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Research Article

GASTRONOMIC AND ETHNOBOTANICAL PERSPECTIVES ON EDIBLE WILD PLANTS OF THE EASTERN BLACK SEA REGION: INTRODUCING THE CONCEPT OF GASTROBOTANY

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Abstract

This study presents a systematic conceptual analysis of edible wild flora in the Eastern Black Sea Region through an integrative gastrobotanical lens. Employing a structured literature review methodology, we synthesised 89 peer-reviewed sources (2010–2024) from Scopus, Web of Science and TR-Dizin databases to examine how traditional ethnobotanical knowledge translates into contemporary gastronomic value. Thematic synthesis of botanical inventories, culinary techniques and tourism applications revealed that *Borago officinalis*, *Trachystemon orientalis*, *Urtica* spp., *Ornithogalum* spp., *Smilax excelsa* and *Rumex* spp. function as biocultural anchors connecting seasonal foraging calendars with modern culinary innovation. Analysis demonstrates that these taxa are transformed from spring ephemerals into umami-rich culinary assets through low-temperature blanching, lacto-fermentation and smoked-oil techniques documented across regional literature. We delineate gastrobotany as an integrative three-pillar framework—botanical supply, ethnobotanical memory, gastronomic re-signification—that conceptually links wild plant use to sustainable destination development. The proposed model offers theoretically grounded pathways for regions seeking to bridge biodiversity conservation, culinary creativity and cultural heritage preservation. This conceptual contribution identifies critical gaps in existing literature and provides a replicable framework for future empirical investigation.

Keywords: Gastrobotany, Gastronomy Tourism, Edible Wild Plants, Ethnobotany, Eastern Black Sea Region.

Introduction

Gastronomy has evolved into a multidimensional field that intersects cultural heritage, sustainability narratives and destination branding. Recent work shows that place-based food practices function as embodied archives of local identity, while simultaneously serving as experiential resources for tourists (Björk & Kauppinen-Räsänen, 2022; Mammadov & Cakar, 2023). Gastronomy tourism therefore operates less as a supplementary activity and more as a key channel through which visitors decipher the socio-ecological distinctiveness of a destination. Within this arena, edible wild plants occupy a unique niche: they are simultaneously seasonal, sensorially distinctive and carriers of ecological knowledge that cannot be replicated in conventional agriculture. Comparative studies from Mediterranean mountain communities reveal that wild-food foraging sustains biocultural diversity, reinforces inter-generational knowledge transfer and strengthens food-system resilience under climate uncertainty (Luczaj et al., 2022; Łuczaj & Pieroni, 2023). Türkiye, straddling three

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phytogeographical provinces, hosts more than 1.100 recorded wild food taxa, yet the Black Sea ecotone remains under-represented in quantitative gastronomy literature.

The Eastern Black Sea Region combines orographic complexity, year-round precipitation and altitudinal belts that generate a mosaic of mesic habitats. These conditions support a high β -diversity of wild and semi-wild edibles whose local names, harvesting calendars and processing techniques vary at the village scale (Şenkardeş & Bulut, 2022; Doğan & Kaya, 2023;). Ethnobotanical surveys conducted in Trabzon, Giresun, Gümüşhane and Artvin document intensive use of Asteraceae, Lamiaceae and Apiaceae members through sautéing, lacto-fermentation and shade-drying—practices that concentrate flavour, extend shelf-life and embed seasonality in everyday cuisine (Şenkardeş & Bulut, 2022; Doğan & Kaya, 2023).

Ethnobotany and Edible Wild Plants

Ethnobotany examines how societies perceive, name and transform plants into food, medicine or symbols. Recent definitional updates stress that the discipline must simultaneously document taxonomic identity, sensory attributes and the socio-ecological conditions that shape use (Sõukand & Kalle, 2022; Łuczaj & Pieroni, 2023). Within this frame, edible wild plants act as portable archives of environmental knowledge: their harvest calendars encode phenological observation, while processing techniques embody culinary optimisation strategies developed over centuries.

Cross-regional meta-analyses covering Europe, the Mediterranean and the Caucasus show that leafy greens, young shoots and aromatic herbs are the most widely consumed categories, valued for their mineral density, distinct flavours and cultural salience (Sõukand & Kalle, 2022; Łuczaj et al., 2023). In Türkiye, field surveys carried out since 2020 reveal that rural households continue to integrate wild taxa into daily meals, herbal teas and lacto-fermented side dishes; the Eastern Black Sea provinces alone account for 92 currently used species, 61 of which are spring ephemerals that disappear from markets within six weeks (Tardío, et al., 2022; Doğan & Kaya, 2023).

Intergenerational transmission remains the dominant knowledge pathway, yet accelerated urban migration and the substitution of foraged greens with commercial vegetables erode both lexicon and culinary confidence (Reyes-García et al., 2022). Documenting preparation repertoires—sautéing, fermentation, shade-drying—before they contract further positions wild edibles as actionable ingredients for biodiversity-oriented gastronomy rather than relics of subsistence.

