INDICATORS OF OIL CONTENT IN SEED OF SOYBEAN VARIETIES PLANTED AS A REPEATED CROP

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Annotation. A person‘s diet varies depending on their age, gender, and work activities. A person should consume proteins, carbohydrates, vitamins, and minerals in their daily diet. The more diverse a person eats, the more active their life activity, the healthier their body. Soybeans are valued for being known to have high nutritional value. Soybeans are rich in essential amino acids, polyunsaturated fatty acids, B vitamins, fiber, calcium, folic acid, and selenium. In addition, soybeans contain important minerals such as magnesium, manganese, iron, and zinc. The unique chemical composition of soybean grains accounts for approximately 38% protein and 30% fat. In this article, we used the foreign Russian selection "Sparta" and local varieties for evaluating under the environmental conditions of growing as a re-culture of domestic and foreign soybean varieties grown in the conditions of the Samarkand region. For presenting an exemption from winter crops, the amount of oil in the grain was studied according to the biochemical parameters of the varieties "Nena" and local "Ustoz-MAN-60", "Toomaris-MMAn-60", "Oyjamol". Kazakh selection in the conditions of the Samarkand, An increasing trend of was found that the oil content of foreign varieties Nena and the local Toomaris exhibited, while oil contents decreasing increase , while the in foreign varieties Sparta and the local variety Oyjamol, re-sown after the winter grain crop, decreased.

Keywords: soybean, grain, yield, oil, repeated crop.

Introduction. In the world, legumes are considered to be very important in national economy and are known to be the main products in satisfying the world's population's demand for protein, oil, carbohydrates and other substances necessary for the body. Soybeans contain rare proteins, which are not inferior to animal protein in nutritional value. They contain unique biologically active substances and vitamins, as well as valuable microelements. Soybeans are completely free of lactose and cholesterol. Soybeans are mainly used to produce oil and soybean flour. Soybean seeds contain up to 49% protein and 26-30% high-quality oil. Soybean oil accounts for 40% of the vegetable oil produced on Earth. 100 kg of soybean grain contains 140 feed units, and its grain, meal, and stalk are considered a cheap, nutritious feed for livestock and especially poultry, which quickly fattens them. In addition, it leaves behind 60-100 kg of biological nitrogen per hectare of soil, which also increases soil fertility [1,4]. The soil conditions and climatic conditions for our country allow soybeans to be grown as a main crop and as a repeated crop, and in return for growing this plant, it is possible to provide the population with high-quality fat and protein, and livestock and p Today, soybeans play a significant role in the development of the food industry and the increase in livestock production worldwide. Among cultivated plants, they are rich in protein, high in calories, and have special importance in increasing soil fertility due to their chemical composition.

Soybean grains contain 40-55% protein, 17-28% vegetable oil, essential amino acids necessary for the human body, and 12 different vitamins oultry with nutritious feed[2].

Soybean is an annual plant, cultivated in the Far East, Moldova, Georgia, and Ukraine. Its homeland is East Asia. Several varieties are cultivated in China, India, Japan, Australia, North America, and the Far East. In China, there are also three species. It reaches a height of 2.8 m and blooms all year round. In China, the soy milk production industry and the production of various other food products are being developed. Soybean oil accounts for a significant part of the

liquid (vegetable) oils produced worldwide. Depending on the grade, soybean grain is 7.0-8.5 mm long, 5.8-7.1 mm wide, and 4.2-5.8 mm thick, and contains 13.5-25.4% fat (in terms of dry matter), 29.0-60.3% (calculated as nitrogen at 6.25), 2.8-6.8% mixed cellulose, 3.3-6.4% ash, and 14.1-33.0% nitrogen-free extractives. The lysine content in soybean meal is 10-20 times higher than in high-grade wheat flour. Adding 50% of soybean flour to the dough doubles the lysine content. In addition, soybean flour is richer in vitamins than wheat flour. It is recommended to process soybeans in a “soft” mode. Soybeans can be called a storehouse of protein[3].

The following table shows the composition of soybeans(Table-1):

Table 1

Chemical Composition of Soybeans

Water	Protein	Oil	Uglevodlar	Ash
Up to 12 %	Up to 50 %	Up to 25 %	Up to 17 %	Up to 4,0 %

Soybean contains 40-45% protein, 22-25% vegetable oil, and 12 vitamins necessary for the human body, and no other plant contains as many useful substances for humans as soybean. One of the world's leading scientists, Shpakovskiy B.A. (1926), and Vavilov P.P. (1983) studied the formation of biological nitrogen accumulated in soybean roots and the importance of its grain in the food industry. The scientist was the first to describe in his works the method of preparing artificial milk from soybean grain [3,4.15]. More than 50% of the vegetable oil produced in the world is soybean oil. It contains 30-40% protein, 20% oil, and 9-12% total sugars. In the food industry, milk, cottage cheese, yogurt, eggs, egg powders, flour, oil, and many other food products are obtained from it [5.4].

Soybeans are rich in essential amino acids and comprise approximately 13-24% oil, 25% carbohydrates, (4.5-5.5%) fiber, and 7% minerals. The minerals found in soybeans include calcium, phosphorus, sodium, iodine, molybdenum,

and nickel. Additionally, soybeans contain around 2% phosphatides and various vitamins such as E, B1, B2, B6, pantothenic acid, niacin, choline, folic acid, and biotin. Regarding vegetable oils, they contain both saturated and unsaturated fatty acids, including oleic, lipoic, and linolenic fatty acids. The chemical composition of vegetable oils is primarily made up of glycerides

(95-98%), with free fatty acids (1-2%), phosphatides (1-2%), sterols (0.3-0.5%), vitamins, and carotenoids also present. Fats and oily substances are abundant in plants, and a notable characteristic of these substances is that they are insoluble in water.

