The development prospects for the raw material base and the edible vegetable oils production in the Krasnoyarsk territory

K V Chepeleva and Zh N Shmeleva
FSBEI HE Krasnoyarsk State Agrarian University, 90, Mira Avenue, Krasnoyarsk, 660049, Russian Federation
E-mail: kristychepeleva@mail.ru

Abstract. The article presents the research results on the market prospects of agricultural enterprises engaged in the oilseeds cultivation in the Krasnoyarsk territory. The role of oilseeds, in particular rapeseed, in the world production, the rapeseed industry condition and geography, the history of industrial production of edible oils in the Russian Federation, as well as the regional experience in the SFD and the problems that hinder the oilseeds production and processing are considered. The analysis of oilseeds production and processing in the Krasnoyarsk territory is presented. The assessment of the Krasnoyarsk territory export activity in the oilseeds market is given. The strategy of gradual development of the Asia-Pacific region target market – China and key marketing elements are defined. The strategy implementation is possible on the condition of support for investment projects implemented in the Krasnoyarsk territory for the development and strengthening of the raw material base, storage and industrial processing of oilseeds, the creation of production of various types of edible and technical oils, as well as cake production.

1. Introduction

The main traded oilseeds on the world market include: soy, rapeseed, peanuts and sunflower. Oilseeds are used for the production of vegetable oils.

Russian agricultural enterprises annually increase the production of oilseeds; domestic processors increase the production of three main types of vegetable oils (sunflower, soy, rapeseed).

In recent years, the market of oilseeds in Russia has changed. One of the changes is the market transfer to the export direction, because domestic consumption of vegetable oils in Russia remains unchanged over a number of years.

Rapeseed is a universal food and feed crop [1]. Global rapeseed production increases by 5-10% annually, 50% of rapeseed is used for animal feed, 25% for oil production and 20% for biofuel production [1].

In world agricultural production, rapeseed accounts for 25%, which is 28-30 million hectares [2]. In Russia, rapeseed crops increased up to 1.494 million hectares, in the Krasnoyarsk territory up to 144 thousand hectares, 80% of which are in the southern regions of the territory.

In recent years, Russia has experienced a change in the attitude of the state to the rapeseed industry. There is an active investment process in the oil processing industry, in terms of modernization of existing and construction of new plants for oilseeds processing [3]. The main event of 2019 is the announcement and the launch of a number of major investment projects in the oil and fat industry aimed at building new enterprises for oilseeds processing. It should be noted that the enterprises are located in the territories of the Central Chernozem region (Kursk, Lipetsk, Orel, Voronezh), which is explained by
both the growth potential of the raw material base and the promising market for finished products. Both leading players in the oil and fat industry and major livestock holdings have expressed interest in new projects. The total investment portfolio for 7 projects is estimated at 40-45 billion rubles. An additional increase in processing capacity can reach 2.8-3.0 million tons per year.

The main producers of rapeseed oil include: 9 plants in the Central Federal District; 6 plants in the Southern Federal District, in the Volga region – 4, in Siberia – 4 (mainly Western Siberia).

The purpose of the research is to assess the market prospects of existing agricultural enterprises in the region, in terms of the production of non-traditional edible vegetable oils.

The object of research is enterprises of the Krasnoyarsk territory engaged in the oilseeds cultivation.

2. Literature review

For the first time in the world, industrial production of sunflower oil was started in 1829 in Russia, in Alekseevka of Belgorod province by the inventor, serf Bokarev Daniil Semyonovich. In 1833 according to his project, the first horse-driven oil mill was built, and in 1835 oil export was started. The oil was immediately recognized and widely distributed throughout the world and was in great demand. By 1860, 160 oil mills were already operating and up to 20 thousand tons of vegetable oil were produced, 70% of it was sold abroad. Currently, production has not only been preserved, but also expanded. In 1992, both Alexeyevsky plants were privatized and were not destroyed. The product assortment included: sunflower oil, mayonnaise, margarine. These products were sold successfully, and the money received was invested in the development of production. In 2002, the plants were modernized and the equipment was completely replaced with equipment from Germany. The volume of production increased to 300 thousand tons of oils and fats annually. The company “EFKO” enterprises hold 12% of the Russian market of vegetable fats. Oil and fat brands products are well known: “Sloboda”, “Picnic”, “Altero”. “EFKO” products compete with the monsters of the world food industry Bunge, Cargill, Uniliver.

