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SELF-SUFFICIENCY FOR FOOD SECURITY ANALYSIS IN THE SAXON HOME GARDENS OF AȚELCOMMUNE, SIBIU COUNTY, ROMANIA

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Abstract

Climate change effects are more and more dramatic in the last years all over the world, and in the Eastern European countries too. In this regard, the self-sufficiency concept use for future rural strategies development should become more than relevant for ensuring food security. Such rural communities should take rapid measures for developing a new strategy for adapting to and mitigating the climate change effects. The more complex a rural landscape, the better responses against climate change effects should be. However, it seems that the best chances for the future may have heterogenous agricultural lands. In Romania, such rural areas can be easily found in Central Romania such as in Sibiu, and Brașov Counties. The scope of this article was to survey 19 properties known as Saxon home gardens in Ațel Village, Sibiu County, Romania, for self-sufficiency in case of vegetable crop production for one year. Also, the survey of wild plant species found in these home gardens is relevant to understand the need to ensure connectivity with the forests and the grasslands. At least 32 wild species and 26 crop species were identified. The self-sufficiency at the community level is ensured 100% based on the circular economy principles. The major limitation factor for agriculture in this locality is the bedrock that under severe drought periods may negatively impact food security for the future. However, the maintenance of wild or domesticated species but autochthonous, would further improve the response against climate change for rural communities in Central Romania as well as in the Easter European countries.

Key words**:** *agricultural land use, circular-economy, crops, food security, self-sufficiency, weed species, Saxon origin home-gardens*

INTRODUCTION

Food security became a stringent subject globally in the past 30 years, mainly due to the dramatic effects of climate change [36] and not only for the countries with weak agriculture system [33] but also for countries where agriculture is an important pillar into their national economy [31, 49]. Starting more than 20 years ago, different scientific articles, reports and publications underlined different ways and means for developing sustainable agriculture strategies for the future [47, 50]. Today the global agri-food market became more and more vulnerable and poses some more risks for countries from Africa [2, 5], Latin America and Pacific [4] as well as for the European countries [17] from an economic point of view. The volatility characteristics of the global market are well documented nowadays in one official report published some more than ten years ago by the United Nations Food and Agriculture Organization (FAO) [35] and continue today to pose the same real problems.

For more than 20 years, food-security was also discussed at the global level in close connectivity to self-sufficiency in agri-food systems [30]. Under this umbrella, it was also raised the problems generated by the colonialism that completely changed the native agricultural landscape, and today local communities are struggling to restore to ancient landscapes [15,16, 53]. Such cases are inspirational subjects for understanding how we can further develop the best strategies for a sustainable agriculture in close connectivity to landscape protection by accessing nature-based solutions [42, 43, 44].

Upon the above discussions it became more relevant that the preservation of heterogeneity of the agricultural landscaping should become part of future land-use planning [37], especially when nature-based solutions are

implemented [45]. In this regard, a more heterogeneous rural landscape is most resilient against climate change and crises [46].

Based on all these discussions, self-sufficiency became more than important as research subject to be defined which, according to Jean Pierre Enriques from Zamorano University Honduras, after 2007 *it is the ability of a household or a region to cover their own agri-food requirements* [20]. However, self-sufficiency, was also defined by Cassio Luiselli Fernandez earlier in 1985 in his attempt to explain the food chain from Mexico towards the United States of America [21]. A deep search in the scientific literature reveals that Sir Alferd Daniel Hall was the initiator of this concept. Thus, he defined self-sufficiency, starting with 1920 when he was able to couple the crop production sufficiency to the income of the holder or farmer (page 64) [25].

Later, Christopher Ritson developed further the concept of self-sufficiency and raised attention to the risks of insulation and detachment of the regional and national economies [39]. Lately, human rights for food sovereignty became more vocal at the global level, especially for countries that are not able to cover self-sufficiency in agri-food systems at the national level [30]. As a consequence, it can be considered that it is relevant to understand the main characteristics of an agricultural ecosystem to cover the local needs for food and, further, to contribute to the circular economy as well as to integrate this local income into the circular economy up to the national level [26]. An appropriate analysis of such agricultural ecosystems may further support the best land-use planning for the future [48].In the past 20 years, as a baseline study in developing agricultural strategies for more sustainable economies, it became obvious that the future conceptual frameworks for sustainable agriculture development in any region should take into consideration the agricultural landscaping, nature-based solutions, pedological and climatic characteristics of the place, and self-sufficiency covering of the population needs in the European countries [48, 54], Africa [13], Asia [38] or America [40].

The scope of this article is to describe certain characteristics of self-sufficiency related to vegetables cultivation and provided by Saxon home gardens in Romania in the traditional village of Ațel, Sibiu County. The same heterogeneity of agricultural landscape can be observed as it was defined for Moșna [10]. We expect that our results will become relevant for future land-use planning, especially for heterogenous agricultural landscapes.

Also, in this article, some original nature-based solutions integration for the future rural areas' development will be emphasized. Such a conceptual framework may be further use for developing a more resilient and sustainable agricultural strategy in the countryside by considering the balance that should exist between the self-sufficiency of agri-food systems and further integration of local incomes into the regional economy to avoid the economic insulation of rural populations and to ensure food security for the future.

