



STABILITY OF OIL FROM OIL SEED RAPE WITH GARLIC UNDER VARIOUS CONDITIONS

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Abstract

Rapeseed oil is obtained by cold pressing of rape seeds. It is performed at low temperature and therefore all valuable components are stored, which give it great biological value. At high temperature, light, oxygen and heavy metals, oils oxidize and harmful oxidation products, peroxides are created.

There were analysed rape seeds "Fila" in which the garlic was added to increase its stability. The peroxide number of this oil is determined under different conditions. Change the volume of the oil in the bottle, the light and the time of storage.

In the oil stored in the dark after 1 and 2 weeks, only the oil with a volume of 250mL after 2 weeks is not for use and has a peroxide number of 7.87. After 3 and 4 weeks, the oils of 250 and 500mL have a peroxide number greater than 7.5, or have peroxides more than the permitted. All is kept in the light have higher peroxide numbers of oils kept in the dark, under the same conditions. All analysed oils after 3 and 4 weeks in the light, have peroxides more than the permitted according to the Oils Rules and fats and oil quality

The light and time of storage are proportional, and the volume of the oil is inversely proportional to the peroxide number.

Key words: cold pressed oil, peroxide number, analysis, oil volume

INTRODUCTION

Rape seed contains a large number of unsaturated fatty acids, which play an important role in lowering LDL cholesterol levels, which is a major factor in cardiovascular disease (Schwingshackl et al., 2018; Gustafsson et al., 1994). The rapeseed oil has high polyphenols content and natural components with significant antioxidant activity (Kostadinovic-Velickovska & Mitrev, 2013; Szydłowska-Czerniak, 2013).

Cold pressing is used to obtain rapeseed oil, therefore all the valuable components that give a high biological value to the final product are stored (Gunstone, 2009; Dimic, 2005). The difference between cold pressed oils and refined oils is in the chemical properties (Pavlovska et al., 2016). Their biological value is higher, but they oxidize faster and their stability is lower.

Chemical changes in oils begin under the influence of air, light, temperature and heavy metals (Fe, Cu, Mn, Co, etc.). After longer standing, the oils might oxidize due to the

influence of the oxygen in the air (Crapiste et al., 1999; Pavlovska et al., 2017). During the process of frying, increasing the temperature increases their oxidation. (Pavlovska et al., 2017, Berger, 1994; Sadoudi et al., 2014; Farhoosh et al., 2013). Peroxides are the main oxidation products in the oils and they are determined by the peroxide number. When the peroxides increase, their stability, decrease and they become harmful to use.

Oxidation products in fats and oils are very harmful to human health and are the cause of many diseases. Most of them are carcinogenic, and are thought to have contributed to the onset of Parkinson's disease (Barrera, 2012; Farooqui & Farooqui, 2011).

Oxidation products are very harmful to human health, therefore it is necessary to reduce their quantity as much as possible. For that purpose, antioxidants are added to the oils and foods with high percentage of oils. They

can be artificial and natural. Essential oils of rosemary, oregano, sage, ginger, cloves, mint, garlic, basil, fennel and others showed high antioxidant stability (Yanishlieva et al., 2006; Özcan, 2003; Piedrahita et al., 2015; Bravi, 2016; Al-Dalain, 2011).

MATERIAL AND METHODS

For the analysis, cold-pressed oil from the seeds of oilseed rape from the producer "Fila" was taken. 8 bottles of oil with a volume of 1 litre were used. In two bottles, the volume of the oil remains 1L, and in 6 bottles, a portion of the oil is taken away, so the oil volume is reduced to 750mL, 500mL and 250mL. In all, 8 bottles of different volume, 20g of garlic is added. Four bottles with a volume of 1L, 750mL, 500mL and 250mL, containing garlic, are stored in a light,

The purpose of this paper is to determine the stability of oil from oilseed rape under different storage conditions. The influence of three factors on the stability of the oil is determined: the light, the amount of oxygen in the bottle and garlic as an antioxidant.

and four bottles with a volume of 1L, 750mL, 500mL and 250mL, containing garlic, are stored in the dark.

The peroxide number of these oils stored under different conditions is determined. The peroxide number is an indicator of the oxidation of the oil and it is determined according to the ISO 3960: 1998 method. Analyses were performed after one, two, three and four weeks.

RESULTS AND DISCUSSION

Figure 1 shows the peroxide number dependence of the oil volume and storage time when storing the oil in the dark.

