

PROSPECTS OF PRODUCING RAPESEED OIL IN THE REPUBLIC OF MOLDOVA

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Received February 15, 2007

ABSTRACT - *The paper studied the existing technology and equipments for integrated rape processing and producing high quality vegetable oil. For obtaining a maximum productivity in case of oil extraction from rapeseeds, the authors of this paper recommended pressing at cold. The Institute of Food Technologies, together with "Alimentarmas" Joint-Stock Company from the Republic of Moldova, have elaborated a technological regulation concerning the rapeseed oil production, based on modern local and imported equipments, purchased for processing oil-producing plants in the Republic of Moldova.*

Key Words: rape, oil, equipment

REZUMAT – *Perspectivetele producerii uleiului de rapiță în Republica Moldova. În lucrare se analizează tehnologia actuală și utilajele pentru prelucrarea integrată a rapiței și producerea uleiului de calitate superioară. Pentru obținerea unui randament maxim la extragerea uleiului din semințe de rapiță, autorii lucrării recomandă presarea la rece. Institutul de Tehnologie Alimentară, împreună cu societatea „Alimentarmas” din Republica Moldova, au elaborat un regulament tehnologic privind producția de ulei de rapiță, pe baza utilajelor moderne, realizate în Republica Moldova și din import.*

Cuvinte cheie : rapiță, ulei, utilaj

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INTRODUCTION

Rape is a worldwide crop belonging to the family of crucifers, which can be used for food and technical purposes.

Under the agro-climatic conditions of Europe, rape is a highly productive crop for oil production. The interest for rape crop has begun to grow once with the rapid development of industry for producing technical oil. The increase in cheap mineral oil production on the world market has resulted in diminishing the areas cultivated with rape. The use of rapeseeds for making food oil was limited by composition traits - the presence of high quantities of toxic erucic acid. A new worldwide approach of the rape growing started in years 60 of the XX-th century, concerning the crop breeding – improvement of seed quality for getting oil, increase in the market demand of vegetal oils, and opportunity of increasing the quantity of nutritive proteins for animal and poultry breeding.

In 1974, in Canada, the first rape variety was homologated and named “canola”; it had a low content of erucic acid in oil (until 2%), which improved oil quality. The residues obtained from canola seeds contained, at low amounts, toxic glucosinolates, diminishing the residues quality and assimilation, and limiting their use for animal breeding.

In the middle of years 70 of the last century, the canola oil represented 33% of the total vegetal oils, produced in Canada, and in 1985, it represented 39%. Nowadays, rape is the main oil-producing crop in Canada and the rapeseed oil represents 54% of the total vegetal oils. The main regions of the rapeseed production are Asia – 46.8%, Europe – 30.3% and Northern America– 19.2%. The rapeseed production is continuously growing. The new varieties with early ripeness have highly increased the area cultivated with this crop, and the low content of erucic acid (until 2%) and glucosinolates (until 3%) allowed getting high quality oil and residues, which are accepted for human food and animal breeding.

According to the forecast of the Oil World, the German analytical agency, during 2005/2006, the production of rapeseed oil EU-25 has reached 5.93 million tons, compared to 5.52 million tons, during 2004/2005. The consumption of food oil represents 2.64 million tons, the remained quantity being used in the industrial field, especially for producing the Diesel fuel (until 97%). According to the forecast of the Oil World, during 2005/2006, Germany was the leader in producing biological fuel in EU, with a production of 2.1 million tons of biological fuel, compared to 1.92 million tons during 2004/2005. It was followed by France with 900 thousands tons and Italy - 600 thousands tons of biological fuel.

At the world level, the World Oil Agency forecasts the increase in rapeseed oil consumption until 16.8 million tons, compared to 15.6 million tons during 2004/2005 (Экономическое обозрение, 2005).

MATERIALS AND METHODS

The study on the elaboration of the technology of processing rapeseeds for obtaining food vegetal oil was carried out according to the information concerning the world trends of producing and using rapeseed oil.

This paper was carried out according to the analysis of technical-scientific information on production technologies of rapeseed oil and to the offers concerning the equipment for its extraction and raw matter used for obtaining high quality oil.

We have analysed the requirements for rapeseed oil and residues according to some regulations: Codex Stan and GOST (State standard), which are in force in the Republic of Moldova. For getting a proper oiliness degree of oil and residues, we have used native rapeseeds with low content of erucic acid.

Oil extraction was done by repeated pressing at M8-MIIIИ press, under experimental conditions of the “Alimentarmas” Joint-Stock Company from Chisinau. The analysis of physical-chemical characteristics of oil and residues was done according to in force methods.

RESULTS AND DISCUSSION

Rapeseed oil is one of the best vegetal oils. It maintains for longtime its clearness, does not get an unpleasant odour because of air action, compared to soybean oil. Due to its high emulsifying stability, it can be used in margarine, mayonnaise and bread making (Поморцева, 1993). According to the content of fatty acids (inclusively, the content of oleic acid) and to its tasting qualities, the rapeseed oil may compete with olive oils, being more useful for humans than sunflower and soybean oils. The composition of rapeseed oil has a high number of non-saturated fatty acids, which play an important role in regulating the lipid exchange, diminishing the level of cholesterol and treating diseases, inclusively tumours. This explains the great popularity of the rapeseed oil worldwide. Rape has a high content of proteins, well balanced as concerns the content of amino acids, representing a future source of proteins for animal breeding. The proteins from rape residues are rich in replaceable amino acids, especially lysine and metionine; their content is a little lower than in soybean residues, but higher than the content of sunflower. The modern technology of making vegetal oils involves different actions on the processed oily raw material. The technological process of obtaining rapeseed oil involves seed preservation and preparation for oil extraction, oil extraction by pressing, primary oil clearing, packing and deliverance of the product. The rapeseeds for oil industrial processing must meet the GOST requirements: humidity, waste content, castor oil seeds, contamination with cereals pests, percentage of erucic acid and percentage of glucosinolate (GOST 10583-76).