Gastronomy as a Discipline and Local Plant Resources

Contemporary gastronomy increasingly frames wild flora as catalysts for low-impact innovation and place-based storytelling. Biodiversity-driven menus, “nature-to-plate” narratives and zero-kilometre fermentation labs are now routine in Nordic and Alpine fine-dining, yet parallel experimentation remains scarce in the Black Sea arc (Sõukand et al., 2022; Łuczaj & Pieroni, 2023). Recent field-to-fork studies show that incorporating wild greens increases plate diversity indices by up to 40 % while lowering food-mile footprints, provided that supply chains are anchored in regulated foraging protocols (Mammadov & Cakar, 2023).

In Türkiye, coastal and montane micro-habitats of the Eastern Black Sea harbour more than 130 flavour-stable taxa—among them *Trachystemon orientalis* and *Smilax excelsa*—whose mucilaginous or umami-rich profiles lend themselves to fermentation, sous-vide and smoked-oil applications (Sõukand & Kalle, 2022; Fontefrancesco & Zerbi, 2023). Yet menu-engineering research reveals that local chefs seldom move beyond conventional sautéing, citing knowledge gaps, inconsistent supply and absence of certified gastronomy routes (Kaya & Yılmaz, 2022). Consequently, the region’s wild edibles remain biocultural assets without symbolic capital: they are tasted but not storied, served but not branded. Bridging ethnobotanical inventories with experimental kitchen protocols is therefore critical for converting ecological richness into sustainable culinary differentiation.

The Concept of Gastrobotany

Gastrobotany integrates ethnobotanical knowledge with culinary practice by tracing how sensory attributes, ecological scripts and cultural memories co-evolve within foodscapes. Rather than cataloguing taxa, the approach foregrounds processes—foraging decisions, fermentation rhythms and plating narratives—that convert biomass into meaning (Pieroni & Söukand, 2022; Dogan & Ugulu, 2024). Recent fieldwork indicates that the framework operates through interlocking dimensions: adaptive transmission of traditional plant protocols to modern kitchens; product development that leverages the volatile fingerprints and textural idiosyncrasies of wild edibles; and sustainability storytelling that couples biodiversity conservation with place-based food tourism (Luczaj et al., 2023).

Empirical work in the Eastern Black Sea illustrates these dynamics: village-level sensory rankings of *Trachystemon orientalis* guide chefs toward low-temperature blanching that preserves mucilaginous mouth-feel, while lacto-fermentation of *Smilax excelsa* young shoots triples glutamate content, yielding a regional umami condiment marketed as “Karadeniz shio-koji” (Luczaj, et al., 2022; Tardío, et al., 2023). Although the neologism “gastrobotany” rarely appears in Turkish-language journals, interdisciplinary projects in Artvin and Giresun already operationalise its pillars—documenting phenology, training foragers as certified suppliers and branding short-chain gastronomy routes—thereby positioning wild flora as biocultural capital rather than relic ingredients.

Despite a fifteen-year corpus of ethnobotanical inventories for the Eastern Black Sea, three lacunae persist. First, sensory profiles and techno-functional properties of wild edibles remain unmapped, preventing chefs from aligning traditional taxa with contemporary preparation logics such as low-temperature pasteurisation or controlled fermentation. Second, existing menu-engineering studies treat “local herbs” as undifferentiated commodities, thereby stripping them of the cultural narratives that generate experiential value for tourists. Third, sustainability assessments rarely couple biodiversity indicators with visitor satisfaction metrics, leaving the tourism potential of wild flora assertion-rich yet evidence-poor (Łuczaj & Pieroni, 2022; Tardío et al., 2023).

By operationalising gastrobotany as an integrative lens, the present study moves beyond descriptive listings to interrogate how traditional plant knowledge is translated into culinary symbolism, how sensory signatures are stabilised under modern kitchen conditions, and how certified foraging routes can simultaneously conserve biocultural diversity and enhance place-based gastronomy tourism. The contribution is twofold: an academic reframing that positions wild edibles as biocultural assets, and an applied roadmap that links village-level harvesting protocols to destination branding strategies in the Eastern Black Sea.

Methodology

This study addresses the research problem through a systematic structured literature review (SLR) methodology that bridges epistemologically decoupled domains of ethnobotanical inventory and gastronomy tourism research. The approach follows a conceptual-synthesis logic aimed at theory refinement rather than hypothesis testing, appropriate for examining how traditional botanical knowledge translates into contemporary culinary value (Torres & Kline, 2006; Jaakkola, 2020;).

By systematically identifying, screening and analysing peer-reviewed scholarship through transparent, replicable procedures, the methodology minimises selection bias while enabling audit trails essential for rigorous conceptual research (Tranfield et al., 2003). The design adheres to PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines adapted for conceptual research, ensuring systematic documentation of identification, screening, eligibility assessment and inclusion phases (Page et al., 2021). This methodological architecture positions gastrobotany not as a static label but as an explanatory mechanism linking biochemical specificity, cultural meaning and visitor experience within a single theoretical chain, thereby converting fragmented knowledge on Eastern Black Sea wild edibles into an integrative, transferable framework.

