

ECONOMIC EFFICIENCY OF GROWING AUTUMN RYE

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Abstract. This article provides information on the importance of rye, distribution, cultivated area, productivity and economic efficiency of growing rye varieties.

Keywords: rye, *Secale*, seed, grass, history, germination, environmental factors, condition, tillering, yield, economic efficiency.

Introduction

Usage. Rye is a multilateral crop. Different varieties of bread are baked from rye flour, nutritionally close to bread wheat. On average, rye grain contains 13% of protein, 65% of starch, 1.7% of fat, 2.2% of fiber, 5% of sugar, 10% of ash. The largest amount of protein is contained in the embryo (47%). Carbohydrates are arranged differently: in the embryo of 37.6%, in the shells – 48.2%. There is starch in the endosperm and sucrose in the embryo. There are many microelements in the rye grain: manganese, copper, boron, aluminum, iodine, bromine, fluorine, cobalt, molybdenum, strontium, and cesium.

Rye (*Secale cereale*) is a grass grown extensively as a grain, a cover crop and a forage crop. It is a member of the wheat tribe (Triticeae) and is closely related to both wheat and barley (genera *Triticum* and *Hordeum*). Rye grain is used for flour, bread, beer, crispbread, some whiskeys, some vodkas, and animal fodder. It can also be eaten whole, either as boiled rye berries or by being rolled, similar to rolled oats. Rye is a cereal grain and should not be confused with unrelated ryegrass (*Lolium*), which is used for lawns, pasture, and as hay for livestock.



Rye is widely used as a feed crop. To do this, they use the grain and biomass. The greatest nutritional value of biomass is noted before the earing. After mowing, Rye stems grow back, for this moisture and nutrients should be enough. The feed used grain and waste milling industry. Rye straw is widely used in everyday life for crafts mats, baskets, hats and bedding for livestock.

History. Rye as a cultivated plant originated on the basis of a field-rye rye of the species *S. segetable L.* Scientists associate the origin of this species with perennial wild species of the genus *Secale L.* - *montanum*, *dulmaticum*, *analiticum*. The formation of rye species *S. cereale L* was long. This is due to a number of biological features. First of all, it is the least exactingness to the conditions of the external environment, lower temperature of seed germination, and low exactingness to the soil conditions. Rye has always grown among crops of winter wheat and winter barley. In contrast to these crops, the root system of winter rye is more developed, and resistant to soil acidity, higher winter hardiness, has the ability to absorb difficultly soluble salts from the soil. As wheat and barley advanced to the north, high in the mountains, to the west, rye prevailed among them as being more resistant to environmental factors. The weed field rye gradually replaced wheat and barley from crops. Modern cultural rye is a species taken from the field of rye for centuries. On this occasion, N.I.Vavilov wrote: "Apart from the will of man, the weed became itself a cultivated plant.d

Cultivation of cultivated rye began in 1-2 millennia BC. The ancient civilization of Greece, India, and China did not know rye as a cultivated plant. Rye crops were known in the first century AD in the countries of Europe. Currently, according to FAO, for 2013 rye is sown on an area of 5.8 million hectares, the average grain yield is 28.9 quintal per hectare, and the gross rye grain production is 16.7 million tons.

Systematics and morphology. Rye belongs to the family of *Poaceae*, the genus *Secale*, species *sereale L.* It is an annual plant with a developed root system.

Production and consumption statistics

Rye is grown primarily in Eastern, Central and Northern Europe. The main rye belt stretches from northern Germany through Poland, Ukraine, Belarus, Lithuania and Latvia into central and northern Russia. Rye is also grown in North America (Canada and the United States), in South America (Argentina, Brazil and Chile), in Oceania (Australia and New Zealand), in Turkey, in Kazakhstan and in northern China.

