

**PhD dissertation thesis**

# **Role of Herbaria in the development of microregions**

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## 1. The history and objectives of the dissertation

As part of the living resources, human beings need to eat to stay alive. The structure and volume of the food intake determine people's state of health and the way they feel. Some of the most significant recent questions to be solved are nutrition, medicine, economic and social stability and development. The contemporary way of thinking has been trying to find solution on global social level, in large scope (*Kmeth, 2014*). More and more people realise their responsibilities in their own health issues and create their eating habits accordingly (*Hodossi, 2012*). Unfortunately, it is not part of the general education to be informed about the health supported diet, although Martin and Ruberte called public attention to the issue and compared its importance to literacy in 1980 (*Martin and Ruberte, 1980*).

Health, as a vital value was defined by the WHO in 1948, as „a state of complete physical mental and social well-being, not merely the absence of disease or infirmity”. It depends on diet, and the composition of the food consumed. Hippocrates, referred to as the „Father of Western Medicine” pointed out 24 centuries ago: "Let food be your medicine, and medicine be your food". Nutrition, food and medication are not necessarily cross directing or contradicting terms. The food that one consumes can cause healing or disease. It is not only the pharmaceutical industry that deals with health conservative and corrective medicine. János Lippai, Jesuit monk stated in his book in 1664 “Contra vim mortis, crescit medicament in hortis”, meaning, that one can find medicine against death in the garden (*Lippay, 1664*).

The term functional food was invented in Japan in 1984 – where the number of elderly had increased significantly by then -, to represent the connection between nutrition and the state of health. The aged were intend to be supported with food that could improve their conditions by not only nourishing them but also conserving their health. In 1991 in Japan these foods were referred to as „Foods for Specified Health Use”. The label FOSHU, which is an abbreviation of the term mentioned above, has been appearing on specified products in the trade flow since then. According to EU legislation, these products in general terms cover health promotion, the concept of enhanced performance – both physically and mentally – and reduction of disease risk factors.

## 2. Methods of the study

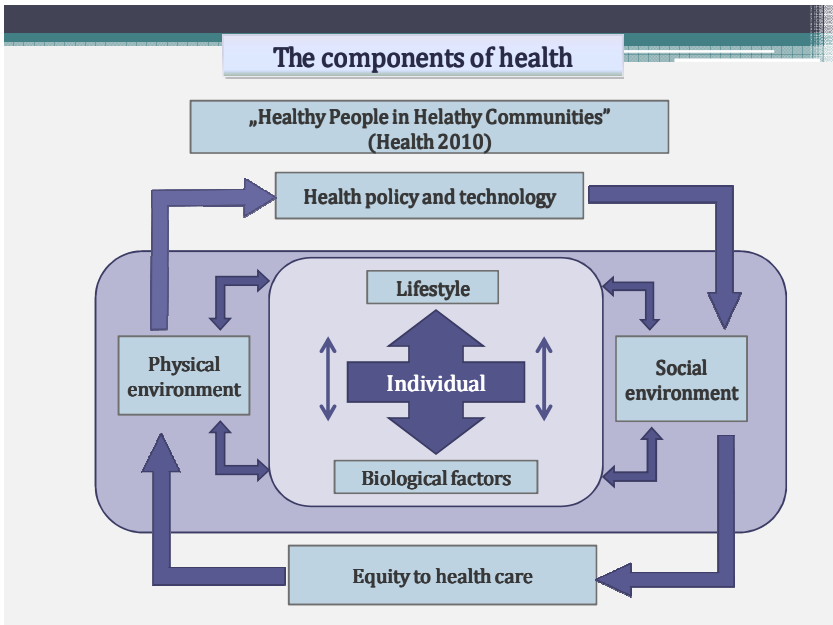
Most functional foods are the product of the dairy sector, the bakery sector and the vegetable oil sector in the food industry in Hungary (*Biacs, 2006*). The only product of the kind in the canning industry is baby food. From the traditional (natural) functional food sit is primarily important to mention the sources of antioxidants which absorb heterocyclic aromatic amines responsible for cancer in the human body.

