


Sustainable approach for the collection and processing of medicinal and aromatic plants in Hungary

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ABSTRACT

Hungary is a Central European country that is rich in medicinal and aromatic wild plant species; in rural livelihoods, the collection, use, process, and trade of these plants are traditionally important contributors. However, due to several recent changes touching the sector, the natural ecosystems, biodiversity, and collectors - who generally belong to poorer social groups - are affected negatively.

The paper aims to introduce the Hungarian herbal sector from a holistic perspective, including its economic, environmental, and human dimensions, with a particular focus on sustainability. In this context, the purpose of the article is to discover this field as comprehensibly as possible and present it from both theoretical and practical aspects. Another objective is to collect the best practices and feasible solutions from the field in connection with promoting a harmonious, as well as economically prosperous relationship between nature and local people. This integrated approach helps show the industry's strengths and advantages, as well as its weaknesses and challenges. Based on the findings, the paper attempts also to propose some recommendations for the future.

KEYWORDS

Hungarian herbal industry, sustainable collection of wild medicinal and aromatic plants, agricultural machines and tools used in herb production, traditional ecological knowledge

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INTRODUCTION

Hungary has a long tradition of herb production. The first written records are found in books dating from the Middle Ages.¹ At that time monks arrived from the Mediterranean regions, such as the area of present-day Italy and France, and settled down in Hungary. They introduced several medicinal and aromatic plants, mainly members from the *Lamiaceae* family (for example *Hyssopus officinalis*, *Majorana hortensis*, *Melissa officinalis*, *Origanum vulgare*, *Rosmarinus officinalis*), that were naturalized in the Carpathian basin at that time. In these early years, herb production was carried out just on a small, family scale (Bernáth and Németh, 2002).

Both collection and cultivation became intensive at the beginning of the 20th century. Overall, the sector of Medicinal and Aromatic Plants (hereinafter: MAPs) was considered a prosperous part of the country's economy. To provide an example, *Chamomillae flos*, *Basilici herba* and *folium* were in high demand in the market and have become known as valued "Hungaricum products". (Bernáth and Németh, 2002).

In the middle of the 1920s oil distillation started to flourish, indeed, due to the special peninsular nature of Tihany, the lavender harvested there had a higher essential oil content than the French lavender at that time. Besides the success of the lavender oil distillation, which produced 400–600 kg of high-quality aromatic oil annually, other plants' oils also indicate a boom in the domestic industry. For instance, the oil production of *Mentha piperita* had reached 8,500 kg by 1941 (Bernáth et al., 2000).

Hungary had therefore a leading, large-scale production in MAPs in the first half of the 20th century and could maintain its important role until the late 1990s. However, after the regime change and the separation from the Soviet Union, the field of MAP business had to face not only political and economic changes, but also challenges. The circumstances of the production were altered, because the natural plant supply diminished while the number of protected and endangered species increased. Privatisation of forests and meadows resulted in the reduction of number of areas used for wild harvesting. Moreover, new purchasing and wholesale firms started to operate, and specialized retail dealers rose, after the downfall of the state monopoly. Several companies were granted permission for MAP export and import, but this liberalisation had both benefits and harmful impacts on the sector. A new trend appeared as well, which resulted in Western investors coming to the country to set up and maintain joint ventures particularly for medicinal and aromatic plants (Bernáth and Németh, 1998).

At the beginning of the 1920s, a specialization based on geographical regions (regarding indigenous species there) was established concerning MAPs in Hungary. This distribution was in use for many decades, although nowadays, collection and processing are concentrated mainly in the operational areas of producers and processors of the sector.

According to the data provided by the Hungarian Herb Cultivators, Collectors and Traders' Association and Commodity Board (hereinafter: (HACB, 2020)), currently, the mass of herbal drugs produced, collected, and cultivated in Hungary is around 27,000–30,000 tons of dry drugs

¹Besides the books written by monks of the monasteries, there is another emblematic piece written by Peter Melius in 1579, under the title *Herbarium, On the names, natures, and uses of trees and herbs*. The book contains descriptions of 275 plant species and lists the names of 1,236 plant species. This was the first book about herbs in the Hungarian language (Babulka, 2005).

The essence of the book is still in use in herbal circles, especially in connection with developing herb recipes.



per year. Approximately 120–130 plant species are collected, and the most important species of them, about 70–80 species, are regularly collected from natural habitats. In the 1990s, about 35,000–40,000 tons of herbal drugs and 80–100 tons of essential oils were produced annually on 37,000–42,000 ha. Nowadays, about 25,000–30,000 ha are under MAP cultivation; while the mass of drugs produced there is around 27,000–30,000 tons. The net turnover of MAP collection, cultivation, and primary processing is HUF 20–23 billion (approximately USD 57–66 million), with an estimated production value of HUF 8–10 billion (approximately USD 23–28 million). (HACB, 2020).

Wild MAP species are therefore of great importance because the majority of domestic herb and spice exports come from the drugs of wild-harvested plants. However, wild plant species are not only important for exports, but also play an important role in the domestic drug trade (Bernáth et al., 2014) (Table 1).

Table 1. The most abundant species collected in the wild. (Source: Bernáth et al. (2014))

Nr.	Plant species (and the part of the plant containing the drug)
1.	<i>Achillea millefolium</i> (herba, flos)
2.	<i>Aesculus hippocastanum</i> (semen)
3.	<i>Agrimonia eupatoria</i> (herba)
4.	<i>Allium ursinum</i> (herba, bulbus)
5.	<i>Althaea officinalis</i> (radix, folium)
6.	<i>Artemisia absinthium</i> (folium, herba)
7.	<i>Betula pendula</i> (folium)
8.	<i>Crataegus</i> (folium cum flore, fructus)
9.	<i>Elymus repens</i> (rhizoma)
10.	<i>Equisetum arvense</i> (herba)
11.	<i>Frangula alnus</i> (cortex)
12.	<i>Galium verum</i> (herba)
13.	<i>Hypericum perforatum</i> (herba)
14.	<i>Juglans regia</i> (folium)
15.	<i>Juniperus communis</i> (pseuso-fructus)
16.	<i>Matricaria chamomilla</i> (flos, aetheroleum, extractum fluidum)
17.	<i>Plantago lanceolata</i> (folium)
18.	<i>Populus</i> (gemma)
19.	<i>Prunus spinosa</i> (flos, fructus)
20.	<i>Ribes nigrum</i> (folium)
21.	<i>Robinia pseudoacacia</i> (flos)
22.	<i>Rosa canina</i> spp. (pseudo-fructus)
23.	<i>Sambucus nigra</i> (flos, fructus)
24.	<i>Solidago virga-aurea</i> (herba, radix)
25.	<i>Symphytum officinale</i> (rhizoma et radix)
26.	<i>Taraxacum officinale</i> (herba cum radix, folium, radix)
27.	<i>Tilia</i> (flos)
28.	<i>Urtica dioica</i> (folium)
29.	<i>Viscum album</i> (folium)



In Hungary, the spectrum of wild medicinal and aromatic plants that can be collected is quite broad, which is a domestic specificity that could be a competitive advantage over many other countries, where fewer species can be collected in industrial quantities due to climatic, geographical, biodiversity or other factors (HACB, 2020) (Table 2).

However, it is important to note that the collection area of the most significant wild stocks coincides completely with underdeveloped regions and small areas (HACB, 2020). The habitats of the medicinal plants collected in the country are usually located in areas with higher unemployment, so the collection contributes to the livelihoods of the local population. Some 5,000–8,000 people participate in seasonal collection. Today, no professional qualification is required to collect medicinal plants, but before the change of regime (1989–1990), a collector’s card was required. Nowadays, herb collection is possible as a private person, as a smallholder (registration with the Chamber of Agriculture requires a collection license) and as a business activity. When collecting from the wild, the activity must always comply with the relevant legislation mentioned earlier, and the necessary permits – when applicable – must be obtained (Lakatos, 2020).

According to Sára Kindlovits (secretary, HACB), in most cases those people go to harvest into the wild who are on low incomes and often live on state or municipal benefits. That is the reason why many of them start nowadays working in the construction industry where they can find a more stable and better paying job. Moreover, due to preferable working conditions, younger generations settle in cities and leave the countryside. Therefore, the main problem is

Table 2. The most important domestic herb species collected between 2016 and 2018. (Source: HACB, 2020)

Nr.	Plant species (and the part of the plant containing the drug)	Collection area(s)	Amount of drugs collected based on a 3-year average (ton)
1.	<i>Achillea millefolium</i> (herba, flos)	Great Plain, north-central mountainous region	50–100
2.	<i>Aesculus hippocastanum</i> (semen)	all over Hungary	150–200
3.	<i>Equisetum arvense</i> (herba)	all over Hungary	20–50
4.	<i>Matricaria recutita</i> (flos)	Great Plain	200–500
5.	<i>Rosa canina</i> (fructus)	north-central mountainous region, Great Plain	50–90
6.	<i>Sambucus nigra</i> (flos)	all over Hungary	60–70
7.	<i>Sambucus nigra</i> (fructus)	all over Hungary	200
8.	<i>Solidaginis virga-aurea</i> (herba)	south-western and north-eastern parts of Hungary	100–120
9.	<i>Tilia</i> (flos)	southern part of Transdanubia, north-central mountainous region	15–20
10.	<i>Urtica dioica</i> (folium)	Hajdú-Bihar, Szabolcs-Szatmár-Bereg, and Heves counties	150–200
11.	<i>Viscum album</i> (folium)	southern part of Transdanubia, north-central mountainous region	5–10



the decreasing number of people who could be involved in the harvesting process. Another problem is that presently only a few of them are in possession of traditional knowledge regarding herbs and their collection methods. That ancient knowledge is disappearing, and the majority of the collectors are not careful enough to harvest adequately and may cause damage to vegetation. Sára Kindlovits added that rural communities would be open to extra employment opportunities and product development in connection with medicinal plants but starting such a program faces difficulties due to lack of expertise and administrative obstacles related to the limited collection points. She said that although the number of collected plant species has not diminished recently and Hungary is still rich in MAP species, loss of natural habitats is detectable, and the steady decline in the number of collectors will lead to the disappearance of traditional herb picking (Interview – Kindlovits, 2022).

