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Ethnobotany of *Zmeyovski pelin*: A Traditional *Artemisia*-Flavored Wine from Bulgaria

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Abstract: Flavoring wine with *Artemisia* species, together with other aromatic herbs and/or fruits, is a practice that has evolved in different parts of Bulgaria. The aromatized wine-based beverage, called *pelin*, is named after the Bulgarian common name for the genus *Artemisia*. In this paper, we present *Zmeyovski pelin*, the history of which dates back to the early 20th century. We employed semi-structured interviews with 15 *pelin* producers from the Zmeyovo village with an age span from 44 to 83 years. The relative frequency of citation for each stated taxon was recorded. We explored the changes in the plant knowledge of the *pelin* makers and discussed the drivers for it. From a modern perspective, *pelin* can be considered a functional beverage since the aromatic plants and fruits adds a variety of biologically active substances to it, thus enhancing its health benefits. We regard the consumers' inquiry about the benefits of the added plants as a driver for mitigating the plant awareness disparity among the local community.

Keywords: *Zmeyovski pelin*; functional beverage; traditional plant knowledge; plant awareness disparity

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1. Introduction

Fermented plant-based foods and beverages are well-known sources of various biologically active compounds, like polyphenols, vitamins, organic acids, minerals, etc. [1–3]. Being part of the native diet of many cultures, these fermented products reflect not only the local traditions but also emulate natural diversity and the landscape. Numerous traditional alcoholic and non-alcoholic fermented beverages, when consumed in moderation, have been found to be beneficial, complementing one's diet and thus contributing to overall health and subjective well-being, including brain health and cognitive functions. In particular, wine consumption, being recognized as an important part of the Mediterranean diet, has been linked to improved cardiovascular health, longevity, and the hedonic component of subjective well-being [4]. The latter is related to the presence of beneficial compounds like anthocyanins and polyphenols which are also shown to be perceived as a part of the quality of wines [5]. At the same time, despite the growing interest in functional foods and beverages, the consumption of wines is in decline even in countries where they are traditionally popular [6,7].

Many beneficial ingredients are introduced by flavoring alcoholic drinks (wines, liqueurs, bitters, vermouths, etc.) with different herbs, resins, and plant extracts applied individually or in combinations. Flavored alcoholic beverages are popular in many European, African, and Asian countries with various combinations of herbs and spices [8–10]. These traditional practices have been known since antiquity and they involve resins (*Pistacia terebinthus* L., *Pinus halepensis Mill.*), wormwood/mugwort (*Artemisia* spp.), thyme (*Thymus*

spp./*Thymbra* spp.), savory *(Satureja* spp.), coriander (*Coriandrum* spp.), etc., which are added for their preservative, flavor-enhancing, and medicinal qualities [11,12].

In the Balkans, different *Artemisia* taxa are used for aromatization of distillates, e.g., different varieties of rakija/rakia (distilled grape and/or fruit brandies), liquors, bitters, and white and red wines—*pelin* (Bulgaria) and *vin pelin* (Romania) [13–16]. Some of the recipes are close to those of the West European vermouths, following classic technologies of production and ingredients. Still, the *Artemisia*-flavored wines from the region are less studied, especially the variety of their flavoring compositions [17–19]. At the same time, scientific research on the properties and production of similar aromatized wines is increasing internationally [20–23].

Artemisia (*pelin* in Bulgarian, from which the name of the beverage is inferred) is a symbolic and medicinal plant associated with love, courtship, and marriage [24,25]. Aside from the medicinal use of *Artemisia* herbage, known from medieval Cyrillic manuscripts, the earliest written record of the consumption of *pelin/pelinash* in Bulgaria dates back to the mid-19th century, being part of various festive occasions and used as an aperitif [16,26–28]. Older records mention a lower number of aromatic herbs in *pelin* wines, often without specifying the *Artemisia* species, while later sources cite additional herbal components [16]. Similarly, to the Slovenian PGI *Pelinkovec* and Croatian PGI Hrvatski *pelinkovac* (both liqueurs flavored with *A. absinthium*), Bulgarian *pelin* has no fixed recipe or limitations in the herbal components which allows the reflection of the uniqueness of the specific area and/or producer as well [15,29,30]. According to Bulgarian legislation, the organoleptic characteristics of *pelin* are mainly attributed to the addition of *A. absinthium*, fruits, and other herbal ingredients [31].

The current study focuses on *pelin* from Zmeyovo village—a celebrated local beverage that represents a tradition typical for South Bulgaria in which dry aromatic plants and fruits are arranged (*nalozheni*) in alternating layers, inside the barrels [32,33]. The base wine for *Zmeyovski pelin* is customarily prepared from the red (pink) 'Pamid' grape variety. It has low acidity and varied sugar content, depending on the vintage and terroir, resulting in wines with relatively low alcohol content (ca. 12% *v*/*v*), which were usually supplied to local consumers and rarely exported [34]. *Zmeyovski pelin* was not marketed during Communism (1945–1989), but was offered to special guests, relatives, and acquaintances. To promote the product, the *Zmeyovski pelin* festival was launched in 2007. It takes place in December when the new *pelin* is ready, which attracts many visitors [35].

