

CONSIDERATIONS ON OBTAINING CAMELINA OIL BY COLD PRESSING

GANEA-CHRISTU I.¹⁾, BUNDUCHI G.¹⁾, G. GEANU G.¹⁾, MARIN E.¹⁾, G. GEANU I.¹⁾,
MATEI GH.²⁾, VLADU V.^{1*)}

¹⁾INMA Bucharest / Romania; ²⁾University of Craiova / Romania

E-mail: valentin_vladut@yahoo.com

Keywords: press, camelina, oil plants, oil

ABSTRACT

The oil obtained from oil plants have characteristics and properties that allow use for people food, animals and in some cases alternative fuel engines. Camelina is an oil plant that has properties superior to other known plants: sunflower, soybean, flax, etc., to be used as fuel, the paper presenting some considerations that make this plant as an alternative to fossil fuels.

INTRODUCTION

In nature, the fat substances are spread in the plants and animals tissue, also in the secretion of some glands from the animal's bodies, for example in milk. In plants, the fat substance is concentrated only in certain parts as: seeds, fruits and tubercles, stones, germs, playing the part of a reserve substance, which the plant uses in the development period as a source of energy [1, 2].

The content of fat substance in these parts of the plants is variable. At the majority of the plants, this varies between 1 and 5 %.

Among the oleaginous plants there are: sunflower, soya, camelina, ricinus, flax, hemp, cotton, poppy, tobacco plant, sesame plant, peanut plant, olive-tree, coconut and palm tree.

Although the oleaginous plants domain is very ample, the plants that can be used as raw material in the vegetable oil industry are not so many because a lot of them have a low content of oil – being uneconomic, and others with a high content of oil present difficulties in obtaining the oil because of the special structure of the plant [3, 4, 5].

✓ **Camelina** is after camelina at the moment one of the most important oleaginous species from point of view energetic efficiency. **Camelina** seeds contain 33÷50 % oil. Camelina oil has multiple utilizations in industry, for combustibles fabrication and other domain. After the oil extraction – the extraction residues which are 40 % protein rich are used as forage, vegetal residues are used for the fabrication of the particle boards or for obtaining of combustible. Camelina it is a very good preceding crop for the grain, the land being cleared in time and without weeds. Depending on the specie and the vegetation conditions, the chemical composition of the seeds is characterized by a content of:

- 33÷49 % fats;
- 19÷20 % raw protein;
- 17÷18 % extract without nitrate.

The oil obtained by cold pressing is extracted from the oleaginous seeds with a superior quality, being possible to be used for alimentary usage and also in medicine.

The main advantages of the cold pressing installations are:

- at medium scale, the cold pressing installations are used by both the government industry and private enterprise;
- its can be placed near the agricultural units;

- direct or indirect, the process performed by the cold pressing installations is connected to the harvest (without intermediaries);
- its have a production capacity up to 25 tone/day;
- by cold pressing there are being obtained vegetable oil and pressed extraction residue;
- pressed extraction residue has a superior value (12-17 % oil content);
- its require low costs for investments;
- its have a low energy consumption (80 kWh/tonne of seeds – with a media of 6 times less than the energy required in the extraction industry);
- its didn't use chemical solvents or thermal regimes for seeds;
- it isn't being obtained any residual water;
- this process involves low logistical costs and low protection requirements;
- it stimulates local economy and short local distances (around 50 km);
- it has a superior flexibility (it's a faster accommodation process for other types of oleaginous seeds);

The extraction residues obtained by cold pressing contain a large quantity of residual oil and therefore it has a high utilization in animal forage in comparison with the extraction residues obtained by hot pressing.

For example, by pressing 3 kg of camelina seeds, it can be obtained about 1 kg of camelina oil and 2 kg of extraction residues. Using the cold pressing method of the camelina harvest from 1 hectare it is being obtained oil and a quantity of extraction residues of about 2.000 kg.

The filtration speed drops once the viscosity rises, which at its turn varies inverse proportional to the temperature of the liquid. In practice, the increasing of the filtering temperature is limited due to technological considerations. Therefore, at the crude oil resulted from pressing, the maximal filtering temperature must be 70°C.