International outlook

MAPs are worldwide precious ingredients of modern drugs. According to Chen et al., more than 1,300 herbs are used in Europe for medicinal purposes, and 90% of them are collected from the wild. Around 80% of the population of the Global South rely on MAPs in the first place for their healthcare,² while more than 25% of commended medicines in the Global North are extracted from wild herbs. Based on the estimation of the International Union for Conservation of Nature (IUCN) and World Wildlife Fund (WWF), humans use globally 50,000–80,000 flowering plant breeds for healing, from which “15,000 species are threatened with extinction from overharvesting and habitat destruction, and 20% of their wild resources have already been nearly exhausted” in connection with the growing numbers of people in the planet (Chen et al., 2016).

Nowadays, the main drivers that hasten biodiversity loss and the usage of wild plants are “climate change, overharvesting, changes in land-use, more intensive agriculture, socio-economic changes, expansion of markets, and disappearance of local knowledge.” (Pawera et al., 2020). On the other hand, there is great intention to establish sustainable societies globally (Takeuchi, 2010).

On the European herbal market, about 90% of the approximately 1,200–1,300 drugs produced and marketed from medicinal and essential oil plants are collected mostly from developing countries (Bernáth, 2000).

Eastern and central European countries are famous for their abundant, but relatively cheap stocks of MAPs. On the one hand, this can be traced back to the centuries-old production of medicinal herbs in these states, which were largely wild native sources. The plants played a great role in the region’s traditional medicine as well, but, beyond domestic use, they were also popular export items in the former Soviet bloc (Lange, 2002).

According to Lange, the recorded global importation of MAP material (based on pharmaceutical plants) reached in general 400,000 tons valued at USD 1.243 million in the 1990s per year. The tendency shows that only a few countries dominate the international trade: 85% of global importation is directed to some 12 countries, while 12 states were subject to 82% of the global exportation. Europe is split into source and customer states. Between 1991 and 1998 around 3% of worldwide import was connected to the region, because this part of Europe is

²In the developing world, people from all socio-economic classes, but mainly rural and urban poor persons use MAPs due to cultural motivation, productiveness, reduced prices, and weak health care systems (Shanley and Luz, 2003).



rather known for export capacities.³ Mainly due to the increased export amounts of herbs in the region, large numbers of MAP species were put under legal protection (Lange, 2002).

The main destination for exports in Europe is Western Europe, traditionally Germany (80–90%). Other important destinations are the Netherlands, Austria, Switzerland, and Italy. It is therefore apparent that the salability and price of goods produced in Hungary depend to a large extent on the world market situation. Some drugs can be sold with a relatively high degree of safety. Their prices vary, but fluctuate within reasonable limits, resulting in higher and lower profits. Related to wild collection, the following products are the most popular choices: *Rosa canina*; *Sambuci flos*, *S. fructus*; *Taraxaci officinalis herba cum radice*, *T. folium*, *T. radix*; *Althaeae radix*, *A. folium*; *Tiliae flos*; as well as some cultivated ones, such as *Majoranae herba*; *Thymi herba*, *Pimpinella anisum*, *Menthae piperitae herba*, *M.P. folium*, *M.P. aetheroleum*. However, quality plays an important role in determining the price; sales opportunities vary from year to year. Market changes are usually monitored by the wholesaler companies (Bernáth et al., 2014).

World demand for medicinal plants and their products is growing at almost 5–7% per year (HACB, 2020). According to an international report, Germany alone imported MAPs valued at USD 250 million in 2015 (Jenkins et al., 2018). At the same time, the supply of MAPs is definite and continuously decreasing. Slow growth of many plant species, or harmful collection methods can lead to full exploitation or even disappearance of plant populations. Therefore, using them based on sustainable principles and applying good harvesting practices may be persuasive options. Besides sustainable harvesting processes, the conservation of MAPs becomes increasingly significant. In this context, multiple solutions have been worked out concerning the conservation of herbs, for example maintaining *in-situ* and *ex-situ* conservation or forming natural reserves, wild nurseries, seed banks, and botanic gardens (Chen et al., 2016).

In many Eastern and Central European countries, including Hungary, the level of income in rural regions is quite low. Consequently, MAP harvesting can provide extra revenue for local collectors. For the most part, these people are poorer, usually, farmers, retired, or women with children, who live in the countryside (Lange, 2002).

The availability of herbal raw materials is expected to become increasingly limited due to the labor shortages in the sector, which have been present for several years. Except for developing countries, the collection is declining, while cultivation and precision farming in herbal medicine are gaining ground. In the production of raw materials, with the development of instrumental detection of active substances and impurities, there are also challenges in meeting increasingly stringent purity and quality requirements (HACB, 2020).

The importance of sustainability, traditional knowledge (TK), indigenous knowledge (IK), and traditional ecological knowledge (TEK)

Nowadays, humanity is facing and coping with critical environmental problems. The common goal is to produce health-centred, quality-oriented, and marketable food and raw materials that contribute to the preservation of the countryside, landscape, wildlife, and environment, and serve the people and communities living there. To achieve positive environmental and social impacts, it is necessary to reestablish the harmonious relationship between man and nature.

³Hungary's export varied between 4,000 and 6,170 tons (Lange, 2002).



The issues of sustainability and biodiversity conservation have become a priority. The concept of sustainability is widely used nowadays, but its exact meaning is interpreted differently in politics, business, and the civil sector. The term was first used by the United Nations in the 1987 Brundtland Report on ‘Our Common Future’, where the concept of sustainability was defined as “the need to meet the needs of humanity today in such a way that future generations will have the resources to meet their needs” (United Nations, 1987). According to ethnobotanist Andrea Dénes (Dénes, 2012.), this thought should be applied to medicinal plants – besides the professional rules – through the following norms and collection ethics:

- Only those plants should be collected that are known to be edible or medicinal.
- Uprooting the plant is forbidden, it is crucial to leave enough leaves or flowers for the survival and reproduction of the individual (Roots and bulbs should only be collected from very common species and in small quantities in a single area.)
- Do not tear, or pull, but use scissors to cut off the parts of the plant to be collected (except, of course, for easily detached fruits).
- Do not trample the habitat where you are collecting. Take particular care in muddy areas. Do not trample over the meadow.
- Only collect flowers and fruit from trees and bushes without breaking branches. Buds and shoots should be collected from side shoots and not from the top shoots.
- Do not collect spatially rare plants, only common species. Those who collect regularly know which species are rare where they collect. It is important to spare them for the survival of their populations and possibly for reproduction. Preferably harvest materials from each stage of life.
- Collect clean, healthy plant parts from clean places.
- Harvesting is forbidden while collectors suffer from transmittable diseases or inflammation.

Guidelines are crucial regarding medicinal plant harvesting nowadays, as the described requirements contribute to constant and proper quality. Since demand for herbs is not predictable, and climatic conditions can change over time, it is always recommended to collect from diverse growing areas in order to avoid over-harvesting (Harnischfeger, 2000).

The rotation of collecting areas is also a guarantee for sustainable harvesting. Attention must be paid to not collect the entire stand and so leave 20–30% of the specimens intact for reproduction and regeneration of the given herb species. During collection, it is important to minimize the perturbation of the area. Besides, we must pay particular attention to basic hygiene requirements: disinfection of protective clothing, utensils, and cleaning cloths, particularly given epidemic situations (Lakatos, 2020).

The quintessence of sustainable harvesting is that harvesters need to use practices that focus not only on financial benefits but also pay attention to the preservation and survival of the plant species. In this context damages caused to habitats must be minimized, while harvesters must be aware of not only the unique characteristics of the plant species but also the gentle harvesting methods and features to promote stability in populations. Notes should be archived regarding the plants’ unique features, including life cycle, and biology (AHPA, 2017).

Following the perspective of Food and Agriculture Organization of the United Nations (FAO), the three main scopes of sustainability are “environmental friendliness, economic viability, and social equity”. (Vantomme and Walter, 2003).



To find the best sustainable practices, ethnobotanist Anthony Cunningham encourages relying on local communities' traditions and routines. He believes that successful biodiversity conservation should include local people too, whose livelihood is strongly linked to the sustainable use of ecosystems and natural resources (Cunningham, 2001). Among others, Schippmann et al. articulate the so-called "ecosystem approach" that names people and their cultural variety as main parts of ecosystems. According to the authors, the core of sustainable development is determined by the liaison between humans and the ecosystem where they live. It also means that their "well-being need to be assessed together. A society is thought to be sustainable when both the human and ecosystem conditions are satisfactory or improving." (Schippmann et al., 2002) According to Holmes, "issues of relationship between protected areas and local communities are of vital importance to biodiversity conservation" (Holmes, 2013); while Molnár et al. note that historical proceedings should also be learned, as well as "social driving forces behind the observed landscape changes," since they are strongly linked to today's biodiversity (Molnár et al., 2008).