Another groups of functional foods we are to emphasize are the mushrooms and the Jerusalem artichokes (*Linxi, et al. 2015*). Fungi as excluded from Flora and Fauna form a third group of living resources. Broadly spoken all mushrooms are functional foods. The highest value in this respect is earned by the Shiitake mushroom (*Lentinula edodes*), which is the symbol of health and long life thorough Asia and has been used in China for medical purposes for 6000 years. It is known for its immune-boosting and anti-inflammatory effects (*Chi, and Gow, 2015*), its healing effect in certain types of cancer (*Navarro, et al. 2015*), its controlling effect in blood pressure and blood lipid (*Mohamed, 2014; Assmann, et al. 2014*) and besides, its fine taste and nutritional value. The primal and most distinctive active substance in the Shiitake mushroom is lentinan, which is the mixture of polysaccharides and lignin-like molecules (*Vetter, 2010*). The Jerusalem artichokes (*Helianthus tuberosus L.*) is the sole natural medicine of the endemic disease of civilisation, the type 2 diabetes (*Radovanovic, et al. 2015; Perera, and Li, 2012*). The tubers of the plant containing inulin of 15% does not increase blood sugar level, as the human body lacks the enzyme inulase to decompose it. Thus it gets into the colon indigestible, where it nourish bacteria flora. National hospital researches has justified the role of the Jerusalem artichokes in boosting the immune system, protecting the liver, reducing urine acid level and serving as antioxidant (*Angeli et al. 2000*). In addition, it has a unique gastronomic value.

The need for health promotion strategies, models and methods is not restricted to a single health topic or behaviour pattern but applies to different population groups, different risk factors and illnesses in variant cultures and circumstances.

Individual health status is substantially determined by genetics and lifestyle, which are affected by external factors, physical and social environment. Nevertheless health is influenced by health policy, equity to health care and the quality of the health care process (see Figure 1).

Figure 1. WHO commitment of 2010



**Energy and health connections in the ancient worldview**

Perceptions of the energy in ancient time are preserved within the Ayurveda tradition (Mireisz, 1998). Ayurveda defines health as life creating and maintaining force. Vitality is divided into three well-distinguished parts each with different qualities (wind-energy, fire-energy and water-energy). Health is present when these energies are proportionally working in balance.

However, if the balance is disturbed and one or two energies proportionally exceed the other two, the imbalance will result in illness. During their life, people's task is to maintain a dynamic balance of these three energies, which will help to preserve physical and mental health.

To maintain stability or restore imbalance the ancient life science identifies different options in each with the essential principle, that the energy in excess should be reduced to the level of energy balance. That can be served, among other things, by the usage of herbs (*Mindell, 1999; Kothe, 2008*), or proper diet (*Balogh, 1996*).

### ***New approach to food and health relations***

#### **➤ *Functional foods***

About two and a half thousand years ago Hippocrates highlighted that the right diet is essential to restore and maintain health. As he said, "Let food be your medicine, and medicine be your food". This reflects his theoretical and practical ideology, i.e. food is inherently medicine, and the primary purpose of eating is to generate and support health and create harmony and only subsidiary to enjoy its culinary quality. Later Galenus synthesized the findings of the Greek school in Rome and thus grounded modern medicine. This scholarly medicine starts to find its roots and discovers functional food describing its functions in modern society. It is unknown yet whether we can talk about more than a temporary fashion wave, which is boosted by some underlying commercial purposes. The answer depends on if we can determine the importance of proper diet and vivify Hippocrates knowledge on diet and medicine. It raises another question i.e. whether health is an objective of human life and thus the right to health is a fundamental human right for which the conditions should be granted on social level. Why is it so and what is the price of health? To answer these questions first I will give an overview of the medical system of Ayurveda and its commitment to diet and food.

### ➤ ***Groups of functional food***

The American Dietetic Association (ADA) distinguishes four groups of functional food.

