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RÉSUMÉ – Cette étude explore le patrimoine bio-culturel du Liban à travers les Plantes Sauvages Comestibles (PSC), indispensables au régime méditerranéen. Utilisant la Théorie de la Collecte Optimale et la Tragédie des biens communs, elle examine le marché des PSC dans la communauté Druze du Mont-Liban. À travers 50 entretiens, la recherche souligne l'utilisation de 68 plantes sauvages, révélant leur rôle dans la sécurité alimentaire et les moyens de subsistance ruraux durables en période de crise. Elle propose un cadre économique pour le marché des PSC, avec des implications politiques.

MOTS-CLÉS – Plantes Sauvages Comestibles (PSC), crise multifacette, cadre économique des PSC, patrimoine alimentaire, consommation de plantes sauvages, sécurité alimentaire

GHADBAN (Socrat), SHAMES (Maya), PIERONI (Andrea), « Économie des Plantes Sauvages Comestibles et patrimoine alimentaire en période de crise au Liban. La communauté Druze »

ABSTRACT – This study explores Lebanon's bio-cultural heritage, focusing on Edible Wild Plants (EWPs) vital to the Mediterranean Diet. Employing Optimal Foraging Theory and the Tragedy of the Commons, it investigates the EWP market in Mount Lebanon's Druze community. Through 50 interviews with EWP consumers and sellers, the research highlights the use of 68 wild plants, revealing their role in food security and sustainable rural livelihoods amid crises. It also proposes an economic framework for EWP market, with significant policy implications.

KEYWORDS – Edible Wild Plants (EWPs), multifaceted crisis, EWPs economic framework, food heritage, wild plants consumption, food security

EDIBLE WILD PLANTS ECONOMY AND FOOD HERITAGE AMID LEBANON'S CRISIS

The Druze Community

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INTRODUCTION

The consumption of Edible Wild Plants (EWPs) in Lebanon, particularly in rural areas, has long been an integral part of the daily diet

of communities. EWPs, which grow spontaneously without human cultivation (Bhattarai *et al.*, 2009), are significant for a diverse and healthy diet. EWPs in rural areas of Lebanon are regarded as valuable and excellent sources for a healthy and diverse human diet. These plants are gathered in a local practice known as “Sliqa,” reflecting a deep-rooted cultural tradition (Food Heritage Foundation, 2015).

Lebanon has experienced a shift in dietary habits over the last decade, moving towards fast food and unhealthy eating, especially among the youth, contrasting its traditional, healthy Mediterranean cuisine. Yet, Lebanon is also renowned for its traditional cuisine within the Mediterranean region, which includes healthy and vegetarian recipes, and an array of fruits and vegetables (Hwalla & El Khoury, 2008).

Additionally, Lebanon faces a multifaceted crisis, severely impacting all sectors, including food (Ghadban & Fayad, 2021), and is considered one of the “top 10 most severe crises globally since the 19th century” (World Bank, 2021). The COVID-19 pandemic beginning in late 2019 worsened the situation, further challenging a nation already dealing with multiple problems. These included a high-risk environment and a profound political crisis, further complicated by a balance of payments crisis, challenges associated with parallel exchange rates, informal capital controls, and interruptions to the convertibility of the Lebanese lira.

Research indicates a significant food security crisis in Lebanon, with over 50% of the population experiencing poor dietary diversity (FAO *et al.*, 2023). The decline in food security, evident in the worsening dietary diversity among both Lebanese residents and Syrian refugees, is closely linked to decreased food imports and reduced availability of diverse food products, intensifying the challenge of accessing nutritious meals. (IPC, 2022) Gedeon *et al.* (2022) report that 74% of people across Lebanese governorates face moderate to severe food insecurity, leading to health issues and decreased meal consumption, exacerbated by rising food prices and poverty.

Studies on EWPs have gained global attention (Bhattarai *et al.*, 2009; Díaz-José *et al.*, 2019), particularly in Lebanon (Baydoun *et al.*, 2023; Marouf *et al.*, 2015) emphasizing rural communities’ reliance on EWPs for food, medicinal, and other uses. However, research gaps exist, especially regarding the Druze community in Lebanon, known for preserving traditional food habits and their connection with nature

(Arab News, 2022; Yehya & Dutta, 2010). Additionally, there's a lack of comprehensive research on EWPs in crisis situations, incorporating in a single framework, various aspects like gathering, consumption, values, and selling.

Building on that, the article seeks to address the following research questions pertaining to the Druze community.

What are the prevailing perceptions concerning the multifaceted socio-cultural and economic significance attributed to EWPs and how does this affect consumption patterns?

In the context of the recent crisis, what changes have been observed in EWP consumption, and how do these changes reflect in individual trading behaviors, potentially affecting sustainability?

How are EWPs collected and incorporated into dietary and consumption habits?

1. LITERATURE REVIEW

This section examines the human-wild plant relationship through various concepts. Initially, it examines the optimal foraging theory to understand how humans consume EWPs. Additionally, it illustrates EWPs as common resources and examines the challenges involved in their sustainable use and management. The review further examines the socio-cultural perceptions surrounding these plants and their economic value, highlighting their role in local economies and global markets.