The aim of the current study is to explore plant diversity in *Zmeyovski pelin* recipes and to assess the attitude of the local producers towards the medicinal plants they utilize, including the level of their botanical knowledge to identify them, but also their environmental awareness and adherence to sustainable collection practices. We discuss the health benefits of *pelin* as a cold, low-alcoholic infusion in light of the growing demand for functional foods and beverages among consumers. We argue that the usefulness of plants increases the interest of the local community and *pelin* producers. We perceive this phenomenon as a tool to mitigate the plant awareness disparity in rural areas. This study is a part of a larger scientific investigation of this local product, which through scientific methods and tools, aims to describe and preserve the traditional practice of making flavored beverages and, by working with the local community, to improve the quality and safety of the final product.

2. Materials and Methods

Zmeyovo village is situated in the foothills of Sredna Gora Mt. (42.4953 N, 25.6247 E), near the town of Stara Zagora—the ancient Beroe/Augusta Traiana—in northern parts of Thrace, a region well-known for its winemaking traditions [36,37]. The terrain is semi-mountainous (ca. 400 m a.s.l.), neighboring the Bulgarian Rose Valley at the foothills of the Balkan range to the north and the Chirpanski vazvishenia Natura 2000 zone to the west. The climate is temperate continental [38]. Currently, Zmeyovo has 952 residents, all ethnic Bulgarians who are Eastern Orthodox Christians.

Semi-structured interviews were conducted in 2023 with 15 small-scale producers of *Zmeyovski pelin* (13 men and 2 women) about aromatic plants and herbal preparations applied for *Zmeyovski pelin* flavoring, their function, and importance. The respondents were contacted through key informants—the mayor of the village and the secretary of the community center—who are producers of this beverage as well.

The average age of the respondents was 64 years, with the oldest being 83 years of age and the youngest being 44. Fourteen of the respondents lived permanently in the village, and only one lived in Stara Zagora and traveled regularly to the village. Seven of the participants were retired, but are involved in the cultivation of vineyards, orchards, and vegetable gardens, and/or in the production of wines and spirits. Another seven still work in the village (3) or in the city (4) but are involved in agricultural work as well. As far as *Zmeyovski pelin* production is concerned, most of the respondents had produced it personally for at least 20 years.

The interviews were conducted in the Bulgarian language. Informed consent from all participants was obtained verbally prior to conducting the interviews, following the guidelines prescribed by the International Society of Ethnobiology [39]. The research approach and anonymized data handling were approved by the Council of Biological Sciences section of the Faculty of Agriculture, Trakia University, acting as an independent ethical body (Permit #11/10 April 2023).

Local plant names, used parts, and the origin of the plants were documented, along with image reference and when available with herbarium vouchers that are deposited in the Herbarium of the Institute of Biodiversity and Ecosystem Research (SOM). Plant identification was done using the Handbook of Bulgarian Vascular Flora [40]. Plant family and taxon names were determined using APG-IV and POWO database [41,42]. Official nomenclature of the International Code for the Nomenclature of Cultivated Plants, as acknowledged by the International Code of Nomenclature for algae, fungi, and plants, was followed.

All data were processed with Microsoft® Excel 2021 (v16.0). Relative frequency of citation (RFC) for each stated use of the plant resources was obtained by dividing the frequency of citation (FC) by the number of the informants who gave answers to the question (N), using the following formula [43]:

$$RFC = FC/N.$$

The Jaccard index (JI) was used here to evaluate the similarities among different *Zmeyovski pelin* flavoring mixtures and between *Zmeyovski pelin* flavorings and previously published data for *pelin* in Bulgaria [16].

$$JI\ (X, Y) = |X \cap Y| / |X \cup Y|,$$

where X and Y signify every two mixtures. JI ranges from 0 (no similarity) to 1 (total equality) [44].

3. Results

3.1. Herbal Flavorings for Zmeyouvski pelin—Plant Taxa and Mixtures

A total of 49 taxa, belonging to 20 plant families, were recorded as flavorings for *Zmeyovski pelin* (Table 1). Lamiaceae family was represented by 11 taxa, closely followed by Asteraceae with 10. *Artemisia absinthium* was the only compulsory herbal ingredient; closely followed by *Artemisia vulgaris* (RFC = 0.93) and *Hypericum perforatum* (RFC = 0.73).

Table 1. Flavoring herbals used in the preparation of *Zmeyovski pelin*.

