

EFFECT OF THE SEED RIPENESS ON THE QUALITY OF CRUDE
RAPESEED OIL

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ABSTRACT

Rapeseed samples were collected two weeks and one week before the full ripeness, in the stage of full rapeness, a week after reaching the full ripeness, and after the desiccation. The content of black and green seeds correlated with that of chlorophylls and carotenoids, the content of sinapins with that of tannins, and the content of polar lipids with the lipoxygenase activity. The content of brown and green seeds correlated with the content of pigments. During the ripening, the content of chlorophyll and carotenoid pigments, polar lipids, brown and green seeds decreased, but not much change was observed in the content of tocopherols and phenolics.

INTRODUCTION

The quality of rapeseed oil is affected substantially by the ripening degree. High content of chlorophylls and carotenoids was observed in Czech crude rapeseed oils (Pokorný et al., 1987), showing the possibility of harvesting seeds before full ripeness. Refined oils produced from crude oils produced from unripened seeds and containing high amounts of chlorophyll pigments need intensive bleaching. Oxidized products are not removed in contact with bleaching clay, and oils treated in such a way have low stabilities against oxidation (Taurus and Low, 1994). Therefore, the effect of ripening and desiccation was studied under climatic conditions in the Czech Republic in order to find the optimum harvesting time.

EXPERIMENTAL

Double-low winter rape *Brassica napus* cv. Lirajet was grown in 6 localities in the Czech Republic. Seeds were collected 2 weeks and 1 week before the harvest time, at the harvest, 1 week after the normal harvest, and samples of desiccated (Reglone + DAM) seeds were taken, the total of 5 samples in a locality. The samples were dried at 80 - 90 °C before the analysis.

Chlorophylls were determined spectrophotometrically after AOCS and ISO, carotenoids spectrophotometrically after saponification, and tocopherols by HPLC of unsaponifiables, phenolics and sinapins by HPLC using the UV detection, polar lipids by HPLC using the refractometric detection. The seed colour was determined by the computerized image analysis (Programme Lucia M ver 2.9, ILM, Prague 10), images were taken by the videocamera Panasonic NV-MS95E (Matsushita) and digitalized using the programme Microsoft Video 1.0 and the image processor VideoSpigot (Creative Labs).

Results are shown in Table 1. The content of chlorophylls decreased dramatically before the harvest; close correlation was found between the AOCS and the ISO methods ($r = 0.9526$). The decrease of carotenoids was less rapid. Close correlation was determined between the content of chlorophylls and carotenoids. The content of brown, green and total discoloured seeds correlated well ($r = 0.9407$, 0.5916 , and 0.9444 , respectively) with the content of chlorophylls, and similarly, with carotenoids. The tocopherol content did not change substantially during the ripening, but the ratio of α -tocopherols/ β + γ -tocopherols increased. The content of sinapins and tannins was not much affected by the harvest time. The contents of these two classes of compounds were correlated ($r = 0.8737$). Polar lipids were moderately lower in ripen seeds, and their amount had some relation to the lipoxygenase activity ($r = 0.4344$).

On the basis of our results, the harvest time used in the experiments was optimal at the respective weather conditions.

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TABLE 1. Changes of some components during rapeseed ripening

Rapeseed component	Unit	Two weeks before harvest	One week before harvest	At the harvest time	One week after harvest	Desiccated seed
Chlorophylls (ISO)	mg/kg	358	58	7	7	4
Carotenoids	mg/kg	72	29	21	21	19
Tocopherols (total)	mg/kg	327	369	384	288	306
α -tocopherol	%	45.9	47.7	47.9	57.3	59.8
β + γ -tocopherol	%	50.1	49.0	48.5	38.5	36.0
δ -tocopherol	%	4.0	3.3	3.6	4.2	4.2
Phenolics	g/kg	16.75	17.90	17.92	17.58	18.09
Sinapins	g/kg	8.86	9.49	9.42	9.63	9.43
Tannins	g/kg	7.89	8.24	8.60	7.55	8.75
Polar lipids	% oil	3.49	4.52	3.52	2.86	3.19
Black seeds	%	75.89	93.84	98.10	97.04	97.44
Brown seeds	%	20.19	4.77	1.00	1.56	1.04
Green seeds	%	3.57	1.21	0.60	0.98	0.58
Yellow seeds	%	0.35	0.18	0.30	0.42	0.94