Sustainable medicinal plant collection and cultivation must therefore be examined in the context of the plants, their habitat, and the people who live there. According to Gadgil et al., "the view of humans as a part of the natural world and a belief system stressing respect for the rest of the natural world" is a significant feature when talking about developing a sustainable relationship between nature and humans (Gadgil et al., 1993).

People living in strong contact with nature are constantly striving to use natural resources moderately and preserve them for the future. Through their traditional practices they also indirectly contribute to strengthening the biodiversity around them. The functioning of these communities can therefore serve as a good example of what sustainability is (Berkes et al., 1995).

To manage ecological services and natural resources, indigenous people have paid attention to preserving biological diversity. Their broad knowledge - including of medicinal uses - has been socially transmitted from generation to generation and constantly updated with new elements (Gadgil et al., 1993). The term *indigenous knowledge* (IK) is also illustrated by ethnobotanist Fikret Berkes, who says that it is "local knowledge held by indigenous peoples, or local knowledge unique to a given culture or society and can be used interchangeably with traditional knowledge." In particular, the authors equally explain Traditional Ecological Knowledge (TEK) as a subset of IK: "an attribute of societies with historical continuity in resource use practices." According to them, TEK has many likenesses with scientific knowledge (Berkes et al., 1995).

Traditional knowledge (TK) has generally been examined in indigenous communities, mostly in African or South American tribes. Certainly, there is no such awareness in European countries, where wisdom has very different characteristics. However, another sort of knowledge occurs in Europe too, mainly in rural areas, preserving over centuries of personal experiences of local people living in close relationship with nature. The same phenomenon exists in Hungary, where there are still some villagers who own TK. According to Molnár et al., traditional ecological knowledge is an element of the Hungarian local culture (Molnár et al., 2008).

The richness of Hungarian medicinal and aromatic herbs and the situation of the Roma collectors, who belong to the poorer social strata but possess extensive knowledge concerning herbs and growing sites, has also been noticed by the Traditional Medicinals Foundation (hereinafter: TMF) located in the United States of America. TMF is committed to reviving herbalism and supporting community-based social business models, including equitable trade.



According to the Foundation’s experience, although the Roma in Hungary have long preserved ancient herbal wisdom and are skilled herbalists, they have a very high unemployment rate of up to 70%, and most of them live in segregated rural communities. TMF’s program *Kenyér* was launched following their visit in Hungary in 2010 and named after the Hungarian word for bread (*kenyér*) which, as one of our most basic foods, also symbolises life. Through the project, TMF has laid the foundations for FairWild certification and helped to build a system that employs local Roma people in wildlife collection in and around Baksa (in the southern part of Hungary), as well as providing training and mentoring for young people ([Traditional Medicinals Foundation, 2016](#)).

The existence of traditional knowledge, long preserved and deeply anchored by the Roma, was confirmed by ethnobotanist Zsolt Molnár. He added that the collection of certain things (horses, herbs, or even waste) and their sale is an integral part of Roma identity and Gypsy culture. As for medicinal plants, their knowledge is extensive, they not only know the plants, but they can also estimate, for example, the quantities that can be collected. Many of them are healers indeed (Pers. communication - Molnár, 2022).

METHODOLOGY

To outline the current situation of the Hungarian herbal industry from a sustainable point of view, comprehensive research was carried out in 2022. This study took an integrated approach: on one hand by collecting and analyzing a range of scientific theoretical knowledge, and on the other hand by presenting practical examples.

To achieve a complex and balanced analysis through a holistic approach, qualitative research methods were chosen to explore the subject from as many angles as possible. Apart from a *broad literature review* and *case study research*, in-depth *interviews combined with field trips* were carried out too. Considering that the Hungarian herbal sector is relatively small and dominated greatly by a few bigger companies, only those herbal firms were selected from geographically different locations for the study which maintain sustainable practices during the production and still proceed with plant collection from the wild. Taking these criteria into account, finally, three herbal companies and the Hungarian Herb Cultivators, Collectors and Traders’ Association and Commodity Board (HACB) were selected for semi-structured interviews.

The next table presents the relevant information regarding the interviews ([Table 3](#)).

Table 3. List of conducted interviews. (Source: own elaboration)

Interviews			
Nr.	Name of interviewee	Position and organization with location	Date of interview
1.	Balázs Nagy	sales manager, Nagy Mihály Medicinal Plant Ltd. (Cserhátsurány, Hungary)	2 May 2022 (onsite); 11 May 2023 (via telephone)
2.	Sára Kindlovits Ph.D.	secretary, HACB (Budapest, Hungary)	17 May 2022 (in person)
3.	József Schmidt	owner, Schmidt und CO. Ltd. (Baksa, Hungary)	20 May 2022 (onsite); 18 May 2023 (onsite)
4.	Zsuzsanna Lopes-Szabó	executive manager, Györgytea Ltd. (Bükkszentkereszt, Hungary)	28 May 2022 (via telephone)



When additional scientific, up-to-date information was required, *personal communications* took place via email or telephone with those experts who have an outstanding academic and/or scientific record in their fields and could provide the researcher with credible answers.

Objectives

The Hungarian herbal industry overall is a more complex and specific professional field than other sectors of the horticulture industry and depends greatly on the collection and cultivation of raw materials. In addition, medicinal plants are used broadly, for instance in the pharmaceutical, food, cosmetic, and chemical industries. In Hungary, the ratio of collected to cultivated medicinal plants is almost half but collection has been steadily declining, and the amount of cultivated material was much higher some decades ago (Nagy, 2020).

These facts provide a good starting point for researchers. However, there is a need for improving our knowledge and gaining a broad picture of the Hungarian herbal sector from a holistic perspective by (i) touching upon the environmental, economic, and social aspects of this field, (ii) discussing if business objectives and environmental management can be reconciled in the process of organic farming, herb cultivation, and processing, and (iii) detecting through practical observations if sustainable harvesting of wild medicinal and aromatic plants can ensure conservation, social, and even economic benefits at the same time.

From a practical perspective, this paper attempts

- to introduce three Hungarian herb companies that are engaged in sustainability,
- to highlight projects aimed at elaborating practices that can be beneficial to local economies and residents in rural areas as well as serve nature conservation purposes at once, and
- to propose recommendations for the future based on the findings.

Additional questions will be touched upon, such as:

- Is it feasible to protect nature and local people and enhance the economy at the same time? Are there any good examples? Can local people be kept motivated to apply sustainable practices in the long term? How?
- What should be changed regarding the Hungarian herbal sector to make it a more prosperous field?
- What positive effects could this have on the structure of rural production and the situation of farmers and collectors?

PRESENTATION AND RESULTS OF IN-DEPTH INTERVIEWS AND PROJECTS

In-depth interviews

In the following paragraphs, the paper will attempt to present how three Hungarian herb companies operate in practice, as well as to reveal the human, social, and environmental aspects of their operation.



Nagy Mihály medicinal and aromatic plant Ltd.

Mihály Nagy started to deal with medicinal plants in the 1970s and then, in 1991, his son joined the family business. At that time, the regime change took place in the country that resulted in many fallow lands and plenty of herbs to collect in the northern-central mountainous region of Hungary where the firm is located. Therefore, building on their previous expertise, processing has become the firm's primary activity. Currently, the company's executive manager is the founder's son, but the grandson, Balázs Nagy also works at the company, doing sales and other tasks. They have 14 permanent employees, and 20 workers are employed in seasonal work (Interview – Nagy, 2022).

The herb factory overall deals with more than 50 types of medicinal plants, but the composition of the varieties changes annually, usually due to the market's demand and the quantity of wild-harvested plants. Some of the raw materials for their products are collected from wild stocks. A small proportion of the raw materials they purchase are dried naturally, while the majority is dried manually in one of their four gas-fired drying kilns (their drying capacity is 10,000 kg of raw material per day). After drying, the processes like cleaning, cutting, and classifying are supported by a highly mechanized technology. The company supplies cut herbs in large quantities, placing them into 100-liter paper bags (Nagy, 2021).

As Balázs Nagy explained, medicinal plants go through a multi-step process, of which the first step, drying, is the key. Today, drying is almost exclusively done artificially, using machines, as traditional "attic drying" has become negligible due to labour shortages, weather variability and the possibility of contamination. The Nagy Mihály Medicinal and Aromatic Plant Ltd. currently has 4 gas-fired drying ovens (drying capacity is 10,000 kg of raw material per day) and 8 table-top dryers, but only two of the latter are used. The ovens are chambers, each measuring 10×5 m, with several trays in which the raw material is loaded manually by workers using pitchforks. The drying process typically takes several hours, up to 20–48 h, depending on the weather conditions - rainy, humid, or dry hot, in which the plants were harvested; how wet the plant is, how thick the stems are, etc. Drying requires heat and airflow, and as the temperature in the chamber increases, more and more steam is produced that is being constantly monitored. When the humidity drops low enough and the air becomes dry, the chamber door is closed manually and the air inside is circulated. In terms of energy efficiency and maximum heat recovery, the company representative stressed that the most efficient way would be to use sensors that would measure "everything that can be measured"; instruments would monitor the temperature and humidity, and the sensors would then regulate and control the drying process based on their measurements. This would also be useful because it could be optimised and could replace human labour. In the case of a table-top dryer (which is 2 m wide and 12 m long), no manual labour is needed: a loading machine loads the table with raw material and spreads it out on the surface. A feeder can also be used in the process to ensure that the material is spread out as evenly as possible, because if the stack is too densely packed, the heat from below cannot penetrate, and if the stack is left with holes, the plant can dry out, which is critical for quality.

