GENOFUND OF NATIVE FRUIT IN THE UNA - SANA CANTON

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ABSTRACT

A high-quality genofund of fruit species and varieties, which are the result of centuries-long adaptation and selection, characterises the Una – Sana Canton. Therefore, this work has included research on the thirty-one sites in eight municipalities (Bihać, Bosanska Krupa, Bosanski Petrovac, Bužim, Cazin, Sanski Most, Velika Kladuša) of the Una- Sana Canton. The aim is primarily to protect and preserve endangered fruit trees and genofund, whereby the first step in meeting these goals is the inventory of native species and varieties. The total of 275 native fruit accessions has been found at these sites, apples and pears being dominant. Most native fruit accessions are not commercially significant varieties. However, local inhabitants mainly use them in the processing and preparation of traditional products. Also, a high degree of tolerance of these accessions for particular diseases and pests was recorded, whereby these accessions represent an exceptional source of starting material for future breeding steps.

Key words: Native fruit, genofund, Una-Sana Canton, inventory, accession

INTRODUCTION

Preserving biodiversity is one of the key concerns of the world community, one of the most important issues for the protection of the environment. The conservation of plant genofund is essential for each country. While the genofund of agricultural species plays an important role in agricultural production of a country, genofund of wild species plays an important role in preserving the environment and preserving biodiversity. Domestic varieties are all those varieties which originate from our country or which are grown for a long time here and are of unknown origin, but according to their economic characteristics are very important, and have a national significance. Domestic varieties are often similar in some basic features, because they originate from the same environmental conditions. They usually have more important agricultural and biological, as well as pomological characteristics, which make them suitable as starting material for selection (Šoškić, 1994). According to Kowarik & Seitz (2003), indigenous varieties are those natural populations spontaneously formed in a certain area, and varieties that have directly or indirectly come to a particular area thanks to a man, and it is not known from which area.

The history of our indigenous fruits varieties is very long. Balkan Peninsula is one of the most important and richest centres of genetic diversity of fruit species in Europe. Many fruit species during domestication came in contact with their wild relatives, and the crossing of genetic material and adaptation to environmental conditions resulted in enriching the biodiversity of the area (Vukojević et al., 2012).

As it is pointed out by Milenković and Lukić (2008), indigenous varieties are donors of genes that are responsible for specific traits: resistance to the causes of diseases and pests, colouring, flavour, resistance to abiotic factors of the environment, storage properties. Specialisation in terms of choice of breeding of certain species and varieties towards which a modern fruit production strives, the choice of intensive breeding systems, market demands, and striving for the realization of greater financial gain, are the reasons of genetic uniformity, i. e. permanent reduction of genetic variability of cultivated fruit trees, which may have disastrous consequences. These effects generally manifest as outbreaks of plant diseases, a significant reduction in yield or total absence of production of certain species or varieties (Jarebica & Kurtović, 1997). As stated by Fischer (2002), an intensive production of new highly productive varieties makes agrobiodiversity susceptible to diseases, pests and weeds, which in turn demands the use of pesticides. The solution to this problem in the fruit growing can be found in the genetic variability of indigenous varieties, therefore the conservation and use of genetic resources of indigenous species and varieties.

Indigenous varieties of fruit, although very present and widespread in the Balkans, were rarely studied. However , today more and more authors conduct research of indigenous fruit species and varieties, which indicates ever increasing importance of conservation of fruit trees genetic resources (Milenković & Lukić, 2008; Skender, Jahić, Hadžiabulić & Kurtović, 2008; Ognjanov 2005; Begić-Akagić et al., 2011; Gaši et al., 2010, 2011, 2013 etc.). According to Begić - Akagić et al. (2011), indigenous varieties in Bosnia and Herzegovina are valuable sources of desirable genetic material for important pomological, nutritional and technological properties of fruit. As Klještanović stated (2012), clonal selection of native apple varieties and their application in hybrid combinations yielded visible results in Serbia.

The north-western part of Bosnia and Herzegovina, i. e. the Una-Sana Canton, is characterized by high quality resources fruit species and varieties, which are the result of centuries-long adaptation and selection. Given that these are very old high trees (indigenous

varieties) in the system of extensive planting, the survival of these resources is questionable. As in other parts of Bosnia and Herzegovina, commercial fruit varieties were dominant in the 20th century. This resulted in neglecting of old genotypes which, apart from representing our natural and cultural heritage, are species and varieties highly resistant to diseases and pests. In north-western Bosnia and Herzegovina, the presence of a large number of very old trees of different varieties of apple, pear, plum, cherry, walnut and chestnut is evident. These genotypes represent a reservoir of genes which should serve as the basis for the breeding of these fruit species in the future. Therefore, the survival and preservation of these varieties is the issue of the overall biodiversity of Bosnia and Herzegovina. The existing genetic diversity can be preserved by establishing *in situ*, *on farm* and *ex situ* collection plantations.

METHOD

Research, i. e. inventory of native species and varieties of fruit was carried out over the period July – December 2012, in north-western Bosnia and Herzegovina, i. e. the Una - Sana Canton. The study included thirty–one sites in eight municipalities (Bihać, Bosanska Krupa, Bosanski Petrovac, Bužim, Cazin, Sanski Most and Velika Kladuša). During the inventory, standard research methodology and data collection of a large number of data from the field was used. A survey was conducted on the field, regarding the data on the variety and age of a tree, basic pomological characteristics, use value, resistance to disease and frost. The exact address has been recorded for each tree. Every tree has been photographed, and very rare varieties have been especially noted. Collection of fruits was done at the time of their full maturity, whereby basic characterization and description of fruit have been conducted, and photographs taken. Some of the identified varieties have not yielded fruit in the studied vegetation season. It is assumed that the reason for this is low temperatures in the spring months, which damaged flowers and led to their sterility and lack of birth. It was also observed that some of the varieties have a characteristic of alternative birth (bear fruit every other year), so this is one of the reasons why the fruits of all varieties found have not been collected. All collected data are summarized in a working manual.

