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## Current state and development trends of spring rape market in the agricultural sector of Krasnoyarsk krai

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**Abstract.** This article is devoted to the general survey of spring rape (colza) market in the Krasnoyarsk Krai to 2019, figures on the dynamics of crop area and average rapeseed yield in the region are presented. The main perspectives of further development of rapeseed cultivation within the territory of the region are viewed. The scheme of comprehensive processing of rape oilseeds for the enterprises of the agricultural sector in the Krasnoyarsk Krai which cultivate spring rape (colza) for seeds and produce pressed rapeseed oil is offered.

The current environment of market economy and the established present-day trends in food industry have made oily raw material a strategic one for many countries of the world. In 2018 - 2019 the new records were obtained according to the key figures of oil-bearing crops producing and processing and in fat-and-oil industry in Russia on the whole. The export of sunflower oil reached 2.3 million tons (+6% compared to the 2017 season). In addition to the sunflower oil export figures the highest figures were achieved in the export of soybean – 892 thousand tons (which is 2.4 times more than in the 2016/2017 season), the export of rapeseed – 322 thousand tons (which is 4.4 times more than in the 2016/2017 season), the export of soybean oil – 566 thousand tons (which is 9% more than in the season 2016/2017) and the export of rapeseed oil – 340 thousand tons (which is 43% more than in the season 2016/2017). The interest in oil-bearing crops in Russia is growing. The further increasing of their crop areas to 13.9 million hectares in the 2018/2019 season (which is 11% higher than last year's level) proves this fact [1].

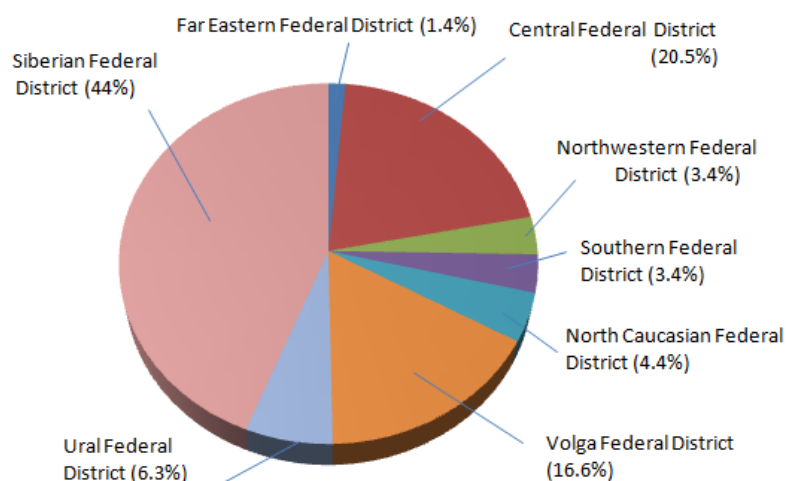
Rapeseed is getting more and more attention in the world oil vegetable market. The Russian rapeseed market taking into account the seed yield in 2017 and 2018 has updated the record of spring rapeseed production by increasing the crop area several times. Rapeseed production in the most parts of Russian Federation has increased almost twice for two years. The crop area record was set in 2018 (1.58 million hectares (55% higher than in 2017)) primarily due to the Ural-Siberian macroregion, which increased spring rape crop areas by 76% compared to 2017. The crop area in the Volga region was increased by 60% - up to 274 thousand hectares. For a second consecutive year, the agricultural workers of Central Federal District increase rapeseed crop area including winter rape crop area.

In 2019 according to figures provided by Federal Service of State Statistics the rapeseed crop area was 1545.5 thousand hectares. The spring rape crop area was 1 354. 4 thousand hectares, the winter rape crop area – 191, 1 thousand hectares. The rapeseed crop area increased by 29.9% (by 355.7 thousand hectares) within five years period (by 2014), the rapeseed crop area increased by 124.5% (by 857.1 thousand hectares) within ten years period (by 2014). The rapeseed crop area increased by 1047. 8% (by 1410. 9 thousand hectares) compared to 2001 [2].



The popularity of rapeseed in Russia has soared thanks to the following reasons. First, there is a growing demand on the part of steady processors in the Central Federal District, in the Urals and in Siberia and for seasonal processing at the start of the season before sunflower in the South and the Volga region. Secondly, the export of rapeseed to China is steadily growing, active suppliers are agricultural producers of Siberia, also, additional demand is generated by the Republic of Belarus, where the processing of oilseeds is organized at a large plant owned by the group of companies «Sodruzhestvo».