After drying, the second stage of processing takes place, during which the products are cleaned and categorized. This is where the cutting machine is used: two conveyor belts compact the material, then a cutting device consisting of a stationary knife and a moving knife slices the plants to the pre-set size. The sieving machine then sorts out the parts of the plant that are too



large or too small, which are then transferred to another fraction. These plant parts are then sold under different conditions. The sieving process also removes dust and sand.

The third stage of processing is no longer a compulsory step, but is optional, either due to the nature of the plant or at the request and extra cost of the buyer. This may involve the use of a pneumatic separator, which is a column-type device with two tubings. The top material is fed into one of the two passages so that the air blown in from below blows the light material (e.g. plant parts) into the other passage, while the heavier material (e.g. gravel) falls down. The device thus both cleans the raw material and is able to separate the plant parts - if necessary (e.g. for mistletoe). In addition to the pneumatic separator, a metal detector can be used to gain clean material, using compressed air to reduce the germs in the product and destroy dangerous micro-organisms, but with care, as the more intensive the process of microbiological contamination removal, the more volatile or active substances the plant loses, so it is not worth overdoing it and risking ruining the product.

As Balázs Nagy added, they are going through a difficult period due to the drastic rise in energy prices; electricity costs five times more and natural gas seven times more than a year ago. For this reason, they use only two of their eight table driers, and they have started a reasonable construction investment of HUF 12 million to install a 90-panel solar farm to replace the electricity they used to use. In addition, solar is a good choice for their consumption curve, as most of the electricity is used when the sun is shining the most, mainly for drying. The investment has not yet been fully implemented because of delays in installation. A good substitute for natural gas would be either the solar air collector for heat production, or “green hydrogen” which would use renewable electricity (solar panels) to split water into oxygen and hydrogen and would not produce harmful greenhouse gases when the hydrogen is burned. However, this latter process is currently not an option for them because it is too expensive. In addition, they are constantly faced with the high cost of energy compared to expensive human labour, and the unpredictability that surrounds them as small businesses, often unsure of how to develop in the face of ever-changing legal, fiscal, and economic circumstances (Interview - NAGY, 2023).

The company's activities are diversified; in addition to buying and processing, cultivated herbs are playing an increasingly important role in the supply. They grow on a total of 20 ha, mainly *Urtica dioica* and *Achillea millefolium*, but they purchase herbs from other farmers as well.⁴

As Balázs Nagy explained, previously, only 20% of the plants were grown. There were buying places in the nearby villages, where the wild harvested materials were brought in, usually already in dried form. There was no need to organize the receipts because the system worked by itself. Local people knew the herbs that grew in the countryside and passed it down from generation to generation. They went into the wild and picked the plants when the flowers flourished.

Today, according to his explanation, it is a different era, there are no buying places anymore, and the company only gets a phone call about the time when the plants will be delivered. So, the trend concerning wild collection and cultivation has now been completely reversed. In 2021, the ratio of wild-collected and cultivated plants was 23.84:76.16 (%). Regarding the

⁴To reach the best quality with cultivated plants, the company contacts as many farmers as possible, and assist them by providing them with technology, seeds, continuous professional monitoring, and, last but not least, a guarantee of purchase. They try to develop long-term relationships with producers (Nagy, 2021).



reasons for that change, the sales manager pointed out in the interview that in the last 5–10 years, the quantities collected in the wild have decreased as collectors have tended to move into the construction industry which gives them a steady source of income throughout the whole year. The main problem is that the herbs grown in the area provide seasonal income. Moreover, the collectors, the majority of whom are of Roma origin, do wild harvesting when they need a short-term, quick income. Finding the right workforce is therefore a huge problem. And as Balázs Nagy mentioned, despite all the benefits of collection, it will continue to decline in Hungary (Interview - Nagy, 2022).

The herb company operates with direct sales, and 99 percent of its products go to foreign customers, mostly in Germany.⁵ In 2021, orders were taken for only 25 types of products. Balázs Nagy has noticed that European countries are increasingly interested in natural ingredients, so almost everything they produce can be sold on the market. They negotiate with buyers around February–March to see what product is in demand.

As he said, the Hungarian herbal profession has always been characterized by high-quality standards, and such as the plants, the standards have not changed in the last fifty years. On the other hand, in many cases, it may be profitable for companies to import dried herbs from abroad than to collect and process them at home, and “as long as Bulgarian and Albanian labor and raw materials are cheaper, this will not change. Hungarian consumers are price sensitive” (Interview - Nagy, 2022).

Regarding the company, it can be concluded that it is run in the spirit of environmentally responsible management. Their professional credo is to sell high-quality products, focus on sustainability, protect the soil, and support the local population. They put great emphasis on growing organic plants and similarly, processing materials collected in appropriate areas to avoid contamination with pesticides. As Nagy explained, the proportion of farmland in the Hungarian countryside is increasing, although there would still be enough herbs in the wild for collection. However, the number of collectors is decreasing drastically, as young people are engaging in other professions. According to him, there are no ready-made solutions in the herbal sector, but it could be a resolution to make wild harvesting an attractive profession by employing those people in autumn and winter who would be glad to work outside in nature for the whole year. In addition, the modernization of the sector and the development of machinery could also attract young people to the herb industry (Interview - Nagy, 2022).

Schmidt und Co. Ltd.

The herb company Schmidt und CO. Ltd. is situated in Southern Hungary, a region known as “Ormátság,” which has always been rich in herbs. The firm was established soon after the regime change, at the beginning of the 1990s. Operating as a family business since 1997, they are engaged in the cultivation, collection, purchase, primary processing, and trade of medicinal and aromatic plants. Their personnel include 18 permanent employees in Baksa, while additional workers help seasonally. Eight people work in the processing plant in Lakócsa. 20% of their income comes from collection and 80% from cultivation.

⁵Domestic to export sales ratio in 2021 was 0.18:99.82 (%) (Interview - Nagy, 2022).



Although the herbal company is profit-oriented, it is committed to both nature protection and a sustainable future and is taking steps to help local collectors from poorer communities. One of their attempts to spread organic farming was to involve municipalities in the so called Start Work Programme in the labour-intensive cultivation of medicinal plants by providing market, seeds, cultivation technology, and certification costs. More than ten municipalities started the program, but just three remain today, typically those who have at least one employee who knows agriculture and is enthusiastic enough about it. In recent years, a dozen farmers have joined them in farming fennel (*Foeniculum vulgare*) on nearly 1,000 ha; with the result that nearly two thirds of the land is either in conversion or has already been converted to organic. This perennial crop seems a good choice because it increases the diversity of the area's fields, allows the use of land that is poor or unprofitable due to wildlife damage, its deep-penetrating taproots loosen compaction, while the remaining green chaff, which grows up to two metres a year, provides a thick blanket of soil over winter. It also benefits wild bees and local beekeepers, who usually set up beehive next to the larger fields during the flowering period (Interview - Schmidt, 2022).

They believe that the best and most promising alternative for the competitiveness and sustainability of agriculture is the expansion of organic farming. This not only helps people stay healthy but contributes to protecting the environment and maintaining natural communities. The aim is to produce quality and marketable food and raw materials, which at the same time preserve the countryside, the landscape, wildlife, and the environment, including people and their communities.

One of their top priorities is to promote biodiversity in the area. Cultivation is important for biodiversity, as the crops grown attract a wide variety of hawk moths and bumblebees when they bloom (e.g. *Allium schoenoprasum*, *F. vulgare*, *Matricaria chamomilla*, *Salvia officinalis*, *Thymus vulgaris*), and the presence of these insects is critically important. Therefore, the company does not grow monocultures, but vary with different cultures and use crop rotation. Soil conservation is also a primary concern; however, some soil conservation practices such as *no till/minimum till/cover crops* are problematic and not always feasible due to organic farming and small seed crops (Interview - Schmidt, 2023).

They farm 90 ha; the main cultivated plants are *M. chamomilla* on 30 ha and *Fagopyrum* as a second crop; *F. vulgare* on 36 ha, *R. canina* on 16 ha, *A. millefolium* on 7 ha, and *Trifolium pratense*, which is complemented with a second seeding, like *Malva sylvestris*, *Cnicus Benedictus*, according to demand. They produce the seeds themselves, therefore their own seeds are sown on the fields, supplemented with high quality purchased seeds as required. They find themselves to be in a lucky position because they can combine organic farming with herb cultivation, which can result in a great variety of richness. As proof of their commitment to biodiversity, in 2020, at one of their lands of 9 ha, they grew 7 species and 12 varieties of plants. For the third year in a row, 2 ha of the 9 ha have been planted with *A. millefolium*. They set up a *T. pratense* variety trial in this field, where 6 varieties for simultaneous main flowering were tested. The plots were separated by flowering strips consisting of a mixture of *Fagopyrum esculentum*, *Helianthus annuus*, and *Phacelia*. The remaining 1 ha was divided into 2, one half for the seeds of *Cannabis sativa* and the other half for *Avena strigosa*. The result was more than expected, as the field was buzzing with wild and domestic bees (Interview - Schmidt, 2022).