1.1. THE OPTIMAL FORAGING THEORY

The Optimal Foraging Theory (OFT) describes the behavior of animals seeking out resources in a patchy environment, employing an energy-maximizing strategy. Various studies have examined the application of OFT to EWPs collection and consumption (Pyke & Stephens, 2019). According to this theory, the use of EWPs by local communities depends on factors like their availability in gathering environments

and access to these areas. Property restrictions, particularly on privately owned lands, can also limit accessibility (Ladio & Lozada, 2003). Moreover, one important aspect of foraging is knowledge production and sharing, formally (through educational and instructional activities) and informally (through family and friends) (McLain *et al.*, 2014). The study conducted by Marouf *et al.* (2015) in Lebanon highlights the foraging practices of Lebanese rural communities for EWPs as part of their daily eating habits. Applying the OFT to this research context helps researchers explore and analyze the behavior of collectors and the processes and ways in which EWPs are being used and traded within a specific community. The OFT allowed researchers to integrate themes like EWP accessibility, availability, collection patterns, and obstacles faced during interviews.

1.2. MANAGING THE COMMONS

The “tragedy of the commons” manifests when individuals, motivated by self-interest, lead to the excessive utilization and degradation of shared resources, thus compromising their long-term sustainability (Hardin, 1968). Feeny *et al.* (1990) pointed out that communal management can, contrary to Hardin’s prediction, effectively sustain common resources. This critique emphasizes the role of institutional and cultural factors in preventing resource depletion, challenging the inevitability of Hardin’s tragedy. It highlights the potential for responsible communal resource management. The prevention of the tragedy of the commons, particularly in wildlife conservation, can be achieved through innovative, community-based management strategies (Pires & Moreto, 2011). In the context of EWP, governing the commons may clarify consumption and utilization patterns. Effective community rules of access are necessary to maintain EWPs over time. In this context, FairWild initiative effectively manages the commons and preserves ecosystem-dependent EWPs, encouraging positive relationships between nature and society while safeguarding species in their natural habitats (FairWild Foundation, 2023). However, challenges arise when individuals believe they can benefit from the resource without contributing to its preservation, known as the “free rider” problem. (Ostrom, 1990)

1.3. HOUSEHOLD TRADITIONAL USE AND CONSUMPTION OF EWP

The OFT framework, through an ethnobotanical lens, explores how local communities use and consume EWPs. Research by Ranfa *et al.* (2014) offers comprehensive details on EWPs, including their classification, applications, processing, and preservation, highlighting their dietary and medicinal roles. Numerous studies have focused on indigenous communities' use of EWPs, Bhattarai *et al.* (2009) and Díaz-José *et al.* (2019) emphasize the significant consumption of EWPs by these communities, noting their health benefits and nutritional value.

Research conducted by De Koker *et al.* (2018) and Díaz-José *et al.* (2019) highlights the importance of local knowledge and traditional harvesting methods in preserving the biodiversity of EWPs. However, the sustainability of EWPs is jeopardized by various factors including commercial exploitation, changes in land use, increasing demand, scarcity, and accessibility challenges. These threats are compounded by the loss of generational knowledge and shifts in food habits. Recognizing the significance of people's understanding of biodiversity and their utilization practices is essential for effectively conserving available resources, including EWPs, and thereby promoting their long-term sustainability.

Studies in Lebanon by Baydoun *et al.* (2023) and Marouf *et al.* (2015) reveal a rich diversity of EWPs and extensive traditional knowledge about their harvesting and use. In Lebanon, EWPs are commonly consumed raw, fresh, boiled, or cooked. They also play a crucial role in Lebanese folk medicine, with communities in the Shouf Biosphere Reserve (SBR) and Northeast Lebanon using them for various illnesses (Jeambey *et al.*, 2009). However, Marouf *et al.* (2015) observed a decline in traditional EWP collection, and Baydoun *et al.* (2023) noted habitat loss and land degradation as conservation threats.

1.4. PERCEIVED SOCIO-CULTURAL BENEFITS OF EWPS

EWPs are regarded by local people as having socio-cultural significance. Ciancaleoni *et al.* (2021) highlighted the importance of EWPs as plant genetic resources, passed down through generations, emphasizing their critical role in local gastronomic and biocultural heritage. However, there has been a reported decline in the traditional knowledge related to collecting and consuming EWPs among young people in Vulcano

Island, Italy. This trend poses a threat to the long-term availability of these plants in the Mediterranean diet (Cucinotta & Pieroni, 2018).

Based on 21 interviews across Lebanon, Marouf *et al.* (2015) complement these views by highlighting the value of harvesting EWPs as a social activity, often undertaken in groups of 2 to 4 individuals. This activity is cherished as an opportunity to enjoy fresh air and foster community bonds through sharing wild plants as gifts among neighbors, family, and friends, especially in urban areas.

