

# POPULATION VARIABILITY OF SWEET CHESTNUT (*CASTANEA SATIVA* MILL.) IN CROATIA ACCORDING TO THE FRUIT MORPHOLOGY

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## BACKGROUND

From the ancient history, sweet chestnut forests represented an important source of various raw materials.

Due to intensive exploitation of chestnut forests and plantations and the appearance of the chestnut blight in the

middle of 20th century, chestnut forests declined.

For this reason, in a number of European countries a series of multidisciplinary projects have been launched with the aim of sweet chestnut **conservation**

and chestnut **re-establishment** to the prior position in forest ecosystems.

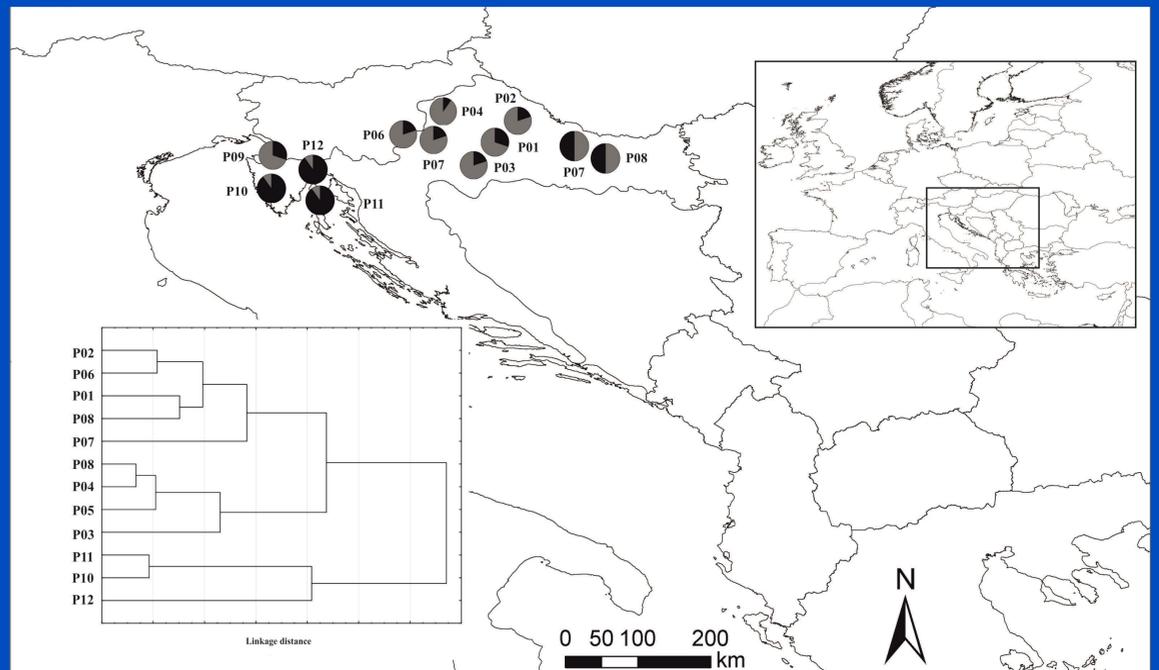
The aim of this research was to determine the **population variability** of the sweet chestnut populations in Croatia, using fruit morphology.

## GEOGRAPHICAL DISTRIBUTION OF THE 12 SAMPLED *CASTANEA SATIVA* POPULATIONS

Geographical distribution of two groups of populations detected from K-means clustering (the proportions of the ancestry of each population in each of the defined clusters are colour-coded: cluster A—black, cluster B—grey).

Dendrogram constructed by UPGMA method of cluster analysis on the closest Euclidean distances between analysed populations.

Acronyms of populations as in Table.



