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PHYSICAL-CHEMICAL ANALYSIS OF OIL TAKEN FROM SEEDS OF SAFFLOWER

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Abstract: Considering the growing demand for vegetable oils today, after the autumn wheat harvest, vacant land areas are being used to grow oilseeds such as sunflower, safflower, sesame, soybean, and other unconventional oil crops as a secondary crop. The extracted oilseeds are then processed to meet the population's needs for vegetable oil and fat products. In our research, we analyzed the cultivation conditions of safflower seeds, the composition of the seeds, and the quality indicators of the extracted oil.

Keywords: safflower seed, vegetable oil, press, cholesterol, vitamins, fatty acids, glycerin.

Introduction. The production of vegetable oil is one of the most significant sectors of the food industry. The demand for vegetable oil in our republic is increasing day by day. Vegetable oil is used in all sectors of the national economy: in the production of food, canned goods, varnishes, paints, soaps, linoleum, perfumes, printing inks, medicine, and for lubricating equipment.

Oil is considered one of the most essential and irreplaceable food products for humans. The production of animal fat requires high costs, and since animal fat contains cholesterol, its consumption is limited. As a result, the use of vegetable oils for consumption is steadily increasing.

Today, in order to meet the demand of the population for vegetable oil in our country and in the world, oil and oil enterprises are increasing the volume of oil by producing and processing vegetable oils from non-traditional seeds, along with traditional oil seeds. Human demand for vitamins and biologically active additives is met through the consumption of vegetable oils. Vegetable oils are a rich source of saturated and unsaturated fatty acids and biologically active additives with a diverse composition that are beneficial to human health, as well as vitamins A, D, K, E. They contain a large amount of unsaturated fatty acids linolenic, linoleic, oleic. Such acids cannot be synthesized in the human body from other products, they are considered essential acids or vitamin F. These are vitamins that are much more necessary for human health than other vitamins. In addition, unsaturated fatty acids serve in the formation of nerve fiber membrane cells in the human body, and also help to remove cholesterol from the body.



When combined with cholesterol, they form a complex ester that is easily oxidized, improving the functioning of blood vessels, restoring memory, preventing heart attacks, and treating a number of other gastrointestinal diseases.

Vegetable oil is a complex ester of glycerin, a three-atom alcohol, and fatty acids. Most vegetable oils react with oxygen in the air and dry, transforming into a solid energetic mass. The drying property of vegetable oil is one of its important quality

indicators. The amount of unsaturated fatty acids in the oil is determined by the iodine value, which is expressed by the number of grams of iodine that are absorbed by 100 grams of oil. The higher the iodine value, the greater the drying property of the oil. Refined, deodorized vegetable oil is recommended for food consumption. The consumption of vegetable oil helps prevent the accumulation of cholesterol in the human body.

Methods. In our research, we analyzed the cultivation conditions of safflower seeds, the composition of the seeds, and the quality indicators of the extracted oil. Today, oil and fat industries are processing unconventional oilseeds alongside cotton seeds to produce vegetable oil and increase production volumes. In our country, after the autumn wheat harvest, vast areas are being used for the cultivation of early-maturing soybeans, sunflower, and safflower varieties as secondary crops. In regions such as Samarkand, Kashkadarya, Bukhara, Jizzakh, and Karakalpakstan, large areas of fallow land are utilized for such crops. Safflower is being cultivated in these areas during the late autumn season. Let us briefly dwell on the origin of the safflower seed. This oilseed is also one of the oldest oilseed crops, like sesame and flax. According to archaeological excavations and correspondence, safflower has been cultivated since before our era. This plant has long been planted and cultivated in countries with a warm climate. There are many types and forms of safflower in our country. The safflower plant is cultivated in regions with a large area of arid land. Safflower oil is a valuable raw material for the food industry and light industry. Safflower oil is no different from sunflower oil. It is pale yellow in appearance, and its taste is very similar to that of sunflower oil. Safflower kernels are used as fodder for livestock, but the husk and kernel skin must be removed, because the kernels are bitter. Therefore, it is used as fuel. Safflower hay is eaten with pleasure by camels and small cattle. 100 kg. of the kernel contains 15 nutritional units. Safflower has been cultivated in India, Arab countries, and Central Asian countries since ancient times. Safflower oil is still extracted from sainfoin today. The plant requires heat. Its seeds germinate at 1-2 C. Its shoots can withstand frosts of -6-10 C, so it can be planted in the fall. This plant requires heat during its growth and development. Since the roots of the plant are strong, they absorb moisture from 2.5-3 m below the soil, creating conditions for the plant to develop, and it uses moisture very sparingly. The plant tolerates low temperatures, but it is also heat-resistant. Seeds is not demanding on s oil, it gives very high yields on fertile soils. It develops especially well on saline soils in our Republic. It grows and develops freely even in conditions where no other plant can grow. In the arid regions of in our Republic, 95-135 days pass from the moment of germination of seeds to the moment of ripening of its seeds. In extremely arid regions, the growing period is 110-116 days. When planted in the fallow zone, canola is considered the best predecessor for grain crops. Since canola is planted in the fallow zone, mineral fertilizers are not applied much. This is because mineral fertilizers are ineffective when the soil is dry. Fertilizers should be applied in early spring with planting. When planting, 30 kg of nitrogen fertilizers and 60 kg of phosphorus fertilizers are applied per hectare, of which 30 kilograms are applied during plowing.