1.5. ECONOMIC VALUES OF EWPS

Research highlights the economic potential of EWPs as trade and income sources in rural areas. Tsing (2015) observed that in the matsutake trade, local bosses purchase from pickers based on trust and long-term relationships, emphasizing the role of communal ties in income generation and the interplay between privatization and the commons. Karabak (2017) found that EWPs, both processed and unprocessed, are traded locally, nationally, and internationally for medical and culinary uses, with local communities depending on their sale for income. Some individuals harvest and sell EWPs directly, while others buy from local collectors. Furthermore, a study by Baydoun *et al.* (2017) conducted in Lebanon's Jabal Moussa Bioserve, identified certain plants for their notable economic value. Among these are *Ceratonia siliqua*, *Cichorium intybus*, *Laurus nobilis*, *Lilium candidum*, *Malva sp.*, *Matricaria chamomilla*, *Origanum syriacum*, *Populus nigra*, *Rhus coriaria*, and *Salix libani*.

In conclusion, ethnobotanical studies underscore the substantial reliance on EWPs in rural communities worldwide. They are vital for daily nutrition and deeply embedded in socio-cultural systems. Nevertheless, these highlight sustainability challenges for EWPs. While the literature has limited exploration of EWP gathering during major crises, Sulaiman *et al.* (2022) observed increased wild plant consumption during the Syrian crisis, highlighting their role in enhancing food security amid conflict. Similarly, Redzic (2010) investigated EWPs as alternative food sources during the Bosnia and Herzegovina war from 1992-1995.

Based on their review of the literature and observations, the authors formulated the following hypotheses:

- H₁: Druze community perceives EWPs as part of their living bio-culture heritage and seeks to preserve them for future generations.
- H₂: The crisis led to a significant increase in EWPs' consumption. Considering EWPs as common resources, individual actions motivated by self-interest, such as excessive harvesting, could threaten the long-term sustainability of these plants.
- H₃: Druze community rely heavily on EWPs as sources of food and medicine and collect them from nearby gathering areas.

2. METHODOLOGY

2.1. THE DRUZE COMMUNITY IN LEBANON

The Druze, an independent religious group mainly in the Levant, including Lebanon, Syria, and Israel, with smaller populations in Jordan, comprise 5.2% of Lebanon's population, roughly 300,000 people (Encyclopedia Britannica, 2023). Predominantly in the Lebanese mountains, Beirut, and western Beqaa, the Druze of Mount Lebanon are deeply connected to their land, with their health and well-being linked to land cultivation (Yehya & Dutta, 2010). The unique characteristics, traditions, and deep bond with nature of the Mount Lebanon Druze community have prompted an investigation into their diet, including the use and consumption of EWPs¹.

2.2. THE STUDY SITES: ALEY AND CHOUF REGIONS

This study was conducted in two locations: Aley and Chouf. Lebanon's agriculture, constituting 64.3% of its land in 2016, has the largest agricultural share in the Middle East (Dal *et al.*, 2021). Mount Lebanon, in 2017, comprised 18% of Lebanon's total agricultural zones. Baydoun *et al.* (2017) found that the Chouf region's residents depend on EWPs for food and medicinal use.

1 See the map of the Druze distribution in the world, Arab News, 2022: <https://www.arabnews.com/sites/default/files/shorthand/2118221/d350saqJBO/assets/0DolCAmT93/druzemap5-01-750x505.webp> (Last accessed 01/08/2024)

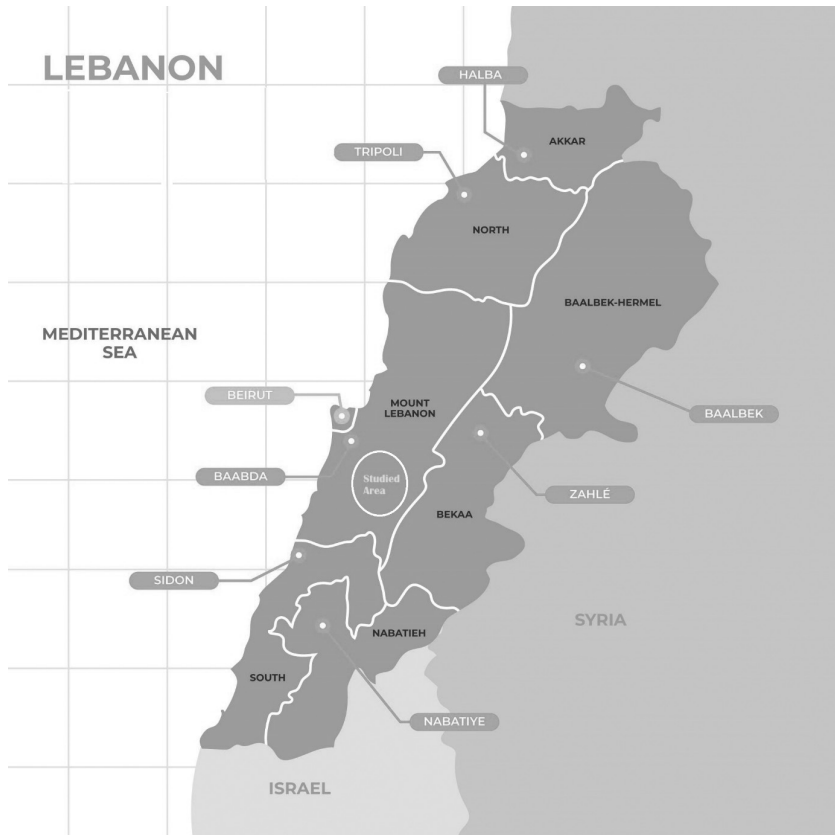


FIG. 1 – Map of Lebanon, highlighting the studied area, and governorate boundaries. Designed by FreePik. *Source:* <https://www.freepik.com/>

