

# INFLUENCE OF THERMAL TREATMENT OF WHITE MUSTARD SEEDS ON OIL QUALITY

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## INTRODUCTION

Plant oils can be a good source of bioactive compounds. The amount of bioactive ingredients and the quality of the oil depend on the quality and preparation of the seeds before obtaining the oil. By thermally treating the seeds before extracting the fat, the amount of bioactive compounds in the oil can also be increased. At the same time, the thermal treatment of the seeds facilitates the extraction of fat from the seeds, increasing the yield.

Mustard belongs to the *Brassicaceae* family, just like rapeseed. It is a plant with less climatic requirements than rapeseed, which is very popular in Poland. As in the case of rapeseed, classic mustard varieties are characterized by a high content of erucic acid and glucosinolates. In 2012, a new mustard variety "Warta" was registered, which has minimal amounts of erucic acid and glucosinolates (Fig.1). In addition, the fatty acid composition of this variety is very favorable because it has a higher ratio of n-3 fatty acids than n-6 (1.7:1).



Figure 1 Photo of a white mustard flower of the Warta variety

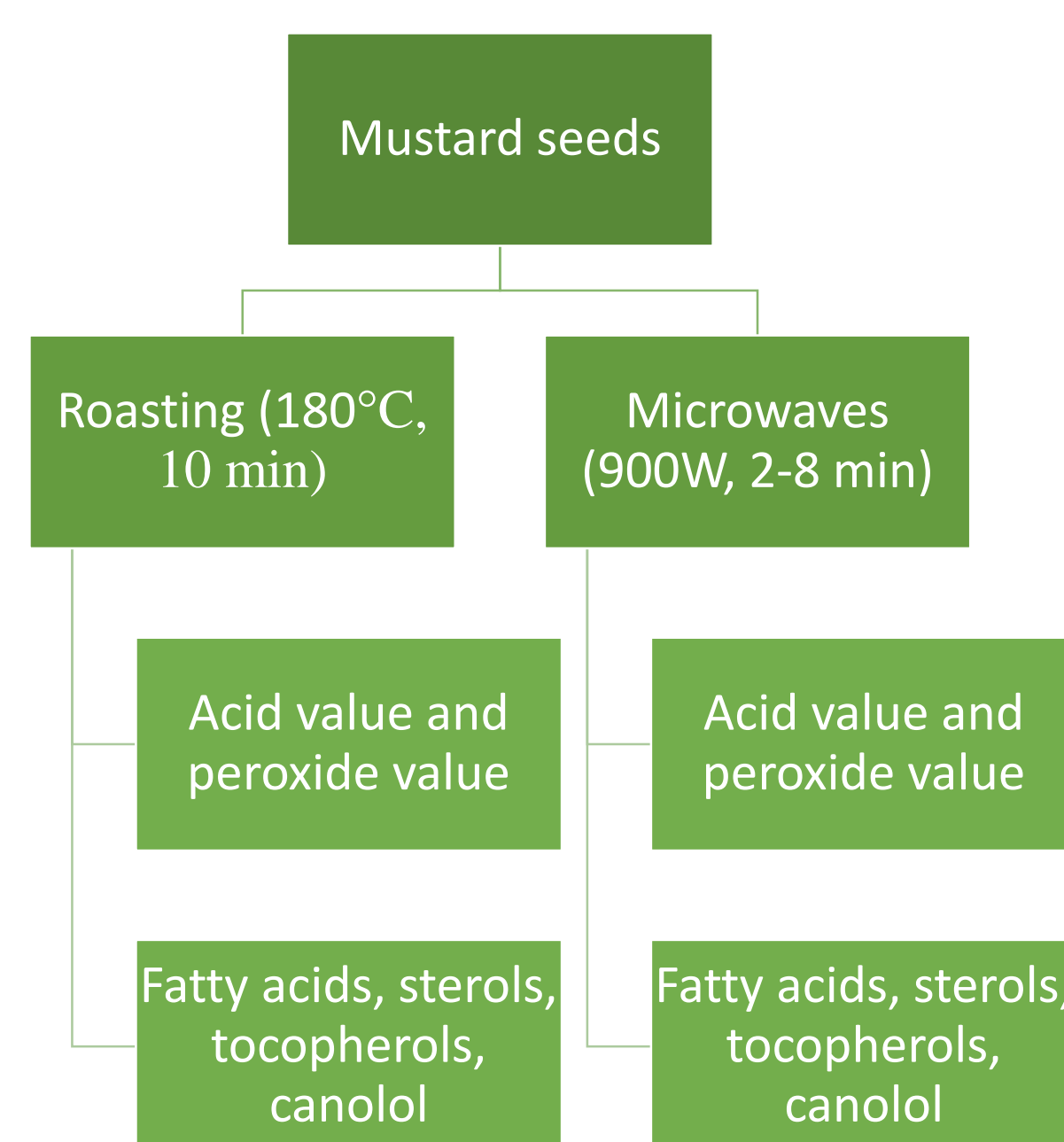


Figure 2 Scheme of performed tests

## MATERIALS AND METHODS

White mustard seeds of the Warta variety (double improved variety) were used in the research. Before obtaining the oil, the seeds were thermally treated. Part of the seeds was roasted (temperature 180°C, time 10min), and the other part was exposed to microwaves (900W, time 2min-8min). Then, oil was obtained from the seeds and the acid value (PN-EN ISO 660:2021), peroxide value (PN-EN ISO 3960:2017), anisidine value (PN-EN ISO 6885:2001), percentage of fatty acids (Seglina et al., 2021), the amount of phytosterols (Seglina et al., 2021), tocopherols (Siger et al., 2017) and canolol (Siger et al., 2017) were determined (Fig.2).