We consider it necessary to summarize and analyze the experience of the SFD regions in terms of existing and planned production of edible vegetable oils.

In the Omsk region LLC “Prodex” launched a plant for processing sunflower and rapeseed seeds at the beginning of the first quarter of 2014. The capacity of the first stage was 135 thousand tons of raw materials per year. The volume of investments was 765 million rubles. The main bet is on the production of edible oils and their export to China, India, Iran and Asia.

In the Altai territory LLC “Yug Sibiry” (“South of Siberia”) is a representative of two oil extraction plants in Western Siberia. The volume of rapeseed and sunflower seeds processing is 250-300 thousand tons per year. It sells bottled sunflower and rapeseed oil on foreign and domestic markets.

The plant for processing rapeseed, flax and producing bioethanol, starch, treacle and dry gluten is being built in the Novosibirsk region. “Transkhimexport” (“Transchemexport”) company has announced the construction of an oil extraction plant in the Novosibirsk region by 2024. The first stage will include the reconstruction of the elevator complex for simultaneous storage of 165 thousand tons of grain with an investment volume of 1.2 billion rubles. The plant capacity, according to the company’s plans, will be 500 tons of raw materials per day. It will produce oil and meal from rapeseed and flax.

Market participants state that the shortage of raw materials is still an obstacle to increasing production volumes.

In the Kemerovo region there are 3 plants for rapeseed processing with a volume of 30 thousand tons of raw materials per year.

The production efficiency and increase in rapeseed processing in the Russian Federation is hindered due to the insufficient number of modern elevators and storage tanks for seeds, the lack of specialized machinery, equipment for production, processing, and modern resource-saving cultivation technologies. There is also a lack of export history for most enterprises. There are no special tanks and filling terminals for biodiesel and its state support.

According to the Institute of agricultural market, all declared projects for processing oilseeds face the problem of raw materials shortage for processing. In addition, agricultural producers do not want to sell at current market prices, waiting for a higher price or sell to other regions.
The construction of modern elevators increases the profitability of production and sales of seeds, oil, cake from 20 to 50% [4].

3. Data and analysis

3.1. Dynamics of oilseed production in the Krasnoyarsk territory

The main volume of rapeseed is harvested in the Siberian Federal District (SFD) – 691 thousand tons (-88 thousand tons to the level of 2018), or 33.6% of the national gross harvest. The SFD accounts for the main part of the sown area – almost 680 thousand hectares, or 44.0% of the total sown area of rapeseed in Russia.

According to Rosstat, in 2019, the production of oilseeds in the Krasnoyarsk territory showed positive dynamics in three indicators at once: gross harvest, yield and acreage.

In 2019, the gross harvest of oilseeds in the region was 191.7 thousand tons (126.3% by 2018, or +39.9 thousand tons). Including: sunflower seeds 1.7 thousand tons (203.5% by 2018, or +0.9 thousand tons) with a yield of 6.9 C/ha (113.1% by 2018, or +0.8 C/ha), soybeans – 7.3 thousand tons (281.4% by 2018, or +4.7 thousand tons) with a yield of 8.7 C/ha (170.6% by 2018, or +3.6 C/ha), rapeseed – 182.7 thousand tons (123.1% by 2018, or +34.3 thousand tons) with yields of 14.6 C/ha (101.4% by 2018, or +0.2 C/ha) were received. 154.9 thousand ha were allocated for these agricultural crops sowing (131.3% by 2018, or +36.9 thousand ha): 2.5 thousand ha – for sunflower for grain (156.3% by 2018, or +0.9 thousand ha), 8.4 thousand ha – for soy (160.8% by 2018, or +3.2 thousand ha), 144 thousand ha – for rapeseed (129.5% by 2018, or +32.8 thousand ha).