Table-1

TOP RYE PRODUCERS

Top rye producers	2021 (metric ton) ^[33]	2019 (metric ton) ^[34]	2017 (metric ton) ^[35]	2015 (metric ton) ^[36]	2013 (metric ton) ^[37]
World Total	13,223,426	12,816,515	13,011,548	12,937,204	16,649,965
 United States	249,130	269,810	260,410	292,010	193,710
 Ukraine	593,150	334,680	507,850	391,070	637,730
 Turkey	200,000	310,000	320,000	330,000	365,000
 Spain	315,750	261,550	139,178	331,930	384,300
 Russia	1,721,912	1,428,421	2,548,719	2,086,675	3,359,873
 Poland	2,472,860	2,415,640	2,673,642	2,013,148	3,359,271
 Germany	3,325,600	3,237,600	2,737,400	3,487,800	4,689,100

Top rye producers	2021 (metric ton) ^[33]	2019 (metric ton) ^[34]	2017 (metric ton) ^[35]	2015 (metric ton) ^[36]	2013 (metric ton) ^[37]
 European Union	7,958,440	8,367,410	7,357,245	7,851,644	10,210,326
 Denmark	672,490	883,510	723,200	771,700	526,800
 China	512,248	525,944	526,728	496,971	620,000
 Canada	472,790	333,400	341,300	225,500	222,900
 Belarus	845,000	755,547	669,841	752,600	648,432

The purpose of the study. In the conditions of irrigated light gray soils of Kashkadarya region, in the cultivation of high-quality grain crops of "Ns Savo" and "Vakhshskaya 116" varieties, it is necessary to determine the optimal period and norms of sowing seeds, and to develop the requirement for feeding with mineral fertilizers during the growing season.

The irrigated light gray soils of Kashkadarya region, varieties of rye "Ns Savo", "Vakhshskaya 116", planting periods, standards and standards of mineral fertilizers were taken as the object of the research.

Geographical location and soil conditions of the researched region. The research was conducted in the experimental field of the Southern Agricultural Scientific Research Institute, located in Karshi district. varies between 10 Gross phosphorus is 0.15–0.20%, and potassium is 1.80–2.50%.

Analysis of research results

When analyzing the indicators of economic efficiency in autumn rye varieties in our research, it was found that the following results were recorded. In this case, the "Ns Savo" variety was planted at the rate of 4.0 million seeds per hectare for the period 01-05.10, the yield was 16.8 t/ha in the case of no mineral fertilizers (control), and 18.5 t/ha in 5.0 million seeds. ha, and 19.3 ts/ha in 6.0 million pieces, gross product income is 5429.1 in accordance with planting norms; 5978.5; 6237.0 thousand soums, total expenses 5473.2; 5966.0; 6458.8 thousand soums, conditional net income -44.1; 12.4; -222.9 thousand soums, 1 ts. grain cost 325.8; 322.5; 334.7 thousand soums, profitability level -0.8; 0.2; It was -3.4%.

Also, when the norm of mineral fertilizers N200P100K75 kg/ha is used in autumn rye variety "Ns Savo", the yield is 46.2 tons/ha at the rate of 4.0 million seeds per hectare, 57.5 and 49 at 5.0 and 6.0 million seeds. 0.0 ts/ha, gross product income is 14924.1 according to planting norms; 18596.4; 15834.8 thousand soums, total expenses 11981.4; 12474.2; 12967.0 thousand soums, conditional net income 2942.7; 6122.2; 2867.8 thousand soums, 1 ts. grain cost 259.4; 216.8; 264.6 thousand soums, profitability rate 24.6; 49.1; it was 22.1%, and at the rate of mineral fertilizer N240P120K90 kg/ha, the yield was 51.9 in accordance with planting standards; 53.1; 54.9 ts/ha, gross product income 16774.9; 17156.9; 17744.4 thousand soums, total expenses 13215.3; 13708.1; 14200.9 thousand soums, conditional net income 3559.6; 3448.7; 3543.5

thousand soums, 1 ts. grain cost 254.6; 258.2; 258.6 thousand soums, profitability rate 26.9; 25.2; was 25.0% (see Figure 1).

The analyzes in our experiments, when carried out in the autumn rye variety "Vakhshskaya 116", 4.0 per hectare proportional to the above; 5.0; On the basis of 6.0 million seeds, when planted without mineral fertilizers (control), the productivity was 16.4-18.5 t/ha, and the profitability level was -3.0-7.4%, while mineral fertilizers N200P100K75 When planted at the rate of kg/ha, the indicators were 45.5-56.5 t/ha, and the yield was 22.8-46.3%, while at the rate of fertilizer N240P120K90 kg/ha, the yield was 51.3-53.7 t./ha, it turned out that the rate of profitability was 22.3-25.4%.