*Conventional food*, which is - without any additives - rich in health protecting phytochemicals such as lycopene, lutein, sulforaphane, etc., those substances that help to reduce the risk of cancer. Sources of these are tomato, citrus fruit, and brassicas. Examples include natural probiotic products that help digestive system to function well.

*Modified food*, which contains biologically active additives, like calcium enriched orange juice, folic acid enriched bread or plant sterol-enriched margarine with cholesterol reducing effect (*Pathak, et al. 2015*).

*Medicinal food*, which has a particular health-enhancing effect and can be applied only under medical supervision, mostly for patient in diabetes, liver- and kidney failure.

*Food for special dietary use*, which is similar to *medical food* but not tied to prescribed medical control. They are made for special dietary purposes, like gluten-free or lactose-free diet and easily available at supermarkets.

### ***Relationship of food and health in traditional view***

We go on to analyse the definition and usage of functional food examining the ancient Indian life system, the Ayurveda. If we ask an Ayurveda doctor to determine what constitutes functional food, he would probably ask back in surprise, what does not count functional food. His theory is based on a different system in a different worldview. According to Indian physiology, through their taste and quality, every food has a certain effect on the consumer (*Vasant, and Frawley, 1991*). This effect is taken into consideration not only on physical level but also on psychological level, so people get holistic treatment.

This ancient physiology does not concentrate on pharmaceutical products or substances but if so, it tries to implement them into its own diagnostic and therapeutic system. Instead of determining particular pathological conditions, it monitors the

diversion from the balance that is health (*Vasant, and Frawley, 1991*). Medication is chosen in accordance with its diagnostic system in order to restore and sustain individual balance. Ayurveda determines three main attributes, which serve as base for diagnosis and medication. Everything is classified according to these three attributes, from food and behaviour to environmental effect. There are numerous written records on diagnosis, pharmaceutical production and therapy and these methods have started to flourish recently.

Within this medical system there is an independent branch so called „flavour healing” which uses flavours to develop diagnosis and therapy (*Vasant, 1989*), and through which we can represent the coherence of the Ayurvedic system. I have chosen this particular area because through the diet we can examine the traditional view that considers the function of food in a way different to Western medicine. The basic conditions are shown below (*Table 1*). The fundamental principle here is that in case of metabolic imbalance a respective flavour as well as physical and psychological symptoms appear and serve as basis for diagnosis. Flavours in excess – and the respective symptoms - can be neutralised by a flavour with opposite effect (*Kmeth, 2013*).

*Table 1.*

**Effects of imbalanced states**

Imbalanced state	Symptoms		Imbalance reducing flavours
	mental	physical	
astringent	Anxiety, fear, distress, panic, stress ,	Stiff muscles, spasm, convulsion, tiredness	Sweet, (salty) sour warming, moistener plants
bitter	Despair, grief, depression	Dizziness, over-activity, desiccation, tissue retarding	
pungent (hot, aromatic, spicy)	Impatience, anger, passion,,	Hypertension, bleeding, wound, thirstiness, hunger	Bitter, astringent, sweet cooling, moistening plants
sour	Envy, jealousy, hatred,,	Acidification, ulcer, phosphene	
sweet	Presumptuousness, egoism, rapacity	Crassitude, obesity, somnolence, sprawling processes,	Bitter, pungent, sour warming, desiccative
salty	Attachment, possessiveness, greediness	Joint and muscle stiffness,	

*Source: Herbarium (Kmeth, 2013)*

➤ **Energy states, flavours and effects**

Flavours and mental states are in a close mutual relationship meaning that should any mental state go to excess, right then emerges the associated flavour, and vice versa emotions show significant relationship. When one type of emotion becomes accentuated, the respective flavour appears and vice versa: should any of the flavours gain predominance, the correspondent mental state turns up immediately. It can be concluded that in a healthy, balanced system, there is no predominantly manifested flavour. All are present in equal proportions, which can be described as a condition without perceivable tastes.

