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Nigella sativa L. SEED PASTE INTO A VALUE ADDED PRODUCT BY RECYCLING

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Abstract. Pollution of the environment is one of the most significant problems of our generation and the future as our living spaces shrink. Waste materials is the first of many sources of environmental pollution. Waste must be evaluated and reused in recycling facilities to ensure environmental order and balance. This study evaluated the pulp of the *Nigella sativa* L., seed plant, whose oil was removed by a cold pressing method and turned it into value-added products. Particularly, pulp and *Nigella sativa* L., seeds have healing and nutritionally rich qualities. *Nigella sativa* L., pulp was made into a skin mask and used as an added value product in the study.

Keywords: *Nigella sativa L., environmental pollution, oil, thymoquinone, added value, pulp, bioactive compounds.*

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1. Introduction

One of the important problems of our age and future is environmental pollution. There are many factors and main concerns that cause environmental pollution; these are waste materials (Nasibova *et al*., 2016; Nasibova, 2020). As production, consumption and service activities increase rapidly, industrialization and increasing population cause waste to increase intensively (Gungor *et al*., 2023; Aliyeva *et al*., 2023). Waste evaluation is a process that involves differences: it is described as output as a result of activities such as production, application and consumption. Waste evaluation, minimization, separate collection at the source, intermediate storage, pre-treatment, establishment of waste transfer centers, recovery and disposal when necessary should be ensured. The main purpose of waste evaluation is to evaluate human-generated waste. Acting without harming the environment and human health is one of the most important elements in this context (Khalilov & Nasibova, 2010; Nasibova, 2016). When evaluating waste, agricultural and aquatic products that turn into waste after being used as products are important in terms of both economic and environmental pollution.

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Nigella sativa L. It is a spice specific to the Mediterranean region. The part of the plant used is its seeds, which are used in edible and medicinal applications worldwide. (Kiralan *et al*., 2014; Cemek *et al*., 2008). The main aroma compounds in *Nigella sativa L*. seeds consist of these components; It contains 4-isopropyl-9-methoxy-1-methyl-1-cyclohexene (5.74%), longifolene (5.33%), -thugene (3.88%) and carvacrol (2.31%) and these compounds has demonstrated antimicrobial and pharmacological properties (Albakry *et al*., 2022). *Nigella sativa L*., seed oil is used to treat skin diseases. *Nigella sativa L*., seed oil has been used to treat psoriasis, eczema and to protect the skin. Nigella sativa L., seed oil is also used in many cosmetic products (Farhan *et al.*, 2021). In particular, *Nigella sativa* L., oil is widely used for medical and cosmetic purposes. Many such synthetic chemicals actively used in cosmetic products pose a health and safety risk to human health. According to international regulations, cosmetics must be safe, with almost no undesirable effects. The safety of cosmetic preparations is very important since cosmetics can be used for a longer period of time than drugs. Recently there have been numerous reports and warnings about serious undesirable effects of cosmetics. The benefits of *Nigella sativa L*., as a medicinal herb are well known, but its potential as a cosmetic ingredient is still little known. (Sudhir *et al*., 2016). Thus, scientists can use *Nigella sativa L.* seed as an active ingredient to develop new effective and safe cosmetic products. Cold pressed *Nigella sativa L*., oil helps strengthen the immune system in humans by promoting the formation of prostaglandin E with its high degree of unsaturation. The most important active ingredient of *Nigella sativa L*., essential oil is thymoquinone.

2. Composition of *Nigella sativa L*., oil and pulp

Nigella sativa L., seed oil is light amber in color with a characteristic herbaceous aroma. It is used in the dietary supplement and personal care industries due to its nutritional properties. For a variety of applications, *Nigella sativa L*., actually has remarkable healing and health benefits. This extraordinary oil has properties that make it one of the most powerful medicinal herbs known to man. It contains a large number of chemical compounds that have been analyzed by many researchers. While the dominant minerals are carbohydrates, vitamins, potassium, calcium, phosphorus and magnesium, it contains significant amounts of sodium, iron, manganese, zinc and copper (Amin *et al.*, 2015; Khalilov *et al*., 2016). Characterization of fixed oil reveals that polyunsaturated fatty acids are in certain proportions compared to the dominant fraction, that is, saturated and monounsaturated fatty acids. The need for widely available and readily available bioactive lipids and natural antioxidants continues to increase.

