IDENTIFICATION OF ECOLOGICALLY NATURAL PRODUCTS

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Abstract

Ecologically clean products are produced with minimal environmental impact, avoiding synthetic chemicals and GMOs. They help preserve ecosystems, reduce pollution, and promote human health. The food industry contributes 26% of global greenhouse gas emissions, with intensive agriculture harming biodiversity and natural resources. Choosing organic and local products, reducing meat consumption, and minimizing food waste can lower carbon emissions and protect soil fertility. Supporting sustainable food policies ensures a healthier planet for future generations.

Keywords: ecologically clean products, climate change, sustainable living.

Introduction

Eco-friendly products might seem easy to source. But for a product to indeed be environmentally-friendly, it must avoid damaging the environment and humanity. Minimally speaking, these products must be non-toxic. However, some other environmentally-friendly characteristics include sustainably-grown, raised, or gathered materials produced using methods that don't damage the environment. If the products use organic materials, they should be grown without toxic herbicides or pesticides. Some sustainable products use recycled materials, like glass, metal, plastic, or wood from waste products. You might even find products have an eco-friendly label if they're biodegradable. This means they'll break down naturally, which translates to less waste in landfills and habitats long-term. As you're shopping, look for products sporting established, third-party emblems. Eco-friendly logos exist to ensure conscious consumers know what they're buying. Some phone emblems exist, and these companies may make some bold claims. But if it doesn't sound legitimate, it's probably not. Organic fertilizers of natural origin, much more useful for the soil than inorganic or chemical ones, since they can have a positive effect on its structure. In addition, the plants grown on them do not contain harmful chemicals, as a result of which they do not have a negative effect on the human body. The category of environmentally friendly food also includes those food products that have been obtained using modern technologies from high-quality natural raw materials. They are practically devoid of foreign inclusions and chemical additives. That is, if we are talking about food of animal origin, then it should be obtained from animals fed exclusively with hay, grass and cereals grown in clean areas without the use of chemical fertilizers or pest control agents.

Research aim: The research aims to identify, characterize, and promote the use of ecologically natural products that are environmentally sustainable, biodegradable, and free from synthetic chemicals. The goal is to support ecological balance, human health, and sustainable economic practices.

The following **objectives** have been set to achieve the aim:

1. Investigate and classify products derived from natural sources such as plants, minerals, and microorganisms;
2. Differentiate between truly natural and artificially processed products.

Research object and methods

- *Ecological Impact Assessment*:

Analyse the environmental footprint of these products, including their sustainability and biodegradability.
Assess their impact on ecosystems and biodiversity.

- *Chemical and Biological Characterization***:**

Study the composition, properties, and potential benefits of natural products.
Compare their safety and effectiveness with synthetic alternatives.

- *Sustainability and Ethical Sourcing:*

Evaluate the sourcing practices to ensure they do not harm ecosystems or contribute to deforestation, overharvesting, or pollution.
Promote fair-trade and sustainable harvesting methods.

- *Consumer Awareness and Market Viability:*

Examine consumer preferences and awareness regarding natural products.
Assess the economic feasibility of scaling up their production while maintaining ecological integrity.

- *Regulatory and Policy Frameworks***:**

Review existing regulations and certifications for ecologically natural products.
Propose guidelines for standardizing and certifying natural products.

- *Applications and Innovations:*

Explore potential applications in various industries such as cosmetics, food, medicine, and packaging.
Encourage the development of eco-friendly alternatives to synthetic products.

Research results and discussion

Research Problem Analysis

The identification of ecologically natural products is a critical area of research due to the increasing demand for sustainable and environmentally friendly alternatives in various industries, including food, cosmetics, pharmaceuticals, and packaging (AFSA-Azerbaijan Food Safety Agency, 2020).

However, several challenges exist. Lack of Clear Definitions Standards – Many products labelled as "natural" may contain synthetic additives or be chemically altered, creating confusion for consumers and regulators (Codex Alimentarius Commission, 2019; U.S. Department of Agriculture (USDA), 2022).

Environmental and Health Concerns. Synthetic chemicals often have negative ecological and health impacts, necessitating the need for natural alternatives (Bhupendra, Bhattacharya, 2020).

Sustainability of Sourcing. Overharvesting and unsustainable extraction methods can lead to resource depletion and environmental degradation.

Scientific Validation. There is often limited scientific evidence supporting the benefits and safety of some natural products. (Newman, Cragg, 2020)

Market Feasibility. The commercial viability of truly natural products is often challenged by cost, production scalability, and regulatory barriers (Aaker, Lee, 2001).

Use of Previous Research Results

Existing research has contributed valuable insights into the identification, classification, and impact of natural products:

Chemical Composition Studies. Previous research has identified bioactive compounds in natural products, highlighting their benefits and safety compared to synthetic alternatives (Bhupendra, Bhattacharya, 2020; Newman, Cragg, 2020).