The seeds of the safflower ripen in a short period of time, within 20-25 days after full flowering. First, the seeds ripen in the baskets located at the top of the main stem, then in the baskets on the side branches, and then in the baskets on the side branches. Even when the seeds ripen, they do not fall out, because the basket is tightly wrapped with leaves. This feature allows the safflower seeds to be harvested mechanically without being destroyed. The ripeness of the safflower is not immediately noticeable. First, the leaves on the side branches turn yellow but do not fall off. The yellowing of the leaves does not indicate that the canola is ripe, but that the moisture content in the plant is high and that the oil production process is ongoing. Even after it is completely ripe, the seeds are very difficult to crush. Even birds cannot peck at the ripe seeds. The fact that they are densely wrapped in sharp-pointed leaves in the basket prevents them from digging. In fact, safflower seeds are eaten with pleasure by birds.



The average yield is 10-12 centners per hectare, and it is primarily grown on fallow land. The root system is a taproot that extends 2-3 meters deep into the soil. It has the ability to absorb moisture and nutrients from the lower layers of the soil. Safflower is a plant that, in addition to tolerating low temperatures, is also resistant to heat. Vegetable oils, along with their fatty acid and triglyceride compositions, differ from one another based on their physical and chemical properties. Vegetable oils obtained from unconventional oilseeds, whether mechanically pressed or extracted using a light volatile organic solvent, contain various types of complex mixtures.

Although these substances are present in small amounts in the oil, they significantly influence its properties. These compounds give the oil its color, distinctive taste, and odor, and may cause sedimentation, leading to its clarification.



Results. The safflower seeds selected for analysis were processed using the pressing method to extract the oil. The extracted oil was then analyzed in the laboratory using the required reagents and equipment. The oil content in the seeds was found to be 24%. However, it was determined that the husk and seed coat should be removed, as the husk contained a large amount of substances that could affect the taste. The seed coat made up 40% of the total seed weight, with its mass constituting 50-60% of the weight of the whole seed. The weight of 1,000 seeds was determined to be 50 grams. The oil had a pale yellow color. The composition of the oil was found to include 73% linoleic acid and 7% linolenic acid, which contribute to the high quality of the safflower oil. The oleic acid content was also found to be high. The analysis determined the acid value through potentiometric titration, color using the Lovibond apparatus, and

the amount of phospholipids through the hydration method. The results are presented in Table 1.

Table 1.

| Properties name | Unrefined safflower oil |
|-------------------------------------------------|-------------------------|
| The oil content in the seeds (in %) | 27 |
| Acid value mg KOH | 3 |
| The mass percentage of non-oil compounds (in %) | 0,01 |
| Ionide value $g J_2/100g$ | 130 |
| Σ saturated fatty acids (in %) | 14 |
| Σ unsaturated fatty acids (in %) | 86 |

Conclusion. Considering the growing demand for vegetable oils today, after the autumn wheat harvest, vacant land areas are being used to grow secondary crops such as sunflower, safflower, sesame, soybean, and other unconventional oilseeds. The extracted oilseeds are then processed to meet the population's needs for vegetable oils and fat products.

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