A further 1,600 ha is integrated in cultivation, 450 ha of land have been brought under wild rose (*R. canina*) cultivation. Demand for this crop is growing steadily on the market and subsidies are also available. In practice, integration is a kind of chain, whereby production is carried



out by other farmers, who are provided with professional assistance, and Schmidt und CO. concentrates on processing. Thus, they do the drying, then the processing and finally the sale of the finished product. The processing of the rosehips is carried out on a newly installed complete processing line, where first the impurities and branches are removed by means of various sieves, then the rosehips are chopped and crushed, and finally the flesh, the seeds and the covering hairs are separated from the crushed rosehips (Interview - Schmidt, 2023).

Their agricultural machinery currently includes: 3 tractors of 110 hp, tillage equipment (disc, soil loosener, plough, seedbed combinator, harrow); seed drill; row cultivator (to determine the size of the sowing distance); tine harrow; trailers; other tools for harvesting (chamomile combine, chipper e.g. for hemp).

To best preserve the valuable active substances of the plants, when the raw material is brought into the plant of Baksa, it is immediately dried in one of the 11 dryer facilities. The herb plant operates with 2 diesel dryers, 5 gas dryers, and 4 machines using burnt wood chip. The right temperature is crucial when drying, as it is not allowed to go above 40° to save the essential oil content of the herbs. Newer gas dryers are now sensor-based, which means they measure humidity and the temperature of the incoming air. They are mechanically ventilated, so you can set the rear air intake to open at certain intervals and for how long, which controls how much fresh air is introduced into the drying chamber. This allows the speed and quality of drying to be influenced. At present, this is done manually, but as the owner noted, the system could be made more modern if a program/application were to perform this operation. A further advantage would be if in the future the drying process could also measure the temperature of the air outlet; and a solution could be found to mechanise the loading and unloading of the dryers, which requires a large amount of human labour (Interview - Schmidt, 2023).

The company's representative explained how the processes of sowing, harvesting, and processing of medicinal and aromatic plants are usually done in practice, using the specific example of the chamomile plant.

In the case of *M. chamomilla*, the process starts with soil loosening, with occasional ploughing to turn in the organic fertiliser. The plow is ploughed with a disc or a combinator, and then a seedbed is made with a digging harrow. This herb also requires that the area be rolled before and immediately after sowing, as the seeds should be prevented from being blown away by the wind. The plant is sown over the entire field and then harvested with a chamomile combine, during which the flower heads are picked and then placed in a basket. After harvesting, the chamomile is dried as soon as possible at low temperatures (Interview - Schmidt, 2023).

The *wild collection* is carried out in Somogy and Baranya counties, in cooperation with 60 people, on nearly 400 ha. The main collected herbs are *Allium ursinum*, *Galium aparine*, *U. dioica*, *Tilia* ssp., *Solidago canadensis*, *R. canina*, *Sambuci fructus*. In 2020, the amount of wild-harvested raw plants was 883,400 kg (Schmidt und Co. Kft., 2021).

As the company's owner József Schmidt admitted, 43 companies were involved in herb cultivation at the time of the regime change, now only 5–6 remain (Interview - Schmidt, 2023). It is also noteworthy that a few decades ago, 133 species of herbs were collected in the area, but today they collect far fewer because the market has no demand for so many herbs.⁶

⁶According to this phenomenon, József Schmidt explained that a few decades ago they used to collect tons of *Vinca minor* because it is from this plant that one of the compounds of the medicine Cavinton was extracted. "But since the Japanese synthesized it, nobody buys it anymore" (Interview - Schmidt, 2022).



Moreover, as the area under built-up or agricultural cultivation increases, the number of natural habitats decreases, which negatively affects the number of plants that can be collected (Interview - Schmidt, 2022). According to him, another obstacle to biodiversity is the land system in Hungary, where large farms rather than small plots were established after the regime change, concentrating large areas of land in one hand, where mainly monocultures are grown. At the same time, in his experience, younger generations are beginning to move towards diversity because they seem receptive to it and understand its importance (Interview - Schmidt, 2023).

Despite the focus on cultivation and the challenges, wild harvesting remains an important factor in the company's operations, as it still has both the human factor (the collectors) and the continuous demand for the collected plants on the market. It is certainly difficult to find people to collect and then keep them in the long term, so it is possible that in the distant future those medicinal plants that require more labour (such as *Tilia*) and cannot be collected mechanically may disappear from the shelves, since there will be no one to pay the increasing costs. At the same time, from the point of view of economy and profitability, it is also important to preserve wild collection because the seasonal harvesting and drying of cultivated plants can be complemented by the collection of wild-collected plants, thus providing an opportunity to make better use of the capacity of dryers, machinery, and warehouses and to employ more people. This is an advantage for the business in the long term. To illustrate this, the owner listed that the year starts with the collection of *A. ursinum*, followed by the collection of *G. aparine*, *U. dioica*, *Sambucus nigra*, *Tilia*.

According to the company's standpoint, the main challenge is how to reorganise the sector, as the collection and wholesale purchase system developed under socialism was adopted after the change of regime, but the wholesale buyers and collectors are getting old, it is difficult to ensure replacement, and there is a noticeable shortage of available labour. However, the prices are competitive with other fees for physical work, in comparison with Hungarian conditions. If someone is quick enough and committed to work, it is feasible to collect HUF 15,000 (approximately USD 45) worth of plants a day. To carry out the herb collection, a manager organises the people for the work and provides the background and the means of transport. In the current reorganisation phase, it is essential to take sustainability into account, to provide ongoing education and training, and to place greater emphasis on product quality, safety, and traceability. The advantage of wild harvesting is that the plant is grown and, if there is enough human labour force to collect it, income will be generated. Although collection permits need to be gained, this can be usually obtained for a small amount of money, as most of the time they are applied to abandoned, wilderness areas. For the poorer population, wild collection can provide a livelihood and employment, but companies should provide them with work all year round. A recent change in legislation has brought a positive change, while introducing the so-called 'purchase ticket', whereby the herb company shall pay the compulsory taxes, and so the critical administrative burden on collectors is reduced (Interview - Schmidt, 2023).

The company's operations are largely determined by the fact that the German Martin Bauer Group, a major player in botanical products, holds a 25% share. They are the primary buyers, with 90% of the goods sold to them and the remaining 10% going to smaller Hungarian businesses in the neighborhood.

As part of the Martin Bauer Group, Schmidt und CO. Ltd. follows a **strict sustainability program** based on strong environmental principles. Sustainability is approached from three perspectives; firstly, social (respect for human rights; gender equality in employment, work and



pay; education; fair living wages), secondly, environmental (protection of natural habitats; promotion of biodiversity; reduction of carbon emissions in the context of climate protection, for example, and achieving climate neutrality by 2030), and thirdly, economic (long-term partnership; steady and fair prices). These three strands are interlinked and are also aligned with the United Nations Sustainable Development Goals.

Regarding renewable energy sources, the company wants to increase its solar capacity to 150 kWatt, currently 50 kWatt are produced. Solar energy is excellent for powering fans and engines and helps run wood chip dryers by producing energy-efficient hot water. Due to their circumstances, they consume the most energy from spring to autumn, they can therefore greatly benefit from solar energy to reduce their carbon emissions, energy dependency and costs.

To achieve climate neutrality, they assess how much greenhouse gas they emit during their operations, how much/how this could be reduced and how the remaining emissions could be absorbed. To do this, a concept should be developed. Related to this, software (such as Cool Farm Tools⁷) is available that uses the data input to calculate how much carbon dioxide is produced in the production of a given product and whether there are modern techniques that could be used to produce it more efficiently (Interview - Schmidt, 2023).

Different standard systems are also playing an extremely important role today in terms of sustainability, product safety and quality assurance.

Since 2001 the company has possessed *organic certification controlled by Biokontroll Hungária Nonprofit Ltd.* The share between organic and non-organic products is currently 60–40% but they sell an increasing proportion of organic products. This figure is justified by the fact that a great part of non-organic products is stemming from the collection of golden rod (*Solidago virga-aurea*) (Schmidt und CO. Ltd., 2021).

The *mabagrown*[®] *Procurement Standard* aims to combine product safety, product availability, social, and environmental sustainability in a single framework and encourages product development. The standard provides visibility and control of the entire supply chain through documentation (Schmidt und CO. Ltd., 2021).

In addition, the so-called *GACP* (*Good Agriculture and Collecting Practices*) is also implemented into the company's management strategy to ensure appropriate and consistent quality during the cultivation, processing, and even storage of plant drugs (Schmidt und CO. Ltd., 2021).

The *FairWild standard*⁸ was introduced to their operation by the Martin Bauer Group and has been in use since 2009. This standard refers to the followings: *S. fructus*, *S. flos*, *R. canina*, *Tilia cordata*, *U. dioica*.

The mission of FairWild is “to enable the transformation of resource management and business practices to be ecologically, socially, and economically sustainable throughout the supply chain of wild-collected products. The aim is to provide a worldwide framework for

⁷The Cool Farm Tool (CFT) GHG calculator is designed for full accounting (GHG emissions and carbon sequestration) at the farm level. “This online tool aims to help farmers evaluate farming management options for improving their carbon balance performance over time.” (CGIAR, 2023).