2.3. DATA COLLECTION AND ANALYSIS METHODS

This study employs an exploratory research design using qualitative ethnography and semi-structured interviews to deeply explore social phenomena. Ethnography, a qualitative approach rooted in anthropology and sociology, explores the beliefs and behaviors of small societies. It is particularly effective for understanding local perspectives by embracing participants' natural settings and observing their behaviors and cultural practices (Naidoo, 2012). In-depth interviews are crucial in ethnography for capturing individual experiences and perspectives (Clair, 2003).

For this study, Druze master's students from the Lebanese University, immersed in the Druze community, conducted the interviews, utilizing their intimate knowledge of traditions.

Two semi-structured interviews were created – one for consumers and another for sellers – to comprehensively investigate both the supply and demand sides of the market. These interviews addressed topics such as: weekly diets, EWP usage and benefits, gathering, processing, selling, buying, traditional recipes, challenges, and socio-demographic information. The study used mixed sampling, including convenience sampling with EWP-knowledgeable individuals and snowball sampling through community referrals. Interviews, lasting 30-50 minutes, were conducted face-to-face (28 in 2020 during the early economic and COVID-19 crisis) and remotely (24 via phone and Zoom in 2023 during a severe economic crisis). This timing facilitated the comparison of different periods and the assessment of the crisis's impact on EWP-related activities.

To ensure data validity, interview questions were piloted with three community members to refine the guide. Conducted in Arabic and translated to English, one interview unrelated to the Druze community was excluded. Recorded interviews were transcribed, organized in Excel for analysis. Thematic analysis was employed to identify patterns, using an abductive approach that adapted initial literature themes to the data.

3. RESULTS

3.1. SOCIO-DEMOGRAPHIC PROFILE OF THE INTERVIEWEES

Females comprise 85% of EWPs collectors, while males make up 15% (Appendix 1). Conversely, males dominate sales at 78%, with females at 22%, reflecting increased male participation in EWPs sales during economic crises. All sellers and 20% of the consumers work in the private sector, with 51% being housewives, and over 75% belong to families with three to five members, reflecting the typical family size in Lebanon.

3.2. WEEKLY MEAL PLAN AND EWPS PERCEIVED SOCIO-CULTURAL VALUES.

Interviewees reported balanced diets comprising meat, chicken, fish, grains, vegetables, and wild plants. Meat and chicken consumption varied, with some eating it daily and others only weekly, citing financial or health reasons. Home cooking, especially heightened during the pandemic and ongoing economic crisis since 2019, emerged as a preferred practice. Wild plants are perceived as nutritious, organic, and free from chemicals due to rainwater reliance. They are deeply rooted in tradition and local cultural heritage, passed down through generations, preserving culture and identity. Gathering wild plants often brings families and communities together, nurturing social bonds and an affinity for the environment. These plants are valued for their cultural and nutritional importance, serving to connect with nature and uphold local traditions.

They remind me my parents and the way we were eating in the past, and it's a tradition and I feel I'm obliged to cook them to let my kids love them and keep them in their mind. I05 (Female, 51)

Notably, 64% of the consumers highlight that EWPs are integral to traditional practices and are handed down through generations. Thus, H_1 is accepted.

3.3. HOUSEHOLD EWPS CONSUMPTION

3.3.1. EWPs identified and their traditional use

The interviewees displayed familiarity with 68 folk plant taxa. Among these, 10 EWPs were consumed as wild vegetables or seasoning/herbal teas, representing 5 families that ranked highest in terms of traditional consumption in line with the finding by Baydoun *et al.* (2023) of a dominant preference for species from the families *Asteraceae*, *Brassicaceae*, and *Apiaceae*. These families collectively make up 48.42% of the plants identified in their study.

TAB.1 –Top ten wild vegetables consumed. Percentage of total of consumers.

Wild plant taxa and family	English common name	Local name	Quotations	%
<i>Cichorium intybus</i> L., Asteraceae	Wild Chicory	<i>Hendbeeb</i>	39	95%
<i>Eryngium creticum</i> Lam. and other <i>E. spp.</i> , Apiaceae	Cretan Eryngo	<i>Kors anni</i>	37	90%
<i>Pseudopodospermum spp.</i> , Asteraceae	Viper's Grass	<i>Messhi</i>	29	71%
<i>Gundelia tournefortii</i> L., Asteraceae	Tumble Thistle	<i>Akkoub</i>	27	66%
<i>Centaurea calcitrapa</i> L., Asteraceae	Purple Star Thistle	<i>Dardar</i>	26	63%
<i>Origanum syriacum</i> L., Lamiaceae	Syrian Oregano	<i>Zaatar</i>	24	59%
<i>Malva spp.</i> , Malvaceae	Mallow	<i>Khebayzi</i>	20	49%
<i>Foeniculum vulgare</i> L., Apiaceae	Wild Fennel	<i>Shumar</i>	18	44%
<i>Salvia spp.</i> , Lamiaceae	Wild Sage	<i>Balghasoun</i>	13	32%
<i>Nasturtium officinale</i> W.T. Aiton, Brassicaceae	Watercress	<i>Korra</i>	13	32%

Source: Authors.