Compared to 2018 there was a rapeseed cultivation area increase in 2019 in the North-western Federal District, in the Southern Federal District, in the Siberian Federal District, in the Far Eastern Federal District. The planted area in other Federal Districts decreased slightly. In 2019 the cultivation area in the Siberian Federal District was 680.0 thousand hectares (44.0% of all rapeseed crops in Russia), in the Central Federal District – 317.3 thousand hectares (20.5%), in the Volga Federal District – 256.7 thousand hectares (16.6%), in the Ural Federal District – 97.7 thousand hectares (6.3%), in the North Caucasian Federal District – 67.3 thousand hectares (4.4%), in the Southern Federal District – 52.8 thousand hectares (3.4%), in the Northwestern Federal District – 52.5 (3.4%), in the Far Eastern Federal District – 21.2 (1.4%). According to statistics [2] the Altai Krai, where 186.0 thousand hectares were sown (12.0% of the total area), in 2019 was the first in the rapeseed area size rating among the regions of the Russian Federation (Top 20 regions-producers of rape seeds). Compared to the previous year, they increased by 34.7% (47.9 thousand hectares). In 2019 in the Krasnoyarsk Krai 144.0 thousand hectares were sown (9.3 % of all planted area in Russian Federation). The crop area in the Siberian Federal District is 680.0 thousand hectares, i.e. 44% of all rapeseed crop area in Russia (figure 1).



**Figure 1.** Rapeseed crop area distribution by Federal Districts in Russia in 2019, %.

In comparison with the season (autumn 2017) when the rapeseed seeds prices in the Central macroregion decreased to 19.0 roubles/kg within the wide-scale harvesting period in 2018 the selling price was from 23.0 to 25.0 roubles/kg within the period from August to November. This rise in price was due to the higher prices of rapeseed seeds and oil in Europe and the difference in rate of exchange compared to 2017. The rapeseed oil export from Russia which achieved its maximum in 2017 and in 2018 and was 340.0 thousand hectares, is still growing. In just five months (from August to November 2018) 236 thousand ton were exported from Russia by water. The Russian-manufactured oil is 170 thousand tons (an increase of 14% over the specified period of the 2017/2018 season). Such raw material as rapeseed ground oil-cake and rapeseed presscake are in high demand in the domestic market where it is used successfully in cattle, poultry and pig feeding. It should also be noted that since the beginning of the current season, prices for rapeseed presscake in the Central Federal District have been kept at the level of 17.5-18.5 roubles/kg, which allows processors to receive the planned profit from production. According to preliminary estimates of the Institute for Agricultural market studies (IKAR) [3].

In the context of the modern market of agro-industrial complex, the cultivation of this crop has become relevant in the Krasnoyarskiy Krai. There is a tendency to increase the crop area and crop productivity (tables 1-4). So in 2018 the crop area of spring rape in the krai increased compared to 2017 almost two times (from 56.6 to 114.0 thousand hectares). There is an increase of the farms cultivating rapeseed for seeds: in 2016 there were 65, in 2017 there were 76, in 2018 there were 130 [4].

**Table 1.** Crop area of spring rape in the farms of all categories in the Siberian Federal District from 2009 to 2019 (thousand hectares) [5].

Region	Years										
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Republic of Khakassia	0.3	0.6	1.1	3.1	4.2	3.7	0.4	1.9	2.9	4.2	
Altai Krai	16.4	24.4	30.1	48.6	58.1	64.0	64.2	50.3	50.5	138	186
Krasnoyarsk Krai	6.3	4.5	7.9	15.0	27.2	29.2	33.5	33.8	56.6	111	144
Irkutsk Oblast	4.2	2.3	2.5	2.6	2.4	4.4	6.1	11.4	13.0	20.5	27.8
Kemerovo Oblast	27.1	44.3	34.6	60.2	70.3	69.0	55.6	61.3	51.3	68.5	74.3
Novosibirsk Oblast	5.5	6.4	5.4	28.5	48.3	65.6	57.8	38.8	50.7	99.7	90.2
Omsk Oblast	22.5	74.2	83.6	93.9	60.3	59.4	60.7	60.5	83.7	157	131
Tomsk Oblast	4.5	1.7	3.2	4.5	10.1	6.2	6.5	10.6	12.3	19.7	
Total	91.2	164	175	264	286	306	289	278	334	619	

Early-ripen spring varieties of rapeseed proved their worth taking into account natural and working conditions in the krai. The share of using the elite seeds of rapeseed of domestic selection in the krai are more than 80%. The following varieties of domestic selection are cultivated in the krai [4]: Nadyozhniy (Novosibirsk); Akkord (Lipetsk); Ermak (Lipetsk); Flagman (Lipetsk), Sibirskiy (Novosibirsk) and etc. The varieties and hybrids of western selection are also cultivated in the krai: Heros (Germany); Trapper (Germany); Belinda (Germany), Brander (Germany).