Plants directly act on the body tissues via their flavours, thus in turn the cycle of transformation of body tissues can directly be influenced by plants (*Table 2.*)

*Table 2.*

**Harmony of the flavours and energy and the emotion caused by overindulgence**

Flavour/energy	Balanced energy state		Emotions caused by overindulgence
	Reduces	increases	
Astringent	Fire and water	Wind	Worry, anxiety, fear
Bitter	Fire and water	Wind	Despair, grief, depression
pungent (hot, aromatic, spicy)	Water	Wind and fire	Impatience, anger, passion
sour	Wind	Fire and water	Envy, jealousy, hatred,
sweet	wind and fire	water	Presumptuousness, egoism, rapacity
salty	Wind	Fire and wind	Attachment, possessiveness, greediness ,

From the abovementioned classification we can conclude that as for the functionality of the food the modern food science concentrates on treating deficiency symptoms and to some extent on preventing diseases and sustaining health. As a matter of fact, these foods are subjected to thorough physiological testing. The recent tendency is that more and more food and food products are tested and labelled as

functional, and demands are taken into consideration regardless of whether the consumers chose food items consciously or not. Determining the necessity of functional food and taking them requires medical background, or at least consumers need some information about them, thus it supports nutrition awareness.

### ***Herbarium***

The most known and most accepted meaning of herbarium is that it serves as synthetic written records of the effect of herbs. In the 16th century more works of the kind appeared in Hungary. They laid the foundation of domestic botanical taxon, tried to consolidate the names and characteristics of plants and describe all the effects of the medication of the certain herb (*Beythe, 1564*).

In the Greek and Hungarian tradition as well, classification of the plants is based on the Hippocratic medical view that established Galenos theories. Pathological conditions are determined according to this classification and certain herbs are allocated to certain conditions (*Melius, 1578*). Considering the possibilities of the era these works form the base for standardised medicine at the turning from medieval to modern ages. Botanic and medicine were going hand in hand that time reflecting the pictures of *Historia Naturalis*. Folk traditions in medicine had great role in the establishment of herbarium, which then preserve herbs and later support the development of modern medicine. Intellectual stream that generated Reformation and Renaissance affected not only Hungary but also the Western part of Europe, as there appeared some similar works from contemporary thinkers.

Nowadays the coherent approach of Medicine, Pharmacy and Botanic supporting each other has been disappearing and so has herbarium. Academic medicine that is getting further and further from the holistic medicine seems to lose social credence.

Herbarium played other important roles. As the predecessor of pharmacies, they were widespread and essential in household in the armoire where those plants and herbs were kept dried, which serves as primer source of remedies in the community. Besides herbaria with a significant market value could be found at traditional healers, doctors and healing centres.

Last but not least herbarium was the area, where herbs were grown or from where they were collected or harvested. These „gardens” were part of the vegetable gardens but some of them were run by the municipalities or medical institutions, medical schools (*Kmeth, 2015*).

With regard to food, we have to clarify from functional aspect what we consider food and how the concept of food and herb interrelates.

Approach to food and diet has changed during the history. In traditional worldview it completely differed what, how and why people took as food. In the Buddhist, Taoist and Hindu worldview, where most of the medical view remained intact, food, diet and all related issues are still part of the healing process. These medical systems claim that the state of imbalance or illness is resulted from improper eating habits and proper diet can prevent them (*Vasant, and Frawley, 1991*). The function of food is unambiguously the conservation of health and the outcome of nutrition is a balanced state.

➤ ***Healing herbs***

Given that healing herbs are given to people as functional food products, we have to take into consideration those areas, processes, bi- and multilateral interactions which fulfil connection of the sets of healing herbs, functional food and people.

With regard to healing herbs on particular place of production some qualities of the land are elemental:

- Pollution-free environment
- Quality water supply
- Plant growth ensuring soil

Monitoring place of production:

- The environmentally cleanest areas in Hungary are poor in infrastructure and innovation.
- In areas where unemployment is relatively high the need for remedial courses is substantial.
- The lack of cultivation does not affect the efficiency of the healing herbs.