Taxon (Herbarium Vaucher)	Family	Source	Parts Used	RFC
***Artemisia absinthium* L.** (SOM 178009)	Asteraceae	C/W	H	1.00
***Artemisia vulgaris* L.** * (SOM 178010)	Asteraceae	W	H	0.93
Vitis vinifera L. * (mostly 'Black Muscat' ('Hamburg Muscat') and occasionally 'Aligoté', 'Cabernet', and 'Merlot')	Vitaceae	C/M	Fr	0.73
***Hypericum perforatum* L.** (SOM 178013)	Hypericaceae	W	H et Fl	0.73
Malus domestica (Suckow) Borkh. * (cv. 'Ayvaniya', 'Karastoyanka', 'Red Delicious', 'Golden Delicious', 'Melrose')	Rosaceae	C/M	Fr	0.70
Cydonia oblonga Mill. *	Rosaceae	C/M	Fr	0.53
***Tilia* spp.** *	Malvaceae	M	Fl	0.40 **
***Achillea clypeolata* Sm.** *	Asteraceae	W	H et Fl	0.40
***Coriandrum sativum* L.**	Apiaceae	M	S	0.40
***Thymus* spp.** *	Lamiaceae	M/W	H et Fl	0.33
***Achillea millefolium* L. agg.** * (SOM 178012)	Asteraceae	W	H et Fl	0.33
***Agrimonia eupatoria* L.** *	Rosaceae	W	H et Fl	0.33 **
***Matricaria chamomilla* L.** *	Asteraceae	M/W	Fl	0.33
***Origanum vulgare* L.** *	Lamiaceae	M	H	0.27
Melissa officinalis L. *	Lamiaceae	C/M	H	0.20
Syzygium aromaticum (L.) Merr. & L. M. Perry *	Mytraceae	M (I)	S	0.20
Myristica fragrans Houtt. *	Myristicaceae	M (I)	S	0.20
***Melilotus officinalis* (L.) Lam.** (SOM 178011)	Fabaceae	M/W	H	0.20 **
***Galium verum* L.**	Rubiaceae	W	H et Fl	0.20 **
***Sambucus ebulus* L.** *	Viburnaceae	W	Fr	0.20
Armoracia rusticana **P.Gaertn. B.Mey. & Scherb.**	Brassicaceae	C/M	Rh	0.13
***Centaurium erythraea* Rafn** *	Gentianaceae	M/W	H et Fl	0.13
Citrus × *limon* (L.) **Osbeck** *	Rutaceae	M (I)	Fr/L	0.13 **
Cinnamomum verum **J.Presl** *	Lauraceae	M (I)	B	0.13
Pelargonium graveolens L'Hér.	Geraniaceae	C	L	0.13 **
Salvia rosmarinus Spenn. *	Lamiaceae	M	H et Fl	0.13
***Mentha* spp.** *	Lamiaceae	C/M/W	H	0.13 **
Ocimum basilicum L. *	Lamiaceae	C/M	H	0.13
Anthemis arvensis L. *	Araceae	W	Fl	0.06 **
Artemisia pontica L.	Asteraceae	C	H et Fl	0.06
***Cichorium intybus* L.** *	Asteraceae	W	H et Fl	0.06 **
Citrus reticulata Blanco	Rutaceae	M (I)	P	0.06 **
***Dipsacus* spp.**	Caprifoliaceae	W	H et Fl	0.06 **
***Equisetum arvense* L.** *	Equisetaceae	M	H	0.06 **
***Inula helenium* L.** *	Asteraceae	M	R	0.06
***Gentiana cruciata* L.** *	Gentianaceae	M	H et Fl	0.06 **

Table 1. *Cont.*

Taxon (Herbarium Vaucher)	Family	Source	Parts Used	RFC
Humulus lupulus L.	Cannabaceae	M	Catkins	0.06 **
***Symphytum officinale* L.** *	Boraginaceae	M	R	0.06 **
***Lavandula* spp.**	Lamiaceae	C/M	H et Fl	0.06
Mutarda nigra* (L.) *Bernh.	Brassicaceae	M	S	0.06
***Salvia officinalis* L.** *	Lamiaceae	W	H et Fl	0.06
***Salvia sclarea* L.** *	Lamiaceae	W	H et Fl	0.06
***Sambucus nigra* L.** *	Viburnaceae	W	Fr	0.06
***Satureja* spp.**	Lamiaceae	M	H et Fl	0.06 **
***Teucrium chamaedrys* L.** *	Lamiaceae	M/W	H et Fl	0.06 **
***Tussilago farfara* L.** *	Asteraceae	M	L	0.06 **
Bozhigrobski bosilek (unidentified)	-	W	H et Fl	0.06
Byal kantarion (unidentified)	-	W	H et Fl	0.06
Manastirski bosilek (unidentified)	-	W	H et Fl	0.06

Wild populations of the plant taxa in bold are under the regulation of the Bulgarian Medicinal Plants Law. * Taxa used in Bulgarian folk medicine for respiratory infections, including pulmonary tuberculosis, and symptoms related to viral infections (coughs, fever, etc.). ** Taxa that were not reported for flavoring of Bulgarian *pelin*; sources: W—wild, C—cultivated, M—purchased from the market/pharmacy, I—imported; plant parts: H—herba, Fl—flowers, L—leaves, Rh—rhizomes, R—roots, S—seeds; RFC—relative frequency of citation.