**Table 2.** Crop area of spring rape in the farms of all categories in the Krasnoyarsk Krai from 2009 to 2019.

Area, thousand hectares	Years										
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	6.3	4.5	7.9	15.0	27.2	29.2	33.5	33.8	56.6	111.2	144.0
Area ratio to the previous year (+,-) %	-35	-29	+43	+48	+45	+7	+13	+1	+41	+50	+23

\*according to figures [4].

**Table 3.** Spring rape seed yield in the farms of all categories in the Krasnoyarsk Krai from 2013 to 2019.

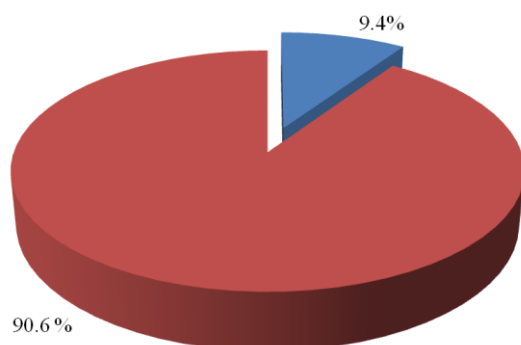
dt/ha harvested	Years						
	2013	2014	2015	2016	2017	2018	2019
	8.3	6.8	9.3	10.0	13.0	14.5	17.0

**Table 4.** Spring rape seed gross collection in the farms of all categories in the Krasnoyarsk Krai.

In weight after processing, thousand centners	Years								
	2011	2012	2013	2014	2015	2016	2017	2018	2019
	51.1	121.2	223.7	195.2	261.5	336.1	592.6	818.1	213.5

The Siberian Federal District in 2019 was; a leader in spring rape seed gross collection – 793.0 thousand tons (34.4% from total in Russia).

On the territory of the Krasnoyarsk Krai, rape seeds are mainly cultivated by agricultural enterprises (90.6%), while peasant economies (farms) also cultivate rape seeds (9.4%) (figure 2). At the same time, no more than 20% of all cultivating farms and enterprises are engaged in seed processing.

**Figure 2.** Spring rape crop area distribution according to farm category in the Krasnoyarsk Krai.

This spring rapeseed crop area distribution is due the following reasons:

- peasant economies (farms) are not well-equipped with technologies and engineering tools for crop growing;
- lift conveyors and drying equipment are not sufficiently adapted to the drying and storage of small-seeded crops;
- no lines for rape seeds processing and primary purification of raw rapeseed oil;
- no lines for oil refining.