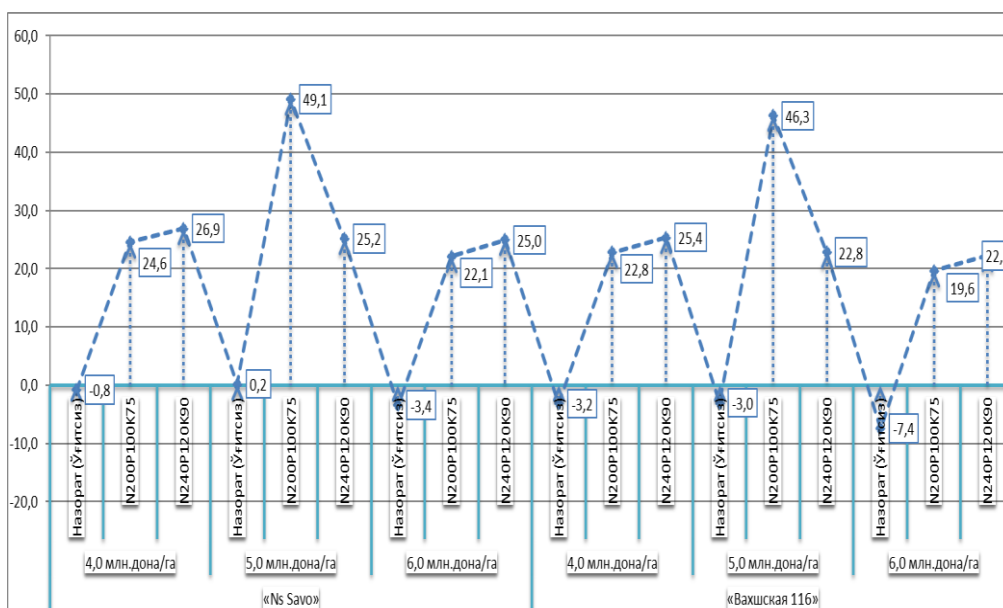


Figure 1. Yield indicators of autumn rye varieties planted in the period 01-05.10 (%)

In our research, winter rye varieties "Ns Savo" and "Vakhshskaya 116" were sown at the rate of 5.0 million seeds per hectare, and as a result of the increase in mineral fertilizer rates from N200P100K75 kg/ha to N240P120K90 kg/ha, winter rye plants became dormant. As a result, it was noted that the grain yield decreased, and the level of profitability decreased by 23.9-23.5% according to the varieties.

In our research, the highest profitability indicator for the options was 49.1% in the period of 01-05.10 planting, the "Ns Savo" variety of autumn rye at the rate of 5.0 million seeds per hectare, the mineral fertilizer rate of N200P100K75 kg/ha was used, and the lowest indicator was in autumn It was found that the variety of rye "Vakhshskaya 116" was -7.4% or 56.5% lower when planted without the use of mineral fertilizers (control) at the rate of 6.0 million seeds per hectare.

When sowing autumn rye varieties in the period of 20-25.10, the total costs spent on agrotechnical measures did not differ from those when it was planted in the period of 01-05.10, but it was found that the results in terms of profitability were low due to the low yield of cultivated grain.

In particular, in the analysis, the highest yield was 55.2 ts/ha, the profitability level was 30.1%, and the lowest indicators were 4.0 million seeds per hectare, in the non-fertilized (control) version, the yield of the "Vakhshskaya 116" variety was 17.5 t/ha, and the profitability level was -12.4% or 42.5% lower.

According to the analysis of the indicators of economic efficiency in the cultivation of autumn rye, the "Ns Savo" variety is 20-25.10, 4.0 per hectare; 5.0; When planted with 6.0 million

seeds, in the control options, where the standards of mineral fertilizers were not applied, the productivity indicators were 15.6-17.8 tons/ha, gross product income was 5041.3-5752.2 thousand soums, total costs 5473.2-6458.8 thousand soums, conditional net profit -431.9-(-706.6) thousand soums, 1 ts. the cost of grain was 344.9-362.9 thousand soums, the profitability level was -6.3-(-10.9) % (see Figure 2).