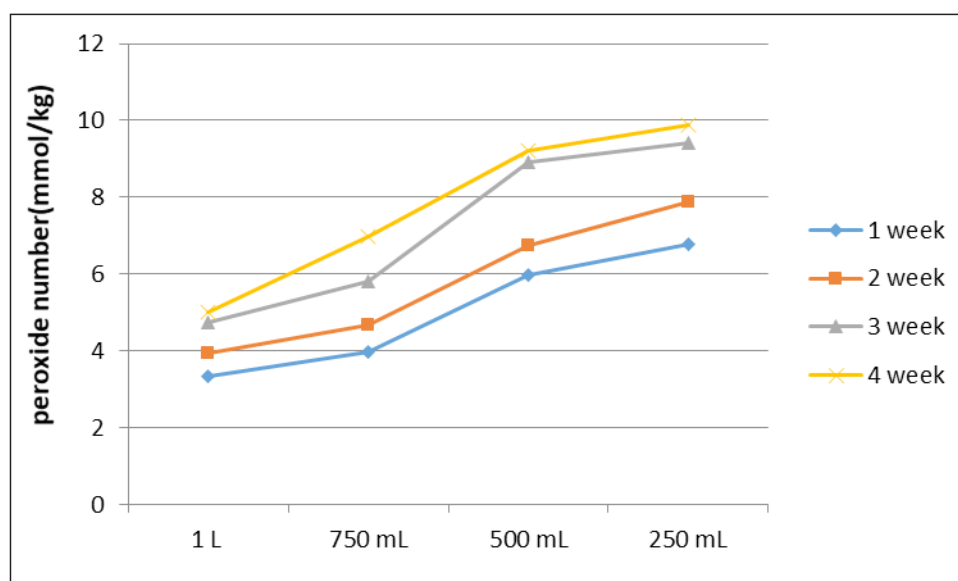


Figure 1. The dependence of the peroxide number on the storage time and volume of the oil from oilseed rape with garlic supplement, stored in the dark.

As seen in the picture, by reducing the volume of the oil in the bottle, the peroxide number increases. This is because when the volume of the oil reduces, the amount of oxygen in the bottle is increased. The smallest changes in the peroxide number are in the oil with a maximum volume of 1L. This oil, compared to the oils with smaller volume, has the smallest

peroxide number after 1, 2, 3 and 4 weeks of storage. The peroxide number dependence on the storage time is proportional, or the longer the oils stored, the higher the peroxide number is. The largest increase in the peroxide number after each week of storage is when the oil volume is reduced from 750mL to 500mL.

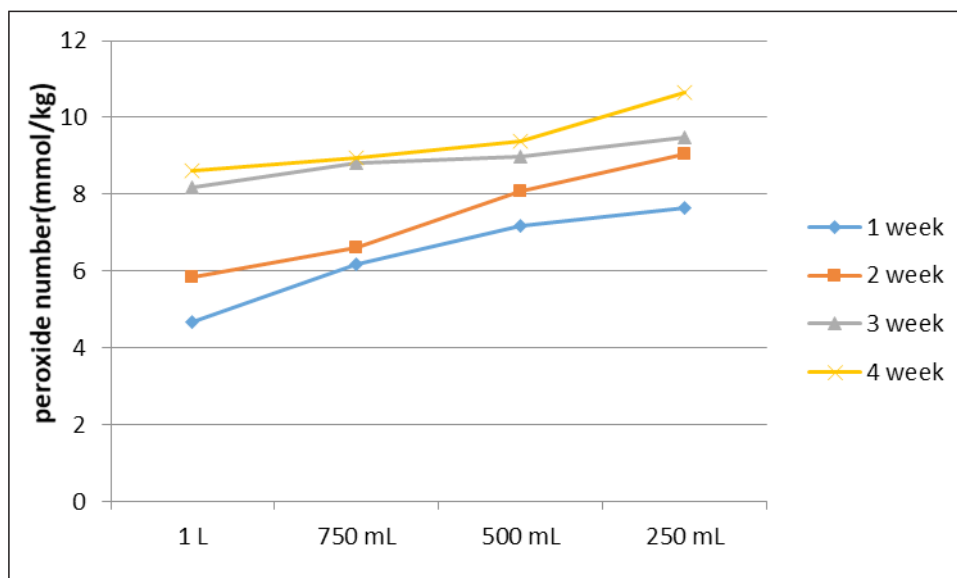


Figure 2. The dependence of the peroxide number on the storage time and volume of the oil from oilseed rape with garlic supplement, stored in the light.

