2023 MULTIDISCIPLINARY CONFERENCE ON SUSTAINABLE DEVELOPMENT

Timisoara, 25-26 May

RESEARCH OF SOIL SALINITY IMPACT ON SOME PRODUCTIVITY INDICES IN HAZELNUT (*Corylus avellana*)

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Abstract: *Soil salinity generates adverse effects for almost all stages of growth and metabolic processes in hazelnut plants, starting from inhibition of seeds germination, delay in the growth and development of plants, and, ultimately, reduction of productive and quality yield of the crop. The research was carried out on two hazelnut genotypes cultivated on large areas at European level, Tonda Gentile Trilobata (TGT) and Tonda di Giffoni (TG) on salinized and non-saline soils from the Emiliana West Rom SRL holding. The impact of salinization was analyzed by evaluating some morphological characters of the nuts (height, large diameter, small diameter, total mass, mass of the core and shells) based on which the shape index and the yield efficiency were calculated.*

• Introduction

Worldwide, more than 800 million hectares of land, i.e. almost 20% of the total arable land area and over 7% of the total global area, is affected by salinity (Shabala, 2013; Hakim et al., 2014). The forecasts are even more bleak, with estimates showing that more than 50% of the arable land on Earth will be salinized by 2050 (Jamil et al., 2011; Shrivasata & Kumar, 2015). Saline soils inhibits the growth and development of many plants, including most cultivated species (Akyol et. al., 2020) by imposing several major constraints. High levels of soil salinity affect cellular processes, including photosynthesis, the major function of chloroplasts.

The presence of salt in the soil can cause both osmotic stress and ionic toxicity, with direct effects in inhibiting its photosynthesis through diffuse (stomatal, mesophilic and layer limitations to CO2) and/or non-diffuse (photochemical and biochemical) carbon fixation [Hussain et al., 2019; Hameed et al., 2021].

The objective of the research was to assess the impact of soil salinity on the main morphological and productivity characteristics of hazelnut fruits (*Corylus avellana*).

• Material and method

The anlyzed hazelnut fruits, from the genotypes Tonda Gentile Trilobata (TGT) and Tonda di Giffoni (TG) were harvested at physiological maturity from plants grown in saline and non-saline areas, from the Emiliana West Rom Farm, located in Dudeștii-Vechi (46°03'00"N/20°28'59"E) Timis county.

Morphological indices.

***Fruit length (mm)*- by determination with the electronic caliper,**

***Large and small diameter of the fruit* (mm)- by determination with the electronic caliper,**

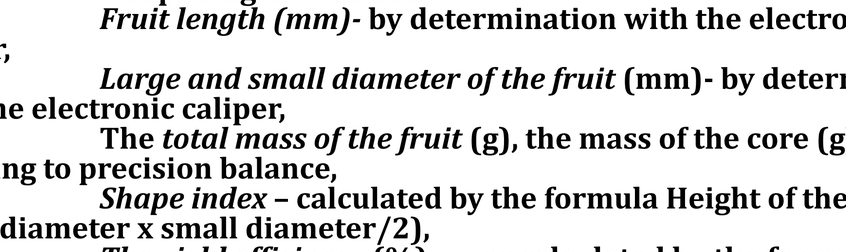
The *total mass of the fruit* (g), the mass of the core (g)- by weighing to precision balance,

***Shape index* – calculated by the formula Height of the fruit/ (large diameter x small diameter/2),**

***The yield efficiency* (%) – was calculated by the formula; mass of the core × 100/total mass of the fruit.**

Soil characteristics

	EC (µs/cm)	Cl (mg/100 g soil)	Na (mg/100 g soil)	Ca (mg/100 g soil)	Mg (mg/100 g soil)	SO4 (mg/100 g soil)	pH	N (%)	P (ppm)	K (me/100g soil)
saline	797,5	63,9	4,31	16,4	8,03	72,1	8,01	0,13	20,25	277
non-saline	286,6	14,4	1,27	27,9	9,17	32,9	6,12	0,21	24,8	314



• Results and discussions

Data analysis on the impact of the genotype and soil salinity on the length of the fruit (fig. 1.) attests that genetically TGT has fruits with a longer length compared to TG, on unsalted soils these values being between 18.62 + 2.52 mm and 16.94 + 2.31 mm

Soil salinity determined the reduction of fruit length to 17.08 + 3.24 mm at TGT and 16.82 + 3,06 mm for TG. Therefore, the reduction in fruit length generated by soil salinity was 1.54 mm at TGT and only 0.12 mm for TG.

