



# **LIMITATION OF TRIACYLGLYCEROLS THERMAL DEGRADATION BY THE ADDITION OF LUPINE OIL SFE**

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## **INTRODUCTION**

Frying is a culinary technique that allows in quick way to obtain dishes with the organoleptic qualities desired by consumers. It consists in thermal processing of food products using hot oil as a frying medium. However, the high temperature used during this process causes oil degradation and the formation of numerous harmful to health products. Oils obtained by supercritical fluid extraction (SFE) with CO<sub>2</sub> are characterized by a unique composition of the unsaponifiable fraction. Due to this, their blends with refined rapeseed oil can exhibit increased thermal stability. The aim of the research was to determine the effect of the lupine oil SFE addition on the degradation of triacylglycerols (TAG) in blends with refined rapeseed oil at high temperature.

**THE RESEARCH MATERIAL** was refined rapeseed oil without additives (RAF), refined rapeseed oil with the addition of TBHQ (aTBHQ) and refined rapeseed oil with the addition of 5 and 25% SFE lupine (5%SFE and 25%SFE).

## **METHODS**

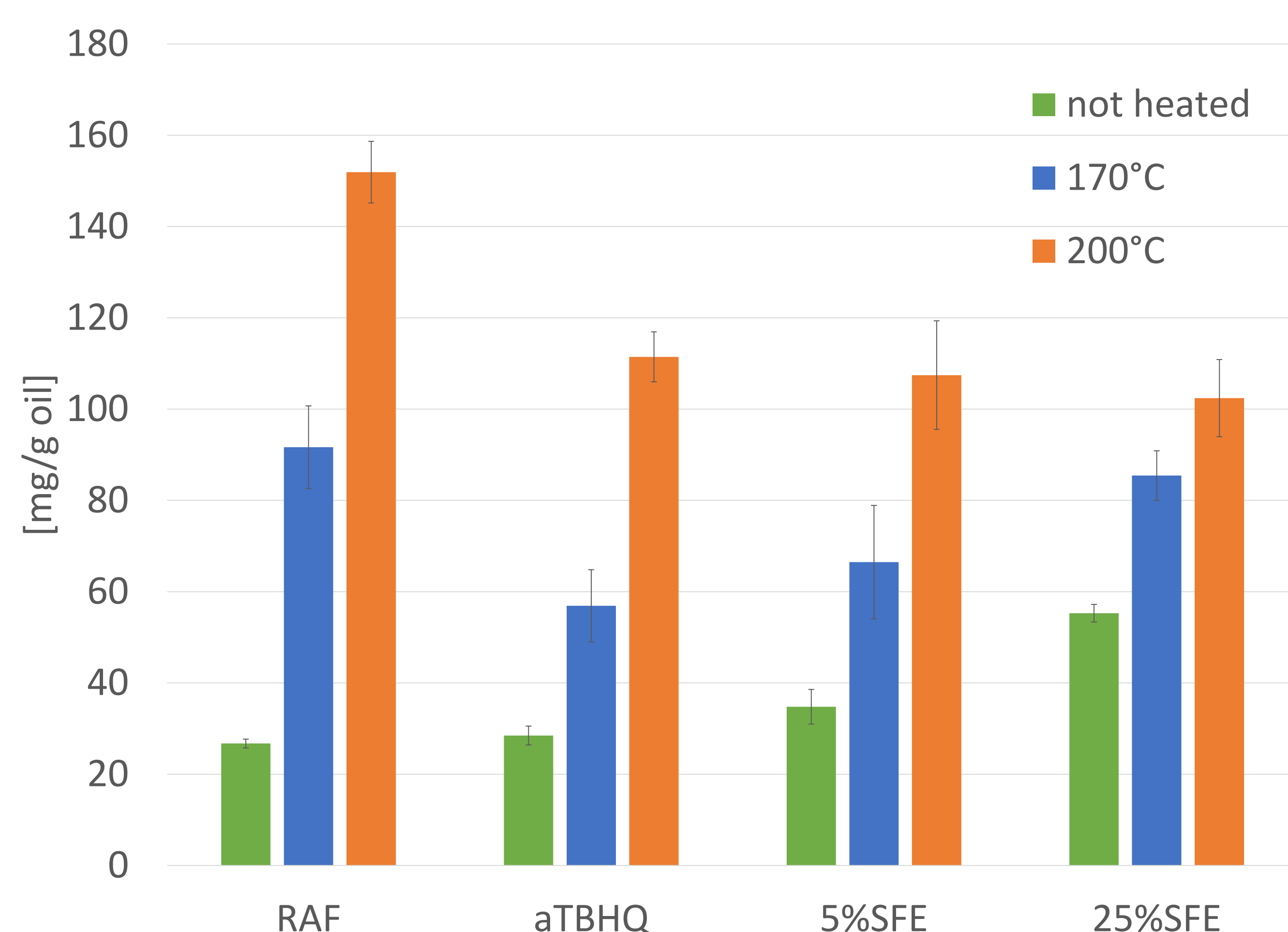
The oils and blends were heated in a thin layer at 170 and 200°C. The total polar content (TPC), TAG oxidized monomers content and TAG polymers content were determined using HPLC-SEC technics in all unheated and heated samples.