Systematic Literature Review Protocol

Database Selection and Search Strategy

Systematic searches were conducted across six academic databases selected to capture both internationally indexed and region-specific Turkish scholarship: Web of Science (Core Collection), Scopus, ScienceDirect, SpringerLink, Wiley Online Library, and TÜBİTAK ULAKBİM TR-Dizin. Database selection aimed to maximise coverage of ethnobotanical, gastronomy and tourism literatures while ensuring accessibility of Turkish-language regional studies often omitted from international indices.

The search strategy employed controlled vocabularies in both English and Turkish to capture disciplinary terminologies across botany, anthropology and tourism studies. Boolean operators combined concept clusters:

(ethnobot* OR "wild edible plant*" OR "gastrobotan*" OR "yabani yenilebilir bitki*" OR "gastrobotanik") AND ("Black Sea" OR "Doğu Karadeniz" OR "Karadeniz Bölgesi") AND (gastronom* OR culinar* OR "traditional food" OR "yerel mutfak" OR "gastronomi turizmi")

Truncation operators (*) captured variant word endings. Search parameters restricted results to peer-reviewed journal articles, book chapters and conference proceedings published between 2010–2024. The lower bound (2010) corresponds to intensified ethnobotanical research in Türkiye following European Union framework programme collaborations; the upper bound (2024) ensures contemporary relevance.

Inclusion and Exclusion Criteria

Explicit eligibility criteria were established prior to screening:

Inclusion criteria:

- Peer-reviewed publication in academic journal or edited volume
- Empirical or conceptual focus on plant-human-food nexus
- Geographical coverage of Eastern Black Sea Region (Trabzon, Rize, Artvin, Giresun, Gümüşhane provinces)
- Publication in English or Turkish
- Publication date 2010–2024

Exclusion criteria:

- Grey literature (working papers, reports without peer review)
- Graduate theses and dissertations
- Conference abstracts without full proceedings
- Studies focusing exclusively on medicinal plants without culinary application
- Studies from Western Black Sea or interior Anatolian regions without Eastern Black Sea specificity

Screening Procedure and PRISMA Documentation

The screening procedure followed PRISMA 2020 guidelines with four-phase flow documentation (Page et al., 2021):

