EVALUATION OF APPLE AND PEAR GENETIC RESOURCES IN BOSNIA-HERZEGOVINA WITH THE AIM OF SUSTAINABLE, COMMERCIAL UTILIZATION

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INTRODUCTION

Traditional apple and pear germplasm in Bosnia and Herzegovina is a result of centuries of introduction, foremost from Asia Minor, during the reign of the Ottoman Empire, and later from Western Europe during the reign of Austrian–Hungary Empire. In order to assess traditional apple and pear germplasm in Bosnia and Herzegovina (B&H), accessions from both *ex situ* collection and *on farm* locations have been investigated using microsatellite markers (Gasi et al., 2010; 2013a; 2013b). Molecular data obtained, revealed a high level of genetic diversity within the examined germplasm and a significant genetic differentiation between traditional apple and pear cultivars, in relation to the international cultivars of these two fruit crops, currently cultivated in Bosnia and Herzegovina. Although the morphologic traits registered among traditional apple and pear accessions in Bosnia and Herzegovina are very diverse (Gasi et al., 2011), this does not necessarily mean that most of the genetic material is appropriate for traditional breeding purposes. However, specific chemical composition of the traditional (B&H) apple and pear fruit might make them suitable as a raw material for processing into products such as pekmez, jam, cloudy juice and brandy, using both traditional and modern methods. In order to evaluate apple and pear genetic resources in Bosnia and Herzegovina for these purposes we are currently investigating chemical content of the fruit as well as their sensory characteristics. Data gathered through the evaluation will be made available to the local food processing industry and this will hopefully stimulate the use of autochthonous fruits in local food industry, especially in combination with rural tourism. Some of the key preliminary results of the study are presented here.

MATERIAL AND METHODS

A total of 30 apple and 15 pear accessions, maintained at the largest *ex situ* collection in B&H, were selected for sensory and chemical analyses from a larger set (50 apples and 40 pears) based on recommendations of two previous studies (Begić-Akagić et al. 2006; Gasi et al., 2011). Together with the traditional accessions, several commercial apple and pear cultivars were used as reference genotypes ('Golden delicious', 'Granny Smith', 'Gala', 'Idared', 'Bartlett', 'Conference', 'Passe Crassane').

Sensory analyses was performed in 2012 by an expert panel on ripe fruits from each examined cultivar. The samples were evaluated by Quantitative Descriptive Analysis (QDA) using two scales (semi structured line scale and numerical scale 1-5-scale).

The following sensory parameters were studied:

▫ Texture: crunchiness, firmness, juiciness, mealiness, grittiness, fondant

▫ Taste: swetness, sourness, bitterness, astrigency

▫ Flavour: odour intensity, sweet flavour, sour flavour green, fruit flavour, floral, typical, after taste, overall sensation

Basic chemical analyses (soluble solids, total acidity, suger/acid ratio) were performed in 2012 on the fruits harvested from the above mentioned apple and pear cultivars. Through the use of principal component analyses (PCA), accessions of interest were identified.

RESULTS AND FUTURE ACTIONS

Twelve traditional apple and eight traditional pear cultivars displayed extraordinary flavor attributes in comparison to reference commercial cultivars. Principal component analyses (Fig. 1. and Fig. 2.) identified three apple ('Rebrača', 'Paradija', 'Prijedorska zelenika') and three pear accessions ('Hambarka', 'Takiša', 'Hasanagićka') with the most interesting sensory traits. Fruits from these genotypes will therefore be used as raw material for processing into apple and pear brandy in 2013 and 2014. All distillates will be subjected to sensory evaluation, after which they will be analyzed using GC/FID (quantifying 8 different volatile aroma).

Based on the chemical and sensory analyses a number of traditional apple and pear cultivars have been evaluated as suitable to be used as raw material for specific fruit products (Tab. 1.). Selected cultivars will be processed into juice, jam and pekmez in 2013 and 2014. The produced fruit products will also be subjected to the sensory evaluation, after which they will be analyzed using HPLC (quantifying organic acid, sugar and phenol composition).

Interpreted results of the three year analyses will be used in order to give recommendations to the local food processing industry on which traditional apple and pear cultivars can contribute to flavor and phenol content of their fruit products.

Fig. 1. Principal component analysis of the sensory atributes and selected traditional apple cultivars

Fig. 1. Principal component analysis of the sensory atributes and selected traditional pear cultivars

Tab. 1. Traditional cultivars selected for appropriate fruit products

Fruit	Cultivar	Fruit products
A p p l e	Kožara, Bijela Funtača, Bukovija, Francuska kožara, Funtača, Kanjiška, Pamuklija, Stana, Ljepocvjetka, Lederka, Rebrača	Cloudy and clear juice
	Ruzmarinka, Masnjača, Paradija, Prijedorska zelenika, Mirisavka, Petrovača crvena, Senabija, Habikuša, Dobrić, Srebrenička, Žuja	Pekmez and jam
P e a r	Krakača, Konjuha	Cloudy and clear juice
	Hambarka, Hasanagićka, Takiša, Budaljača, Debelkora, Dolokrahan, Crvena kanjiška, Alidžunka, Urumenka, Zelenika, Sarajka, Ahmetova, Ljeskovača, Crna izmirka, Kačmorka	Pekmez and jam

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6. Gasi F., Kurtovic M., Kalamujic B., Pojskic N., Grahic J., Kaiser C., Meland M. 2013b. Assessment of European pear (*Pyrus communis* L.) genetic resources in Bosnia and Herzegovina using microsatell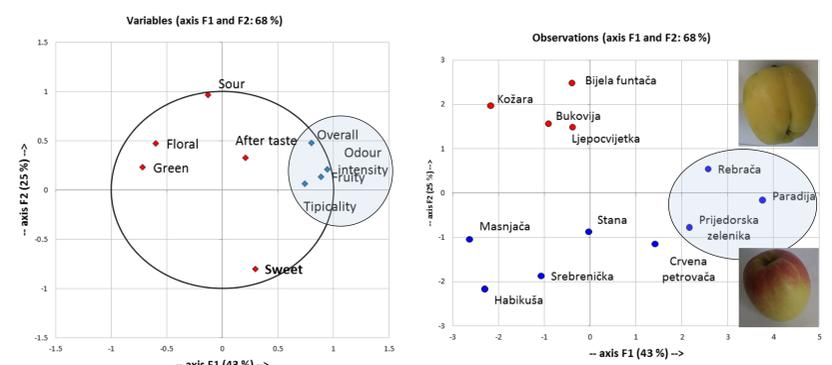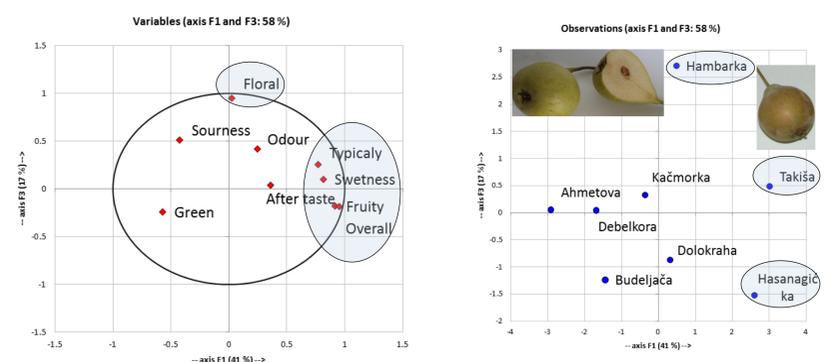ite markers. Scientia Horticulturae. 157, 74–83.