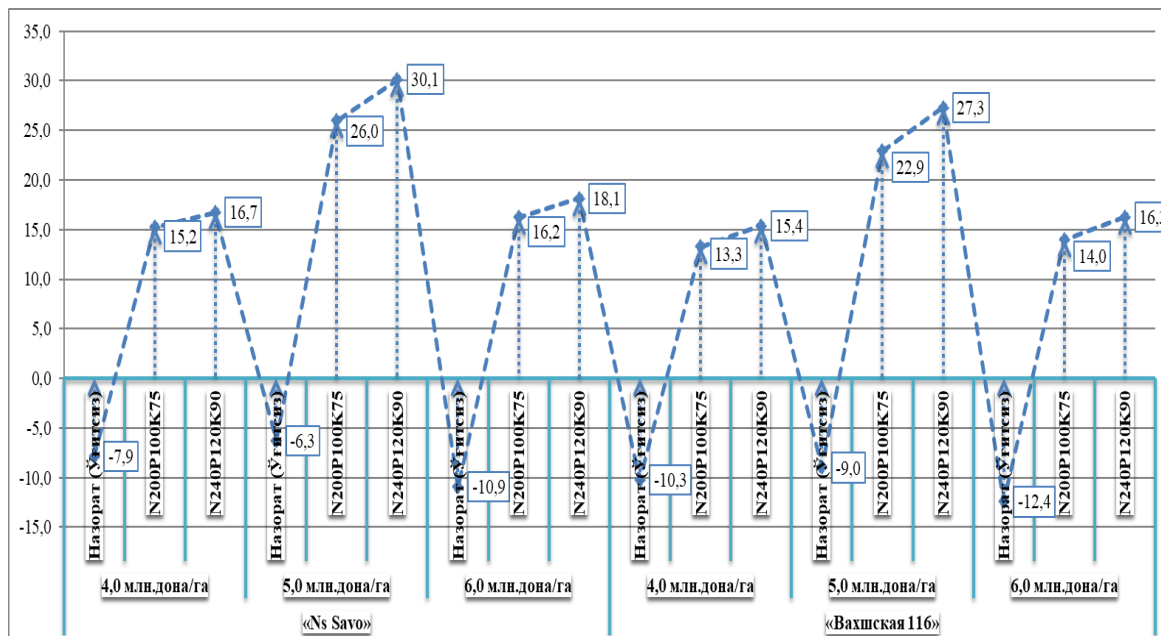


Figure 2. Yield indicators of autumn rye varieties planted in the period 20-25.10

According to the above indicators, when using mineral fertilizer standards N200P100K75 kg/ha, the productivity was 42.7-48.6 t/ha, profitability was 15.2-26.0%, when using mineral fertilizer standards N240P120K90 kg/ha, productivity was 47.7- It recorded 55.2 ts/ha, profitability level 16.7-30.1%.

The following results were recorded when the analyzes were carried out on the "Vakhshskaya 116" variety of autumn rye. In particular, in the case where fertilizer standards were not applied (control), the productivity was 15.2-17.5 ts/ha according to the planting standards, and the yield was -9.0-(-12.4) %, when the standard of mineral fertilizer N200P100K75 kg/ha was applied. yield was 42.0-47.5 tons/ha, profitability was 13.3-22.9%, when fertilizer N240P120K90 kg/ha was used, yield was 47.2-54.0 tons/ha, and the level of profitability It was noted that it was 15.4-27.3%.

Summary. In short, when the varieties of autumn rye "Ns Savo" and "Vakhshskaya 116" are planted in an acceptable period (01-05.10) at the rate of 5.0 million seeds per hectare and fed with mineral fertilizer N200P100K75 kg/ha, the grain yield according to the varieties is 57 ,5 and 56.5 ts/ha, the total costs are 12474.2 thousand soums, 1 ts. the cost of grain was 216.8 and 221.0 thousand smo, and the level of profitability was 49.1 and 46.3%, which ensured the cultivation of an economically efficient grain crop.

When sowing autumn rye varieties "Ns Savo" and "Vakhshskaya 116" in the period (20-25.10) and using the rate of 5.0 million seeds per hectare and the rate of mineral fertilizers N240P120K90 kg/ha, the grain yield according to the varieties is 55.2 and 54.0 ts/ha, the rate of profitability was 30.1 and 27.3%.

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