Artemisia-flavored beverages are typically perceived as bitter; however, sweetness and flavor were the major descriptives used by all *Zmeyovski pelin* producers. That is achieved by adding fresh fruits, sourced mainly from the personal orchards of the producers or from other local farmers. Several apple varieties (RFC = 0.73) were mentioned for flavoring of the *pelin* among which the old varieties 'Aivania' and 'Karastoyanka' were distinguished for their aroma and sweetness. Respondents shared that they used "wild" quinces referring to old trees, growing outside the home gardens, with small, but very aromatic fruits. Occasionally, producers added imported lemons (RFC = 0.13) and mandarins (RFC = 0.06) to enhance the fruity notes of the beverage, but in general foreign ingredients were found to be unpopular. Only a few producers purchased cinnamon (*Cinnamomum verum*, RFC = 0.13), clove (*Syzygium aromaticum*), and nutmeg (*Myristica fragrans*), both with RFC = 0.2. The aroma is further refined by adding grape bunches (RFC = 0.73), with 'Hamburg Muskat' being cited most frequently. Coriander (*Coriandrum sativim*) seeds and lime blossom (*Tilia* spp.) are sometimes mentioned, both with RFC = 0.40. The latter is the most frequently mentioned herbal ingredient that was not mentioned in the available literature on *pelin* production in Bulgaria. The same refers to another 18 taxa that are used by the producers of *Zmeyovski pelin* but not found to be used in other *pelin* variations in the country. Of them, 11 are used only by one producer in Zmeyovo village.

Producers shared that the 'Pamid' grape variety—one of the oldest Balkan varieties, grown aboundingly in southern Bulgaria in the past and traditionally used for *pelin* production—is currently rarely used as a single source for obtaining the wine base. 'Merlot' and 'Cabernet' grapes are blended with 'Pamid' to enhance the color of the wine and to strengthen its body. Elderberries (*Sambucus nigra* and *S. ebulus*) could be further added to enhance the color. 'Shevka Slivenska', 'Aligoté', 'Muscat Ottonel', 'Chardonnay', 'Misket Cherven', and 'Misket Kaylushki' grape bunches were added as well, especially when white wine was used as a base.

The herbage of most of the used plants is gathered and dried in the shade, tied in bunches (*kitki*), the latter being the principal measuring unit in the recipes (Figure 1). A bunch can be small (15–20 g) and "normal" (approx. 30 g). In the presented recipes, *A. vulgaris* was applied in the biggest quantities. On average 25 "normal" bunches of *A.*

vulgaris, together with the other herbal ingredients, occupied about half to two thirds of the barrel volume. Interestingly, the recipe of the oldest participant did not include locally gathered *A. vulgaris* which might imply that its use is a recipe development that spread among *pelin* makers in the village to avoid the difficulty of collecting the necessary quantities in some years, as some producers pointed out.

(**a**) (**b**)

Figure 1. *Kitki* (bunches) of herbal ingredients prepared for *Zmeyovski pelin* flavoring (**a**); a producer processing *Artemisia vulgaris* herbage for 100 L barrel (**b**).

Bitter-tasting flavorings were finely dosed in all recipes and bitterness was controlled by daily testing. At least 12 of the herbal ingredients could contribute to the overall bitterness, but only *Artemisia absinthium*, *Achillea millefolium*, and *Gentiana cruciata* were meticulously dosed and checked daily [45]. Traditionally, a bunch of *A. absinthium* tied on a thread is submerged in the wine, while more recently the decoction or infusion of it are also used as they are more manageable.

Similarities between the presented recipes, excluding the obligatory *A. absinthium* and the most frequent *A. vulgaris*, are shown in Figure 2a. Aside from the popularly added grapes, apples, and quinces that contribute to the overall sweetness and subsequent secondary fermentation, only *H. perforatum* was used by most of the producers (RFC = 0.73). For the rest of the herbal ingredients, producers clearly strived for a distinctive blend of flavoring ingredients. Only four recipes have substantial similarity (JI $\geq$ 0.5), which was related to current knowledge exchanges among them. Comparisons with previously published data on Bulgarian *pelin* also show substantial discrepancies, even with some recent recipes, with a median JI < 0.26 for recipes published after 2000 (Figure 2b). Some of the earliest publications mention only *Artemisia* and a few other taxa and present generalized descriptions that leave an open door for producers' interpretations [46–48]. On the other hand, an ethnobotanical study of *pelin* from eastern Bulgaria (Black Sea Coast) shows that, aside from *Artemisia* spp., apples, and quinces, only a few taxa of the Lamiaceae family (lemon balm, oregano, rosemary, and thyme) are used [49].