RESULTS

It is known that the inventory represents the first step in determining and rescuing rare plant species and genotypes. Based on the inventarisation of indigenous fruit species and varieties in the Una - Sana Canton, we established the actual condition and position which they take on these sites. During the war period, but in the post-war years as well, many individual trees have been cut down in order to build residential buildings, and old trees were dying out. The specialization in terms of choice of individual species and cultivated varieties, then intensive cultivation system, as well as market requirements and striving for greater financial gain led to the gradual disappearance of autochthonous assortment. The results showed that the studied area of the Una-Sana Canton today has an enviable genofond of native species and varieties, but we also noted the disconcerting regression in breeding them. It was noted that almost every municipality has a large number of varieties of apple trees Petrovka and Tuskača (which possesses various synonyms in different areas, and is referred to as Čupa and Rapava). Also, many varieties of apple trees Gavranuša (Garvanuša), Senabija, Zvečac (Zvečarka), varieties of pear Kolatuša, Barliman, and Black Pear were found. In some locales, there are many fruits of Požegača plum, which is still trying to resist its greatest disease, Plum pox virus, in some parts of the Una-Sana Canton.

DISCUSSION

The greatest attention should be focused on the assortment that has the smallest number of trees on our sites, which is the most vulnerable and which we might lose in the near future. Those are apple varieties Đulabija, Delbašinka, Muškinja, Šarenika, Stambolka, Zukva, Prutulja, the varieties of pear Karupnjača, Medika, Vodenjača (Jeribasma), and plum Zambelija. Currently, this assortment listed has the smallest number of individual trees and represents the most endangered varieties in the area of the Una-Sana Canton, and especially those with trees older than 100 years. The age of catalogued trees usually ranges between 50 and 70 years, although there are trees older than 100 years. The encouraging fact is that there are trees between the ages of 15 and 30, which means certain indigenous varieties will be kept in this area for some time.

Inventoried trees are mainly grown in extensive conditions, without the use of any agrotechnics, and no significant attack of pests and diseases was noticed, which suggests that these varieties are resistant to pests and diseases in poor growing conditions. Because of that, the preserved indigenous genofund of these endangered varieties can be used in breeding purposes, because they have characteristics which new varieties mainly lack. Those are resistance to frost, disease and pests, late blossoming, and some have good organoleptic properties.

Skender, Jahić, Hadžiabulić, and Kurtović (2008) have conducted tests of pomological characteristics of some of these indigenous varieties of apples from the area of the Una-Sana Canton, and the results showed that certain indigenous varieties in this region have high-quality varieties regarding their pomological traits, where the variety of Kisela apple is particularly prominent and still enough represented. Drkenda et al. (2007) have conducted similar research when it comes to technological properties of some indigenous apple genotypes in the area of Goražde, and came to the conclusion that the tested genotypes have satisfactory values of important technological parameters, and the fruits of these genotypes can be recommended for direct consumption and for processing.

In the municipalities of Velika Kladuša, Cazin and Bužim, there are large natural populations of chestnut (*Castanea sativa* Mill.), which are the largest natural habitats of European edible chestnut in our country. These populations can be used to select suitable material for genetic selection and conservation of natural populations of chestnut in Bosnia and Herzegovina. During this study, a chestnut tree estimated to be about 300 years old was found in Rošići near Pećigrad.

In the end, it can be concluded that 275 indigenous varieties of fruit trees have been found and photographed in 31 investigated sites in the eight municipalities of the Una - Sana Canton. Many of the varieties found are similar in phenotype, but they may have different synonyms at different locations. Indigenous varieties are similar in some of its properties, as they occurred in the same environmental conditions. To draw attention to preserving our native varieties, both through counselling of small farmers and raising awareness of all our country's citizens to protect and preserve our agrobiodiversity is of utmost importance.

CONCLUSION

Based on the inventory of indigenous varieties of fruit in the Una-Sana Canton, the following conclusions can be drawn:

- Despite large regression of indigenous varieties in the last twenty years, the area of the Una - Sana Canton still has a considerable number of indigenous varieties of fruit.
- The most common indigenous varieties of apple in this area are Petrovka, Tuskača, Čupa, Gavranuša, Senabija , Zvečac, pears Kolatuša, Barliman, and Black Pear, while the most common plum variety is Požegača.
- The most vulnerable indigenous varieties which could be extinct soon are varieties of apple Đulabija, Delbašinka, Muškinja, Šarenika, Stambolka, Zukva, Prutulja, and pears Karupnjača, Medika, and Jeribasma, while the most vulnerable plum variety is Zambelija.
- When it comes to the age of trees of the indigenous varieties, it usually ranges between 50 and 70 years, although there are trees that are older than 100 years, and those younger than 30 years.

Since inventory is the first, but very important step in preservation of indigenous fruit varieties, it is necessary to intensify research in the field of indigenous varieties of fruits and preserving them in the near future, because they represent a valuable natural and cultural heritage of the area, as well as the genetic material for breeding purposes. One of the ways to preserve and protect indigenous species and varieties in the Una - Sana Canton is the raising of the first *ex situ* collection planting of those indigenous varieties which have been found to be most vulnerable. This planting would, apart from conservation of these species and varieties, provide an opportunity for detailed studies of their properties, and would serve to obtain starting material for further propagation and breeding. Also, raising the *ex situ* plantations would enable us to find native species and varieties of this region in one place, which would raise the awareness of local people about the importance of preserving indigenous genofund and values that these varieties have.

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