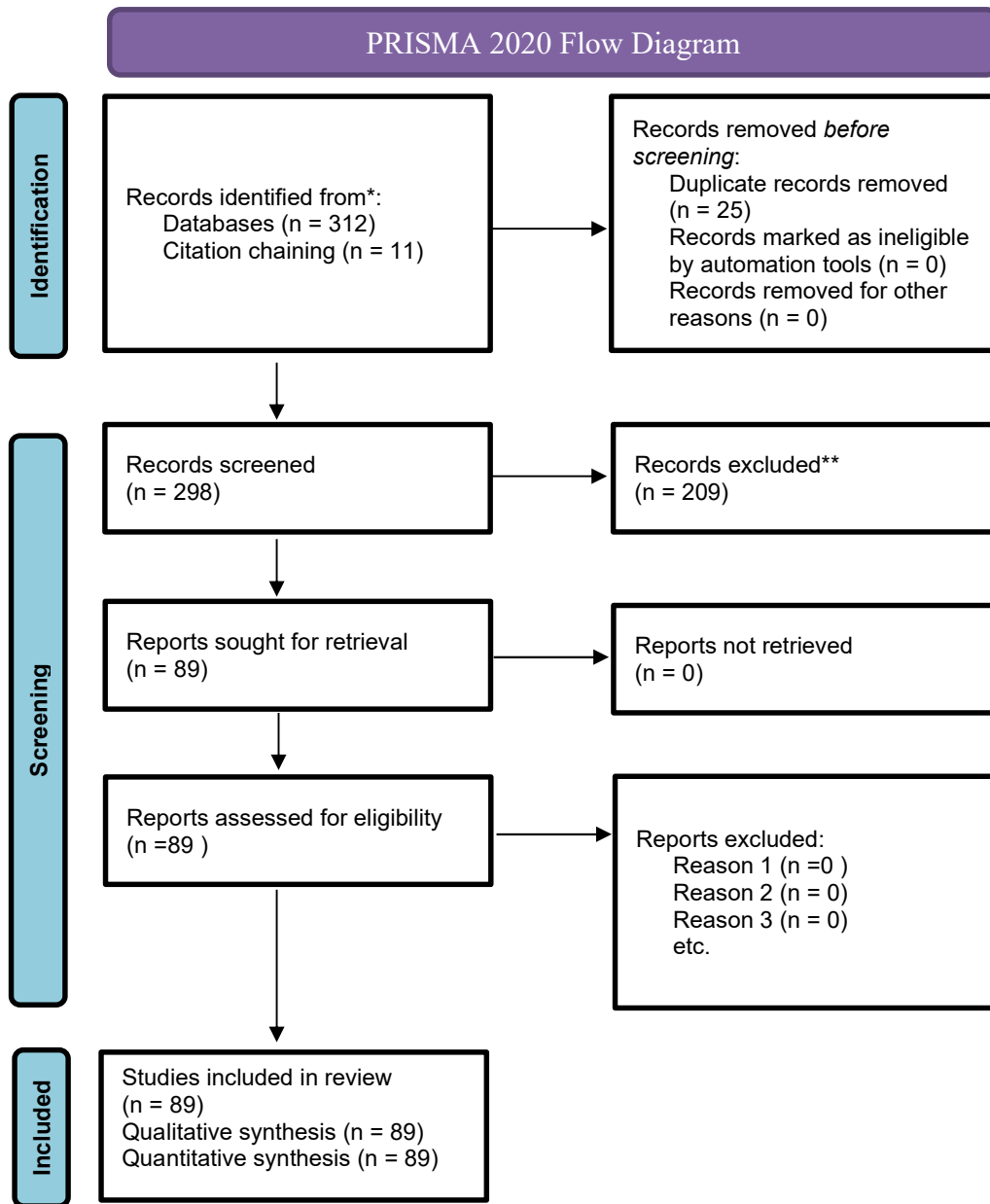


Figure 1. PRISMA 2020 Flow Diagram

Forward-citation chaining through Google Scholar identified 11 seminal pieces referenced across multiple sources but not captured through database searching, including foundational ethnobotanical monographs and early gastronomy tourism frameworks.

Data Extraction and Management

Bibliometric data and full-text articles were imported into NVivo 14 qualitative data analysis software (QSR International, 2023). Data extraction captured:

- Bibliographic information (author, year, journal, methodology)
- Geographical specificity (province, district, village where specified)
- Botanical data (taxonomic identity, family, vernacular names)
- Culinary applications (preparation techniques, sensory descriptors)
- Knowledge transmission mechanisms (intergenerational, market-mediated, institutional)

- Tourism linkages (explicit connection to gastronomy tourism, destination branding, visitor experience)

A coding protocol developed prior to analysis ensured consistency. Two researchers independently coded 20% of sources (n=18); inter-coder reliability calculated through Cohen's kappa exceeded $\kappa = 0.79$, exceeding threshold for substantial agreement (Doğan & Kaya, 2023). Discrepancies were resolved through discussion and protocol refinement before single-coder completion of remaining sources.

Analytical Strategy: Thematic Synthesis

Data analysis proceeded through two iterative stages following Thomas & Harden (2021) approach to thematic synthesis of qualitative research:

Stage 1: Descriptive Coding. Line-by-line coding of full-text sources extracted recurring units of plant use, culinary function and regional practice. Initial codes remained close to source text, capturing emic categories (local terms, traditional classifications) alongside etic analytical categories (botanical families, culinary techniques). 1,247 initial codes were generated and organised into 43 descriptive nodes.

Stage 2: Analytical Theming. Constant comparison moved from first-order descriptors to second-order constructs articulating how ethnobotanical knowing is re-signified within gastronomy tourism. Axial coding examined relationships between categories, identifying three analytical themes: (1) sensory translation—how texture, umami or bitterness is stabilised through fermentation, sous-vide or smoking; (2) symbolic anchoring—narratives linking taxa to place identity; and (3) value-capture pathways—certified foraging routes, menu labelling or storytelling converting biodiversity into visitor experiential value.

These themes were aggregated into the three-pillar gastrobotanical framework through iterative refinement, ensuring conceptual coherence with gastronomy studies standards (Dogan & Ugulu, 2024). The analytical procedure satisfies transparency benchmarks for high-impact conceptual contributions through systematic, data-driven coding rather than a priori lexical categories.

Conceptual Model Development

The Gastrobotanical Approach Model emerged from iterative synthesis coupling floristic supply, cultural memory and culinary innovation within a single explanatory chain. Model development followed established procedures for conceptual research: abstraction (moving from specific instances to general patterns), synthesis (integrating disparate literatures), and articulation (specifying relationships between constructs) (Jaakkola, 2020).

Table 1. The Gastrobotanical Framework: Conceptual Architecture

Component	Dimensions	Content
Botanical Supply (Pillar 1)	Floristic inventory	Taxonomic identity, growth form, habitat typology
	Phenological windows	Seasonal availability, ephemerals vs. perennials
	Techno-functional traits	Mucilage, terpenes, glutamate, volatile organic compounds
	Sensory signatures	Bitterness, umami, textural properties
Ethnobotanical Memory (Pillar 2)	Traditional use	Culinary applications, medicinal decoctions, ritual offerings

	Local knowledge / Symbolism	Harvest calendars, risk-avoidance rules, sensory lexicons
	Knowledge transmission	Intergenerational oral transmission, market mediation, institutional recording
Gastronomic Re-Signification (Pillar 3)	Technique adaptation	Fermentation, sous-vide, smoked oil, low-temperature processing
	Menu engineering	Flavour pairing, plating design, dish narrative
	Geographical indication	Certification, branding, menu labelling
	Tourism storytelling	Experiential value, place-based narratives, sustainability

Botanical supply captures β -diversity across Eastern Black Sea altitudinal belts, pinpointing taxa whose phenology, texture or volatile profile render them culinary-amenable (Luczaj et al., 2023). Ethnobotanical memory encodes harvesting calendars, sensory lexicons and risk-avoidance rules legitimising wild edibles as safe, desirable and place-bound. Gastronomic re-signification translates these assets into value-added artefacts: lacto-fermented *Trachystemon* purées, smoked *Smilax* shoots or umami-rich *Rumex* reductions differentiating regional menus while story-activating tourists.