According to the Ministry of agriculture and trade of the Krasnoyarsk territory, about 200 producers are engaged in oilseeds growing in the region, of which agricultural organizations constitute the majority. Many of them, due to the growing interest in oilseeds, in 2019 decided to increase the sown areas or engage in cultivation of crops those that were not previously engaged in.

The latter is due to the following reasons. According to Rosstat, over the past 3 years, the average price for wheat was 10.1 thousand rubles/t, while sunflower seeds on average cost 18.1 thousand rubles/t, soybeans – 22.2 thousand rubles/t, rapeseed – 21.2 thousand rubles/t. Also, the development of animal husbandry in the region generates demand for oilseeds. The climatic conditions of the region practically do not allow growing soy and sunflower for oil production, but the crops are in demand in the production of compound feeds, silage, and green mass.

As a result of rapeseed production in 2019 the Krasnoyarsk territory became the first in Russia. According to the assessment of the Krasnoyarsk branch of “Agrarian Analytics Center”, the following reasons facilitated the region’s lifting from the third position occupied in 2018 to the first: the steady increase in cultivated area over the last 5 years (4.9% from 29.2 per thousand hectares in 2014 to 144 thousand hectares in 2019), and increase in the rapeseed yield from 14.4 t/ha in 2018 to the highest indicator in 2019 for the Siberian Federal District: 14.6 C/ha due to the use of high-quality seeds, effective crop cultivation technology, and timely protective measures against pests and diseases.

The oilseeds growing, especially rapeseed cultivation in the Krasnoyarsk territory is a promising direction. Against the background of a decrease in the sown area for rapeseed in 2019 in Russia as a whole to 1,545.5 thousand hectares (−30.8 thousand hectares, 98% by 2018), the region increases the area of agricultural crops and, accordingly, its share in total crops in the country (from 7.1% in 2018 to 9.3% in 2019). The cost of rapeseed is significantly higher than the cost of wheat: according to the Ministry of agriculture and trade of the Krasnoyarsk territory, in February 2020, the average selling price of rapeseed oil was 22.5 thousand rubles/t, third-class wheat – 10.5 thousand rubles/t. Among oilseeds, rapeseed occupies the leading position in terms of profitability, but the use of rapeseed oil is not widespread in our country and its production is mainly export-oriented [5].

In general, oilseed processing in the region is currently insufficiently developed. Soy is used for the production of compound feeds at LLC “Yenisei” in the Minusinsky district. LLC “Khosyain” (LLC “Master”) produces oil from rapeseed in the Achinsky district. So far, the organization operates one line with a capacity of 9 thousand tons per year, but plans are to increase the capacity for the production of
rapeseed oil by 45 thousand tons per year. In this regard, most of the rapeseed crop is sold both to other regions of Russia and abroad.

The Krasnoyarsk territory does not have a regional program for the production and processing of rapeseed. The farms of the region do not have the capacity to dry and calibrate best oilseeds.

The selection and seed center with a capacity of 60 thousand tons of seeds per year should appear in the Uzhursky district of the Krasnoyarsk territory in 2021. The new agro-industrial facility will be engaged in the production and storage of elite and high-quality seeds of wheat, barley, oats, rapeseed and perennial herbs adapted to the natural and climatic conditions of the region. By 2024, the region plans to increase the export of agricultural products to 48 million dollars.

3.2. Oilseeds export of the Krasnoyarsk territory

Within the framework of the national project “International cooperation and export”, the Ministry of agriculture and trade of the Krasnoyarsk territory is implementing a regional program. Its main goal is to increase the export of agricultural products of the region by 2.5 times: from 18.7 million dollars in 2017 to 47.9 million dollars in 2024 [6]. Almost 50% of total agricultural exports are wheat and rapeseed. In 2018, grain crops were sold for $26 million and rapeseed for $6.5 million. In 2019, the situation changed, in October 2019, rapeseed exports increased by 2.7 times, but there is a decrease in grain crops [6].

A high rapeseed yield contributed to an increase in crop exports in 2019 to $0.01 billion (+$0.01 billion, 106.17% by 2018) (table 1).