Table 3.

**Energy and quality effects of herbs**

Herbs	Energy effect	
	Cooling	Warming
apple	cooling	
aloe	cooling	
angelica		warming
goldenseal	cooling	
goldenrod		warming
bilberry		warming
anise		warming
mountain arnica	cooling	
field sandbur	balances	
bay leaf		warming
betony		warming
psyllium seed	cooling	
basil		warming
elder	cooling	
greater burdock	cooling	
juniper		warming
pepper		warming
peppermint	cooling	
yarrow	cooling	
lemon	cooling	
lemon balm		warming
common nettle		
star anise		warming
pennyroyal	cooling	
walnut	cooling	

➤ *Special effects of healing herbs*

Special effect is a property of the plants that, regarding its nature and degree, is not always deductible from the energy effect, being either akin to or sometimes even the opposite of the latter. This effect may concern an individual organ, an organ system, all body functions globally, a particular pathological condition, physical or mental state, or other biological functions. The following grouping of such effects is based primarily on the everyday needs of application:

1. cooling and warming blood-purifier herbs
2. bleed staunching or inducing herbs
3. wound healing and tissue regenerating herbs
4. antiseptic herbs
5. antifebrile and anti-inflammatory herbs

6. lymphatic system purifying herbs
7. mucolytic, anticatarrhal, antitussive, expectorant herbs
8. digestive and gallstone dissolving herbs
9. herbs that slow down digestion and global tonics and nourishing herbs
10. bowel activity stimulating herbs and purgative herbs
11. herbs that slow down bowel activity and antidiarrheal herbs
12. intestinal cleansing, antiseptic and anthelmintic herbs
13. antispasmodic herbs, sedatives and nervine tonics
14. diuretics, herbs that cleanse the kidney and dissolve stones
15. sudorific and anti-sudorific herbs
16. tissue regenerating and rejuvenating herbs
17. herbs that affect sex organs, libido and potency boosters, aphrodisiacs

### ***Baby food national and international context***

The sole functional food of the Hungarian canning industry is baby food, which can easily be exported but essential in domestic market as well.

Food for the body - especially for babies and children – means the intake of nutrients and their utilisation necessary for substantiality. Diet ensures energy and sustains health. This means that diet is fundamental in preventing illnesses, maintaining health condition and regaining health. Babies and children under three are especially concerned as this is the period of physical - mental development. To get the necessary nutrients and food for growing and progress has a unique role in this period (Decsi, 2001).

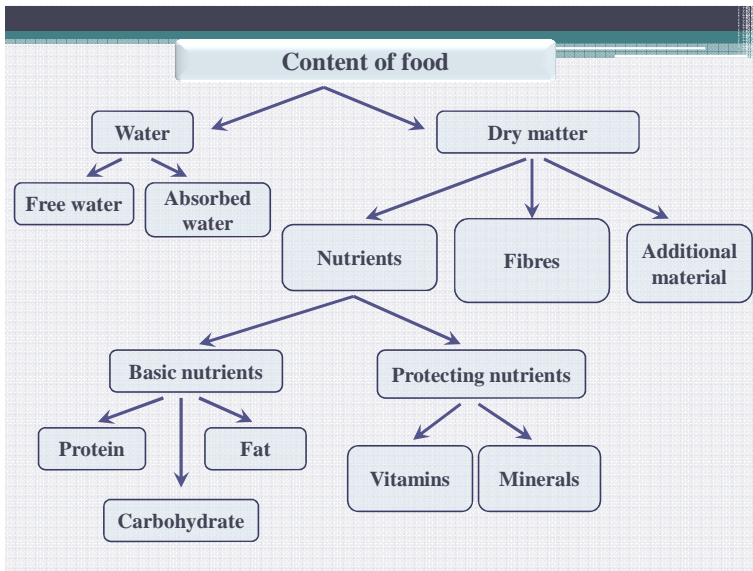
From the physiological point of view the healthiest types of food are vegetables (green pepper, tomato, eggplant, watermelon, cantaloupe, green peas, green beans, root vegetables, brassica vegetables, onion, garlic, etc.), fruits (apple, pear, plum, apricot, peach, strawberry, red- and black currant, raspberry, cherry, sour cherry, banana, orange, grapes, etc.), nuts, dairy products (butter, cheese, cottage cheese, etc.), whole wheat flour, lean meat, fish and eggs.

