

From waste to profit: Non-Edible Byproducts of Pistachio



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Challenges stemming from raw pistachio exports in Iran have led to the inclination toward producing secondary products from this commodity to maintain the industry's sustainability over the coming years. Currently, about 2% of the entire pistachio production in Iran is processed annually, and the remaining majority of the product is being supplied domestically and exported in its raw form. As a result, the bulk of pistachio production does not yield added value despite the potential.

Meanwhile, foreign countries purchasing Iranian pistachios have employed various methods to turn them into significantly higher-profit products. Therefore, there is a need for publishing guidelines and relevant content to inform the industry's stakeholders about different ideas and methods for producing value-added products. This can significantly impact the expansion and diversification of agricultural processing industries in Iran, considering the recent challenges with the export of raw pistachios. Each year, substantial quantities low quality pistachios are produced in various processing stages. Since these products cannot be directly marketed as nut products, they result in capital loss to the farmer.

Pistachio Compost

Pistachio Compost is a byproduct resulting from the cleaning of pistachios. It includes soft outer skins, clusters, leaves, stems, and hollow or "blank" pistachios. With its production at about 1.6 times that of produced dried pistachios, this byproduct possesses suitable nutritional value and can be used as a part of the diet for livestock and animals.





Packaged pistachio compost used as livestock feed

The presence of arid and semi-arid climates in most regions of the country, limitations in pasturelands, scarcity of accessible water resources, low rainfall combined with inappropriate precipitation patterns, and mismanagement of available resources have led to a shortage of usable feed resources for livestock.





Pistachio waste in the drying process to eliminate fungi growth

On the other hand, a significant volume of various agricultural byproducts with potential use in animal diets is produced annually in Iran. Among these, pistachio byproducts and waste are among the most important agricultural byproducts, estimated at around 5 to 8 hundred thousand tons annually in the country. Research results indicate that this byproduct holds appropriate nutritional value and can be utilized in animal diets. Utilizing this byproduct in pistachio-rich regions of Damghan and Rafsanjan, being situated in the warm, dry, and desert areas of the country, can help alleviate feed shortages.

In addition to addressing feed shortages for livestock in the country, the use of this byproduct can contribute to reducing environmental pollution and mitigating the proliferation of *Aspergillus* fungi in pistachio orchards. The high moisture content and suitable organic material in pistachio waste create favorable conditions for rapid decay, necessitating special attention for the storage and preservation of pistachio



compost. Natural drying of the compost requires a minimum of 4 days in a clean space with multiple turnovers during the day.

With appropriate processing, pistachio byproduct can be mixed in the diet of dairy cows up to 8%, beef cattle up to 12%, and sheep and goats up to 20%.

Producing Soap from Pistachio Oil Waste

Pistachio kernels of all quality degrees contain a high amount of oil (approximately 45%) which can be extracted relatively easily. Utilizing this oil in producing a value-added product such as soap can not only prevent economic loss but also lead to a final product with unique selling points. Moreover, due to the essential role of soap in personal hygiene and the increasing demand for various types of soaps with diverse functions, incorporating soap products and their production into practical and suitable commodities deserves significant attention.

Pistachio oil contains carotenoids, chlorophyll, and vitamin E, substances that contain significant amounts of beneficial unsaturated fatty acids. It also contains biologically active components such as phenolic and polyphenolic compounds that, in addition to nutritional value, contribute to its noteworthy antioxidant. Due to its high skin penetration, rapid skin absorption, softening, moisturizing, reparative, and soothing properties, as well as a significant percentage of absorbable organic and mineral substances, pistachio oil is considered a suitable option for use in cosmetic and personal care products. In addition to pistachio oil, other ingredients – including animal fat – can be used in the production of soap to enhance the product quality.





Soap produced using pistachio oil before packaging

The most common oils used in soap-making fall into two groups: oils from plant seeds (like coconut oil and palm kernel oil) and hard oils (such as animal fats and palm oil), both of which are required for producing suitable soap. Therefore, besides pistachio oil, materials like tallow and coconut oil, along with other additives that contribute to product quality can be used.