Table 1. Export of the Krasnoyarsk territory, oilseeds, oils and fats for 2015-2019 [6].

| Products          | Total export volume, billion dollars | Place in product rating | Share of product in region’s exports | Major markets                      |
|-------------------|-------------------------------------|-------------------------|--------------------------------------|------------------------------------|
| Oilseeds (rapeseed) |                                     |                         |                                      |                                    |
| 2015              | 0.00                                | 24                      | 0.03                                 | China, Abkhazia, Australia         |
| 2016              | 0.01                                | 19                      | 0.11                                 | China, Mongolia, Kazakhstan        |
| 2017              | 0.01                                | 17                      | 0.12                                 | China, Mongolia, Kazakhstan        |
| 2018              | 0.01                                | 23                      | 0.10                                 | China, Mongolia, Turkey            |
| 2019              | 0.01                                | 14                      | 0.21                                 | China, Mongolia, Latvia            |
| Oils and fats     |                                     |                         |                                      |                                    |
| 2015              | 0.00                                | 59                      | 0.00                                 | Belarus, Abkhazia, Australia       |
| 2016              | 0.00                                | 63                      | 0.00                                 | Belarus, Abkhazia, Australia       |
| 2017              | 0.00                                | 32                      | 0.01                                 | China, Kazakhstan, Abkhazia        |
| 2018              | 0.00                                | 41                      | 0.00                                 | China, Belarus, Abkhazia           |
| 2019              | 0.00                                | 62                      | 0.00                                 | Armenia, Belarus, Mongolia         |

According to the Russian Ministry of agriculture, the main buyers of Krasnoyarsk rapeseed are: Mongolia – 14 thousand tons (333.3% by 2018, +9.8 thousand tons), China – 12.6 thousand tons (120% by 2018, +2.1 thousand tons), in 2019 Latvia was added – 3.2 thousand tons (table 1).

According to export data on oilseeds, fats and oils for the period 2015-2019, the main countries of oilseeds supply are China, Mongolia, Kazakhstan, oils and fats are supplied to Belarus, Abkhazia, Mongolia, and China [6]. The total volume of Russia’s exports in the period from 2015-2019 is growing annually and is in 2019 for oilseeds – 1.02 billion dollars (+32.8%) compared to the previous year, for oils and fats – 268 million dollars, which is 28.6% more than the same period [6].

At the moment, the region is exporting to foreign markets one of the oilseeds – rapeseed, in 2019, the volume of oilseeds supplies was 0.01 billion dollars (+106.2% by 2018, [6]). The chosen path of the region is raw material, which does not allow to get the maximum economic return from the produced rapeseed and is too dependent on external conditions. The region is able to produce not only traditionally
safe, but also modern, high-quality products of a wide range (rapeseed, ginger, mustard and other types of non-traditional vegetable oils).

The successful location of the region opens up great opportunities for exporting oilseeds processing products to East Asian countries.

4. Research results

In the future, per capita consumption will increase faster in Eastern Europe, Asia, and Latin America, where incomes are rising and population growth is slowing [7]. The maximum increase in demand is planned, primarily for vegetable oils, sugar, meat and dairy products. Based on the analysis of demand and market assessment, it is advisable to sell about 90% of the produced rapeseed oil for export [8]. Without access to foreign markets, new production will not pay off, and the sale of large volumes of edible rapeseed oil in the domestic market is a difficult task. It is possible to export rapeseed oil to the countries of the Asia-Pacific region: first of all, to China, then to Vietnam, Japan, and Korea, which requires long-term contracts.

Thanks to a well-chosen strategy of gradual market development and differentiated marketing technologies, enterprises will be able to prepare the ground for interaction with consumers (table 2).