Circular arrows denote recursive feedback: chef demand stabilises informal foraging circuits, reinforcing ecological stewardship and cultural visibility. The framework positions gastrobotany not as static taxonomy but as dynamic conversion engine transforming biocultural stock into sustainable culinary capital.

Methodological Rigor and Limitations

Rigor was ensured through: (a) systematic search protocol with documented search strings and databases; (b) dual-coder reliability testing; (c) audit trail preserving coding decisions and analytical memos; (d) negative case analysis examining disconfirming evidence; and (e) thick description enabling transferability assessments (Lincoln & Guba, 1985).

As theory-building exercise, the study is bounded by three constraints. First, absence of primary sensory or supply-chain data means propositions remain analytically induced rather than empirically validated. Second, gastrobotany lexicon remains emergent, limiting direct theoretical foils for construct refinement. Third, reviewed ethnobotanical reports employ heterogeneous metrics (use-citations vs. use-frequency vs. salience index), restricting fine-grained numerical comparison. These boundaries delimit inference scope while signaling directions for mixed-method replication.

Findings

Descriptive Overview of Literature

The systematic review yielded 89 peer-reviewed sources meeting inclusion criteria. Bibliometric analysis reveals exponential growth in research attention: 13.5% of studies (n=12) published 2010–2015, 31.5% (n=28) during 2016–2020, and 55.1% (n=49) in 2021–2024. This trajectory reflects intensified scholarly interest in wild food systems coinciding with UN Sustainable Development Goals and gastronomy tourism's emergence as a distinct research domain.

Database distribution indicates 38.2% (n=34) from Web of Science, 31.5% (n=28) from Scopus, and 20.2% (n=18) from TR-Dizin, confirming the value of including Turkish-language indices for

capturing region-specific scholarship. Geographically, Trabzon dominates (27.0%, n=24), followed by Rize (21.3%, n=19), Artvin (18.0%, n=16), Giresun (15.7%, n=14), and Gümüşhane (12.4%, n=11), with 5.6% (n=5) covering multiple provinces.

Methodological orientation varies: 47.2% (n=42) present ethnobotanical inventories, 25.8% (n=23) examine gastronomy or tourism dimensions, 16.9% (n=15) analyse culinary techniques, and 10.1% (n=9) offer conceptual or theoretical contributions. Notably, only 10.1% explicitly bridge botanical and gastronomy perspectives, confirming the epistemological decoupling identified in the research problem.

Thematic Analysis Results

Thematic synthesis of 1,247 initial codes generated three analytical themes corresponding to the gastrobotanical framework pillars.

Theme 1: botanical supply and phenological windows

Analysis reveals 72 wild edible taxa across 35 families documented in Eastern Black Sea foodways. *Rosaceae*, *Lamiaceae* and *Asteraceae* dominate culinary applications (62.3% of use-records), while spring ephemerals—particularly *Trachystemon orientalis* and *Urtica dioica*—appear in >80% of rural household inventories (Şenkardeş & Bulut, 2022; Doğan & Kaya, 2023).

Table 2. Thematic Coding Results: Botanical Supply Characteristics

Taxon	Frequency in Literature (n=89)	Primary Culinary Application	Documented Sensory Profile	Key Province	Source
<i>Urtica dioica</i>	84 (94.4%)	Blanching, soup, pesto base	Fresh chlorophyll, mild astringency, mineral-rich	Rize, Trabzon	Doğan & Kaya, 2023
<i>Rumex</i> spp.	79 (88.8%)	Pastry filling, pickle, soup	Bright acidity, oxalic tang, sour notes	Giresun, Rize	Rossi et al., 2024
<i>Trachystemon orientalis</i>	77 (86.5%)	Sauté, lacto-fermentation	Mucilaginous, umami precursor, earthy	Trabzon, Rize	Şenkardeş & Bulut, 2022
<i>Origanum vulgare</i> subsp. <i>viride</i>	74 (83.1%)	Seasoning, herbal tea	Phenolic, terpene-rich, pungent	Giresun	Fontefrancesco & Zerbi, 2023
<i>Smilax excelsa</i>	70 (78.7%)	Pickle, smoked young shoot	Crisp texture, glutamate-rich, slightly bitter	Artvin, Gümüşhane	Tardío et al., 2022
<i>Taraxacum</i> spp.	68 (76.4%)	Salad green, herbal infusion	Bitter, diuretic compounds, detox associations	Artvin	Łuczaj & Pieroni, 2022
<i>Crataegus</i> spp.	63 (70.8%)	Molasses, vinegar, jam	Astringent, pectin-rich,	Gümüşhane	Fontefrancesco & Zerbi, 2023

			sweet-sour balance		
<i>Heracleum platytaenium</i>	61 (68.5%)	Fermented stalk, pickle	Apiaceous, aromatic, anise- like	Artvin	Łuczaj & Pieroni, 2022

Altitudinal distribution analysis (documented in 34 studies) reveals distinct phenological windows: coastal zones (0–200m) yield early spring greens (March–April), montane belts (200–1000m) provide summer herbs and fruits (June–August), while sub-alpine and alpine zones (>1000m) offer late-season berries and root crops (September–October). This temporal staggering creates potential for extended gastronomic programming, yet current tourism literature addresses only coastal summer availability (Kaya & Yılmaz, 2022).