Figure 2 shows the peroxide number dependence on the oil volume and storage time when the oil is stored in the light. For oils of 1 L and 750 mL, the biggest change in the peroxide number is between the second and third week. In the 750 mL oil, the difference in the peroxide number between the third and fourth week is minimal. For all oils kept in the light, the peroxide

number increases with increasing storage time and reducing the volume of the oil.

In figure 3, the values obtained for the peroxide number in the analysed oils stored in the dark are compared to the maximum allowed concentration (MAC) for the peroxide number in cold pressed oil given in the Rulebook for oils and the quality of fats and edible oils.

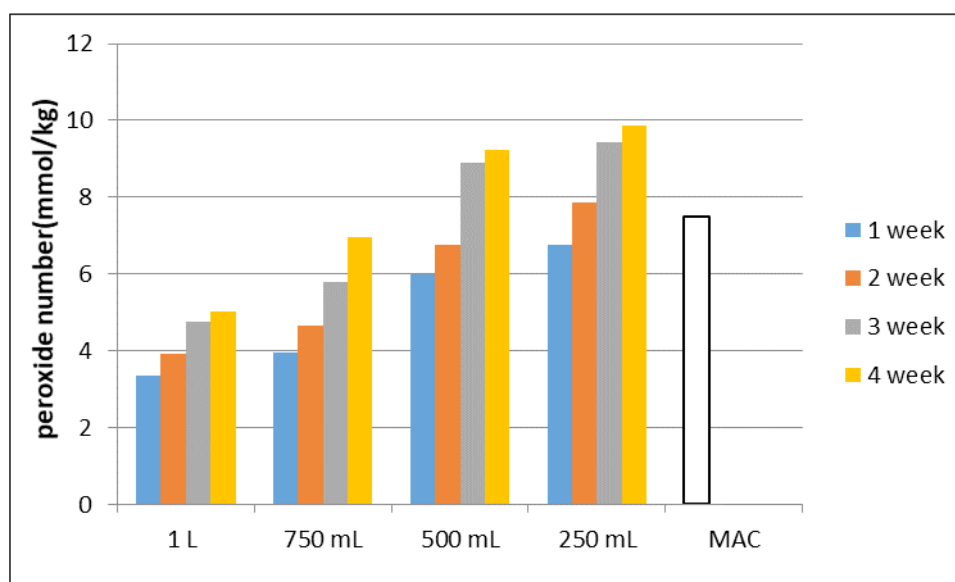


Figure 3. Peroxide number of cold pressed oils from oilseed rape with garlic supplement, stored in the dark.

Oils with a volume of 1L and 750mL, after 1, 2, 3 and 4 weeks of storage in the dark, have a lower peroxide number than the MAC. There is oxidation in them, which increases when the storage time increases as well, but it is very small and it is within the limits of the permitted values. The oil with volume of 500mL after 1 and 2 weeks of storage in the dark is good for nutrition, but after 3 and 4 weeks it should not be used because the peroxide number is greater than the MAC. The peroxide number in the oil

with volume of 250mL, is lower than the MAC only after 1 week of storage in the dark, while after 2, 3 and 4 weeks the values are higher than the permitted values.

The obtained values for the peroxide number in the analysed oils, stored in the light, are compared to the MAC for the peroxide number in cold pressed oil given in the Rulebook for oils and the quality of fats and edible oils and are shown in Figure 4.