Table 2. The marketing mix elements of the product group “Edible vegetable oils”.

| Elements          | Description                                                                 |
|-------------------|-----------------------------------------------------------------------------|
| **Product**       | Edible vegetable oil: rapeseed, in the future, ginger, mustard.              |
|                   | In bulk, bottled. Degree of purification: unrefined. Volume 3, 5 liters.    |
|                   | Compliance with indicators of quality by CIQ.                               |
| **Price**         | The average price policy is based on the best price-quality balance         |
| **Physical**      | China: Chengdu, Wuhan, Nanjing, Suzhou, Shanghai                            |
| **distribution**  | Supermarket and hypermarket chain China Resources Vanguard, on-line stores: |
|                   | Tmall (https://www.tmall.com/), JD (https://www.jd.com), Suning (https://www.suning.com/), Pinduoduo (https://www.pinduoduo.com/), online stores. |
| **Promotion**     | Advertising in places of sale, in specialized catalogs. The target product can be presented as part of exhibition and fair events: Food Expo Hong Kong, FHC China Shanghai, ANUFOOD China. |

Partially refined rapeseed oil can be used for feed purposes in the diets of cattle, pigs and poultry.

There is a great demand for rapeseed cake from livestock complexes, poultry farms, and feed mills of the region. The cost of rapeseed cake is cheaper than imported soybean meal, the cake has high feed advantages, which leads to a significant reduction in the cost of livestock and poultry products and increases the production profitability. The planned price of cake from the warehouse of the enterprise is 14-16 thousand rubles/ton; the wholesale price of rapeseed oil will be 48-55 thousand rubles per ton (EXW).

The demand for high-energy rapeseed cake from agricultural enterprises of the Krasnoyarsk territory is huge. The number of cows is 139.4 thousand heads, pigs – 507.9 thousand heads, poultry – 5856.5 thousand heads. The need for cake is: cows and pigs with a daily norm in the rations of 1 kg – 233,028 tons; poultry with a daily norm of 0.3 kg – 632,502 tons.

5. Conclusion

A very successful market environment for oilseeds and vegetable oils for the Russian Federation is being formed now. The situation is particularly favorable for rapeseed oil, which is traditionally in demand both in the European Union, Asia and neighboring countries.

The production of oilseeds is of great strategic importance for the development of the Krasnoyarsk territory agro-industrial complex. Taking into account the regional potential, the positive dynamics of the oilseed production development in the SFD, the territory can take one of the leading places in this industry.
The latter determines the development and support of investment projects implemented in the Krasnoyarsk territory for the development and strengthening of the raw material base, storage and industrial processing of oilseeds, the creation of production of various types of edible and technical oils, as well as cake production.

References
[1] Boltenko Y, Vasilenko V, Frolova L, Mikhailova N, Dragan I and Semchenko I 2019 Creation of Innovative Solutions for the Production of Composite Vegetable Oils Balanced in Fatty Acid Composition Advances in Biological Sciences Research 7 https://doi.org/10.2991/isils-19.2019.9
[2] Oilseeds. Results of the year-2019. Institute of the agrarian market conjuncture Retrieved from: https://agrovesti.net/lib/industries/oilseeds/maslichnye-itogi-goda-2019.html
[3] Baryshnikova N A, Sukhorukova A M, Kireeva N A and Bagautdinova N G 2018 National Priorities vs Economic Advisability: Search of Russian Integration Limits into World Food Market Advances in Economics, Business and Management Research 61 https://doi.org/10.2991/icemw-18.2018.52
[4] Zhaishylyk N and Kazakhstan's F Sun Revealed Comparative Advantages in Agricultural Exports 2017 Advances in Economics, Business and Management Research (AEBMR) 37 https://doi.org/10.2991/ictim-17.2017.4
[5] Sheng Yu 2018 Current Situation and Development Trend of Food Supplies in China Advances in Social Science, Education and Humanities Research 194 https://doi.org/10.2991/etmhs-18.2018.4
[6] Analytics and research. Export commodity report. Portal Russian export center. Retrieved from: https://www.exportcenter.ru/services/analitika-i-issledovaniya/
[7] Pyzhikova N I, Chepeleva K V and Shmeleva Zh N 2020 The regional brand formation in the category processed products of oilseed crops Advances in Economics, Business and Management Research 128 https://doi.org/10.2991/aebmr.k.200312.307
[8] Chepeleva K V and Shmeleva Zh N 2019 Production and processing of oilseed crops – a strategic agro-industrial complex development vector of the Krasnoyarsk territory IOP Conference Series: Earth and Environmental Science 315 https://doi.org/10.1088/1755-1315/315/2/022053