Naturally for the baby the most adequate, fully natural nutrient is mother’s milk. At the same time it is the easiest accessible source of food. In some cases, it is not enough in quantity and length, so infant formulae is needed. At a later age, baby food and drink can complement from 3-4 month-old age until 3 years.

***Baby and early childhood nutritional aspects***

Requirements of the diet for babies and children is to guarantee high quality, comestible, sufficient nutrients adapted to the level of development and actual demands. The primary aim of feeding children in the first three years is to ensure energy for growing and physical- mental development. The energy need of a child is 90–95 kcal per 1 kg of bodyweight. The energy demand is satisfied from protein (10–15 %), fat (30%) and carbohydrate (55–60%). Our food consists of water and dry matter, which can be further divide into macro- and micronutrients. The content of food is shown in *Figure 2*.

*Figure 2. Content of food*



*Source: edited by author*

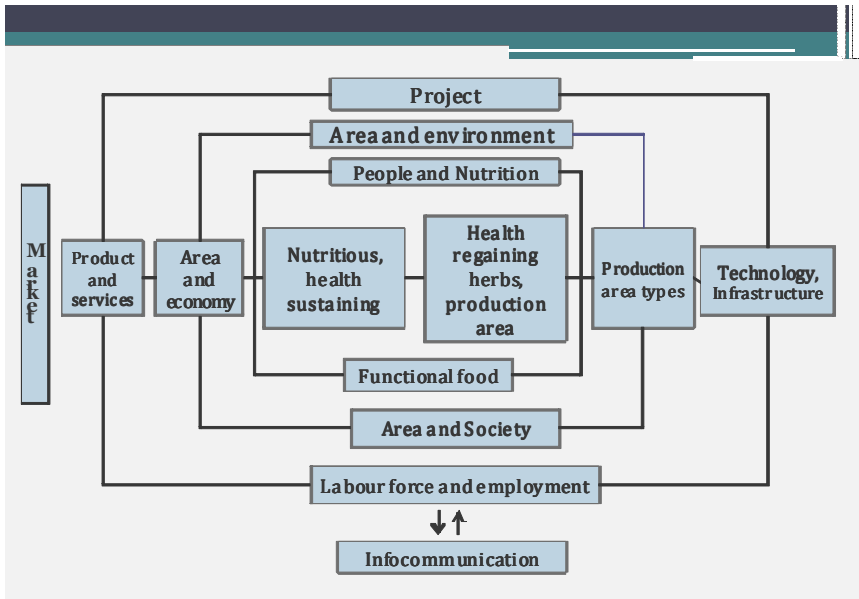
### **3. The results of the thesis**

1. Using a new method I systematized 108 healing herbs. I defined their indicators, and specific parameters and recorded the symptoms, effects and conditions.
2. To support my thesis I formed a model to represent how healing herbs (as functional foods) can serve as social cohesion strengthening, economy building, and environment enhancing force.
3. I intended to define the physiological connections of nutrition in a new system based on a different approach to energy. To record the quality of the connections and relations I applied the six flavours as the code for indicators and I defined them in reference to 108 healing herbs. To systematize my findings I used the maxims of thermodynamics. This new way of arrangement makes it possible to handle human energy functions and processes and the energy and physiological processes marked by herbal indicators in a unified system.
4. I defined and interpreted new relations in connection with the physiology of nutrition, functional food and healing herbs. I identified the system-relations in the mutual correlation of conditions and processes. I described conditions with regard to 13 components, and typified processes as energy variations and shifts.