## POPULATION, SAMPLE SIZE AND MORPHOLOGICAL TRAITS DATA BASED ON MEASUREMENTS OF *CASTANEA SATIVA* FRUITS

| No.     | Population       | n  | m           | h           | w           | t           | sl          | sw          | pmw         |
|---------|------------------|----|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| P01     | Moslavačka gora  | 10 | 6.4 (31.4)  | 23.9 (10.2) | 26.2 (11.2) | 16.0 (17.3) | 21.4 (13.9) | 10.9 (17.3) | 14.4 (11.4) |
| P02     | Bilogora         | 10 | 7.1 (24.4)  | 24.5 (7.9)  | 26.8 (9.3)  | 17.2 (39.5) | 20.0 (13.1) | 10.3 (12.5) | 13.4 (10.7) |
| P03     | Zrinska gora     | 10 | 6.0 (35.9)  | 23.6 (7.9)  | 24.8 (15.6) | 15.6 (17.4) | 18.7 (17.4) | 10.0 (18.1) | 12.9 (13.0) |
| P04     | Medvednica       | 10 | 7.6 (28.2)  | 24.1 (7.6)  | 27.1 (10.0) | 16.3 (13.9) | 19.3 (13.0) | 9.3 (17.2)  | 13.7 (9.8)  |
| P05     | Samoborsko gorje | 10 | 7.4 (22.4)  | 24.5 (8.2)  | 26.8 (8.8)  | 16.3 (14.1) | 18.5 (12.7) | 9.5 (15.1)  | 14.1 (7.9)  |
| P06     | Žumberak         | 10 | 7.2 (32.5)  | 24.7 (13.6) | 26.9 (12.6) | 16.3 (14.9) | 19.8 (16.9) | 10.1 (17.5) | 14.2 (10.2) |
| P07     | Krndija          | 10 | 7.7 (23.9)  | 26.0 (7.8)  | 28.8 (9.3)  | 16.1 (12.6) | 22.5 (10.9) | 10.7 (11.7) | 14.8 (11.4) |
| P08     | Psunj            | 10 | 7.6 (25.7)  | 24.1 (7.5)  | 27.8 (10.1) | 17.1 (12.3) | 21.8 (14.2) | 10.8 (16.3) | 13.9 (9.6)  |
| P09     | Buje             | 10 | 7.1 (30.2)  | 24.4 (11.8) | 27.5 (11.9) | 16.3 (15.0) | 19.1 (14.9) | 8.9 (17.4)  | 13.6 (12.2) |
| P10     | Poreč            | 10 | 10.3 (21.6) | 28.8 (8.0)  | 30.9 (8.6)  | 19.2 (11.9) | 22.0 (14.2) | 11.1 (14.1) | 15.0 (10.0) |
| P11     | Cres             | 10 | 9.8 (25.9)  | 28.5 (7.8)  | 29.6 (11.6) | 19.3 (15.7) | 21.6 (16.4) | 11.4 (17.7) | 15.4 (9.2)  |
| P12     | Učka             | 10 | 10.7 (23.0) | 26.7 (7.5)  | 31.5 (9.5)  | 19.5 (12.5) | 21.1 (10.7) | 10.7 (11.6) | 11.9 (9.9)  |
| p value |                  |    | <0,01       | <0,01       | <0,01       | <0,01       | <0,01       | <0,01       | <0,01       |

n - number of individuals per population;

m - fruit weight (g);

h - fruit height (mm);

w - fruit width (mm);

t - fruit thickness (mm);

sl - scar length (mm);

sw - scar width (mm);

pmw - position of max fruit width (mm);

p value (ANOVA)

Mean value (CV%)

All represented traits are mean values.

CV%=coefficient of variability

## RESULTS & DISCUSSION

The results clearly demonstrated a high phenotypic diversity of sweet chestnut populations in Croatia. In addition, the existence of two morphologically distinct and well-defined groups of sweet chestnut populations was observed.

Nevertheless, the results were not entirely consistent with the bio-geographical distribution of the researched species. Rather, they indicated that the morphological variability of sweet chestnut populations in Croatia is the result of both environmental heterogeneity and significant and lengthy human impact.

The research of variability is important for preparation and implementation of measures for the conservation of sweet chestnut genetic resources, whereas the morphological research of fruits is, along with chemical analysis, important as the first step in selecting trees as candidates for future autochthonous best-quality sweet chestnut cultivars.

## MATERIAL & METHODS

A total of **120 sweet chestnut trees** were sampled in **12 populations** from continental and Mediterranean biogeographical regions of Croatia.

Descriptive and multivariate statistical methods were combined. **Seven morphological traits** were studied: fruit weight, height, width, thickness, scar length, scar width and position of max fruit width.

## REFERENCES

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