MATERIAL AND METHOD

Camelina is an alternative to traditional fossil fuel sources it with the best characteristics: viscosity, lubricity, calorific value, of oilseeds, oil obtained from seeds of this plant can be used to ob inrea of biokerosen, for use in the aviation industry.

However this should not be at the expense of other crops cultivated only on surfaces that are not suitable for other crops, so as not to influence food security.

RESULTS AND DISCUSSIONS

In order to emphasize some characteristics of seeds, and oil from camelina, experiments were carried out on a pilot plant for cold forming, consisting of three press with a capacity of 450 kg seed treatment (150 kg / each release), fig. 1.



Fig. 1 - Pressing module used to experimentations

The characteristics of the seed before it is provided are shown in table 1

Table 1

SAMPLE	FEATURE	VALUE	UM
I (first batch)	Moisture	8.84	[%]
	Hectoliter mass	51.51	[kg/hl]
	Purity	79.0764	[%]
	Impurities non-oleaginous:	20.9236	[%]
	▪ impurities > 2 mm	14.4496	[%]
	▪ 1.6 mm > impurities < 2 mm	2.8884	[%]
	▪ 0.5 mm > impurities < 1.6 mm	2.8948	[%]
▪ impurities < 0.5 mm	0.6788	[%]	
▪ dust	0.0120	[%]	
II (second batch)	Moisture	12.91	[%]
	Hectoliter mass	36.45	[kg/hl]
	Purity	29.0592	[%]
	Impurities non-oleaginous:	70.9408	[%]
	▪ impurities > 2 mm	18.9428	[%]
	▪ 1.6 mm > impurities < 2 mm	38.2220	[%]
	▪ 0.5 mm > impurities < 1.6 mm	12.9720	[%]
▪ impurities < 0.5 mm	0.7300	[%]	
▪ dust	0.0740	[%]	

NOTE: The two samples were collected from different bags with different quality seed, but came together in the process of reconditioning.

The results determined for the received camelina seed oil, by-products and impurities or chemical and physical analyzes thereof are shown in Table 2.

Table 2

FEATURE	MU	VALUE
Quantity received seed	kg	2830
• Impurities (chaff, sharps, earth, other seeds, etc.)	kg	1297.4
• Losses	kg	1.3
• Quantity conditional seed, of which:	kg	1531.3
Oil cake	kg	1046.7
Total oil produced, of which:	kg / l	484.6 / 530.8
- Filtered oil	kg / l	388 / 425
- Oil residues	kg / l	96.6 / 105.8

• Equipment / gauges used

Name / Type	Measuring range / division	Series
Precision weighing apparatus special / AW 220, with autocalibrating	0÷200 g / 0.1 mg	D440100161
Furnace with temperature control / MEMMERT-UFE 500	0÷260 °C / 1 °C	G 507.1422
Hectoliter balance/CS 2000E, with stainless steel cylinder 1050 ml	0÷2000 g / 1 g	17453608

CONCLUSIONS

Camelina (that and rape) is an alternative to fossil fuels, but only if it cultivate agricultural land not for production of agricultural products to feed humans and animals.

Therefore there are conflicting views on the cultivation of this plant: first are farmers who want to obtain higher income per hectare compared to crops classic camelina not need treatment and works între ienere expensive and on the other hand are governments and FAO who prioritize food security of the country or the planet.

BIBLIOGRAPHY

1. **Singer M. & others**, 1950 - *Oil and vegetable fats technology*, Technical Publishing Bucharest;
2. **Kolpakov I. P.**, 1951 - *Manual for the exploitation of the screw conveyer presses in view of sunflower seeds processing*, Technical Documentation Institute Bucharest;
3. **Boeru Gh., Pusedrea D.**, 1980 - *Vegetable oils technology*, Technical Publishing Bucharest;
4. **Banu C. & others**, 2002 - *Food industry engineer's manual*, Technical Publishing Bucharest;
5. **Popa C., J canu V.**, 1998 - *Design guidelines for food businesses*, Beams I, II, Technical Publishing Galati.