### **3.1. Innovative results**

1. I defined the criteria of healthy diet and its possible resources in a practical approach. I observed the fundamental role of mushrooms and baby food and denoted their potentials in area development. Possible local production provides inhabitants with job opportunities, improves social situation, and prevents migration.
2. I developed and offered practical solutions in the nourishment of babies and children. I defined the role of functional and medicative food in nutrition with regard to specific micro-environment.
3. As part of the practical implementation I concentrated on the disadvantaged micro region of Fehérgyarmat where considering the physical and genetic characteristics of the land I elaborated and mapped the possibilities of the cultivation of medicinal plants. From the research of my objectives, the research database, the testing method and the thematics I concluded my deductions about setting a system of functional food, diet and health. Summarizing my deduction I conclude that the product (functional food), the process (eating) and the condition (health) forms a harmony in a system that can be denoted as a tool for regional development in a new model.

Figure 3. Interrelating points of separate areas in increasing the effect and use of healing herbs and functional foods



Source: edited by author

#### **4. Application and usability of the results**

In my thesis I aimed to rethink the aspects and definition of health by reviewing the principals of traditional medical school and modern medicine. Considering the applicability of functional foods and medicinal plants in the process of eating, their role in health regaining and sustaining I concluded, that we have to apply a system suited to modern science. This assumes a unified energy system which includes mutual conjecture of functional food, nutrition and health and the related diagnosis and therapy.

Reviewing the data I concluded that potentials in the application of healing herbs in medication and food science. Data investigated in functional food production for baby food and children nutrition demonstrated that the coordination of nutrition and medicine on social level is essential and a common system is to be elaborated to analyse and evaluate scientifically. In my research I deduced that to achieve the abovementioned system we have to combine the traditional Indian Ayurveda that considers effects of energy alteration and the trends of modern medicine that considers functionality. In the outlined system scheme we can picture possibilities and interrelations which regarding the principles confirm the necessity and operation of the evolved system in this human-based world. Functional food as the product and repetitive process and health as the state of energy harmony are in system-correlation. In evaluating the correlation of the product, the process and the condition I denoted a model that can be practically applied to healing herbs, their production areas and regional development.

Verifying the elements of my thesis I drew the conclusion that the application of the denoted system of healing herbs is necessary and plays an integral part in regional development.

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## 6. Publication of the candidate on the topic



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Subject: Ph.D. List of Publications

Candidate: Sándor Kmeth  
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Doctoral School: Kerpely Kálmán Doctoral School  
MTMT ID: 10050968

### List of publications related to the dissertation

#### Hungarian book(s) (1)

1. **Kmeth S.**: Herbárium: Az általános rendszerező élettan könyve. Harmadik Évezred Kft., Budapest, 464 p., 2013. ISBN: 9789638581082

#### Hungarian scientific article(s) in Hungarian journal(s) (3)

2. **Kmeth S.**: A gazdaságinformatika szerepe a funkcionális élelmiszerek és a herbáriumok felhasználásában, valamint a mikroregionális terек fejlesztésében.  
*Agrártud. Közl.* 63, 83-86, 2015. ISSN: 1587-1282.
3. **Kmeth S.**: Herbáriumok és élelmiszerek a mikroregionális terек fejlesztésében.  
*Agrártud. Közl.* 63, 87-90, 2015. ISSN: 1587-1282.
4. **Kmeth S.**: Funkcionális élelmiszerek fejlesztésének lehetőségei.  
*Agrártud. Közl.* 60, 41-44, 2014. ISSN: 1587-1282.

#### Hungarian conference proceeding(s) (18)

5. **Kmeth S.**: A hét szövelem: Ivar szövet.  
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6. **Kmeth S.**: Diagnózis: A salakok III.  
*Javaslap.* 3 (12), 62, 2000. ISSN: 1418-4699.



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7. **Kmeth S.:** Diagnózis: A salakok II.  
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