Wild Chicory, Syrian Oregano, Tumble Thistle, and Viper's Grass are frequently consumed EWPs, suggesting regional favorability and accessibility. Syrian Oregano, for instance, is easy to preserve and use in dishes, requiring little preparation and being suitable for sandwiches or pastries. Additionally, numerous interviewees reported that their families and friends enjoy wild plants, with some preferring these over conventional vegetables or salads.

The wild plants that we prepare are very tasty. "Zaatar" is the most consumed plant, since we consume it over a long period. I10 (Male, 53)

They are very tasty, especially when I go and collect them and I prepare them by myself I feel that they are tastier. Also, I get very positive comments (tasty, very delicious). Zaatar and Hendbeeb are the most consumed. I02 (Female, 27)

In some cases, family members or children may not like consuming wild plants due to taste or unfamiliarity. Parents may still promote their consumption for their health benefits.

Yes, for me so delicious but for my children not too much. I insist they eat because they are healthy. I32 (Female, 39)

No, I don't like them I eat them only for their health benefits and my children as well. I34 (Female, 45)

One interesting fact was mentioned by one of the respondents regarding a potential difference in gender perception.

Too much tasty and delicious, mainly the guys the males they don't like it they like more the meat, I feel girls like it more. I05 (Female, 51)

Interviewees consume wild vegetables frequently, about 4-5 times monthly, especially when in season. Certain types, like Viper's Grass and Tumble Thistle, demand extensive preparation and are often used for special occasions. Wild Chicory, for example, is served as an appetizer in restaurants. These vegetables are eaten in various forms – raw in salads, cooked in stews, fried, boiled, in pies, or in omelets. Typically, they're consumed within 2-4 days, but preservation methods like freezing, sun-drying, distillation for medicine, and pickling are also used.

3.3.2. EWPs consumption change

73% of interviewees reported an increase in wild plant consumption, while only 7% noted a decrease, and 20% said it remained unchanged. Reasons for the rise included the economic crisis, health concerns, and a desire for a healthier lifestyle. Some individuals returned to traditional practices, using wild plants for medicinal purposes. As most interviewees indicated a rise in EWP consumption, this observation substantiates Hypothesis 2, which predicts an increase in consumption in a crisis context. However, changing eating habits or declining interest led to decreasing consumption in some cases.

EWP consumption has evolved, influenced by factors like dietary shifts, population growth, plant domestication, and diminishing traditional knowledge, particularly among Druze younger generations. Yet, certain EWPs, like *Anchusa strigosa* and Tumble Thistle *Gundelia tournefortii* L., *Asteraceae*, are reported as facing habitat loss and environmental pressures, rendering them rare or endangered.

General consumption is increasing compared to the past due to an increase in population... now we're having some plants that are domesticated. I03 (Female, 54)

My mom used to collect some types of wild plants in the past, but I don't know them because I didn't join her always during her trips to the nature. I20 (Female, 61)

Demand has increased, people are collecting wild plant in a wrong way, some wild plants are becoming rare. I50 (Female, 55)

Due to climate change, some wild plants are not available every year. I21 (Female, 34)

3.4. EWPS COLLECTION AND BUYING BEHAVIOR

The responses indicated that some individuals gather wild plants (Table 2), while others buy them locally, sometimes from collectors or neighbors. Prices depend on factors like location, plant type, and preparation status. Some plants are scarce and are purchased rather than collected.

Mostly, I collect them, mainly the "akkoub" I get from local sellers because it is not available near my place of residence. I06 (Female, 44)

We buy only "akkoub" because it is hard to collect. I15 (Female, 53)

3.4.1. Changes in collecting and buying EWPs During the Crisis

The data indicated that during the country's crisis in 2019, people in rural areas have become less inclined to purchase wild plants associated with the decline in their purchasing power. According to Table 2, in 2020, 62% of respondents bought wild plants, whereas only 27% did so in 2023.

I collect them, we don't have money always to buy them. I35 (Female, 54)

TAB. 2 – 2020-2023 change in collection & buying EWPs.

	Buying		Collecting	
	Yes	No	Yes	No
2020	16	10	25	1
2023	4	11	13	2
2020	62%	38%	96%	4%
2023	27%	73%	87%	13%

Source: Authors.

Many prepare wild plants themselves, taking 30 minutes to 3 hours based on the plant type. Some opt to buy processed varieties, especially for challenging ones like Tumble Thistle, also supporting residents in generating income.

