ISSN: 0974-5823 Vol. 7 No. 3 March, 2022

International Journal of Mechanical Engineering

Influence of the timing and norms of sowing seeds on the quality indicators of winter rye grain

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Abstract. In the article, grain quality indicators are one of the important factors that determine the nutritional value of grain. From many scientific studies it is known that the quality of grain varies mainly depending on the type of plant, variety and cultivation technology.

The results of our scientific research in 2016-2019 also confirmed the above assumptions. An important role in the quality of rye is played by the level of development of the root system and the duration of the growing season.

It is noted that the chemical composition and nutritional value of rye grain is affected by the timing of sowing seeds and the thickness of seedlings.

Key words. protein, fiber, carbohydrates, ash, fat, growing season, seed thickness, grass grain, resource saving, synthesis, genetic material.

Introduction. The Strategy for the Development of Agriculture of the Republic of Uzbekistan for 2020-2030 includes the placement of cereal varieties, taking into account the soil and climatic conditions of the regions, timely planting and care, timely and complete supply of the necessary material and technical resources, grain production. It is planned to increase production and increase the interest of farms.

Based on these tasks, in the agriculture of the republic to increase the range of winter crops, their distribution by region, the correct setting of the timing of sowing and seed consumption, the use of the latest innovative resource-saving technologies during the growing season, high protein content and the development of agricultural technology for growing high-calorie cereals,a number of measures are being implemented to ensure guaranteed yields through timely agricultural activities, increase the responsibility of farms for the rational use of land, water and mineral and local fertilizers and achieve high yields, and introduce an incentive system.

In solving the above problems, one of the most pressing issues is the development of agricultural technology for growing high-quality grain in the light gray soils of the Andijan region, the establishment of rye seeding rates depending on the timing.

The main reason for the decrease in the content of protein and gluten in the grain is the lack of nitrogen, which can be absorbed by plants in the soil as the grain yield of winter wheat varieties increases. It is known that during the period of grain formation and filling, wheat requires about 20-30% of its nitrogen needs. However, in many cases, during this period, there is a lack of nitrogen in the soil, especially during the formation of high yields, which in turn leads to a decrease in grain quality. When applying 20% nitrogen fertilizers at a relatively late date, i.e., in the germination phase, the grain yield increases by 7-12 c/ha, the protein content in the grain increases by 1.1-2.1%, the gluten content increases by 2 .1-3.3% [1].

Rye is a plant that can grow in places where other crops cannot be grown. This crop is resistant to climate change and can be grown in cool, temperate, semi-arid, marginal and low-yielding soils.

The activities of the International Year of Rye complement the United Nations Decade of Food (2016-2025) and highlight the need for a sustainable food system.This will contribute to the implementation of Recommendation 10 of the Second International Conference on Nutrition (ICN2). Allows you to follow a healthy, varied diet that includes many different foods. The International Year of Rye promotes sustainable farming and production practices for millions of farmers and ranchers. Rye is a cereal crop with great genetic diversity.The celebration of the International Year of Rye will significantly increase public awareness of the benefits of production and consumption [2].

Winter rye is grown in Uzbekistan as an intermediate crop and for grain. It is the second grain crop after wheat in many countries. Rye bread is high-calorie, nutritious, tasty. The grain is rich in valuable essential amino acids, especially lysine, protein, and vitamins A, C, E, and B [3].

Rye has great genetic diversity, which must be ensured by characterization, storage, and efficient selection between existing gene banks and breeding programs.In addition, the ability of rye to adapt to adverse conditions makes it a source of genetic material in wheat improvement programs (rye is part of the synthesized triticale crop). The International Year of Rye significantly raises public awareness of the benefits of production and consumption by the international community, creating opportunities for the diversification of rye and food systems and increased dietary diversity from an economic, ecological and nutritional perspective.

The Estonian government proposed an International Year of Rye at the 31st session of the European Regional Conference and the Council requested further information at its 159th session.