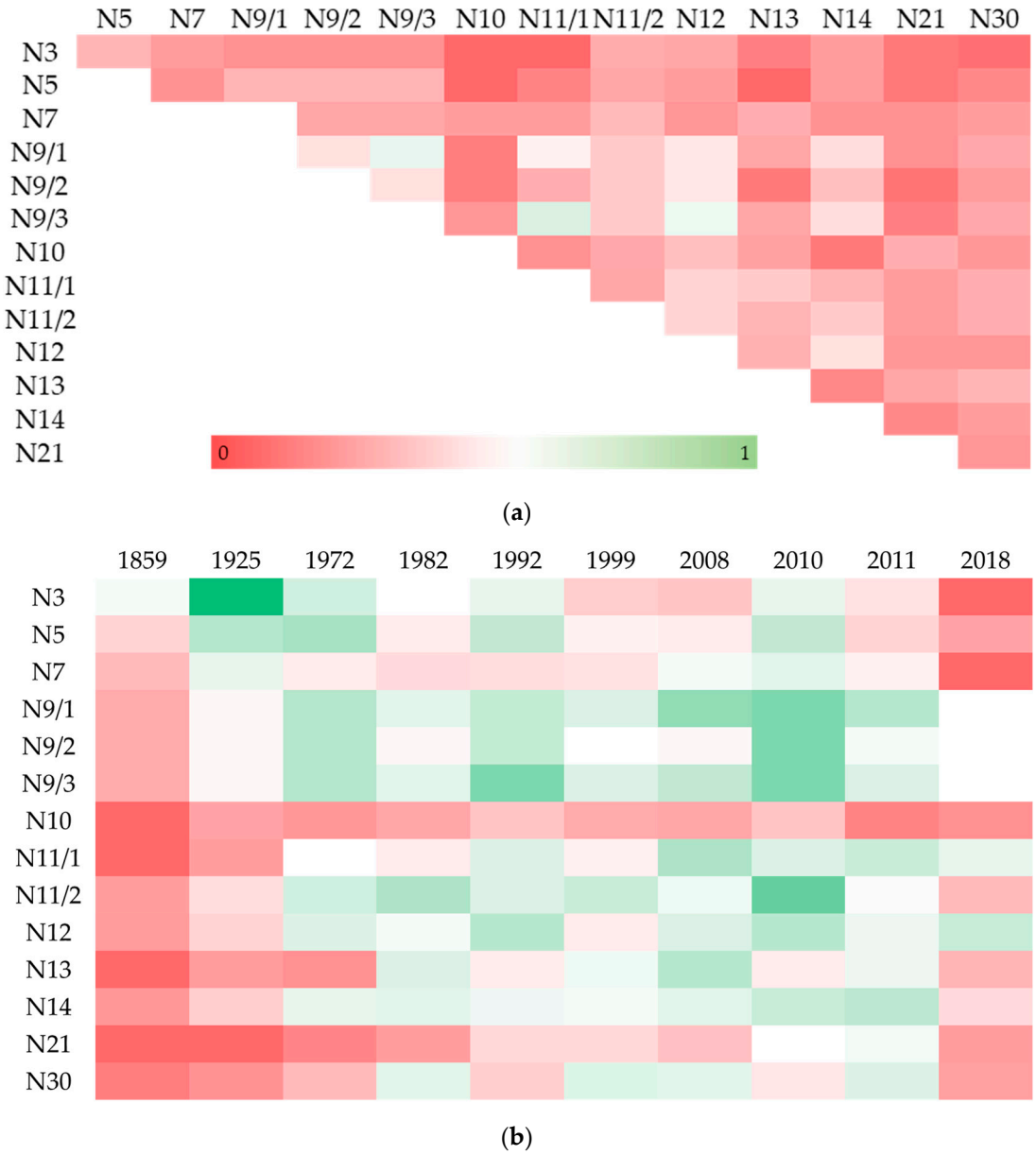

Figure 2. Similarity matrix (Jaccard index) of different preparations of *Zmeyovski pelin* (**a**); compared to previously published data on Bulgarian *pelin*, in chronological order (**b**). Numbers in the *Zmeyovski pelin* codes (Nxx) indicate the number of plant taxa in each blend. Literature data sources: 1859 [48], 1925 [46], 1972 [47], 1982 [50], 1992 [51], 1999 [52], 2008 [53], 2010 [54], 2011 [55], 2018 [49].

Most producers of *Zmeyovski pelin* (64%) were found to use between 9 and 20 plant taxa, with an overall median of 10.5 taxa per recipe (Figure 2). Only three producers (22%) used fewer herbal ingredients (3–7). The oldest producer used the fewest number of plants. Still, no association between the producers' age and the complexity of the recipes was found statistically. The largest number of taxa (30) was demonstrated only in one recipe that was claimed to be handed down from the grandmother of the producer (with more than 100 years of history). Some of the participants had secret ingredients that they would not share with outsiders; however, they were aware of the preferences of their neighbors and consumers and had an overall idea about the ingredients in different recipes.