We seek to help local people, so we buy from them. I15 (Female, 53)

All sellers observed a significant rise in wild plant sales due to factors like the current economic and health crises and the recognized health benefits of wild plants compared to other market products. This increased demand often exceeds supply, encompassing different plant types and attracting buyers from rural and urban areas. Urbanites' growing awareness of wild plants' health benefits has fueled this trend. Therefore, even with reduced buying power in rural areas and a trend towards personal collection, this surge in demand offsets the rural decline in purchasing power.

Of course, it is increasing because compared to other products available in the market wild plants are healthier. Demand always exceeds the available quantity. I44 (Male, 5)

3.4.2. Collection process

Wild plant collection mainly occurs during the spring, preferably in the afternoon to avoid intense heat. While many collectors are females, some males also participate. Gathering often involves family members, like sisters, husbands, and daughters, or friends, neighbors, and locals familiar with the area. Collectors typically explore nearby mountains and valleys rather than designated reserves, with trips lasting 2-4 hours or occasionally a full day. H3 is then validated; the Druze community in the rural areas of Lebanon collects EWPs from nearby gathering areas. The quantity collected varies, but on average, it's around 1-3 kilos per category for personal use. Greater quantities of specific plants may be gathered, particularly when collectors intend to distribute or sell them.

We go in groups, with family, and friends to collect wild plants... For the quality it depends, we collect a lot, more than two kilos per category. We consider this as a day out in nature. It is done yearly. I40 (Female, 26)

During spring when the sun is not too hot and usually, it's in the afternoon. I01(Male, 46)

3.5. SELLING EWPS

The sellers (Demographics Appendix 1) revealed that the top 10 selling EWPs are the same as those identified as the top 10 consumed, apart from three: Nettle, Wild Leek, and Sticky Fleabane (Table 3).

TAB. 3 – Top ten selling EWPs.

Wild plant taxa and family	English common name	Local name	Quotations	%
<i>Eryngium creticum</i> Lam. and other <i>E. spp.</i> , Apiaceae	Cretan Eryngo	<i>Kors anni</i>	9	100%
<i>Cichorium intybus</i> L., Asteraceae	Wild Chicory	<i>Hendbeh</i>	7	78%
<i>Gundelia tournefortii</i> L., Asteraceae	Tumble Thistle	<i>Akkoub</i>	6	67%
<i>Origanum syriacum</i> L., Lamiaceae	Syrian Oregano	<i>Zaatar</i>	4	44%
<i>Pseudopodospermum spp.</i> , Asteraceae	Viper's Grass	<i>Messbi</i>	4	44%
<i>Urtica dioica</i> L., Urticaceae	Nettle	<i>Korwais</i>	2	22%
<i>Allium ampeloprasum</i> L., Amaryllidaceae	Wild Leek	<i>Kurath</i>	2	22%
<i>Centaurea pallescens</i> Delile, Asteraceae	Pale Star	<i>Dardar</i>	2	22%
<i>Foeniculum vulgare</i> L., Apiaceae	Wild Fennel	<i>Shumar</i>	2	22%
<i>Dittrichia viscosa</i> (L.) Greuter, Asteraceae	Sticky Fleabane	<i>Tayoun</i>	2	22%

Source: Authors.

Sellers acquire EWP through diverse channels, including buying from local individuals or collecting from the wild, sometimes on their farms. Some acquire plants from women's cooperatives to support women's empowerment and boost the local economy.

I buy them from the local community. No, I don't collect them. I38 (Male, 40)

We collect them, and we have constituted a women's cooperative. I49 (Female, 46)

The 9 interviewed sellers serve a diverse customer base of various ages and locations, including neighboring villages, urban areas, and tourists.

From all ages: young, old, housewives, etc. From all over Lebanon as well as international customers (especially tourists). I36 (Male, 53)

Different ages from the village and other villages as well as from Beirut and other cities. I47 (Male, 38)

3.6. EWPS PROFITABILITY AND CHALLENGES

Some individuals find EWPs economically profitable when processed (dried, distilled, pickled) or when combined with other vegetables and plants. However, selling EWPs alone may not be very profitable, often requiring integration into a package. For example, one interviewee offered wild plants as part of dishes for tourists. The profitability of selling wild plants varies, with some, like Tumble Thistle, being more beneficial. Various factors, including the accessibility of plant-rich geographical areas, can impact profitability.

Some people have built their houses from the revenues gained. People take leaves from work to go and collect them because they are profitable. I47 (Male, 38)

I don't sell them to gain revenue, but just to compensate for our efforts deployed in collecting and cleaning them. I49 (Female, 46)

Not profitable but people buy them because they trust that we buy them healthy and fresh products. I38 (Male, 40)

Collecting wild plants poses challenges such as health risks due to mobility issues, exhaustion from long walks and climbs, time constraints, and adverse weather. Some worry about supply meeting demand, excessive collection, and the decline of traditional collection methods harm species sustainability.