1. Rye (Secale cereal) is a cultivated cereal crop (Cyperales, Poaceae family) after wheat, barley, corn. Rye was first mentioned in written sources 2000 years ago.
2. The homeland of this cultural culture is located on the territory of modern Turkey: It is very common in Northern and Eastern Europe, as well as in China, Scandinavia, Canada: in some countries, up to 30% of the territory is allocated for its cultivation.
3. Globally, however, it is a small crop accounting for less than 5% of wheat or rice production - Japan, the only non-producing country, has become a major consumer of rye.

3. Rye yields in extreme climatic conditions where other crops cannot be grown, and can also be grown at low temperatures and low rainfall. It can be grown in sandy and poor, sandy, barren soils. In addition, there is a low demand for fertilizers and pesticides, which makes their production in certain regions economically and environmentally beneficial.

Growing rye

4. The area under rye is shrinking. If in 1986, according to FAOSTAT, its crop was harvested from 15.4 million hectares, then by 1996 this figure dropped to 11.1 million hectares, and by 2016 - to 4.4 million hectares (t (e. 71% of the cultivated area from 1986 to 2016)
5. Over the same period (1986-2016), total production decreased from 30 million tons to 13 million tons. 57% ha. During the same period (1986-2016), total production decreased from 30 million tons to 13 million tons 57% ha.
6. The reduction in the area of arable land was partially offset by an increase in crop yields. This has been achieved through improved agricultural practices, especially the use of chemical fertilizers and crop rotation techniques, reduced use of low-yield land, and development of high-yielding varieties.

Basically, rye is sown in autumn and grown as an annual autumn crop. Due to its good winter hardiness, it can be grown in areas inconvenient for wheat and barley.

Spring rye is grown in areas with severe winters in Canada and Central Europe. As a rule, spring varieties are inferior to autumn ones in terms of agrotechnical characteristics (for example, yield) and consumer characteristics.

Conditions, system and methodology of the experiment.

Field experiments were carried out in the conditions of weakly irrigated light gray soils of the Andijan region. According to the mechanical composition, the soil is moderately sandy, groundwater passes under non-saline soils to a depth of 4-5 meters.

The experiment will be carried out in 2016-2019 at the Andijan Scientific and Experimental Station of the Research Institute of Cotton Growing, Seed Growing and Agricultural Technology to study the influence of the timing and rates of sowing seeds of winter rye on the growth, development and yield of grain.

Experience 15 variants were placed in one tier in 4 repetitions. On the experimental field, the field width is 70 cm, the length is 50 m. The area of each spring is 280 m^2, the considered area is 140 m^2. The total area of experiments was 1.7 ha.

Table 1

Scheme of experiment

Var	Seed sowing dates	Seed sowing criteria
1	September 20	3 million
2		4 million
3		5 million
4	October	1 3 million
5		4 million
6		5 million
7	October 10	3 million
8		4 million
9		5 million
10	20-October	3 million
11		4 million
12		5 million
13	November	1 3 million
14		4 million
15		5 million

The area of each spring is 280 m^2, the considered area is 140 m^2. The total area of experiments was 1.7 ha. The experiment was carried out for 3 years in a system of short rotational crop rotation 1:1 (cotton:wheat).

Experimental results and their analysis

It is known that grain quality indicators are one of the important factors that determine the nutritional value of grain. From many scientific studies it is known that the quality of grain varies mainly depending on the type of plant, variety and cultivation technology.

The results of our scientific research in 2016-2019 also confirmed the above assumptions.

Based on the data of our scientific experiments carried out in 2016-2017, it was noticed that there are some differences in the chemical composition of the grain over time, depending on the thickness of the seedlings.

In particular, as of September 20, 3 million hryvnia. When analyzing the chemical composition of grain harvested according to option 1, sown at the expense of germinated seeds, the moisture content was increased to 14.0%, proteins - 10.6%, fats - 2.2%, carbohydrates - 66.2% the amount of fiber was 4.4% and the amount of ash was 2.4%. and 5 million. When analyzing samples taken from variants sown with germinated seeds, the protein content was 10.4–10.3% fat on average 2.1%, carbohydrates 66.4-66.6%, fiber 4.5-4.6% and ash 2.6-2.5%. Although the protein content was 0.2-0.3% lower and the fat content 0.1% lower than the seed version, but the carbohydrate content was 0.2-0.4% and the fiber content was 0.1 -0.2% and the ash content was lower. can reach 0.2-0.1%.