The modern methods of storing seeds were silos, which have preserved for long-term oil producing seeds. The leader firms in making silos are “ARAJ”,

“AG-Project” and “BIN” (Poland); “RIELA” (Germany) and “Project Contact Service” (Ukraine). The capacity of silos is of 100 -5000 tons.

Generally, the silos contain cylindrical vessels, made of stainless steel, with holes for air blowing. The ventilation of stored material is uniform.

When processing oil-producing crops, the vegetal oil is obtained in two stages: previous and final cleansing of the oil producing material. The pre-extraction of oil was done by pressing, and the final oil, by pressing or extraction. There are two base proceedings for obtaining rape oil: high and cold temperature pressing. In case of using cold pressing, oil was heated until the maximum temperature of 35°C, so that it could preserve all its valuable components, which gave an increased biological value to the finished product, comparatively to the high temperature pressing, when raw matter was heated at over 80°C.

The advantage of cold pressing is obtaining vegetal oil, with low phosphorus content and energy consumption. However, by high temperature pressing, they reached the maximum degree of oil extraction and its increased antioxidant stability.

The Czech Firm “Farmet”, set up in 1992, designs, makes and delivers complex equipments for obtaining and processing vegetal oils. The Firm makes equipments for pressing, inclusively helical conveyor presses for cold pressing, with the capacity of 20 kg/hour until 800 kg/hour, for rapeseed processing and helical conveyor presses for high temperature pressing, from 1800 kg/hour until 3600 kg/hour.

The “De Smet” Firm, the world leader in making equipments for oil industry, produces over 400 press types, inclusively for pre- and final oil pressing.

Pre-pressing ensured the fat content of residues from 15% until 20%, afterwards oil was obtained by extraction. The capacity of press was from 100 until 800 tons/every day. Full pressing ensures the fat content of residues from 5% to 12%.

The capacity of press was from 15 t/every day until 140 t/ every day. The “Alimentarmas” Joint-Stock Company from the Republic of Moldova makes M8-MIIIII presses for final oil pressing, having the capacity until 12 tons/every day. The press is used for continuous pressing and obtaining oil.

The temperature of the residues after pressing is of 60-65°C. At seed pressing, the oiliness of the residues is of 12-14%. Within the press, the continuous mechanical separation of liquid and solid phase of seeds was done by the action of pressure, created by a special helical conveyor and of the Zeer chamber, during material processing.

Nowadays, there are elaborated technologies of rape processing, inclusively the use of equipments for extrusion, which allow getting food oil and fodder for animal breeding.

The dry condition extrusion involves the short-term action, from 5-6 seconds until few minutes, of high temperatures, which results in the inactivation

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of mirosinase ferment. Residues could be used as fodder without additional processing.

The rape processing in the Republic of Moldova was carried out at the enterprise for processing oil-producing crops, which was constructed according to the technological draft (*Figure 1*).

The raw matter for making rape oil was represented by native rapeseeds, which do not contain erucic acid: “Colibri”, “Antei” and the seeds from abroad. The capacity of the plant is of 300 thousand tons/every day.

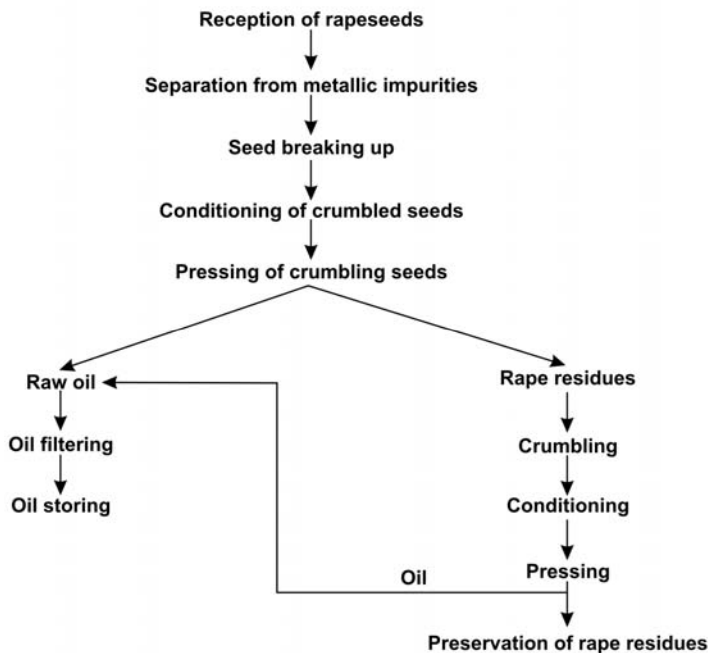


Fig. 1 – Technological draft of obtaining oil from rape seeds

CONCLUSIONS

A study was carried out concerning the firms producing equipments for seed preservation and obtaining rapeseed oil.

For obtaining a maximum productivity in case of oil extraction from rapeseeds, we recommend pressing at cold.

The technological regulation was elaborated for making rapeseed oil by pressing at cold; filtered vegetal oil and rape residues were obtained by using native and import equipments.

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