Akkoub is becoming rare since people use inadequate tools to remove them affecting their roots. I32 (Female, 39)

Rainy days are time-consuming; it is too tiring. I18 (Male, 53)

3.7. ECONOMIC FRAMEWORK FOR THE EWPS MARKET.

The economic framework, outlined through the interviews (Figure 3), reveals the interactions within the EWPs' market, highlighting the value creation for each stakeholder. Processors enhance value by converting raw EWPs into more desirable, longer-lasting products, thus fostering revenue growth. Sellers, pivotal in distributing EWPs, extend the economic reach beyond local boundaries to include non-residents, stimulating community economic vitality. Local collectors, with their expertise in sustainable harvesting, ensure ongoing EWP availability, supporting both their livelihood and the market supply. Consumers, through their purchases, underpin the local economy and uphold traditional dietary customs, crucial for community health and cultural identity. Non-residents, including tourists and urban dwellers, inject external financial resources, critical during economic downturns. Meanwhile, Syrian refugees representing more than 1.5 million individuals, account for over 35% of the Lebanese population (IPC, 2022), by engaging in the EWP economy, attain economic autonomy and augment the supply chain, though this raises competition for resources.

In this framework, EWPs are pivotal in the Druze community's crisis response, securing food systems, generating income, and promoting healthy lifestyles. The crisis has reshaped collector and consumer behaviors, with more collectors using EWPs for nourishment or selling them for income, and fewer local consumers purchasing EWPs due to diminished financial capacity, leading them to forage themselves. However, this economic cycle faces sustainability challenges due to population growth, increasing EWP consumption and collection by refugees, access restrictions in the Natural Reserve (SBR) and in surrounding built areas, primarily due to private ownership of houses, unsustainable collection practices, climate change, and heightened demand from non-residents. These pressures may industrialize the socio-cultural values of EWPs, potentially leading to over-collection and future scarcity, as wild plants lose their identity and heritage dimensions, becoming commodified items exchanged between sellers and consumers driven by competition for resources and economic gain.

This economic framework may be conceptualized through the lens of the 'tragedy of the commons.' Here, individual agents engaged in

the exploitation of EWPs act in self-interest, which cumulatively risks the sustainable use of this communal resource, further compounded by external demands population pressures, economic and environmental factors. The increase in EWP consumption and the corresponding market behaviors of agents notably indicate support for the second hypothesis.

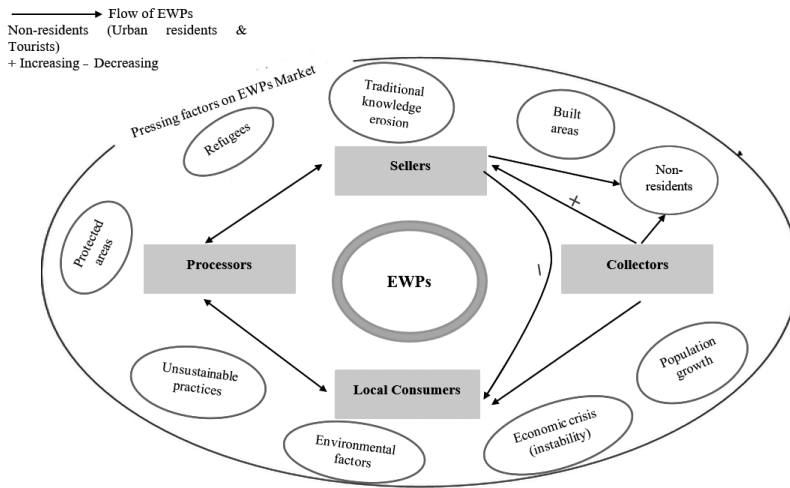


FIG. 2 – The economic framework for collecting and selling EWPs: Druze Community-Lebanon. *Source:* Authors.

DISCUSSION AND POLICY IMPLICATIONS

This research reaffirms the positive socio-cultural perception of EWPs and the community's strong traditional attachment to them, as confirmed by H1. The findings validate wild plants' importance in sustaining healthy diets amidst shifting consumption patterns, owing to their rich nutritional content (Food Heritage Foundation, 2015). The EWP families observed in the study sites closely resemble those found in the Mediterranean basin (Ranfa *et al.*, 2014; Ceccanti *et al.*, 2018). Additionally, the study confirms the economic significance of certain plant species identified by Baydoun *et al.* (2017).

This article introduces an economic framework in the form of a circular flow diagram. It depicts exchanges among collectors, sellers, processors, and consumers, revealing market pressures and their impact on the EWP ecosystem. Amid economic and health crises, local EWP consumption has risen due to their cost-effectiveness and health benefits, as supported by Sulaiman *et al.* (2022). Despite fewer local buyers, sales to non-residents have grown, highlighting EWPs' crisis role as affordable healthy alternatives and rural income sources. The severe economic and refugee crises have heightened competition for common resources like EWPs, resulting in excessive harvesting and posing a threat to the long-term sustainability of these plants, as identified by Ostrom (1990) in the "free rider" problem. Foraging wild plants, crucial for ensuring food security both in times of crises and under normal circumstances, avoids nutritional catastrophe and prevents the appearance of several diseases (Redzic, 2010). Similarly, Ong and Kim (2017) showed the use of EWPs as adaptive strategies in the Philippines. This paper emphasizes the importance of food security's four pillars: availability, access, utilization, and stability. It also advances two more dimensions, as suggested by Clapp *et al.* (2022): agency and sustainability. Through stressing the need to integrate sustainability into food and nutrition policies. Additionally, it underscores the agency's role in easing tensions between protected area management and the community, enabling community members to engage in governance. For instance, implementing the "Fair Wild" standard requires stakeholder cooperation and ethical practice training. This approach, along with FairWild certification, promotes species protection and sustainability awareness (Makita, 2018). Besides, involving locals in wildlife management transforms them from exploiters to guardians, aiding conservation efforts (Pires & Moreto, 2011).