As of October 1, 3 mln. When analyzing the sowing option based on germinated seeds, the protein content was 10.9%, fat 2.3%, carbohydrates 66.2%, fiber 4.4%, ash 2.1%, 3%, although the fat content was higher by 0,one %.ash content was lower by 0.3%. During this period, 4 million and 5 million. When analyzing 5-6 options sown on the basis of germinated seeds, the protein content was 10.8-10.3%,fat content 2.1–2.0%, carbohydrates 66.2–66.8%, fiber 4.3–4.4%, ash content 2.6–2.7% compared to September 20. the protein content in the seed variant is higher by 0.8%,however, carbohydrate content was found to be 0.2% lower and fiber content 0.2% lower compared to 5 million per hectare. Although the protein content was the same in the variant in which the seeds were sown, it was found that the fat content was 0.1%, the fiber content was 0.2% lower, the carbohydrate content was 0.2%, the ash content was 0.2%. Above as of October 10, 3 million hryvnia. In the analysis of the variant sown with germinated seeds, the protein was 11.1%, fat 2.0%, carbohydrates 66.0%, fiber 4.4%, despite the fact that the ash content was 2.5%, the protein content was 0.5% higher than the period of September 20, the ash content was higher by 0.1%, but the fat content was lower by 0.2%, and the carbohydrate content was lower by 0.2%. During this period, 4 million and 5 million. In the analysis of 8-9 variants sown on the basis of germinated seeds, the protein content averaged 10.9%, fat - 2.1-2.3%, carbohydrates - 66.3-65.5%, fiber - 4.2-4.4%ash content is 2.3–2.7%, and as of September 20, 4 million tons per year. 4 million. Although the protein content in the seed version was higher by 0.5%, the carbohydrate content was 0.1%.fiber content decreased by 0.3%, ash content decreased by 0.3%, 5 million tons. Although the protein content was the same in the variant in which the seeds were sown, it was found that the fat content was 0.1%, the fiber content was 0.2% lower, the carbohydrate content was 0.2%, the ash content was 0.2% higher.

In the evening, i.e. October 20, 3 mln. When sown with germinated seeds, by September 20, 3 million showed almost the same result compared to the variant of sowing with germinated seeds,during this period, 4 million until September 20 will be sown at 4 million hectares per hectare. protein by 0.1%, fat by 0.1% compared with the variant sown with germinated seeds.at the same time, the ash content was higher by 0.3%, and the content of carbohydrates was lower by 0.3% and fiber was lower by 0.2%, 5 million. When sowing seeds by September 20, 5 million. It was noted that the protein content was higher by 0, 2%, ash content by 0.3%, carbohydrates up to 0.1% and fiber up to 0.5% lower than in the variant sown with germinated seeds.

Comparing the options sown in the evening, i.e. November 1, with the options sown on September 20, it was noted that the above patterns were confirmed, and 3 million. In the sowing variant due to germinated seeds, the protein content decreased by 0.8%, fat by 0.1%, fiber by 0.5%, carbohydrates by 1.7%, ash content was 0.4% higher. These figures are 4 million per hectare and 5 million. In variants sown with germinated seeds, the protein content is 0.6%, fiber 0.7-0.9.

The content of carbohydrates increased by 1.6% and the ash content by 0.3-0.5%.

From the data obtained, it was noted that the timing of sowing seeds and the thickness of seedlings influenced the chemical composition and nutritional value of grain.

Our experiments carried out in 2017–2018 and 2018–2019 also reflected the above patterns, and when seeds were sown on October 1 and 10, the results were similar to those on September 20.

In conclusion, we can say that a well-developed level of the root system and the length of the growing season play a big role in the quality of the plant.

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