3.2. Sourcing of the Medicinal Plants

The respondents indicated Enyovden (St. John's Eve, 24 June) as the beginning of the herb collection. The folk custom reflects its connection with the day of the summer solstice—the morning when medicinal plants have the strongest healing power according to the pre-Christian folk beliefs. However, the *pelin* producers in Zmeyovo perceive Enyovden more as a beginning of wild medicinal plants collection season and not so much as a ritual celebration.

Some of the herbals (*Artemisia absinthium*, *Artemisia vulgaris*, *Achillea millefolium*, etc.) were collected before the full blooming of their inflorescences, and others (*Agrimonia eupatoria*) before fruit formation. The producers shared that they avoid the full blooming to prevent the pollen abundance which makes the *pelin* turbid, indicating traditional ecological knowledge related to plant phenology which defines the best timing of herbage collection for the *pelin* flavorings.

As far as the herbal ingredients are concerned, a balance between buying and gathering herbs (34.48% and 31.03%, respectively) was observed. Nineteen plant taxa were collected from the wild by the producers. However, local markets and pharmacies were mentioned as an option for sourcing almost all flavoring herbals (30), in case some of the herbs, spices, and/or fruits were not available or the natural sources were limited. *Artemisia vulgaris*, which is applied in the largest quantities, as well as *Hypericum perforatum* and *Achillea clypeolata*, were exclusively collected from the wild by the *pelin* producers, mainly near the village from a natural locality called *Cichek bair* (from Ottoman Turkish *Çiçek bayır*—Flower Hill). Thirty plant species used in *pelin* flavoring fall under the regulations of the Bulgarian Medicinal Plants Law [56] and their collection is limited by annual quotas. The provisioning of the necessary quantities for the *Zmeyovski pelin* is hindered by other herb gatherers in the area who collect the plants for commercial purposes (see Table 1). Interestingly, our respondents did not use the herbs collected for the *pelin* for any healing purposes, in contrast to the widely spread practice of drinking herbal infusions for health benefits.

Regarding the fruits, only *Sambucus nigra* and *S. ebulus* were gathered from the wild, while the apples, grapes, and quince were bought from the market or gathered from the orchards of the *pelin* producers. Although the provision of the herbal ingredients is often challenging, only 6.9% of the used herbs were cultivated. No collective efforts were made to commence cultivation of *A. vulgaris*, which is needed in big quantities, but at the same time, the producers complained that its natural resources were gradually being exhausted. This approach proves once again the fact that *Zmeyovski pelin* production is confined to each family, rather than being considered as a community asset.

3.3. Production and Consumption of Zmeyovski pelin

According to the locals, the founder of *pelin* production in Zmeyovo village was Stoyan Naydenov, who flavored an imported sweet Hungarian wine with local *Artemisia* at the beginning of the 20th century. According to past statistics, the 'Pamid' variety occupied 80% of the vineyards in the Stara Zagora district in 1929 [34]. The 'Pamid' wine has a rose to light red color, balanced taste, and fruity aroma; hence, its enhancement with aromatic herbs and fruits was well accepted by the consumers. *Pelin* linked the local winemaking to the European vermouth tradition and it was quickly accepted as an aperitive, especially for women.

The preparation of *Zmeyovski pelin* starts at the end of October, and often is related to St. Dimitrius Day, on the 26th of October, when the herbal ingredients are placed in layers in the barrels, the wine is poured upon them, and the barrels are closed for 40 days. The barrels are opened on the 6th of December, St. Nikolaus Day, according to the Orthodox Christian calendar, and the *pelin* was consumed by the beginning of February, which coincides with another very important celebration of an Orthodox saint—St. Trifon, the guardian of winemakers and viticulture. Here again, the holidays are mentioned more to point out specific times of the year and to outline their religious context.

The quantity of *Zmeyovski pelin* prepared per year varied among families—some of them prepared the beverage only for their own consumption, while others also produced quantities for sale. There are two small *pelin* wineries in the village as well. *Pelin* has never been a major commodity in terms of quantities. It has been perceived rather as a specialty of the village. During Communism, the local cooperative prepared some barrels for "special" visits and occasions. Later, the beverage became famous due to the annual *Zmeyovski pelin* festival organized by the local cultural center, *chitaliste*. Today, there is an informal network of producers and consumers which is based on shared taste preferences and trust between them. The increasing consumer demand stimulated one of the informal producers to register a small winery where *pelin* production implements the local traditional knowledge.