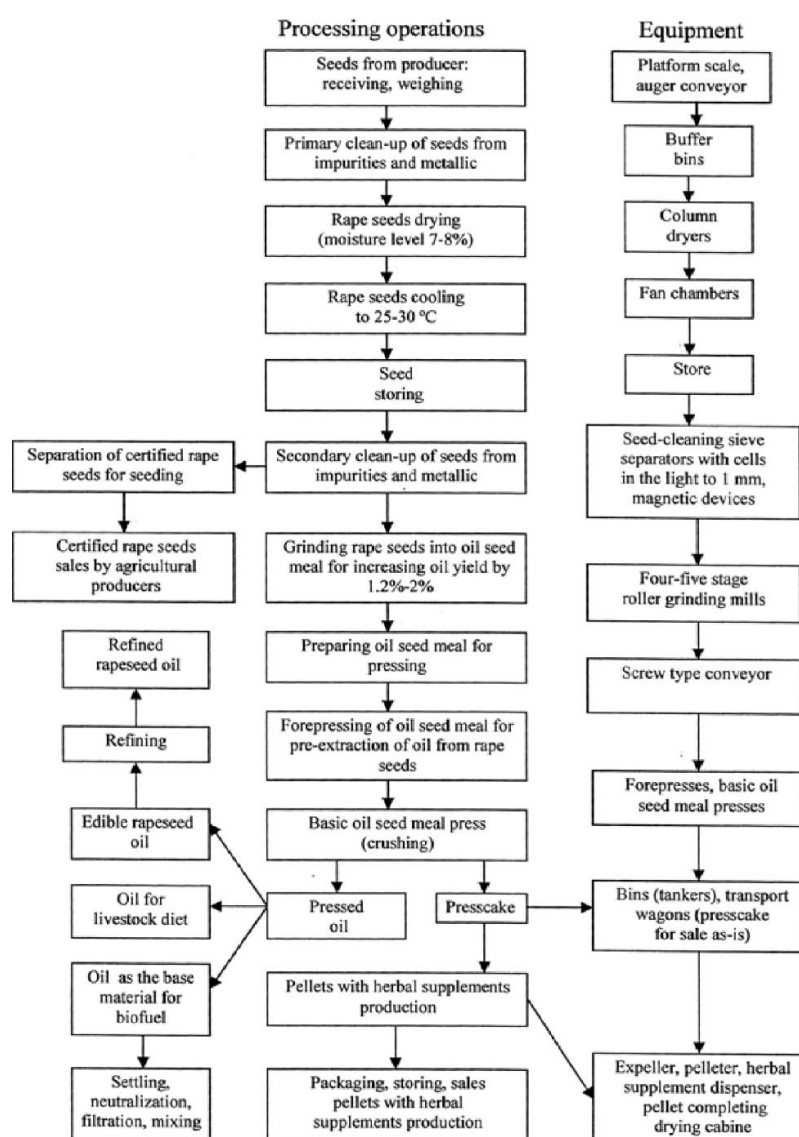
In the Siberian Federal District the rapeseed market is represented by commodity export of rape seeds and oil. All produced oil in the region is represented as follows: only 3% is refined and the remaining 97% is unrefined (raw oil).

As it has been noted, the number of farm economies and enterprises cultivating spring rape for seeds is growing. It may be explained by the stability of average prices of oil-bearing crops seeds. Rapeseed seeds are mainly exported, so many farms do not have to store them for a long time.

In 2018 the total export of rape seeds was almost 40 thousand tons including: to the People's Republic of China – more than 10.5 thousand tons, to Belarus – more than 25.7 thousand tons; to the Mongolian People's Republic – 3.6 thousand tons. The export is due to the demand for rapeseed in the oil vegetable market, and both seeds and raw oil are purchased.

It is planned until 2025 to continue increasing rape oilseeds production, rape oilseeds processing including non-waste one according to the programmes and forecasts [4]. In the Sukhobuzimsky district of the Krasnoyarsk Krai, it is planned to build a plant for processing seeds of oil-bearing crops. This will allow to get not only raw and refined vegetable oils, but also their derivatives.

The analysis of production and export ramp-up suggests the need to re-equip the funds for oilseeds processing. This refers to oil production plants which can produce not only edible and technical oils but also by-products such as glycerine, surfactants, combined feed and biofuels [6-11] (figure 3).



**Figure 3.** Suggested scheme of comprehensive processing of rape oilseeds.

By organising high-quality oilseeds processing, the fat-and-oil industry is able to increase the internal industry relations of the national economy. At the same time, it is necessary to take into account the

possible decrease in prices for raw materials from rapeseed, since an increase in gross collection will sooner or later set the stage for competition, both for the federal subjects, and for districts and farms within the region. Farms that have their own processing will have advantages.

In this situation the issues of intrafarm production of biofuel compositions based on rapeseed oil are becoming relevant again.

Some enterprises which cultivate rapeseed for seeds have the similar questions from time to time and test options for rapeseed oil using on mobile agricultural machinery which is equipped with diesel engines, also as substitute commercial-grade diesel fuel while drying grain. In any case oilseeds processing needs equipment to get raw oil and refined oil, presscake or feed stuff enriched with oil and presscake. The approximate list of equipment (according to the scheme figure 3) can be supplemented with additional machines or lines depending on equipment in hand and final processing goals.

With the yield of rapeseed obtained in 2019 and the planned volume of production of this crop, in the near future it will be necessary to improve the technologies of cultivation, storage and processing of seeds, primary and subsequent oil refining, and expand the export of not only raw materials from rapeseed, but also products based on it.

The main positions of the state of production of rape seeds in agricultural sector in 2019 are:

- increasing demand for seeds and their processed products (oil, presscake, ground oil-cake):
- rapeseed crop area increasing:
- yield and gross collection increasing:
- increasing the share of exported raw materials and consolidation of the export price.

Increasing demand for feed in the livestock industry of the Krasnoyarsk Krai and non-waste processing of oilseeds, including for obtaining motor fuel, make the crop strategic one for the region, bringing its importance closer to grain crops.

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