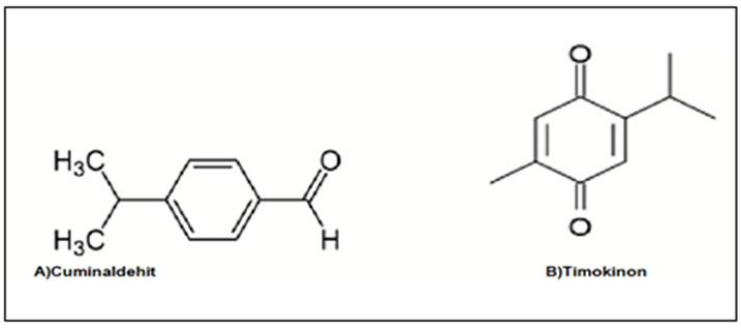

Figure 1. Main bioactive compounds of *Nigella sativa L*. plant

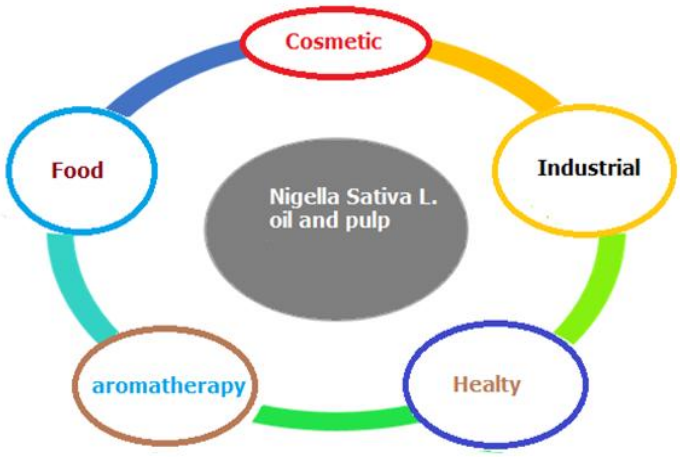

Figure 2. *Nigella Sativa L*. Seeds and Oil

Figure 3. *Nigella sativa L*., Seeds and Oil

It turns out that *Nigella sativa L*., contains functional components such as thymoquinone, dihydrothymoquinone, pcymene, carvacrol, α-thujene, thymol, α-pinene, β-pinene and t-anethole as the main components.

3. Obtaining *Nigella sativa L*., Oil and Pulp (Cold Pressing)

After adjusting the humidity of the *Nigella sativa L*., seeds purchased from herbalists in the center of Iğdır, they were passed through a cold pressing machine to obtain oil and pulp. *Nigella sativa L*., oil was recovered using cold pressing techniques, which is a solvent-free system. *Nigella sativa* L., seeds were pressed at room temperature (25° C) without any heat treatment. It is very rich in terms of the composition of oils, fatty acids and bioactive compounds (sterols, tocopherols, chlorophyll, carotenoid and phenolics profile) and some physicochemical properties. The oil and pulp obtained were used for cosmetic, health, food and aromatherapy purposes. *Nigella sativa L*., seed oil is used in cosmetics in many personal care products, such as creams, lotions, skin masks and many products with moisturizing properties (Trujillo-Cayado *et al*., 2017; Foo *et al*., 2022). The main purpose of our

study is to evaluate the defatted *Nigella sativa* L., pulp and turn it into a value-added cosmetic product. Here, the waste *Nigella sativa* L., seed produced at the end of *Nigella sativa* L., oil production is used as a bio-based filling material and cosmetic product.

4. Converting *Nigella sativa L.*, oil and pulp into value added products

Nigella sativa L., pulp is a product that has not been studied much in academic studies in the field of cosmetic studies. In general, it was used as feed for animals and as nutritious fertilizer for plants. Studies are also carried out with different materials and methods in the field of cosmetics. *Nigella sativa L.*, pulp obtained in our study was turned into a mask to be used on the skin. In the *Nigella sativa L.*, mask study, our formulation has become comprehensive by adding certain amounts of glycerin, Kaolin, *Nigella sativa L.*, paste and a very small amount of *Nigella sativa L.*, oil, in addition to *Nigella sativa L.*, pulp.

Table 1. *Nigella sativa L.*, skin mask production recipe

S/N	Raw Material Used	Quantity (gr)
1	Nigella sativa L., Pulp	30.0
2	Kaolin	10.0
3	Glycerine	8.00
4	Nigella sativa L., oil	10.0
5	Deionized Water	40.0
6	Polyvinyl Alcohol(PVA)	2.00

Figure 4. Skin Mask Production Phase

5. Conclusion

After the hygiene and environmental conditions were ensured in the study, the product production phase started. The dried *Nigella sativa L.*, pulp was ground into powder in the coffee machine. The powdered *Nigella sativa L.*, pulp was placed in an empty beaker, kaolin was added and mixed. Then, deionized water was added and mixed with the baguette. Polyvinyl Alcohol (PVA) was dissolved with some of the water. The dissolved mixtures were mixed and *Nigella sativa L.*, oil and glycerin were added. The prepared skin mask was tested on employees and students who agreed to apply it voluntarily. In the application, stain cleaning and moisturizing properties came to the fore.

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