Environmental Impact Assessments. Studies have demonstrated the reduced carbon footprint and ecological benefits of natural products over synthetic counterparts.

*Regulatory Frameworks***.** Research has explored international certification systems (e.g., USDA Organic, EU Eco-label) and their effectiveness in ensuring product authenticity (U.S. Department of Agriculture (USDA), 2022).

*Consumer Behaviour Studies***.** Market research has revealed trends in consumer preferences and willingness to pay for truly natural and eco-friendly products (Aaker, Lee, 2001).

By synthesizing these findings, the research can build a stronger foundation for identifying and promoting ecologically natural products (AFSA - Azerbaijan Food Safety Agency, Normative Act on Food Safety and Ecological Standards 2020).

Presentation and Substantiation of Research Results

To ensure the reliability of research findings, statistical methods are crucial in validating the results. The following methods can be applied:

Descriptive Statistics:

Used to summarize data on the composition, origin, and environmental impact of products.

Measures such as mean, median, and standard deviation help in understanding trends.

Comparative Analysis:

Hypothesis testing (t-tests, ANOVA) can compare synthetic vs. natural products in terms of effectiveness and ecological impact.

Regression analysis can identify key factors influencing consumer choice and sustainability metrics.

Multivariate Statistical Techniques:

Principal Component Analysis (PCA) to categorize products based on multiple ecological and chemical parameters.

Cluster analysis to group similar natural products based on composition and ecological footprint (Hair et al., 2019).

Reliability Testing Validation:

Cronbach's Alpha can be used to assess the reliability of survey-based research.

Sensitivity analysis to test the robustness of ecological impact models (Montgomery, Douglas, 2019).

The difference between organic and ecological farming is that organic products always maintain a higher level of quality and control. They are inherently eco-friendly, as they must adhere to strict standards throughout the product's lifecycle, including the outright prohibition of chemicals, toxins, pollutants, and GMOs. Moreover, it is produced, processed, and packaged following high ethical and sustainability standards. A product is considered natural when it contains substances of natural origin, such as plant, animal, and mineral-based ingredients. On the other hand, a product is considered organic when a certain percentage of it consists of natural substances derived from organic farming. This means it is free from GMOs, synthetic fertilizers, chemical pesticides, and harmful substances that can potentially

endanger our health and the environment. Organic products obtain certification attesting to the presence of a specific percentage of organic material, and every stage of production and processing adheres to specific quality standards. Additionally, strict rules are imposed on the use of chemical substances, and these products are cruelty-free, meaning no experiments or tests on animals are conducted. For non-food products like organic clothing, various certifications allow you to recognize organic cotton through labelling and confirm that the product contains at least a certain percentage of organic fabric. Natural products are not composed entirely of natural substances; they often consist of substances obtained through the transformation of natural materials. Chemical processes are frequently employed to produce and preserve them, and synthetic substances are added (European Commission, 2020).

People who take their health seriously choose environmentally friendly products. We are talking about products grown in fields without the use of pesticides, insecticides and chemical fertilizers. Only natural substances are used to improve their growth. These can be fertilizers that have long been known to mankind, such as bone meal, manure, and seaweed (European Commission, 2020). EU Organic Farming Regulations).

Definition and Classification

With such a great importance for human health, natural products are an important subject of research in academic sectors all over the world. However, the reconstruction and transformation of biomass can be utilized, fundamentally, for analytical and structural-spectrometric applications in its natural composition, realizing quantification and elucidation of complete structures in complex organic extracts. The extraction and purification processes of bioactive compounds from natural sources are also basic to obtain implants, bactericides, and fungicides derived from natural peptides. It is evident that pharmaceutical and pharmaceutical products and other articles of graduated or daily industrial use have been clearly established by the market all over the world, alongside other commercial objects like cosmetics and food additives. (Mishra, Bhattacharya, 2020). Natural products are structurally and functionally diverse secondary compounds derived from plant, microbial, and marine sources. As a historical fact, this term was used for the first time in English by a creative logician for potential classification not covered analytically by a publication in 1913. Nevertheless, while in the world many different cultures were already describing some of the oldest potential uses of natural sources in the preparation of dyes, mead, soaps, intoxicating drinks, and medicines, the understanding of this term has been significantly altered by scientific discoveries in both industrial and academic sectors over the last hundred years (Newman, Cragg, 2020).