⁸The standard is connected to the FairWild Foundation which is a Swiss-registered Nonprofit Organization. The aforementioned Nagy Mihály Medicinal and Aromatic Plant Ltd. also possessed the FairWild standard, but they stopped using it years ago due to the high administrative burden, and they had difficulty in organizing the distribution of the premium as well (Interview - Nagy, 2022).



implementing a sustainable, fair, and value-added management and trading system for wild-collected natural ingredients and products thereof.” In addition, ethical working conditions and fair salaries provided for collectors are also focal points to guarantee sustainable wild collection (FairWild, 2022).

When applying the standard in practice, at first, it is necessary to check if there is a possibility of contamination in the area (e.g. if there is arable land or railway tracks nearby). Secondly, it is required to estimate the number of herbs occurring in the relevant field, as generally only 60% of the areas can be harvested to ensure the survival of the plant’s genetic stock. It is essential to keep an accurate daily record of the amount each collector collected from each location, the amount of money that was paid to them, to ensure they receive a fair income for the work done, which is sufficient for their livelihood. Every year there is training to educate the collectors on sustainable harvesting methods and to give them solid knowledge concerning the identification of poisonous plants. Traceability is a fundamental part of the standard, requiring that every detail is documented: collectors, collection areas, ecosystems, resource analysis, and monitor the remaining plant stocks. There is one employee from the herb company who brings the collectors together, looks after them, and pays them daily. Processing is also detailed to guide what drier shall be used for drying a special plant, where to store the material afterward, etc. (Interview - Schmidt, 2022).

Related to sustainability, the standard has an important social aspect as well, which is called a premium. It can cover various programs based on the companies’ unique features; the goals can be modified for what serves the community the best.⁹ At Schmidt und CO. Ltd. they decided to support winter employment (wood cutting, cleaning, etc.), pay winter electricity bills, give gift packages, and assure bus sharing for the participating collectors. The amount of the bonus is presently €0.50/kg (approximately USD 0.55/kg), which is paid by large multinationals who give this money back indirectly to collectors. According to József Schmidt, the premium guarantees that the group of harvesters will survive and remain interested. Currently, there are 48 people from the region of Ormánság, which represents a few villages. Most of them are young Roma persons who like freedom and do not want to be tied down, so turnover among the employees happens frequently. He added as well that it is hard to motivate and keep them in the program because they do not tolerate being told what to do. They generally go collecting when they need money urgently.

Besides, during the annual inspections, they are often confronted with problems arising from local customs. For example, the issue of child labor is prohibited by the standard. They should always make it clear to FairWild auditors that Roma people do not leave their children alone, but always take the little ones with them. This is also the basis for learning about medicinal plants from their ancestors and how to collect them in the wild. This is how knowledge is passed down through generations. József Schmidt illustrated this through a personal experience from decades ago. It happened that they were collecting MAPs in the neighborhood, near Igal, when one of the Roma collectors approached him and asked if they were collecting “cinnadónia” too (using this particular Hungarian word) because it was time to do so. At first, József Schmidt did not understand which plant he meant exactly, but then he realized that the old Roma harvester was using the Italian name with a Hungarian accent for the plant Greater Celandine

⁹To provide a practical example, in Africa, they typically build schools and roads with premium money.



(*Chelidonium majus*). This can be explained by the fact that the ancestors of the Roma collector learned from the Italian monks living in the region in the past.¹⁰ This traditional knowledge of herbs has been preserved over generations among the local collectors, however, nowadays it is decreasing because – as the owner of the company noted – younger ones do not have nearly as much knowledge as their predecessors had (Interview - Schmidt, 2022).

It is the company's priority to ensure continuity and to preserve the jobs of the collectors and workers. That is why they continued to participate in FairWild indeed to provide their local collectors with the extra income coming from the premium money. However, following the recent incorporation of FairWild requirements into the mabagrown® sourcing standards system, it has been decided that from 2023, both will no longer be used, but only the Martin Bauer Group-affiliated mabagrown®, which will result in finished products being able to carry both the FairWild and Rainforest Alliance labels (Interview - Schmidt, 2023).

Despite their aspirations, capital constraints and poor lending system have always affected their entrepreneurial existence, even though important technical research into the future of herbal medicine sector is already underway. Some countries are already experimenting with drones to map the presence of poisonous plants in collection and cultivation areas as efficiently as possible, with an accuracy of around 80%, so that they can go directly to fields without the use of pesticides to eradicate poisonous plants such as the common *Senecio vulgaris*. However, Schmidt und CO. Ltd. is not capital-strong enough and lacks the liquidity to apply the cutting-edge technology in a targeted way, so they are still watching and learning. They also do not have the right tools to use sensors and other devices in production to detect and eradicate different weed flora. Consequently, they rely on their decades-long experience and existing mechanical tools, or simply their ingenuity to push them through the difficulties. For example, if they want to farm a new crop, they start the procedure with the machinery they already have, and do not invest in new equipment, as this would be a financial burden and a risk. For the future, from a machinery point of view, they are looking to modernise both drying and processing to increase efficiency. In the current economic climate, the quantity of gas or wood chips used in these activities matters, as well as how energy-dependent they are. However, they hope that, in addition to organic farming and production-linked subsidies, there will be scope for a comprehensive modernisation of the herb factory within the framework of the European Union's second pillar economic development. It is crucial to increase efficiency in processing, through the acquisition of modern technologies and equipment, in addition to a complete renovation of the buildings to improve food hygiene and safety. They believe that the herbal sector is an environmentally friendly alternative to cereal and industrial crops, which can lead the Hungarian agro-industry in a good direction (Interview - Schmidt, 2023).

Györgytea Ltd.

The family-owned company was named after its founder, György Szabó, who was best known in Hungary as “Uncle Gyuri Szabó”. It has been a long and special journey to the point where his name has become inseparable from herbs among Hungarian consumers, and his engaging

¹⁰This conclusion is probable, since according to the Historical-Etymological Dictionary of Hungarian herbs' names, the word “cinnadónia” is of Latin origin and indeed means the plant *Chelidonium majus* (Vörös, 2008). Thus, it is assumed that the name of the plant entered the vernacular through the Western monks.



personality has contributed greatly to the flourishing of the company. As he passed away recently, the company is run by his daughter, Zsuzsanna Lopes-Szabó, herbal expert and executive manager, and former teacher.

According to the family legend, the maternal grandmother of Uncle Gyuri Szabó (born in the 1860s) was raised in Sajókazinc which is a little village in Borsod-Abaúj-Zemplén county, situated in northern Hungary. She had a vast knowledge of medicinal and aromatic plants, which she had inherited from her ancestors. Since there was no doctor in the village, or it was too expensive to call one, she performed in the community as a kind of medicine woman or healer, acclaimed to cure both local people and animals. Her traditional healing knowledge was considered a treasure among the locals, which was part of the community's spiritual culture and always passed down over the centuries from generation to generation. She taught her grandchild, György, the knowledge and respect of medicinal plants at a very young age. During his childhood, the little György also learned from a local midwife, as the son of this woman was a friend of his, and the children could accompany the wise woman to collect wild herbs and acquire the knowledge of the plants and when and how to harvest them. In later years, during the era of communism, he did not work with medicinal plants. It was only when he retired that he started collecting herbs again, drying them at home and selling them at the market. In 2004, as his reputation spread quickly and more and more people were interested in his teas and advice, Györgytea Ltd. was established (Interview - Lopes-Szabó, 2022).

The firm employs 53 permanent workers. In addition, approximately 150 families from nearby villages and numerous individuals (for example students) contribute to wild collection temporarily. They are local people who usually belong to the poorer Roma ethnic group. When it is time to harvest wild plants, a colleague from the company contacts the leader of the Roma group and lets him know that the collectors can be notified and go to harvest. Györgytea Ltd. is very conscious that Hungarian herbs should serve domestic consumers, so they do not sell their products abroad (although they often receive offers from foreign companies, most recently from a Chinese one). As Zsuzsanna Lopes-Szabó explained during the interview with one of the researchers, 99% of their raw materials come from wild collections, some of which they collect themselves and some of which they source from suppliers. They do not want to go into cultivation because it can be very expensive due to costs occurring related to the possession of fields, soil maintenance, and human resources (Interview - Lopes-Szabó, 2022).

60-100 species of herbs are available in their surroundings. They currently sell a wide range of herbal teas and tea blends, including tisanes or teas recommended for diabetes. Moreover, they organize herbal tours for visitors in the forests of the Bükk mountain, maintain educational and health promotion programs, and publish their own herbal books. They have recently launched two new products specifically for baby care. In their herb factory, innovative production practices are combined with manual processing¹¹ (Györgytea, 2022).

The quality of raw materials is of key importance in their internal policy, as well as environmental protection and sustainability aspects during both collection and production. In this context, they pay attention to sustainable harvesting methods and only collect the number of

¹¹The firm also welcomes college students who can learn a lot about the practical side of the profession as trainees (Interview - Lopes-Szabó, 2022).



herbs in the areas that will ensure the stable survival of the stand in the coming years. Besides, they use recycled and/or recyclable packaging, containing jars made of aluminum and glass. Tea bags are delivered in paperboards. Regarding the social aspects, it was said that a priority for the company is to support the villagers and provide them with work. As a family business, they care about protecting jobs and the future of their employees. However, as Mrs. Lopes-Szabó admitted, the wild collection of herbs is a heavy job, and it is sometimes difficult to cooperate with Roma harvesters due to their free lifestyle. Involving them in proper plant harvesting and maintaining sustainable methods during work remain challenges each time (Interview - Lopes-Szabó, 2022).