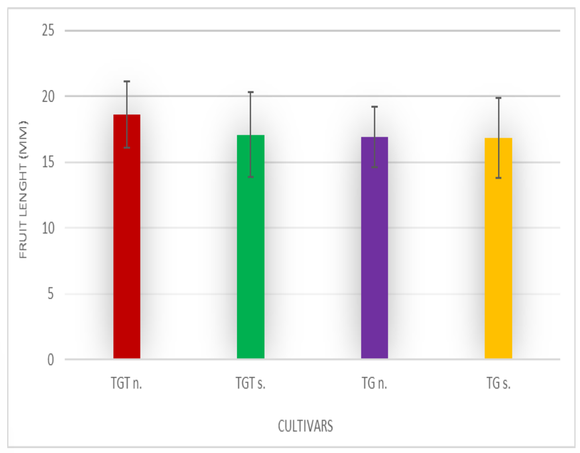


Fig.1. Fruits lenght (mm)- *n- non saline soils; s- saline soils*

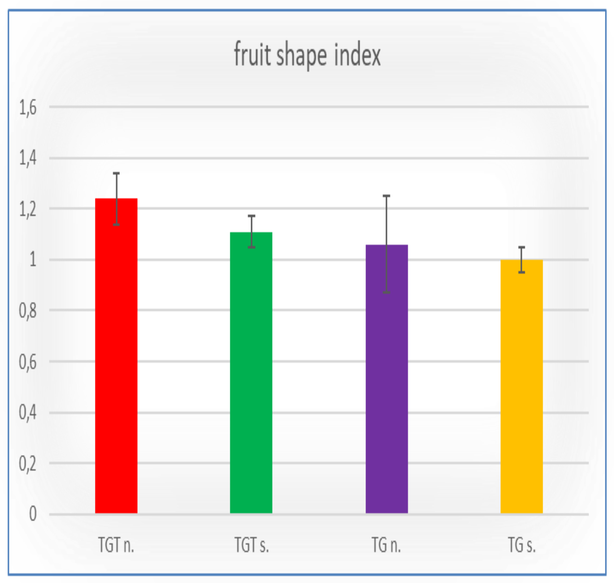


Fig.2. fruits shape index- sphericity

Analysis of the shape index data (Fig 2.) shows that the soil salinity tends to flatten the nuts. The TGT variety has, in conditions of non-saline soil, an elongated shape index with a value of 1.24 while the salinity conditions have determined the reduction of its value to 1.11. TheTG variety has round fruits, the shape index being close to the value 1, the soil salinity caused a reduction in the value from 1.06 non-saline to 1.0, which means that the parameters of length and diameter are equal.

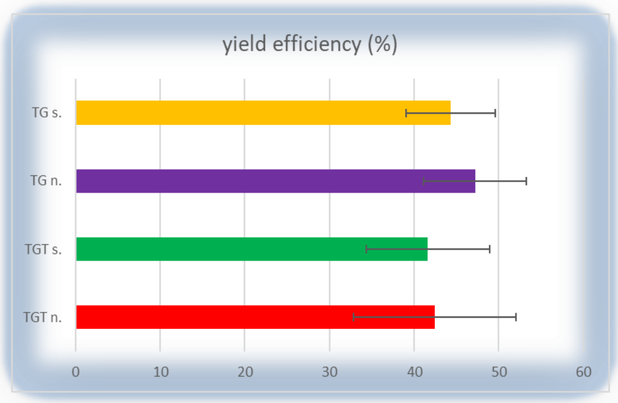


Fig.3. Yield efficiency (%)

Data on the yield efficiency (fig 3.), i.e. how much is the edible product, of the total quantity harvested, show that the values vary from 41.63 + 7.29 % in the case of the TGT variety under saline stress to 47.23 + 6.06 % in TG grown under non-saline soil conditions.

Clearly, the saline stress led to reductions in production yields in both varieties studied to values of 44.33 + 5.26 % in TG and 41.63 % in TGT.

Conclusions

Comparison of the morphological indicators of the nuts shows that the TGT variety is more elongated, and the TG shows globular fruits shape. Saline stress alters the shape index tending to flatten the hazelnuts in both varieties. The values of the yield efficiency were lower under conditions of salinity in both varieties, but higher in TG, which shows a greater ability to adapt to the conditions of saline stress in the case of the Tonda di Giffoni genotype.