Women cooperatives within the Druze community play a crucial role in gathering and directly selling wild plants to consumers or sellers. This economic activity not only ensures financial sustainability but also contributes to poverty alleviation. Moreover, these cooperatives serve as platforms for women's empowerment by providing them with access to resources (Bharti, 2021).

Consistent with the findings of Bhattarai *et al.* (2009), the gradual erosion of traditional knowledge poses a significant threat to the conservation of EWPs. Consequently, safeguarding this traditional

knowledge, securing households' rights to gather and utilize EWPs, and regulating their economic significance are recommended actions to be integrated into Lebanon's national agricultural policy and the 2020-2025 national agricultural strategy.

Sustainable tourism initiatives, recommended by Dorobantu and Nistoreanu (2012), tackle rising tourist demand and unsustainable practices like collectors removing plants from the roots, with a focus on preserving natural areas and promoting environmental awareness. Ecotourism emerges as a practical strategy for safeguarding wild plants, enhancing biodiversity, and supporting rural livelihoods. Moreover, to raise awareness among local restaurant industry stakeholders, it's suggested to create dedicated learning platforms for chefs. These platforms would teach chefs how to process and cook EWPs, promoting local food heritage to tourists.

Protected areas have raised tensions over wild plant access and collection, but they play a vital role in biodiversity preservation. Collaborative partnerships with Indigenous land stewards, as emphasized by Schuster *et al.* (2019), are crucial for ecosystem continuity, respecting Indigenous rights, promoting sustainable resource use, and enhancing well-being. For the Druze community, such agreements should be fostered, aligning the shared objective of biodiversity between the local community and protected area management.

Townsend (2020) proposed an effective communication strategy, tested in the UK, it offers guidance on safe foraging for wild foods during COVID-19 in rural and urban settings. Adapting this strategy for the Druze community in Lebanon, particularly those unfamiliar with gathering EWPs, would enhance their safe access to gathering areas and bolster resilience during uncertain times.

In conclusion, foraging EWPs in the Druze community provides high-quality food, income, social connections, and well-being. It fosters biocultural cohesion during crises, reduces dependence on costly products, and supports biodiversity preservation. Sustainable practices like selective harvesting and resource conservation ensure long-term sustainability for wild food and ecosystems.

LIMITATIONS AND RECOMMENDATIONS

This article has limitations that warrant future research. Despite several interviewees associating increased EWP consumption with the economic crisis, the exploratory qualitative nature of this study cannot establish a causal relationship. Increasing the sample size could facilitate the exploration of changing EWP consumption patterns and intergenerational differences. A limitation of this study is the absence of hierarchy among the factors influencing the economic framework for EWP market. Future research should aim to systematically analyze these factors, allowing for the prioritization of their impacts. Overcoming reluctance among potential respondents and quantifying EWP expenditure in the fluctuating Lebanese Lira exchange rate are challenges to address. Conducting willingness-to-pay studies within the Lebanese context is advisable. The gender dynamics revealed a male-dominated seller and female collector landscape, emphasizing the need for gender-focused studies, particularly women's contributions to rural food security. The UN's Mazej project, supported by the Italian government, demonstrates domestication as a conservation strategy, aiding 26 Zaatar producers and creating 595 jobs. Future studies should explore if domestication, while enhancing production and reducing pressure on EWPs, might shift cultural values towards profit-driven industrialization. Lastly, investigating EWP collection and consumption in crisis contexts and the role of sustainable tourism in their protection warrants further exploration.

APPENDIX

A1: Socio-demographic characteristics of consumers and sellers

Variable		Consumers		Sellers	
		Count	Percentage	Count	Percentage
Gender	Male	6	15%	7	78%
	Female	35	85%	2	22%
Age	20-30	4	10%	1	11%
	31-40	3	7%	2	22%
	41-50	12	29%	2	22%
	51-60	13	32%	3	33%
	More than 60	9	22%	1	11%
Employment status	Employee Private Sector	8	20%		
	Unemployed	4	10%		
	Housewife	21	51%		
	Employee Public Sector	1	2%		
	Freelance/Business Owner	2	5%	9	100%
	Architect	2	5%		
	Teacher	3	7%		
Marital Status	Single living with family	2	5%	1	11%
	Married with children	31	76%	8	89%
	Married with no children	2	5%		
	Widowed	4	10%		
	Separated	1	2%		
	Single living alone	1	2%		
Family size	Living Alone (1)	2	5%		
	2	2	5%		
	3	9	22%	3	7%

	4	10	24%	2	5%
	5	13	32%	3	7%
	6	2	5%	1	2%
	7	3	7%		
Place of Residence	Chouf	26	63%	5	56%
	Aley	15	37%	4	44%

Source: Authors.

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