## RESULTS

The degree of changes occurring during roasting and microwave exposure is shown in Fig. 3. As a result of roasting mustard seeds, an increase in the acid and peroxide values was found. In the case of exposure to microwaves, both acid and peroxide values decreased. The changes that occurred in the fat during microwave exposure caused the disintegration of the original compounds formed during fat oxidation. An increase in anisidine value of 1.98 during microwave heating indicates the presence of secondary products of fat oxidation.

In both experiments, the temperature effect did not change the percentage of fatty acids. In the case of phytosterols, roasting significantly decreased the amount of these compounds. Exposure to microwaves for 4 minutes increased the amount of sterols, the next minutes caused their loss. In the case of microwave treatment, the number of tocopherols decreased significantly, while after roasting it slightly increased.

The thermal treatment of mustard seeds also caused the decarboxylation of sinapic acid. The decarboxylation product is canolol, which has a strong antioxidant effect. Microwaving resulted in a 20-fold increase in the amount of canolol, and roasting even a 37-fold increase in the amount of canolol.

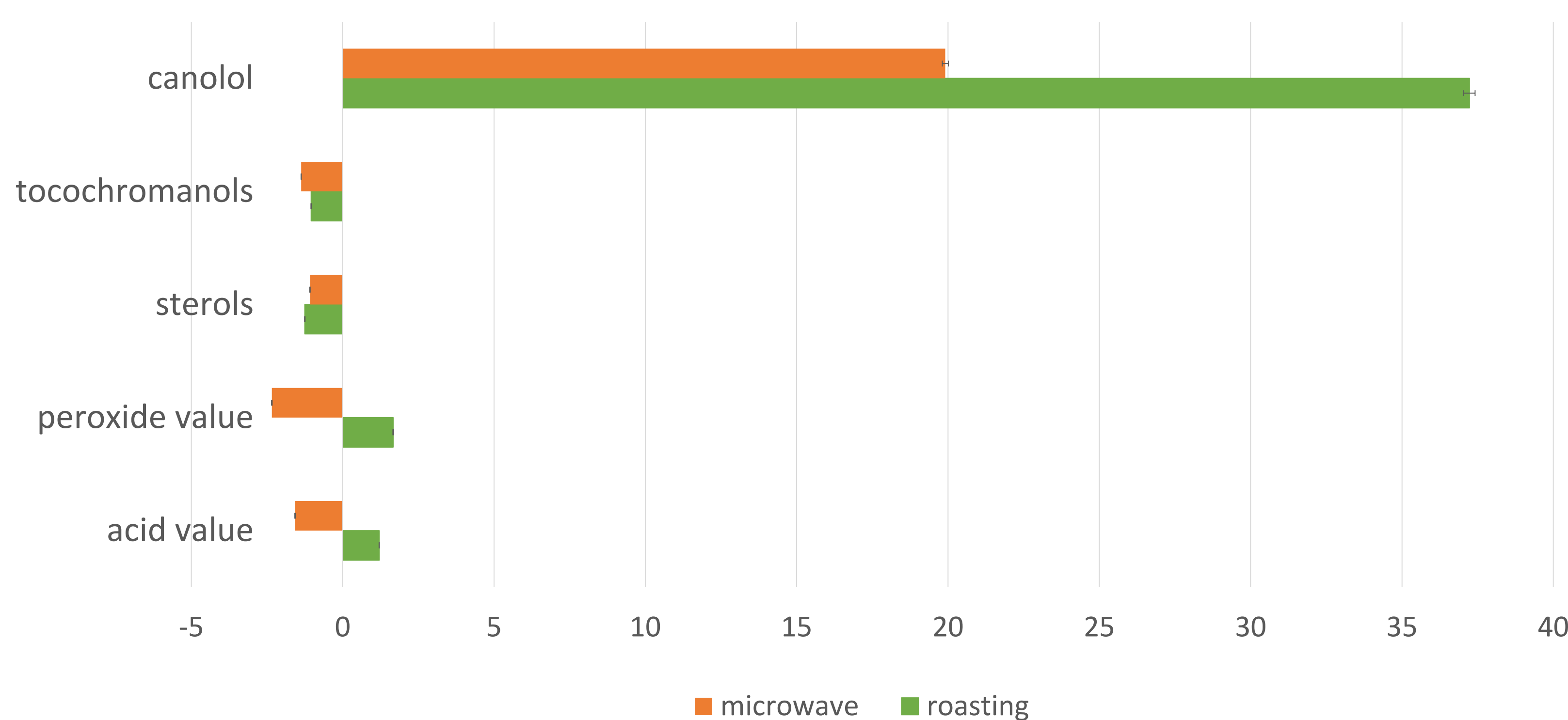


Figure 3 Graph showing the direction of changes in mustard seed oil after seed roasting (180°C, 10 min) and after seed exposure to microwaves (900W, 8 min).

## CONCLUSIONS

Both roasting and microwave exposure contribute to the formation of canolol. However, we are able to obtain larger amounts of canolol by roasting the seeds. At the same time, there are smaller oxidative changes in the oil during roasting. However, the method of seed treatment does not change the effect of the temperature sample on the percentage of fatty acids, the amount of sterols and tocopherols.

In the case of mustard, roasting is a better method of treating the seeds before extracting the oil than microwave treatment.