According to Mrs. Lopes-Szabó, the Hungarian herbal industry faces many difficulties nowadays. One of the serious concerns is the legal context. In her point of view, herbal products should be regulated as a separate, distinct category on the market. Despite this legal issue, the need for medicinal plants in society is growing, and demand for herb products is increasing (Interview - Lopes-Szabó, 2022).

Regarding the company's mission statement, traditional medicine is a living phenomenon nowadays that should be kept alive. This immense knowledge has been passed down and preserved through generations, therefore it is in the interest of all of us not to let this common value be lost. In addition to contemporary Western medicine, it is important to not forget the healing knowledge that humanity has accumulated over the past centuries. The name of Uncle Gyuri Szabó has been intertwined with herbs in today's Hungarian public consciousness. His personality and work contributed to the widespread recognition and popularity of traditional medicinal plants in Hungary (Györgytea, 2022).

Projects

In recent years, similarly to the aforementioned *Kenyer* Project, there have been several running projects aimed at finding practical solutions to protect local natural assets and achieve economic growth for the local population at the same time. These projects were carried out mainly by environmental non-governmental organizations (NGOs) with the financial support of the European Union.

Traditional and wild: promoting traditional collection and use of wild plants to reduce social and economic disparities in Central Europe

This project was financed by the European Union and was realized in a transnational framework from May 2011 to April 2014 with the contribution of nine organizations from Hungary, Slovenia, the Czech Republic, and Poland. The project was advocated essentially because, although Central Europe is still very rich in wild MAPs, traditional knowledge regarding the characteristics and usage of these plants has been decreasing for many decades “due to urbanization, changes in land ownership and changing lifestyle choices.”¹² The main goals of the program were to “protect cultural heritage of collecting and processing useful wild plants, and to foster the sustainable use of traditional knowledge and expertise among vulnerable groups,

¹²According to the report, around “2000 wild plant species are traded commercially presently, of which 60–70% are native to Central Europe” (Rodina et al., 2014).



particularly the ethnic Roma populations, the elderly, and women, in rural parts of Central Europe.” It aimed to build the local capacity of workers and support the region’s economy for the long term (Rodina et al., 2014).

The project partners, including local authorities, academic institutions, and NGOs, joined together to fight against rural unemployment and unsustainable harvesting practices. Having a transnational approach, the relevant areas’ socio-economic and cultural contexts were analyzed, data was gathered on wild MAP species, a strategy for capacity building was developed, and markets for local products were identified (Rodina et al., 2014).

Two pilot areas were selected from the territory of Hungary: Kunadacs and Ormánság. *Kunadacs* is a village in the Great Hungarian Plain, in Bács-Kiskun county, involved in agriculture. The assessed plant species contained *S. nigra*, *U. dioica*, and *Juniperus communis*. From the plant materials, marmalade and dried herbal tea are produced, as both have a long tradition of consumption in the countryside (Rodina et al., 2014).

Investment was also carried out during the project, resulting in the construction of a folklore house that has been in use since then. The first room of the country house presents the region of Kiskunság with pictures and descriptions, while the second exhibition room shows the uses of the collected plants and the products made from them. The house is open to hosting open-air traditional children’s and crafts programs during spring and summer. The investment was also supported by the local municipality, since it is important for them that residents and visitors learn more about the landscape’s natural treasures, including the natural plant treasures that are an integral part of the Kiskunság region. Kunadacs has a long tradition of herb collection and processing. In the 1980s and 1990s wild plant harvesting provided a significant source of employment for local people, with a small processing plant even operating in the village. They would like to revive this now, to provide families with extra income (Szép Magyarország, 2014).

A reasonable question that the reader may ask is: what has Kunadacs gained from this project in the long run? Looking back a few years later, are the people who live there now benefiting from the results? To properly answer these questions, the researchers contacted several people who were involved originally in the project. Finally, the employees of the municipality of Kunadacs responded in March 2023 by phone that the biggest achievement of the project was the creation of the folklore house. It is regularly used by residents and summer camps are held there in the summer. However, the collection of MAPs in the region has declined, so has the production of jam and tea.

The other pilot area for the program was in Ormánság, situated in the south-western part of Hungary. This is the region where the previously described Schmidt und CO. Ltd. operates. Through the program, four training sessions were organized with 53 participants who gained basic knowledge about MAPs and their sustainable usage. In addition, “product development, marketing, and entrepreneurial options” were also discussed (Rodina et al., 2014).

By the end of the project, it was clear that the Hungarian herbal sector has solid economic potential, however, applying a transnational model and involving several stakeholders can help deal with such complex matters as supporting the endurance of the traditional wild plant harvesting methods in Central Europe. Moreover, new technologies and investments into community spaces (for example training facilities and gardens) are key components of keeping and continuing the traditions of wild medicinal and aromatic plants (Rodina et al., 2014).



Project LENA: local economy and nature conservation in the Danube region

As one of the INTERREG projects,¹³ LENA was co-financed by the European Union and Hungary. It was carried out between January 2017 and June 2019 with the aim to support “the sustainable use of natural and cultural heritage and resources” in the Danube region. It was realized with the cooperation of twelve partners from seven countries (Bulgaria, Croatia, Germany, Hungary, Romania, Serbia, and Slovenia) and eleven conservation areas. The project was implemented in Hungary by WWF Hungary and TRAFFIC.¹⁴

The main objective of the LENA project was to support a joint and integrated approach to the conservation and sustainable use of protected natural areas (mainly Natura 2000 territories) and to create new income-generating opportunities in sectors based on natural resources. As part of the program, the previously presented FairWild standard was used for better resource management of commercially harvested medicinal plants and thus to protect nature. One of the main purposes was to create long-term benefits for the regions concerned by training collectors in sustainable production techniques and the application of fair-trade standards, as well as contributing to the development of livelihoods of the local communities (WWF Hungary, 2022).

In the project, there were various goals, for example maintaining an added value of sustainable agriculture, strengthening marketing of regional tourism, sharing know-how, generating income from wild plants in a sustainable manner, and connecting local people and nature for progress and welfare. The population of the participating regions was mostly poor, facing emigration and aging societies (Interreg, 2022).

In Hungary, the project was realized in the Szatmár-Bereg Nature Park, which is situated in the north-east part of Hungary and has been engaged in contributing to the progress of this rural area by cooperating with local firms and persons. Nature is communicated to the companies as an advantage that can provide benefit to the local economy. Knowledge was passed on to collectors about sustainable collection methods and products that can be developed based on the available wild-collected materials in the region (Interreg, 2022).

The program in Hungary also aimed to create job opportunities that, in addition to their economic benefits, can contribute to the preservation and enhancement of natural and cultural heritage, through the conservation and maintenance of protected natural areas and their sustainable use. At the end of the organized and implemented harvesting of wild local plants (e.g., *S. nigra*, *Crataegus*, *Prunus spinosa*), a typical and popular product is processed. The community’s educational and demonstration cooking events have resulted in the production of pear, elderberry, and hawthorn jams. These products are sold locally, providing additional income for dozens of families per village. It is a kind of secondary income, the amount of which depends only on the activity and commitment of the people involved in its production and sale. In other words, the implemented program will not only have an economic benefit but will also have a positive impact on nature. To provide an example, significant part of the birch bushes have been eradicated by the employees of the public works program in the area in recent years, causing

¹³The Danube Transnational Programme is a financial tool of the European Territorial Cooperation (ETC) or Interreg. It is strongly linked to the European Union’s cohesion policy and aims to maintain common actions and policy exchanges between actors from several levels of different Member States (Interreg, 2022).

¹⁴TRAFFIC is a leading non-governmental organization working globally on trade in wild animals and plants in the context of both biodiversity conservation and sustainable development (Schindler et al., 2022).



huge damage to wildlife. However, as locals learn sustainable harvesting techniques, the damage caused to nature resources will be radically reduced. Moreover, it is expected that the completion of the program will serve as an example to the inhabitants of the region and that the areas with birch bushes will become valuable habitats. By stopping the destruction, real value can be created (LENA output, 2019).

CONCLUSIONS AND RECOMMENDATIONS

Many herbal experts and scientists report that globally the area of former plant habitats is reduced. In parallel, consumer demand for medicinal plants is constantly growing, as these plant substances are not only used as medicines and pharmaceuticals but can also be used in many other areas, such as food or cosmetics. But as the multi-billion-dollar industry builds up in the Global North, the previous, centuries-old traditional collecting habits change, and over-harvesting takes place. These tendencies negatively affect the stocks of wild plant populations and in the worst case, can lead to biodiversity loss or even the disappearance of some plant species.¹⁵ Investments are therefore needed to promote harvesting methods and conservation strategies that can serve both local interests and growing international demand (Bodeker, 1997). As Lange also confirmed, in states of the former Soviet Union, the main threats concerning wild MAP populations are “the increasing and intensive commercial collection; unmonitored trade; destructive harvesting techniques; trade structure changes; global habitat loss and alteration.” Over-exploitation can also lead to a loss in genetic variety (Lange, 2004). These issues are detectable in Hungary indeed.