## **RESULTS**

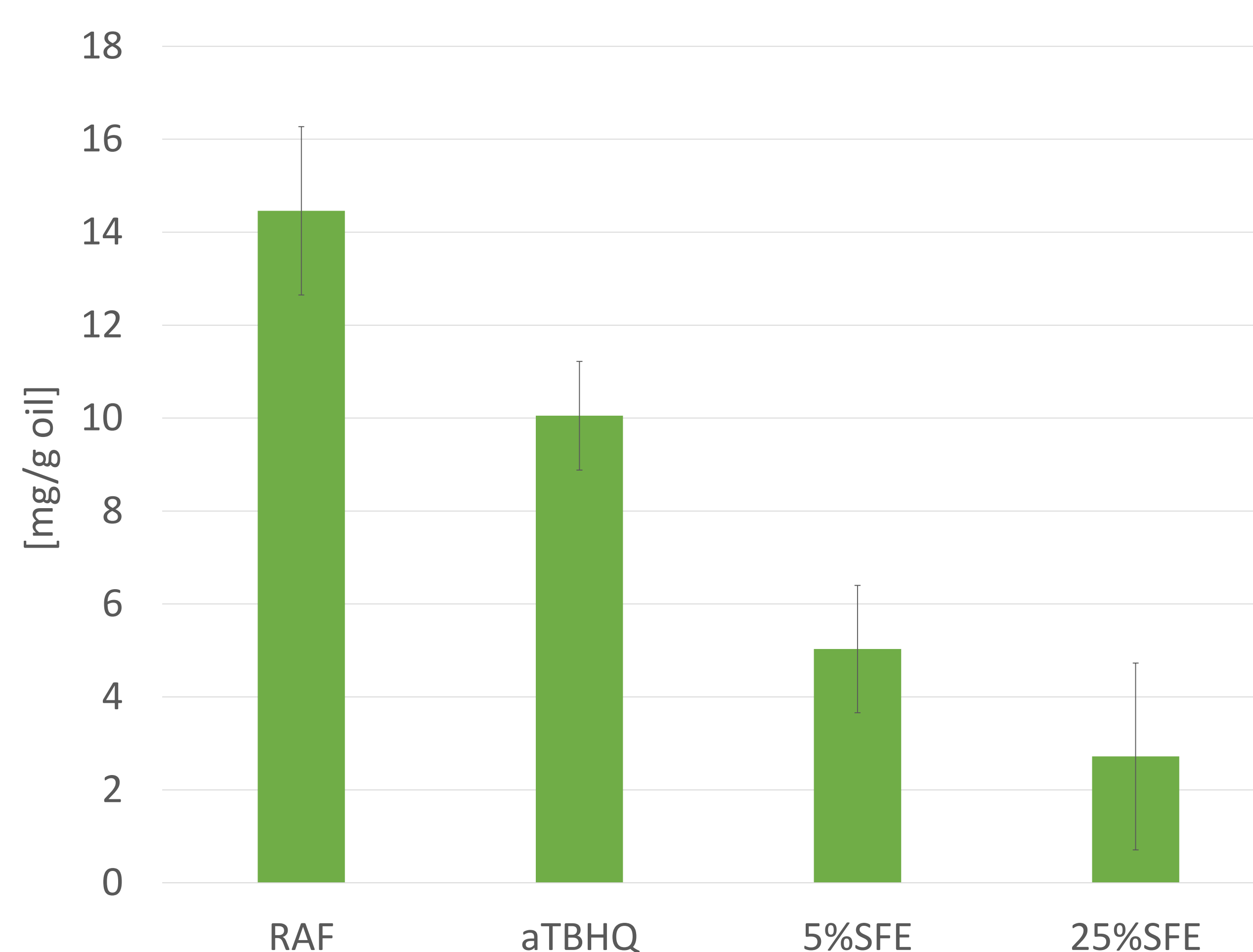
TABLE 1. Total polar compounds content [%] in SFE oils and in their unheated and heated mixtures

	RAF	Δ after heating	aTBHQ	Δ after heating	5%SFE	Δ after heating	25%SFE	Δ after heating
not heated	2,74±0,04aA	-	2,95±0,21aA	-	3,57±0,35aA	-	5,7±0,28bA	-
170°	9,38±0,94aB	6,64	5,88±0,78bA	2,93	6,78±1,26bA	3,21	8,74±0,54aA	3,04
200°	16,78±0,85cC	14,04	12,34±0,69bB	9,39	11,42±1,04bB	7,85	10,51±0,80aB	4,81

Means in the same row followed by different little letters indicate significant differences between samples. Means in the same column followed by different capital letters indicate significant differences (p < 0.05) between samples.



RYS. 1. Monomers TAG content in SFE oils and in their unheated and heated mixtures



RYS. 2. Dimers TAG content in SFE oils and in their unheated and heated mixtures

## **CONCLUSION**

1. Mixtures with the addition of 5 and 25% of lupine oil were characterized by lower susceptibility to oxidation and polymerization of triacylglycerols, based on significantly lower increases in the content of polar compounds, oxidized triacylglycerols and dimers.
2. The activity of the addition of 5 and 25% lupine oil was comparable to the activity of TBHQ considering the increase in the content of polar compounds and oxidized triacylglycerols, and more than twice as high considering the final content of triacylglycerol dimers.
3. A higher concentration of lupine oil addition was more effective in limiting the oxidation and polymerization of triacylglycerols.
4. The high activity of mixtures with SFE lupine oil could be due to the high content of active substances.