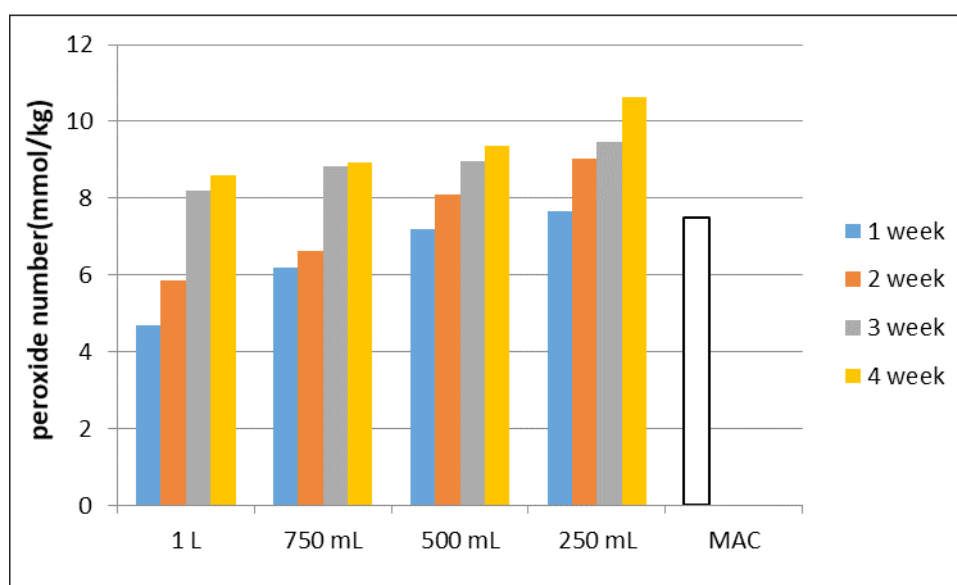


Figure 4. Peroxide number of cold pressed oils from oilseed rape with garlic supplement, stored in the light.

Oils with volume of 1L and 750mL, stored in the light, after 1 and 2 weeks of storage have a peroxide number smaller than the MAC. In these oils, after 3 and 4 weeks of storage, the peroxide number is higher than the MAC values and has occurred high oxidation, so they are

harmful to use. For oil with a volume of 500mL, oxidation is within the permitted limits only after 1 week. The oil with volume of 250ml has a high oxidation rate after 1, 2, 3 and 4 weeks of storage and it is not recommended for use.

CONCLUDING REMARKS

We analysed cold pressed oils from oilseed rape seeds from producer "Fila". 8 bottles of oil were analysed, four of which with a volume of 1 L, 750mL, 500mL and 250mL, were stored in the light, and the other four with the same volumes were stored in the dark. Garlic was added in all bottles, as an antioxidant, to increase their stability. The peroxide number, which is a measure of the stability of the oils, is determined. From the obtained results we can conclude that the peroxide number increases when the storage time is increased and the volume of the oil is reduced. The longer the storage is, the lower the stability becomes. Light has also a major impact on the oil stability.

Under the same conditions, the analysed oils stored in the light have a higher peroxide number than the analysed oils stored in the dark. Regarding the oils stored in the light, only the oils with a volume of 1L and 750mL, after storage of 1 and 2 weeks, and oil with volume of 500mL stored for 1 week, show a satisfactory stability. The remaining oils stored in the light have a peroxide number higher than the MAC. The peroxide number of oil stored in the dark is above the MAC in oils with a volume of 500mL, after 3 and 4 weeks of storage and in oils with a volume of 250mL, after 2, 3 and 4 weeks of storage.

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СТАБИЛНОСТ НА МАСЛО ОД МАСЛОДАЈНА РЕПКА СО ЛУК ПРИ РАЗНИ УСЛОВИ

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Резиме

Маслото од репка се добива со ладно пресување на семките од репка. Тоа се врши на ниска температура и затоа се зачувуваат сите вредни компоненти кои му даваат голема биолошка вредност. При висока температура, светлина, кислород и тешки метали, маслата оксидираат и се создаваат штетни оксидациони производи, пероксиди.

Анализирано е масло од семките од репка „Фила“ во кое е додаден лук за зголемување на неговата стабилност. Определен е пероксидниот број на ова масло чувано при разни услови. Се менуваат волуменот на маслото во шишето, светлината и времето на чување.

Во маслото чувано на темно по 1 и 2 недели само маслото со волумен од 250 mL по две недели не е за употреба и има пероксиден број 7,87. По 3 и 4 недели маслата со волумен од 250 и 500 mL имаат пероксиден број поголем од 7,5, односно имаат пероксиди повеќе од дозволеното. Сите масла чувани на светло имаат повисоки пероксидни броеви од маслата чувани на темно при исти услови. Сите анализирани масла по 3 и 4 недели стоење на светло имаат пероксиди повеќе од дозволеното според Правилникот за масла и квалитет на масти и масла за јадење.

Светлината и времето на чување се правопрпорционални, а волуменот на маслото е обратнопрпорционален со пероксидниот број.

Клучни зборови: ладно цедено масло, пероксиден број, анализа, волумен на масло.