The research revealed that although Hungary is still rich in medicinal and aromatic plant species, there are already signs of biodiversity loss, due to extended agriculture, among other issues. In addition, the herbal sector is typically a peripheral field, containing agricultural, social, economic, and environmental features. Therefore, it is more difficult to manage it since there is no real authority in the public sector to oversee the sector as a whole, including each part with its own problems.

To conclude the *findings* related to the current problems facing the Hungarian herbal sector, the roots of the problems in connection with its competitiveness stem from the time of the regime change, so for more than 30 years. During this time, the former production structures have broken down, collection networks have disintegrated, and companies have been restructured or have ceased to exist. Privatization has led to a reduction in free access to many previous collection areas. In addition, in national parks and nature reserves, the collection has become a licensed activity, and income from the collection of medicinal plants has lost its exemption from contributions. The necessary technological improvements that could improve the efficiency of production and processing have not been made. From a social aspect, mainly due to generational change, the number of people involved in this activity has greatly decreased. The lack and inadequate adoption of the legislative framework have also contributed to the stagnation of the sector. Another crucial problem is the lack of reliable data on production and trade, which makes it even more difficult to see the sector as a whole clearly and critically (HACB, 2020).

¹⁵In this context, some important MAP species should be mentioned that have become endangered due to overcollection, such as *Prunus africana* from the central and southern part of Africa, or *Arnica montana* from Europe.



It was found that the herbal sector and the processing industry based on it could make an important contribution to the Hungarian economy. In the short term, its positive employment impact could be significant, and its value added to exports could be substantial. The utilization of wild medicinal plants could be a strategic advantage for the country since marketable medicinal plants that are suitable for collection in large quantities have been always available without significant financial expenditure. However, it is hard to make use of these resources nowadays, as collection faces several difficulties. For instance, although the collection areas are currently partially open to the public, the collection of the by-products of the land requires the consent of the owner or land user (HACB, 2020). In addition, the drastic reduction in the number of collectors is also well-marked. But it is crucial to support the workforce in the sector for two main reasons. First, because of the need to preserve traditional knowledge related to plants and collection practices, and secondly, to retain the local workforce in rural parts of Hungary.

Based on the discoveries of the research, it can also be concluded that the usage of MAPs in various forms will continue to grow worldwide, including in Hungary. In this country, many plant species will still be collected in the wild but following current trends, the importance of *wild collection will decline* year by year as there will not be enough personnel to harvest. Cultivation will therefore become more intensive. In order to support local collectors in rural areas and to preserve their traditional knowledge of medicinal and aromatic plants that is still detectable today, sustainability, transparency, required skills and knowledge, and responsible business practices will be of key importance.

In addition to the dynamic development and growing trends, compliance with increasingly stringent international *regulatory requirements* is a constant challenge for the sector. At the same time, legal and economic uncertainty, constantly declining public funding, and a lack of sufficient and skilled labor are the main problems (HACB, 2020).

The *people involved in the collection* of medicinal plants in our country today are mainly from the low-educated social strata and the unemployed population of underdeveloped regions. The professional collection of medicinal plants in a controlled environment could help to increase the population retention capacity of the most deprived areas and alleviate unemployment and social tensions in these regions (HACB, 2020).

The complexity of the herbal sector is therefore apparent. Often, neither the legislation nor the practice based on it can deal with the specificities of this peripheral industry rationally and appropriately, as various disciplines are interlinked, and different professionals approach the sub-sectors and the matters from their own perspectives. Moreover, the sustainable collection of medicinal and aromatic plants is quite a problematic issue.

However, the previously presented examples, especially the one of the Schmidt und CO. herbal company, have shown that it is manageable to apply a business model in which business objectives and certified environmental management can be reconciled in the process of organic farming, herb cultivation, and processing. Moreover, sustainability will diversify the production structure of the area, ensure the livelihood of farmers, give the centuries-old tradition of herb collection a chance to survive and finally, promote biodiversity.

In the future, some objectives should be achieved at once:

- protection of natural resources (soil, surface and underground water resources, genetic resources, forest and landscape);



- quality assurance of consumption and products to be used, enhancement of food safety; and
- providing acceptable salaries and alternative income-earning and work opportunities for those working in agriculture.

With regard to the above-mentioned, the following recommendations should be considered by the decision makers to advance the Hungarian herbal sector.

- A *holistic perspective* should be taken that considers the economic, environmental, and human dimensions of the sector at once.
- *Knowledge cooperation* would help to combine scientific and traditional ecological knowledge.¹⁶ In addition, the future of these vital medicinal and aromatic plant species should be examined and shaped with *care and prudence*. The ancient traditional ecological knowledge closely linked to these plants should not be set aside but should be better understood and applied, complemented by our modern scientific knowledge. Lessons could be learned from the practice of our ancestors who used natural resources sustainably, as their own survival was tightly linked to the materials available locally. Given the complexity of sustainable wild plant harvesting, practice should move toward a more *collaborative knowledge production* by integrating the variety of scientific and societal characteristics of the herbal sector.
- Both the *accumulation and the exchange of data* are highly encouraged at the national, European, and international levels because real numbers related to wild collection are only estimated, meaning a significant shortcoming.
- It would be essential to remove the territorial restrictions on the collection and to develop more extensive cooperation with forestry departments and national parks. A move towards a controlled collection framework must ensure that the increasingly strict territorial limits on the collection are lifted. A crucial objective is to simplify the administrative burden of collection. (Nagy, 2020)
- Development of the sector should be based primarily on domestic production and collection. The *technical, legal,¹⁷ and financial conditions for drug certification* must be created, containing guidelines for sustainable harvesting practices. To facilitate the increase of the domestic herbal medicinal products industry, a proper legislative environment should be created which, on the one hand, considers the EU harmonized legislative framework with its ongoing changes and, on the other hand, provides domestic companies with a unique opportunity, including competitive advantage. The operation of quality assurance systems at all levels concerning good agricultural, collection, and cultivation practices (GACP) should be introduced generally, supported by training. (HACB, 2020).¹⁸

¹⁶Enough literature is available to solve that matter, but usually, it remains at the academic level due to financial problems, as there is not enough money to put theory into practice (Interview - Kindlovits, 2022).

¹⁷A huge remaining concern is still the lacking proper place for MAPs in the Hungarian legislation. Until herbs are categorized as food, they cannot fulfill their true function, including healing purposes.

¹⁸Although sustainable wild MAP collection depends upon good working practices and reliable scientific data, this option generally faces several challenges, literally "lack of knowledge about sustainable harvest rates and practices, undefined land use rights, lack of legislative and policy guidance" (Schippman et al., 2002).



- *Eco-labels and standards for certification* adopted in the botanical industry can provide feasible and good solutions to guarantee that products made of wild herbs were created under sustainable conditions. Moreover, sales suggest that there is a strong interest from consumers in safe, healthy, and certified products. However, as the research pointed out, although labels are ground-breaking and necessary tools to adequately integrate the environmental and social aspects, the implementation of certification might be difficult and burdened with too many administrative duties. Probably more actors could be involved by simplifying administrative obligations.
- *Pilot projects* (such as LENA and Kenyér) can be useful tools to combine sustainable wild plant collection with local economic purposes. However, they do not reflect reality in all cases and their long-term positive impact is uncertain as well. As the practice has shown, their goals are noble, but the main organizers (usually NGOs) are not interested in an economic sense. Those persons and/or companies should be part of the programs who want to make a profit but also have the means and expertise for applying sustainable principles. If they can define the targets for which they will use the financial support received through the project and can organize it, they will be motivated in the long term to create value. Involving local people and universities would be beneficial too (Interview - Kindlovits, 2022)
- The research found that although wild collection will remain, cultivation is gaining ground more and more. Therefore, it would be useful to take a closer look at those processes that could make cultivation beneficial not only from an economic but also from a conservation point of view, and provide guidance on how cultivation can actively contribute to the conservation of the wild relatives of cultivated species and their habitats.
- *Supporting herb collectors by several legal and administrative tools* is essential:

Since most of the collectors in Hungary belong to poorer groups, such as the Roma ethnic group, and they usually gain financial aid from the state, *the income from collecting should be aligned with increasingly stringent aid and social policies* (Nagy, 2020).

Given their specific situation, the number of new jobs should not be the only priority, but the legal income from the activity should be complemented with the issue of off-season/winter employment. This solution seems reasonable as it is strongly connected to the matter of why so many former collectors stop collecting and choose a stable, steady income-generating job instead.

To monitor professional collection, appropriate training (e.g., courses on sustainable harvesting methods) and registration of collectors should be developed, together with the issuing of a (revocable) license.

The research has shown that the Hungarian herbal industry is a complex phenomenon with many advantages and difficulties. This means that challenges must be addressed in an open and compound way as well. Building on the sector's strengths (including the good quality of herbal raw materials, and the already emphasized traditional knowledge), such solutions should be adopted in the future that sustainably generate economic benefits, based on locally available herbal raw materials and skilled local labor. Subsidies would be important for green investments available for interested and competent companies, and for training and retaining the local workforce.

Smaller communities certainly have a better chance to preserve the tradition of wild herb collection, and to be an integral part of health and/or provincial tourism, as well as the green economy. Through these, they can flourish and gain self-sustainability in the long-term.



A complex approach would therefore benefit not only local herbal companies but residents in rural areas and last but not least, the valuable natural resources.

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