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ANALYSIS OF THE RELATIONSHIPS BETWEEN FRUIT TRAITS IN SWEET CHESTNUT

Picinisi I.G., Ciulca S.

University of Life Sciences "King Michael I" from Timisoara

Abstract: In contemporary times, there has been an increasing consumer interest in sweet chestnut fruits attributable to their nutritional qualities and prospective health advantages. The analysis of correlations aids breeders in discerning the interconnections among diverse traits, thereby enriching their understanding of the contribution of each trait to the genetic framework of yield. This comprehension is essential for making informed decisions within breeding initiatives. The aim of the research was to elucidate the characteristics and degree of correlation among five fruit traits across ten wild and cultivated genotypes of sweet chestnut, with the intent of facilitating effective selection for pod traits pertinent to yield. The results pertaining to the fruit traits of the examined genotypes were subjected to rigorous statistical analysis, employing variance analysis for multiple regressions incorporating four independent variables, alongside Pearson phenotypic correlation and path coefficient assessments. This collection of wild populations and cultivated genotypes of Castanea sativa exhibits varied interrelations among the primary kernel characteristics and, as such, may function as a valuable resource for the selection of materials intended to improve these traits.

Introduction

Chestnut fruits are highly desirable and widely consumed throughout the world, and generally have several beneficial nutritional characteristics The fruit is rich in carbohydrates and low in fat content. This characteristic increases its use in diets. Chestnut is widely used as a food by cooking as well as in cake and candy industry. However, differences could be detected among the species and the cultivars with respect to their nutritional value. the quality parameters and chemical composition of chestnuts are largely influenced by climate conditions. The correlated traits can be distinguished as important for further selection and breeding of sweet chestnuts. The associations between different studied kernel traits can provide references and guidance for chestnut cultivation and also genetic breeding.

Material and Method

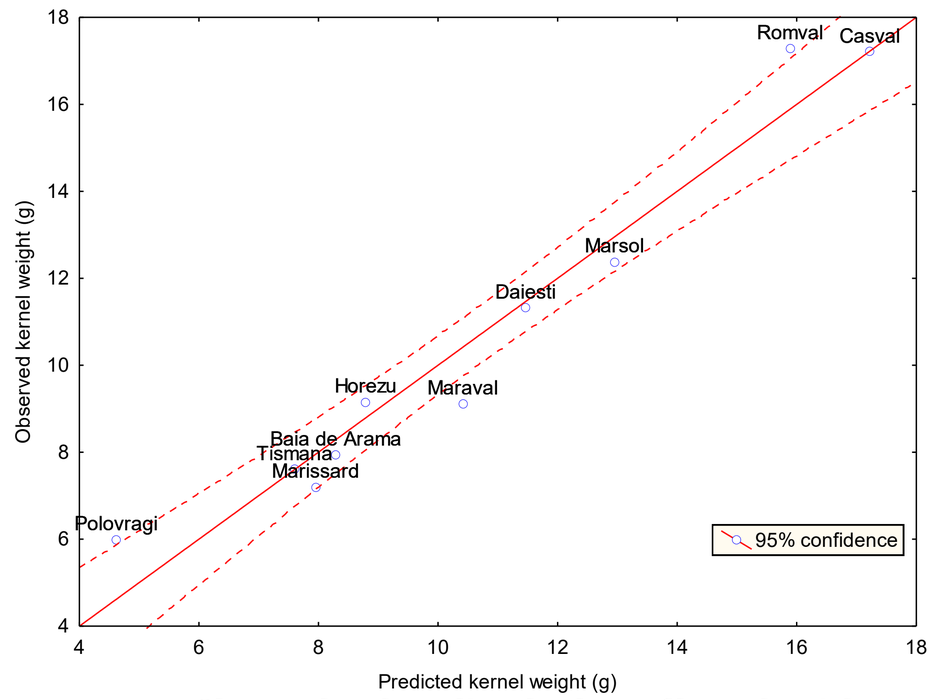
The studied plant material included three wild populations from Romania, two selections from Romania, and five cultivars from both Romania and France. 20 kernels/genotype were randomly selected and measured with a digital calipper regarding: height (mm), width (mm), thickness (mm); while the weight (g) was determined using a digital scale. The kernel shape was assessed using the ratio of fruit height and width. The results pertaining to the fruit traits of the examined genotypes were subjected to rigorous statistical analysis, employing variance analysis for multiple regressions incorporating four independent variables, alongside Pearson phenotypic correlation and path coefficient assessments.

Correlation matrix for kernels traits

Kernel traits	Width	Height	Thickness	Shape index	Weight
Width	-	0.009	<0.001	0.675	<0.001
Height	0.775	-	0.042	0.136	0.006
Thickness	0.878	0.649	-	0.595	<0.001
Shape index	-0.152	0.506	-0.192	-	0.847
Weight	0.958	0.793	0.919	-0.070	-

Results and Discussions

The contribution of different kernel traits to the kernel weight, was different among the genotypes, indicated an important variation of kernel morphology for this set of genotypes. Kernel weight shoved the strongest correlations with kernel width and thickness.



Observed and predicted values of kernel weight according to multiple regression

The regression model with four independent variables shoved a high accuracy, indicating very close values of observed and predicted kernel weight. In the case of 'Romval' and 'Polovragi' genotypes the observed values are higher compared to predicted ones, while in 'Maraval' cultivar the predicted values are higher to the observed.

Conclusions

This set of wild populations and cultivated genotypes of sweet chestnut presents diverse relationships among the principal kernel traits and, consequently, may serve as a resource for the selection of materials aimed at enhancing these traits.