SUMMARY

Keywords: *Prunus avium* L., SSR, RAPD, phenolic compounds, assimilating pigments.

The PhD thesis called *Genetic and biochemical research concerning the hereditary characteristics of some cherry tree varieties grown in Romania* comprises an introduction, six chapters and bibliographical references. This work was focused on establishing the kinship degree between some of the cultivars taken into the study, as well as the monitoring of some biochemical parameters in order to identify the varieties with high bioactive compounds content.

The paper is structured on two parts containing 36 tables and 111 figures.

In the introduction we present several general ideas connected to the origin and spread of *Prunus avium* L., the current status of the world production and the objectives that we have set for the PhD thesis.

Part I, called *Current status of the research related to Prunus avium L.* comprises three chapters.

Chapter I *Importance of sweet-cherry tree culture* targets the main nutritional characteristics and the use extent of the sweet-cherry tree (fruit, wood, etc.).

Chapter II *Species that have contributed to the creation of the varieties* presents the hypothesis connected to the origin of the *Prunus avium* L species. Also within this chapter we have presented the phylogenetic tree of some species from the *Prunus* genus, drawn up by Malusa (1992) following the use of the restriction fragment length polymorphism (RFLP) technique.

Chapter III *The current status of research on the hereditary characteristics of sweet-cherry varieties* comprises three sub-chapters, in which the following are presented:

- Biological characterization of the sweet-cherry and history of its cultivation from the earliest mentions up to the present day;

- Molecular biology techniques used in taxonomy such as: Polymerase Chain Reaction (PCR), Random amplified polymorphic DNA (RAPD), Single Sequence Repeats (SSR – microsatellites);
- Genetic researches carried out by different authors on some sweet-cherry varieties;
- The description of some biochemical and physiological parameters of nutritive and pharmaceutical importance.

Part II of the PhD thesis is called *Results and discussion* and includes three chapters.

In Chapter IV *Material and methods* we have presented the aim and objectives of the researches, the stemming area of the biological material, the varieties selected for the study and the analysis methods used in this research.

The biologic material included 50 varieties of sweet-cherry, of which 24 have been homologated by the Research and Development Station for Fruit-Tree Growing (SCDP) in Iaşi and 26 have been native and foreign varieties, with a large history on the international or national level.

The genetic and biochemical analysis of the cultivars was carried out within the Horticulture Research Centre belonging to the University of Agronomic Sciences and Veterinary Medicine Iaşi, the Molecular Biology Lab of the Agricultural University of Athens and the Molecular Genetics and Aerchaeo-genetics Laboratory of "A. I. Cuza" University of Iaşi. In order to achieve the proposed objectives, the following analysis methods have been used:

- DNA extraction and purification through a modified protocol of CTAB (CetylTrimethylAmmonium Bromide), method elaborated by Doyle and Doyle (1990);
- DNA amplification using the RAPD and SSR techniques;
- Determination of the assimilatory pigments in leaves using the method described by Hartmut K. Lichtenthaler and Claus Buschmann;
- Determination the total polyphenol content by using the Folin-Ciocalteu assay (Jayaprakasha & Singh & Sakariah, 2001);
- Determination of the total flavonoids according to the method described by Guorong and collaborators (2009);
- The determination of flavanols was carried out using the DMACA method (Li & Tanner & Larkin, 1996);
- Determination of anthocyanins, that was carried out using the differentiated pH method described by Guisti and Wrolstad (2001);
- Determination of soluble sugar content has been carried out using the School method,

modified by Vlad Artenie, and the dried soluble substance has been determined in fruit juice using a refractometric method;

- Determination of total acidity has been carried out using the potentiometric method;
- Determination of vitamin C content (ascorbic acid) has been done using the titrimetric method with 2,6 diclorfenolindofenol*;*
- Determination of total minerals in fruits was carried out through calcinations.

In Chapter V *Experimental researches regarding the hereditary characteristics of the studied sweet-cherry varieties* we have presented and interpreted the results obtained in 2011 and 2012 following the analysis carried out at the sweet-cherry tree varieties considered for the study.

Following the spectrophotometric quantification of the total isolated and purified DNA, we have obtained values between 22,9 and 738,2 ng/µl. Following the amplification of this DNA, through the RAPD and SSR techniques and the interpretation of the electropherogram we have drawn up two dendograms that have presented similarities among them. At the same time, we could observe that the varieties have mainly grouped depending on the area of origin.

As result of biochemical analysis, the varieties have been divided into two groups:

a) cultivars obtained at SCDP Iaşi
b) established varieties

The main biochemical differences between these two groups are given below:

- photosynthetic pigments: 4,93 $mg \cdot g^{-1}$ S.U. (Summit) and 1,22 $mg \cdot g^{-1}$ S.U. (Biggareau Donissen);
- total polyphenol content: 303,4 mg EAG/100 g S.P. (Amar Maxut) and 56,7 mg EAG/100 g S.P. (Biggareau Drogan);
- total flavonoids: 18,28 mg ER/100 g S.P. (Anda) and 10,74 mg ER/100 g S.P. (Lapins);
- total flavanols: 59,81 mg EC/100 g S.P. (Paul) and 11,44 mg EC/100 g S.P. (Maria);
- anthocyanins: 246,46 mg ECG/100 g S.P. (Amar Maxut) and 2,67 mg ECG/100 g S.P. (Marina);
- soluble carbohydrates: 22,52% (Amar Maxut) and 12,82% (Scorospelka);
- total fruit acidity: 5,15 g L^{-1} $C_6H_8O_7$ (Lapins) and 11,58 g L^{-1} $C_6H_8O_7$ (Iaşirom);
- vitamin C content: 16,55 $mg \cdot 100g^{-1}$ (George) and 11,12 $mg \cdot 100g^{-1}$ (Timpurii de Bistriţa);
- total minerals: 0,97% (Roşii de Bistriţa) and 0,26% (Izverna).

Chapter VII of the PhD thesis shows the conclusions and recommendations that have been drawn from the analysis of the experimental data.

At the end of the PhD thesis a list of bibliographic references is given. This contains a number of 187 books and scientific works, from Romania and abroad.