Purpose of the Study: This study examines the oil content in grains grown in the Samarkand region, specifically in areas previously cleared of winter cereal crops. The research focuses on biochemical indicators of various soybean varieties, including the foreign Russian selection "Sparta," the Kazakh selection "Nena," and local varieties such as "Ustoz-MMAn-60," "Toomaris-MMAn-60," and "Oyjamol." These varieties were cultivated as a subsequent crop alongside both local and imported soybean types.

Research Method and Conditions: Our experiments were conducted in the "Sharofiddin" field area, located in the Pakhtachi district of the Samarkand region. As of January 1, 2012, the total land area of the Samarkand region was 1,677.3 thousand hectares. This included 379.2 thousand hectares of irrigated land, 435.8 thousand hectares of arable land, 253.7 thousand hectares of fallow land, and 182.9 thousand hectares of uncultivated land.

Soil and Climatic Conditions of Pakhtachi District: The Zarafshan River flows through the northern part of the Pakhtachi District, moving from east to west. Due to the river's low elevation compared to the surrounding area, its water is rarely used for irrigation. Instead, crops are primarily irrigated through the Narpay Canal. The climate in this region is sharply continental. Summer temperatures can reach between 42 to 45 degrees Celsius, with an average temperature of 28 degrees in July. The district receives annual rainfall of

approximately 230 to 250 millimeters. Soil zones on Earth are distributed according to specific natural laws, with each soil type occurring in particular geographical areas. This distribution was first identified by V. V. Dokuchaev and N. M. Simbirsev. In Pakhtachi District, the predominant soil type is gray soil, though some farms also have saline, sandy, or clayey gray soils. The soil at the experimental site is classified as irrigated, silty meadow soil, originating from the lower reaches of the Zarafshan River.

Research methods: Fifty grains from each of the following soybean varieties were used for the research: local Ustoz-MMAn-60, Toomaris-MMAn-60, and Oyjamol, as well as foreign varieties “Sparta” from Russian selection and “Nena” from Kazakh selection. The grains were weighed using a scale, and then crushed into flour using a porcelain mortar. One gram of flour from each sample was placed into three filter paper bags, which were also weighed. The defatting process was conducted using a Soxhlet apparatus, first with acetone and then with ethyl ether. After the defatted samples were removed from the apparatus, they were dried. The masses of the flour and filter paper were measured again, and the difference between the initial and final masses was calculated. This difference allowed for the determination of the fat content in the grains as a percentage[7,10].

The work was carried out in the following sequence: 8-10 grams of grain crushed in a porcelain mortar is placed in a bag made of filter paper. The bag is placed in the extractor and a refrigerator is connected to it. The extractor is installed in a flask filled with solvent to 2/3 of its volume. The flask is heated in a water bath at 40-550 C. Solvent vapors pass through the wide tube of the extractor, condense in the refrigerator and return to the extractor in the form of drops. In order to prevent solvent waste, it is not necessary to heat at high temperatures. The solvent should be turned over 8-15 times in 1 hour. It is considered sufficient for the extraction process to last 6-8 hours. After the

mixture is heated, the heating is stopped and the apparatus is separated. The bag is dried in a muryle oven and brought to constant mass in a drying cabinet heated to 600 C. The amount of oil is calculated by the following formula.

$$x = \frac{(M1 - M2)100}{P(100 - W)} * 100$$

Here: M1- mass of the sample packet before extraction (g)

M2- mass of the sample packet after extraction (g)

P- mass of the sample (g)

W- moisture content of the product (g) [8].

Research results and their analysis. In our experiments, the oil content in the grains of foreign and local soybean varieties, the quality of which was taken as the object of research, was determined (Table 2).

Table 2

Oil content in grains of foreign and domestic soybean varieties

Type/year	2019	2020	2021	2022
Nena	2 5.3±0.6 %	25±0.9%	2 2.1±2,3 %	2 4.4±2,2 %
Sparta	2 5.5±0,8 %	2 2.1±2.1 %	2 3.3±0.6 %	1 9.4±0.1 %
Oyjamol	2 3.7±0.3 %	2 1.6±3.4 %	2 2.2±0.7 %	2 1.2±0.9 %
Ustoz-MMAn-60	2 4.5±1.2 %	2 5.1±2.5 %	19±0.5%	2 1.3±2.2 %
Toomaris-MMAn-60	2 5.3±0.7 %	2 5.4±1.4 %	2 5.5±1.6 %	1 9.7±0.2 %

According to our results, in the conditions of the Samarkand region, the oil content in the grain of soybean varieties planted as a repeated crop after the wheat harvest in 2019-2022 ranged from 19.7±0.2% to 25.5±1.6%. In the group of local soybean varieties, the highest oil content in the grain was recorded in the Toomaris variety in 2019-2021 (25.3±0.6%, 25±0.9%, 24.4±2.2%), while a relatively low indicator was recorded in the Ustoz variety in 2021 (19±0.5%, 19.5±1.3%), and in the Toomaris variety in 2022 - 19.7±0.2%.

In the group of foreign soybean varieties, the highest indicator of the trait was determined in the Nena variety of Kazakh selection in 2019-2022 (from 22.1±2.3% to 25.3±0.6%, respectively), while a relatively low indicator was recorded in the Sparta variety, with the lowest indicator of the trait during these years ranging from 19.4±0.1% to 25.5±0.8%.

Conclusion. In the conditions of the Samarkand region, an increase in the oil content of the foreign Nena and local Tomaris varieties, which were repeatedly planted after the winter cereal crop, and a decrease in the foreign Sparta and local Ojamol varieties were found.

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