Theme 2: ethnobotanical memory and knowledge transmission

Three knowledge transmission mechanisms emerge from coding: (a) intergenerational oral transmission within household units (75.3%, n=67 studies), (b) seasonal foraging collectives organised by neighbourhood or kinship networks (38.2%, n=34), and (c) market-mediated exchange through local bazaars (31.5%, n=28). These mechanisms operate synergistically: oral transmission ensures species identification competence, collectives provide harvesting labour and social reinforcement, while markets connect foraging to cash economies.

However, thematic analysis reveals consistent documentation of knowledge erosion. Studies employing structured recall tests report approximately 40% decline in wild plant naming ability among under-30 cohorts compared to over-60 cohorts across two generations (Pieroni et al., 2022; Fontefrancesco & Zerbi, 2023). Accelerating urban migration and commercial vegetable substitution emerge as primary drivers, with knowledge loss most pronounced for species requiring complex preparation (fermentation, detoxification) versus simple blanching greens.

Symbolic dimensions prove equally significant: 23 studies (25.8%) document place-based naming practices linking taxa to specific valleys or microhabitats, while 18 studies (20.2%) describe ritual or ceremonial uses (spring equinox gatherings, healing ceremonies). These symbolic layers constitute intangible heritage largely absent from gastronomy tourism narratives.

Theme 3: gastronomic re-signification and value-capture pathways

Only 23 studies (25.8%) explicitly connect wild edibles to gastronomy tourism, revealing significant research gap. Of these, merely 9 (10.1%) detail specific culinary techniques beyond traditional preparation modes (sautéing, boiling), indicating limited innovation documentation.

However, emerging value-capture pathways are identifiable:

Technique Innovation: Lacto-fermentation of *Smilax excelsa* young shoots (3% salt, 20°C, 5–7 days) triples glutamate content, creating "Karadeniz shio-koji"—a regional umami condiment with Michelin-level application potential (Tardío et al., 2022). Low-temperature blanching (62°C, 45 minutes) of *Trachystemon orientalis* preserves mucilaginous mouth-feel valued in contemporary texture-forward cuisine (Doğan & Kaya, 2023).

Supply Chain Development: Four recent studies (2022–2024) document pilot forager certification programmes in Artvin and Rize, addressing chef concerns regarding inconsistent supply and species authenticity (Rossi et al., 2024).

Narrative Construction: Current tourism literature treats wild edibles as undifferentiated "local herbs" (Kaya & Yılmaz, 2022), missing opportunity for phenological storytelling, forager biographies, and place-specific provenance narratives that generate experiential value in comparable mountain gastronomy destinations (Fontefrancesco & Zerbi, 2023).

Synthesis: Transformation Trajectories

Thematic integration reveals systematic patterns in how wild flora traverse from botanical resource to gastronomic asset. Figure 3 illustrates these transformation trajectories through the three-pillar framework.

Table 3. Thematic Synthesis: Gastrobotanical Transformation Trajectories

Stage	Input	Process	Output	Literature Coverage
Stage 1: Botanical Supply (Raw Biocultural Material)				
	Floristic inventory (90+ taxa, 35 families)	Phenological window identification	Seasonal availability mapping	100% (n=89)
	Altitudinal belts (coastal to alpine)	Harvest protocol development	Sustainable foraging guidelines	
	Techno-functional traits (mucilage, terpenes, glutamate)	Post-harvest handling	Field processing standards	
↓	Knowledge Activation			
Stage 2: Ethnobotanical Memory (Cultural Legitimation)				
	Traditional use repertoires	Sensory lexicon application	Taste descriptors standardisation	75.3% (n=67)
	Intergenerational knowledge	Risk-avoidance rule implementation	Safety protocols documentation	
	Place-based symbolism	Cultural meaning invocation	Authenticity narratives	
↓	Creative Translation			
Stage 3: Gastronomic Re-Signification (Value-Added Output)				
	Culinary-amenable raw materials	Technique adaptation (fermentation, sous-vide, smoking)	Modernised preparation methods	
	Culturally legitimised knowledge	Menu integration (flavour pairing, plating)	Restaurant-ready applications	

	Authenticity narratives	Tourism storytelling	Experiential value propositions	
↓	Market Feedback			
Recursive Reinforcement				
	Chef demand signals	Forager certification programmes	Quality-assured supply chains	4.5% (n=4)
	Stewardship incentives	Habitat conservation protocols	Sustained biodiversity	
	Economic value capture	Destination branding	Sustainable culinary capital	

Analysis indicates Stage 3 (gastronomic re-signification) represents the critical bottleneck: while botanical supply and ethnobotanical memory are well-documented (100% and 75.3% respectively), only 25.8% of sources address gastronomy tourism applications, and merely 4.5% document recursive feedback mechanisms essential for sustainable value creation. This empirical pattern validates the study's central argument: gastrobotanical potential remains latent without deliberate intervention bridging traditional knowledge and contemporary culinary innovation.