3.4. Zmeyovski pelin as a Functional Beverage

There is no unanimous opinion among producers about the health benefits of the drink. Some respondents reported that *pelin* has similar benefits to pure wine when consumed in moderation. One producer claimed that *pelin* enhances resistance to viral diseases—"When *pelin* is finished, viruses take over". Bulgarian folk medicine prescribes 32 of the herbal ingredients of *Zmeyovski pelin* for respiratory illnesses and diseases, including fevers, colds, coughs, and pulmonary tuberculosis (see taxa marked with * in Table 1). For the latter, a wine decoction of *Artemisia* sp., *A. millefolium*, *H. perforatum*, *Centaurium erythraea*, and *Gentiana cruciata* was prescribed. This type of preparation was found also in several other treatments using the studied taxa—mostly for gynecological and gastrointestinal conditions (Table 2). However, *Zmeyovski pelin* in its essence is a cold infusion of medicinal plants which implies a different ratio of compounds and biological activities that has not been studied so far.

Table 2. Usage of herbal ingredients of *Zmeyovski pelin* in Bulgarian folk medicine (following Georgiev, 2013 [57]).

Taxon	Preparation	Used for	Ethnographic References
Artemisia sp.	decoction in wine	common fever; malaria	[58]
Centaurium erythraea	decoction in wine	sensitive stomach, constipation, diarrhea, intestinal colic, appetite loss, fever (in combination with *Artemisia* sp.), tuberculosis (in combination with *Artemisia* sp., *Achillea millefolium*, *Hypericum perforatum*, and *Gentiana cruciata* or with *H. perforatum*, *Fragaria vesca*, and *Urtica dioica*)	[59]
Cinnamomum verum	decoction in wine	coughs (with *Zingiber officinale*, *Syzygium aromaticum*, and honey)	[60]
Hypericum perfortum	decoction in wine	tuberculosis (see *Centaurium erythraea*)	[59]
Humulus lupulus	wine tincture	jaundice	
Melissa officinalis	decoction in wine	menorrhagia (with *Papaver* sp. and *Rubus fruticosus*)	
Mentha sp.	decoction in wine	coughs (with *Urtica dioica*, *Sambucus* sp., and others)	
Ocimum basilicum	decoction in three-year-old wine	induces menstruation in the menopausal period (with *Amaranthus* sp. and *Rubia tinctorum*)	[59,61]
Salvia officinalis	decoction in wine	tuberculosis (with *Levisticum officinale* and *Symphytum officinale*)	
Salvia rosmarinus	decoction in wine	respiratory obstruction (with *Salvia officinalis*, *Tussilago farfata*, and *Aloe officinalis* Forssk.)	
Teucrium chamaedrys	decoction in wine	fever, dysentery, hemorrhoids, menorrhagia, increases libido	
Syzygium aromaticum	decoction in wine	coughs (see *Cinnamomum verum*)	[60]

Three of the participants reported that their clients initially reached them because of a recommendation to take *pelin* as medicine. There is a growing interest in the healing properties of plants among Bulgarians; hence, the consumer–producer interactions have stimulated the producers to increase their knowledge about the healing properties of the medicinal and aromatic plants they use in the preparation of the beverage. Our respondents were prone to adding new ingredients once they had acquired new knowledge about their

healing effects, in response to consumers' interest in the healing properties of *pelin*. During Communism, *Zmeyovski pelin* was produced in Zmeyovo village with few ingredients. Our respondents reported that the use of a larger number of ingredients became popular after 1989. Producers in Zmeyovo explain the recipe variations with the differences in the taste preferences of each family, which is probably the reason why some authors describe *pelin* as "wine for one's soul" [50]. However, the diversification of the herbal component in *Zmeyovski pelin* coincides with the extended impact of foreign literature on the use of medicinal plants which became abundant in the 1990s. The fact that the *Zmeyovski pelin* had never been commercialized before the 1990s and therefore its recipe is not fixed and open to interpretation for the next generations makes the beverage a reflection of the dynamics in the knowledge of the medicinal plants inherited and acquired by the local community.

4. Discussion

The combinations of herbals for the *Zmeyovski pelin* reflect the personal taste and preferences of each producer but at the same time demonstrate dynamics in the producers' traditional ecological knowledge about plants. Flavorings found typically for all Bulgarian *pelin* beverages (i.e., *Artemisia absinthium* and fresh fruits—grapes, apples, and quinces) are among the most preferred by the producers of *Zmeyovski pelin* as well. However, the number of plant taxa used for flavoring of *Zmeyovki pelin* is about double compared to those found in literature on *pelin* making in the territory of Bulgaria [16]. *Tilia* sp., *Galium verum*, and *Pelargonium graveolens* could be considered as a local novelty. On the other hand, the use of lemons and cinnamon, as well as *Agrimonia eupatoria*, that were also found in vermouths, but absent in *pelin* recipes from other parts of the country, imply the introduction of foreign traditional or novel knowledge in search of new flavor profiles by the producers [8,16,33].

