UNIUNEA EUROPEANĂ
GUVERNUL ROMÂNIEI MINISTERUL MUNCII, FAMILIEI ŞI PROTECŢIEI SOCIALE AMPOSDRU
Fondul Social European POS DRU 2007-2013
Instrumente Structurale 2007-2013
MINISTERUL EDUCAŢIEI CERCETĂRII TINERETULUI ŞI SPORTULUI
OIPOSDRU
USAMV IAŞI

ABSTRACT

Keywords: antiradical potential, storage, cabbage, plum.

Much attention was focused on the natural antioxidant potential presents in fruits and vegetables due to their ability to reduce the level of oxidative stress.

Bioactive compounds activity attracted researches attention due to high ability to act as antioxidant agents. Different pathophisiological factors such as pro-oxidants and pro-inflammatory processes are leading to a various diseases to human. Oxidative stress is considered a major factor in the cancer, cardiovasculare diseases, degenerative diseases, diabities aparition and aging process. In this context, improving the antioxidant system by diet represent an important strategy to deal with the inconsistencies caused by oxidative stress.

Rich diet in fruits and vegetables was associated with low risk of cronical diseases. Recently, compounds with antioxidant potential from fruits and vegetables have generated a great interest for scientific community. Many scientific articles had as a subject determination of antioxidant activity and antioxidant compounds from fruits and vegetables.

Cabbage and plum are the most consumed horticultural products from România. Both species are known from old times and since than dates the informations about their health benefits. Over the years there were registred big values of production of these two species.

Although the cabbage and plums are common products consummed by roumanian, they were not been studied in terms of antioxidant activity and antioxidant compounds.

The main purpose of this study was the investigation of antiradical potential of different cabbage and plum cultivars. This study pointed out the changes which occur during storage on the content of antioxidant compounds and antioxidant activity of samples analyzed.

Were compared antioxidant activity and the content of antioxidant compounds of summer and autumn plums. At cabbage were compared ecological and conventional cultivars. There were also compared the antioxidant potential of external and internal leaves.

The main objectives of this research were:

- ✓ Studying the literature in order to inform about actual state of fruits and vegetables antioxidant activity domain;

- ✓ Preparation of the extracts needed for antioxidant activity and antioxidant compounds determination;
- ✓ Antioxidant potential investigation of the cabbage and plum samples (both fresh and stored 10 days at 4 °C) using two of the most used methods, ORAC and DPPH;
- ✓ Storage influence on antioxidant activity of hydrosoluble antioxidants, using the Photochemiluminescences method;
- ✓ Red blood cells resistance;
- ✓ Determination of the antioxidant compounds content such as ascorbic acid, flavonoids, anthocyanins and phenolic compounds;
- ✓ Correlation of antioxidant potential with antioxidant compounds.

The doctoral thesis includes two parts and it is structured in seven chapters.

First two chapters summarize informations from literature about actual state of the antioxidant domain.

Chapter I presents general aspects of antioxidants such as definition, concept and clasification. In this chapter are described also the antioxidant mechanism and the the compounds with antioxidant potential from fruits and vegetables. Notions like free radicals and oxidative stress were explained in this chapter.

Chapter II represents an systematization of data regarding the antioxidant activity of fruits and vegetables. In this chapter were treated aspects concerning the changes of antioxidant potential of fruits and vegetables during storage.

Chapter III contains information about cabbage and plum origin, economical importance and some data about different varities and their storage conditions.

Chapter IV presents the main purpose of this research and the main objectives. Numerous studies have shown that a high intake of fruits and vegetables provides beneficial nutrients for human health.

There is a great interest in antioxidant monitoring in food field. Antioxidant substances play an important role in preventing certain diseases like cancer, cardiovasculare disease and slowing down the aging process. Currently there are a variety of methods used for antioxidant activity evaluation.

Chapter V presents the studied biological material and the used research methods. It presents the chemical analyses used.

Different cultivars of cabbage and plum served as biological material.

Twelve plum cultivars were used for this research: Carpatin, Silvia, Bn7-237-7, Tuleu gras, Superb, Dâmbovița, d'Agen, Stanley, Record, Blue free, Joris plum și BN68, first six represents summer cultivars and the last six are autumn cultivars.

For cabbage were studied two cabbage cultivars from ecological culture: Copenhagen Market and Işalnița; another two cultivars from conventional culture: Bucharest and de Buzău. The red cabbage was chosen to compare antioxidant activity of the white and red cabbage.

Antioxidant activity of cabbage and plum, both fresh and stored, was determined with four different methods: ORAC, DPPH, haemolysis test and chemiluminescence assay.

ORAC method is one of the most used assay for antioxidant activity of fruits and vegetables. Unlike others methods used for the same purpose, these methods is standardized by american researchers. Method ORAC use as free radical AAPH.

DPPH assay it is another method used for determining the antioxidant potential of fruits and vegetables, which use as free radical DPPH. The results of these method can be expressed in Trolox equivalent, ascorbic acid equivalent or other compound, because is not a standardized method like ORAC.

In the case of chemiluminescence method, peroxyl radicals produced by AAPH oxidize lumynol, their reaction products issue light that can be detected with a chemiluminometer. Antioxidants from the sample will inhibit the chemiluminescence for a while, these is proportional with total antioxidant potential of the sample.

Haemolysis test or red blood cell resistance proves the beneficial efect of antioxidants from samples on health.

For all the samples studied were determined the ascorbic acid, flavonoids, anthoacyanins and total phenolic content.

Total phenolic content was determined with the Folin-Ciocâlteu method. pH variation method was used for determination of the anthocyanins content. Flavonoids content was determined with aluminium chloride method and ascorbic acid content was used the method with diclorfenol-indofenol.

Chapter VI presents the results of this research regarding the antioxidant potential and the content of antioxidant compounds of cabbage and plum cultivars studied. The results were presented separately, by species (fresh and stored). In the case of cabbage there is a temporary storage (short duration).

At plums we could observe an increase of antioxidant activity in most cultivars during storage. Among cultivars, autumn varieties presented a bigger antioxidant activity than summer varieties. Total phenolic content presented an increasing evolution during the storage.

The variability of the cultivars wich is quite tipical for plum, was observed in this study for antioxidant activity and for antioxidant compounds.

Carpatin, Record, Stanley, Blue free and Joris plum were the plum cultivars with the biggest values of antioxidant potential.

Red cabbage presented the highest values of antioxidant activity.

Among white cabbage ecololgical cultivars, Işalnița presented the biggest antioxidant activity.

Among white cabbage conventional cultivars, Bucharest presented the biggest antioxidant activity.

Antioxidant activity of fresh and stored cabbage showed different evolution.

There were not found signifficant differences between ecological and conventional cultivars, neither between external and internal leaves of the cabbage varieties studied.

Haemolysis test demonstrated that both cabbage and plum are valuable sources of antioxidants and they can delay the red blood cell haemolysis.

In this chapter were presented the correlations obtained between antioxidant activity and the content of the antioxidant compound analyzed. The correlations were made by liniar regression, separately for fresh and stored samples.

In the case of antioxidant correlation with phenolic ocntent at stored plums the value of the determination coeficient was better than the one registered by the fresh cultivars. Phenolic compounds seems to contribute to the antioxidant activity of the stored plums.

The correlatons obtained in the case of cabbage proved to be better than those obtained in the case of plums.

Very good correlations were obtained between antioxidant activity and total pehnolic content, ascorbic acid and flavonoids, but even between methods used for antioxidant potential.

Chapter VII contain the conclusions of this research. The most important conclusion is the fact that both products studied represent rich sources of antioxidants.