Sources of Natural Products

Chemical substances that are extracted or isolated from biological sources, including terrestrial plants, marine plants and animals, fungi, and microorganisms, are considered natural products. This review is focused on the potential role of these natural products from these sources—marine plants and animals, terrestrial plants, and fungi and microorganisms—in the sustainable development and environmental conservation of the world. It is well known that approximately 50% of the approved anticancer drugs are from natural sources, including terrestrial plants, marine plants and animals, fungi, and microorganisms (Newman, Cragg, 2020). The suggested areas of further study include the exploration of Antarctic and deep-water marine plants and animals for natural products, better documentation of medicinal plants by local traditional healers and biologists, and investigation of the positive and negative ecological effects of using natural products for human benefits, such as the effects of using natural products on the ecological food web and the potential threat of diminishing future plant and animal resources as a consequence of the overuse of medicinal plants for drug development. These suggested further studies seem to require more comprehensive international collaborations from all the different science disciplines, such as pharmacologists, environmentalists, biologists, anthropologists, pharmacists, and traditional healers.

Natural Products and Sustainable Development

In the post-Rio era, the concept of sustainable use has been progressively expanded beyond its more evident application concerning the use of non-timber forest products to encompass issues as diverse as the conservation of renewable resources and the economic sustainability of associated developmental activities. In the latter sense, the incorporation of natural products into development policy has now extended to forms of subsistence agriculture and is designed to equip low-income countries with enabling development strategies based on the unique utility of their natural resources. Additionally, this evolution in thought has seen the integration of natural products and the ecosystem with other development objectives. Concerns for food security, for example, were formally integrated with the conservation and sustainable use of biodiversity, through the identification of a program element entitled "Utilization, including biotechnology, production, and marketing." Natural products and their role in sustainable development were also recognized. It is recommended that economic opportunities be sought that locally produce natural resource products in a sustainable fashion and do not disrupt traditional farming patterns. The challenge is to give life to the concept of sustainable development by allowing an economic engine to drive investment in and promotion of the development of forms of local agriculture based on the sustainable use of biodiversity, while also rewarding those that conserve the planet's living wealth. With pressures to use these resources for less benign purposes, that moment has now arrived. In the words of the women of the Gran Chaco, the time has come "to use the forest, yet not to damage it," for the goal is "to maintain the forest as a mirror, as a home for the suppression of hunger and the formation of the spirit, thus maintaining the bond among beings". To do so, it has been suggested, calls for the development of markets that first put in order the cultural and material reality that bind us to the plant, animal, and mineral worlds, and which respect the ecology. In some instances, this may mean at the very least still further collaborative work with collectors to arm them with the knowledge and experience needed to maintain habitats. In other cases, untapped potentials point to the creation of new value-adding

opportunities on which a wealth of natural products depends. Means through which natural products can sustain both biodiversity and people, and the observed values of local resource use, offer untapped, synergistic vehicles through which to help the world conserve the environment that remains (Food and Agriculture Organization of the United Nations (FAO). (2004). The Role of Forests in the Development of Sustainable Livelihoods).

Challenges and Limitations

Unfortunately, there are several challenges that both researchers and companies involved in the discovery of natural products and derivatives will need to address in the future. These challenges include gaining access to developing countries' biodiversity, as well as intellectual property rights, resource and process optimization, knowledge gaps that still exist, propaganda and advertising, and concerns about health, mainly regarding biological activities that may occur in human health. In addition, the replacement of chemical compounds from the synthesis industry by natural products, supplied by countries with greater biological wealth, has revealed a danger to the sustainable use of these natural resources. Errors, exaggerations, and practices that lead to the ban on the commercial sale of some natural products have been reported. Capitalism, pharmacology, and techniques must create systems that are not totally dependent on one main molecule; these systems should be able to use thousands of technologies and product applications. (One of the challenges to be met is to maintain technology in the fields of management innovation, geography, marketing, and biotechnology. These areas need the basic knowledge of chemistry, botany, animal ecology, and microbiology present in biosciences. Otherwise, there is a risk of unequal competition at the levels of access, negotiation, research, and resources for conservation. It must also evaluate the credibility of the information in order to avoid restricting the scientific, cultural, and multinational context of the companies involved.

Conclusion

Natural products play a critical role in sustainable development and environmental conservation. Natural products are the result of millions of years of evolution. However, they may not be sustainable if not harvested in a proper way. Natural products from biological resources can maintain the ecological balance of organisms when they are used rationally. Furthermore, in the competitive development of modern technology, the use of natural biomass in the production of natural products is greatly beneficial to the realization of sustainable development. Based on the reasons listed, several policy recommendations are given. Natural products have always been an important source of lead compounds for drug discovery and development. However, they can also play a critical role in sustainable development and environmental conservation. The use of natural biomass in the production of natural products is greatly beneficial to the realization of sustainable development. The yield of natural products can also change significantly during the different growing periods of medicinal plants. In summary, in order to realize sustainable development and more efficiently achieve the goals of environmental conservation, it is not only necessary to uncover the relationship between ecosystems and natural products through modern biology, molecular biology, and other biological methods but also to establish and improve the relevant laws and regulations for the harvesting and application of natural products.

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