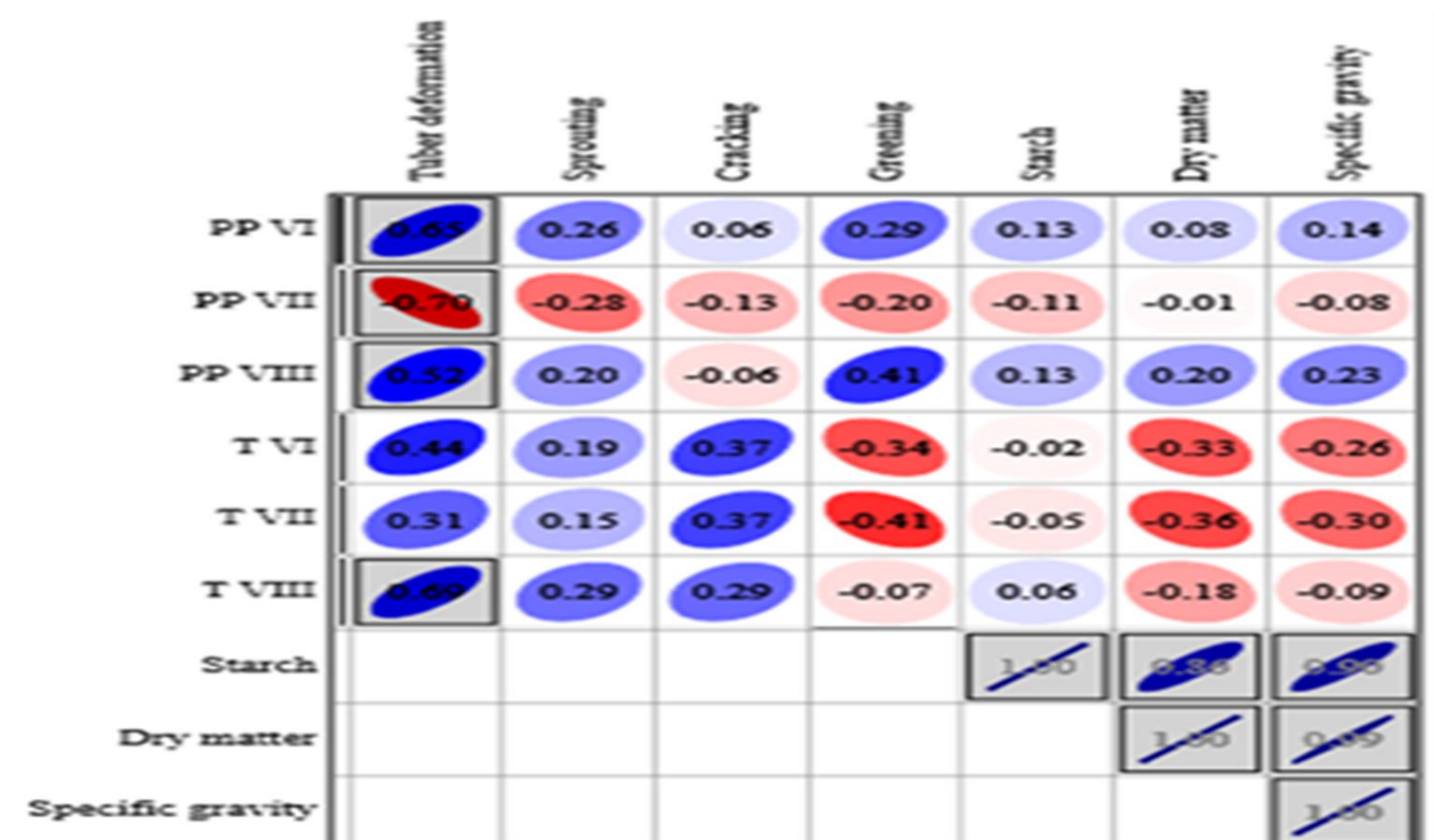


Figure 2. Correlation matrix of summer climatic conditions (T - temperature, PP - precipitation) and potato tuber quality traits

Descriptive statistics of tuber production by fractions highlight a differentiated distribution of values between genotypes and a significant variability depending on the size of the tubers (Figure 3).