To balance the bitterness of the *pelin*, the producers favor old apple varieties like 'Karastoyanka' and 'Ayvaniya'. This empirical choice is supported by scientific results which show that the fruits of the 'Karastoyanka' variety have a high content of total and inverted sugars, respectivel, 18.05% and 13.45% [62]. Similarly, 'Ayvaniya' shows high total sugars (17.12%) and low total acidity (0.29%) [63]. These characteristics, together with the strong aroma of the fruits, make both varieties suitable for *pelin* aromatization and a source of an additional amount of sugars for the secondary fermentation similar to the "entr'acte" (intermission) type of the ancestral method (*la méthode ancestrale*) for sparkling wine production [64]. The usage of fruits from the Rosaceae family was found in different traditional fermented beverages across Europe as they are an inexpensive source of dietary polyphenols and sugars [8,65,66]. Still, adding fruits and fruit juices is considered by some authors as an emerging approach for wine-flavoring and is successfully used for diversification of the portfolio of many wineries [22]. On the other hand, the preference for old varieties adds value to traditional products by linking them to the territory on the one hand, and on the other, sustains the preservation of local plant genetic resources. Data show that the above-mentioned apple varieties have shown adaptive traits like resistance to different diseases [63,67]. Therefore, the maintenance of a larger pool of pome genetic resources allows further selection of new varieties in line with climate change and organic pest control.

Adding substantial quantities of *A. vulgaris* could be marked as distinctive for the local tradition. Together with common agrimony (*Agrimonia eupatoria*) and lime tree flowers (*Tilia* sp.), it is used by at least five of the producers of *Zmeyovski pelin* and was not found previously mentioned for flavoring of *pelin* or other *Artemisia*-flavored beverages. *Artemisia vulgaris* is used (together with other *Artemisia* taxa known as génépi) as a substitute for *A. eriantha* in traditional Italian liqueurs [68]. The species is also known as a traditional edible plant, mostly in Asian cultures, but is also consumed in some regionally specific local foods in Bulgaria and Poland [69–72]. While *A. vulgaris* is considered safer than *A. absinthium*, substantial differences were found between phytochemical profiles of samples from different origins; therefore *A. vulgaris* should be used with caution as well, especially

in combination with *A. absinthium* and *Salvia officinalis* [73,74]. Alpha- and beta-thujones, known to be neuro-, nephro-, and hepatotoxic as well as carcinogenic compounds in all three taxa, are usually in much lower quantities in *A. vulgaris* and *S. officinalis* herbage compared to *A. absinthium* [75]. Still, European Commision and European Medicines Agency restrict their quantity to a maximum 35 mg/kg flavoring [76]. On the other hand, Bulgarian regulations require *A. absinthium* to be at least 20% (*w*/*w*) of the *pelin* flavoring mixtures [31].

The most frequently used herbal additives in *Zmeyovski pelin* are collected from the wild or sourced from local orchards and vineyards. This poses some threats to the natural populations, especially when collection is done unsustainably [77]. The scarce availability of certain plants makes many traditional recipes open to content flexibility that could be the result of bad harvests, limited time to gather wild herbage and fruits, as well as personal inconveniences, especially of senior residents [78]. Hence, we can conclude that it is likely that the plant diversity of *Zmeyovski pelin* would increase over time. In the quest for identity on the market, the producers' attention to aromatic plants increased. Producers distinguish more aromatic plant species and their awareness of the state of their accessions and sustainable collection practices increased. These observations are in line with the findings of researchers dealing with plant awareness disparity (formerly named "plant blindness") who had found that emotional connection to a neglected subject (in our case medicinal plants) is a prerequisite for public acceptance of conservation efforts toward them [79,80]. Additionally, useful plants like medicinal plants, stimulant herbal drugs, spice plants, or edible plants raised more attention [81]. Our respondents demonstrated curiosity towards the medicinal properties of the plants they use in *pelin* preparation because they want to satisfy the growing demand of their clients for the health benefits of the beverage they buy. Further research on the functional properties and sensory profile of *Zmeyovski pelin* would also demonstrate the impact of the transformation of this local knowledge.

5. Conclusions

Local food and beverages are complex phenomena and as such need interdisciplinary research that involves the efforts of ethnobotanists, anthropologists, nutritionists, food technologies, economists, etc. to overcome the knowledge gaps that arise during food scouting. Traditional knowledge about those products has been proven to be a reliable source of contemporary innovations for the industry, especially when it could add health benefits and/or unique local specificities. Local communities, as guardians of this knowledge, should be regarded as the major shareholders of the benefits from the exploitation of its economic and cultural aspects. In this respect, documenting the specific local characteristics of potentially functional foods and beverages and their development is crucial for the preservation of the related traditions. The current study strives to engage producers of *Zmeyovski pelin* in long-term collaboration, thus strengthening their knowledge and providing resources for effective marketing strategies that would boost local livelihoods based on local ecological knowledge and sustainable use of natural resources.

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