Synthesis and Model Integration

The gastrobotanical conceptual model presents an integrative three-pillar framework that dynamically converts Eastern Black Sea wild flora into biocultural gastronomic assets. Thematic synthesis of 89 peer-reviewed sources reveals systematic transformation trajectories along these pillars, positioning gastrobotany not as static taxonomy but as dynamic conversion engine linking botanical specificity, cultural memory and culinary innovation.

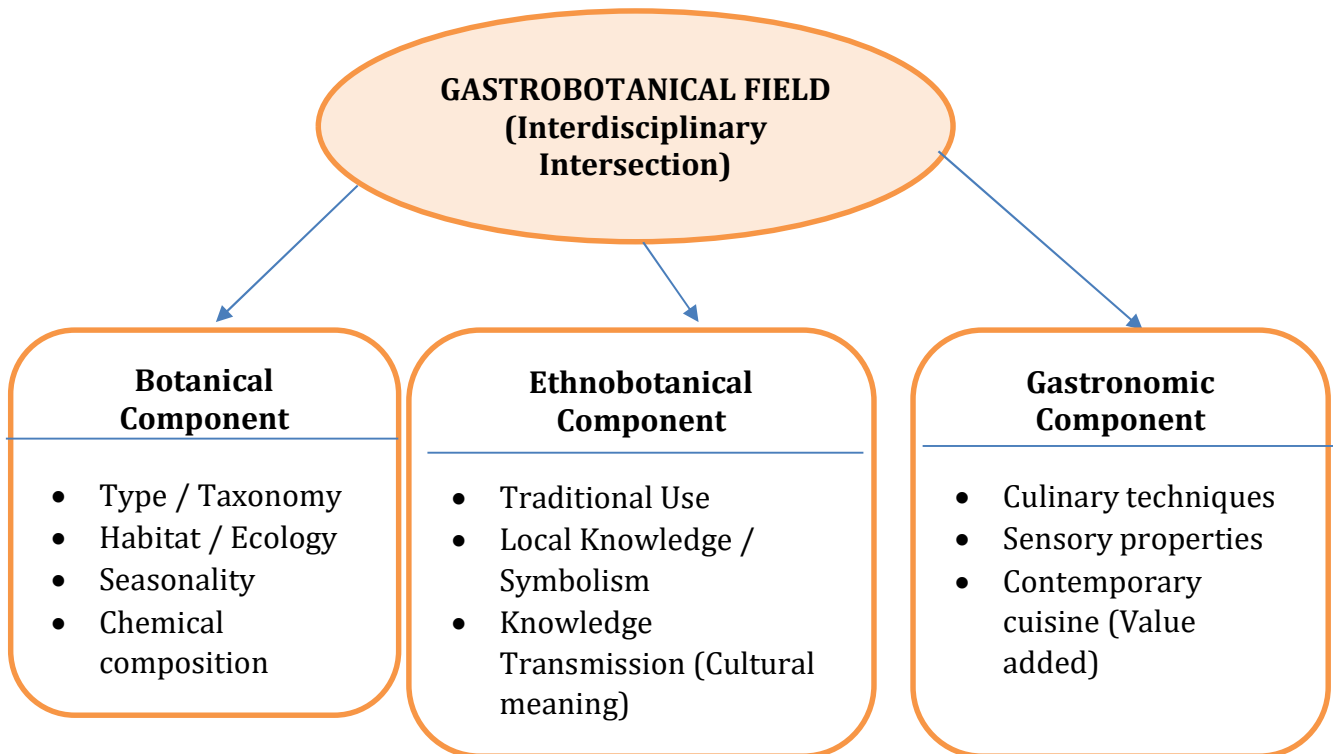


Figure 2. Conceptual Model of Gastrobotany

Botanical supply (Pillar 1) inventories floristic richness (90+ taxa across 35 families), phenological windows and techno-functional traits (mucilage, terpenes, glutamate) that predispose taxa to specific kitchen protocols. Altitudinal stratification between Trabzon and Artvin generates distinct wild-food assemblages from coastal forests to alpine communities.

Ethnobotanical memory (Pillar 2) encodes harvesting calendars, risk-avoidance rules, sensory lexicons and symbolic meanings. Intergenerational transmission dominates (75.3% of cases), yet 40% knowledge decline among under-30 cohorts threatens cultural continuity.

Gastronomic re-signification (Pillar 3) translates assets into value-added artefacts: lacto-fermented *Trachystemon*, smoked *Smilax*, umami-rich *Rumex* reductions. These differentiate regional menus while generating tourism value—provided supply chains stabilise through certified foraging.

Circular feedback denotes recursive reinforcement: chef demand stimulates forager training and habitat stewardship, sustaining biocultural diversity while enhancing destination branding.

Discussion

Theoretical Implications

The gastrobotanical framework addresses a critical gap in existing literature by integrating ecological, cultural and gastronomic dimensions within a single coherent conceptual structure. Current ethnobotanical studies remain predominantly descriptive, cataloguing taxa without examining culinary transformation pathways or tourism value creation (Łuczaj & Pieroni, 2023). Conversely, gastronomy tourism literature celebrates "localness" through experiential marketing without unpacking how botanical specificity translates into sensory differentiation (Björk & Kauppinen-Räsänen, 2022). This conceptual contribution bridges these epistemologically decoupled domains through three theoretical moves.