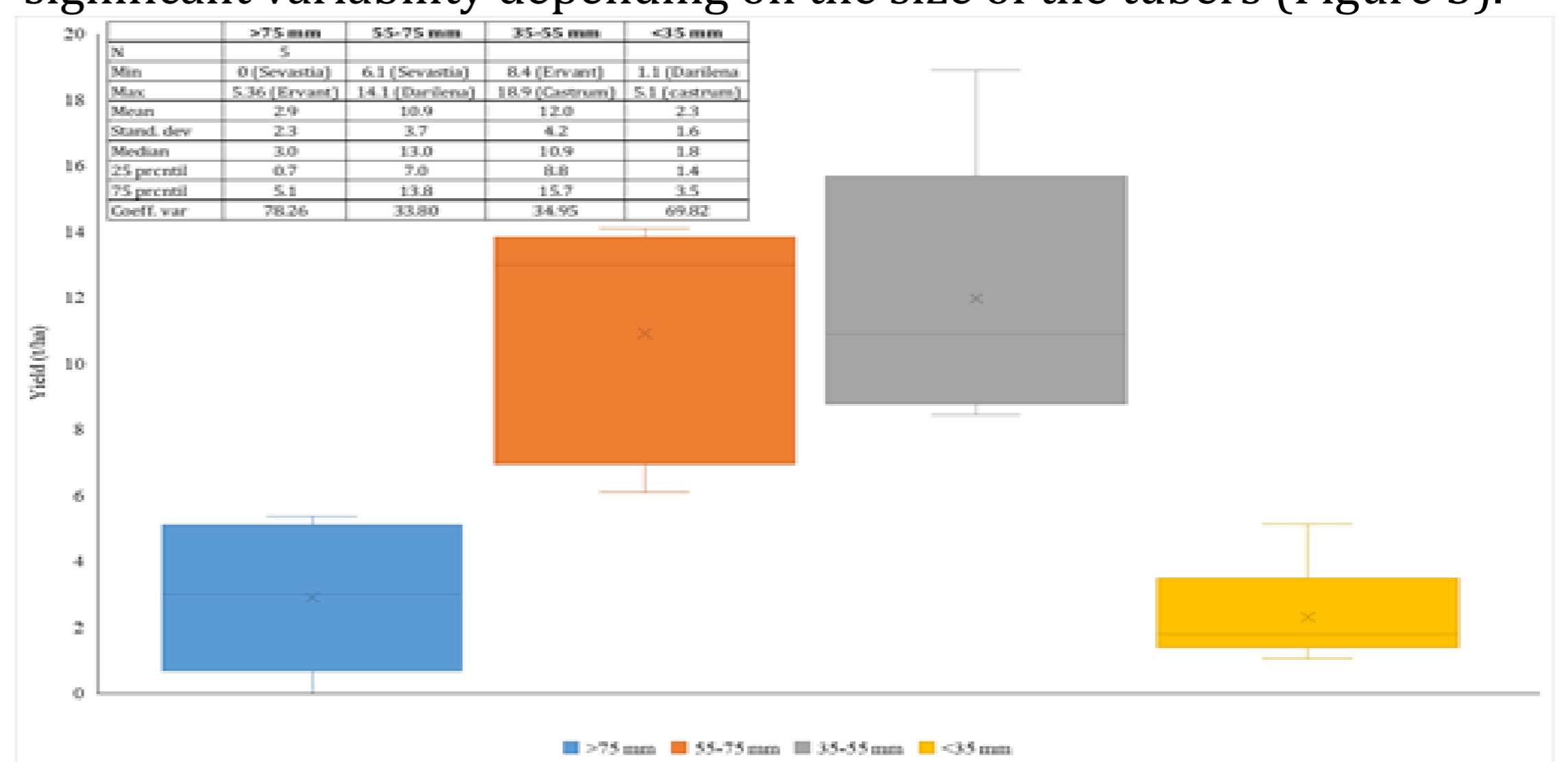


Figure 3. Descriptive statistics of potato yield in five varieties and 3 experimental years

### • Conclusions

- ❖ The climatic conditions during the vegetation period significantly influenced tuber size distribution: precipitation favoured the formation of large and very large tubers, while high temperatures determined the increase in the share of small tubers.
- ❖ The correlations between quality indices (starch content, dry matter and specific gravity) were strongly positive, confirming a close relationship between these parameters, while climatic factors showed weak and negative correlations with them.
- ❖ Tubers defects were influenced by climatic stress: drought and high temperatures favoured deformation and greening, and the succession between rainfall deficit and subsequent precipitation, under high temperature conditions, determined the increase in the percentage of sprouted and cracked tubers.