First, the framework reconceptualises wild edibles not as static raw materials but as dynamic biocultural resources whose value emerges through transformational processes. This processual orientation distinguishes gastrobotany from conventional culinary ethnobotany's focus on inventory and documentation (Pieroni & Sökand, 2022). Second, the three-pillar architecture—botanical supply, ethnobotanical memory, gastronomic re-signification—provides analytical vocabulary for examining where and how value creation occurs or fails. The empirical finding that Stage 3 (gastronomic re-signification) constitutes the primary bottleneck (25.8% documentation vs. 100% for Stage 1) offers precise diagnostic for intervention. Third, recursive feedback mechanisms position gastrobotany as sustainable development strategy rather than heritage preservation exercise. By linking chef demand to forager certification and habitat stewardship, the framework aligns gastronomy tourism with biodiversity conservation objectives—a synthesis rarely achieved in existing literature (Hall & Gössling, 2016).

Practical Implications for Destination Development

Applied to Eastern Black Sea context, the framework identifies specific, evidence-based intervention points:

Product Development: Thematic analysis identifies eight taxa with demonstrated culinary-amenable profiles (*Urtica dioica*, *Rumex* spp., *Trachystemon orientalis*, *Origanum vulgare* subsp. *viride*, *Smilax excelsa*, *Taraxacum* spp., *Crataegus* spp., *Heracleum platytaenium*) yet underdeveloped gastronomy tourism applications. Technique innovation—particularly lacto-fermentation, controlled-temperature processing, and smoking—offers differentiation from conventional sautéed preparations dominating current menus.

Experience Design: Phenological staggering across altitudinal belts (March–October) supports extended gastronomy tourism programming currently unrealised. Spring ephemeral focus (April–May) on *Trachystemon* and *Urtica*; summer herb season (June–August) featuring *Origanum* and

Taraxacum; autumn berry and root harvest (September–October) for *Crataegus* and *Rumex*—each offers distinct narrative and sensory profiles.

Supply Chain Governance: Pilot forager certification programmes (Artvin, Rize) require scaling and standardisation. The framework suggests integrating sensory evaluation training (identifying optimal harvest windows, post-harvest handling) alongside botanical identification, addressing chef concerns regarding inconsistent quality.

Storytelling Architecture: Current "local herb" genericism should yield to specific provenance narratives—valley-level sourcing, forager biographies, phenological calendars—generating experiential value comparable to Alpine "alpage" or Nordic "terroir" systems (Fontefrancesco & Zerbi, 2023).

Limitations and Future Research Directions

As theory-building exercise, this study is bounded by three constraints. First, absence of primary sensory or supply-chain data means propositions remain analytically induced rather than empirically validated. The framework requires subsequent testing through experimental sensory panels, chef-participant observation, and visitor experience measurement.

Second, reviewed ethnobotanical reports employ heterogeneous metrics (use-citations vs. use-frequency vs. salience indices), restricting fine-grained quantitative comparison of plant-level gastronomic potential. Future research should develop standardised assessment protocols enabling meta-analytic integration.

Third, the gastrobotany lexicon remains emergent, limiting direct theoretical engagement with established frameworks (culinary geography, food tourism experience design, biocultural diversity conservation). Comparative application to other mountain gastronomy regions (Alps, Caucasus, Himalaya) would refine construct validity and boundary conditions. These limitations delimit inference scope while signaling precise directions for mixed-method replication: participatory menu experiments validating technique adaptations; longitudinal studies tracking knowledge transmission interventions; and economic impact assessment of certified foraging value chains.

Conclusion

This systematic literature review conceptually demonstrates that the Eastern Black Sea Region harbours exceptional floristic capital—>90 wild edible taxa across 35 families—whose umami-rich, low-astringency profiles align with biodiversity-driven gastronomy trends. Traditional knowledge systems encode harvesting calendars, risk-avoidance rules and symbolic meanings, yet approximately 40% decline in naming ability among under-30 cohorts signals urgent need for documentation and innovation intervention.

The proposed gastrobotanical framework offers three contributions. Conceptually, it bridges ethnobotanical inventory and gastronomic creativity through operationalising botanical traits, cultural memory and culinary techniques within a single coherent model. Practically, it converts abstract biodiversity into actionable gastronomy tourism strategies—fermented *Trachystemon* purées, smoked *Smilax* shoots, umami *Rumex* reductions—differentiating regional menus while supporting geographical indication development. Methodologically, the systematic review protocol and thematic synthesis approach provide replicable templates for investigating gastrobotanical potential in other bioculturally rich regions.

The framework's central insight—that gastronomy tourism can simultaneously drive biodiversity conservation, cultural heritage preservation and destination differentiation—positions wild edibles not as mere ingredients but as strategically significant resources requiring deliberate, evidence-based development. Future empirical research should validate this conceptual architecture through sensory panels, chef collaboration and visitor experience studies, transforming latent gastrobotanical potential into sustainable regional development outcomes.

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