MATERIALS AND METHODS

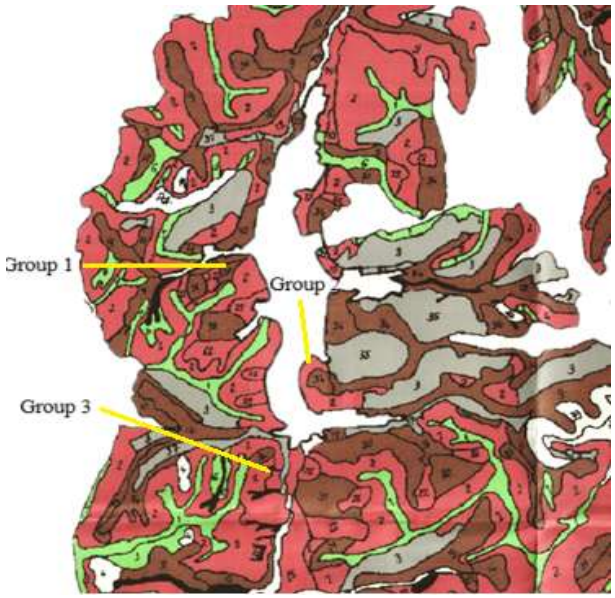
The analysis of vegetable self-sufficiency is based on the household's land use inside home-gardens and adult persons relaying on the food products for one year, or 365 days. In this study we applied the same principles like in our research before [10]: (1) investigate only households as landowners and not change for more than 50 years; (2) protect from an ethical point of view the owner's identity; and (3) local endorsed landowners for local and traditional knowledge related to agricultural practices.

Place of study. All data collection was realized in Ațel locality, Sibiu County Romania, between 2010-2023 (GPS: 46.1572222, 24.46777) (Map 1).

Land-use mapping of home-gardens inside households was realized with the support of Google Map [23] and a Bosch GLM 50-22 laser telemeter. All obtained data with the telemeter were compared to the results obtained when Google Map provided the map. For the scope of this article, the surfaces of home-gardens were investigated as well as the need for food for the adults inhabiting the household. All in field investigations were conducted during March and September 2010,

2015, and 2022. The free GPS software 3.3.1.2. of Virtual Maze was used for maps creation.

Map 1. Aerial view of Ațel locality, Sibiu County, Romania map realized with Google Map
Source: Google Maps, https://www.google.com/maps, Accessed on 6 Sept. 2024[23].



Map 2. The map of arable land limitations due to bedrock for Ațel locality, Sibiu County Romania. Scale: 125 000.
Legend:
severe land limitations
extremely severe limitations
reduced land limitations.
Source: Modified map in 2024 based on the original according to Acelenescu (2007) [1].

Land Limitations mapping towards the bedrock was provided in 2010 by the Chief Officer of the Soil Studies office working under the Agriculture Direction of Sibiu County, namely Eng. Septimiu Acelenescu [1]. The map was modified with the support of the 3D Painting software to overlap the Google Map of the village and data collection areas. The original colors were used also for the final map (Map 2).

Questionnaire applied. A scientific based questionnaire developed in our laboratory based on our experience starting in 2010 was applied through direct interviews with local authorities and householders [9]. The householders are interviewed for the crops species as vegetables cultivated in their gardens as well as the self-sufficiency as production that should respond to the needs of all adult members family for one year long. The land-use in the household properties is similar towards that already published for Mosna [10].

Householder's owners survey. In 2010, 2015, and 2022, 12 full days were dedicated to field missions for 19 household owners that have been endorsed by local authorities. All owners provided information related to household surface, home-garden surface, land use history of the household, vegetable cultivated species, and the needs and gaps in their needs covering.

Scientific data bases. The official scientific names of plant species are documented based on the information provided by the International Plant Name Index [28].

Data analysis. All scientific data, based on specific criteria, were introduced and processed in Excel.

RESULTS AND DISCUSSIONS

The village of Ațel was settled by the Saxon population in 1283 and has different names under different dialects (Saxon: Hätselderf, Hâtseldref, German: Hetzeldorf, Hungarian: Ecel). If in the beginning it was populated with 14 families in a group of houses surrounding the church, during the time the population grew and slowly integrated into the natural forest and pastures a heterogenous agricultural landscape [3]. Today the locality has 565 houses or buildings, and 3 of them are still not inhabited with a population of 1,395, or 3.03 people per household. This locality is positioned at 16 km distance towards the closest city: Mediaș, and 68 km towards the capital of the Sibiu County. The village is also

positioned in the protected area Sighisoara - Târnava Mare ROSCI0227 based on Natura 2000 classification system for European Union countries. Since 2015, this village is also part, of an integrated management plan for SPA Podișul Hârtibaciului, SCI Sighisoara - Târnava Mare and SCI Oltul Mijlociu – Cibin – Hârtibaciu, and it is designated as a museum open village too for eco-tourism too.

The locality is positioned in a hilly area, crossed by a small but permanent crick, with the average annual precipitations ranging between 700 and 600 mm. The year 2024 is coming with the highest shortage in precipitations for July and August [14]. We mention also a 230 m variation on vertical altitude due to hills (i.e., 540 m highest altitude) valleys, crick, and meadows (i.e., 310 m lowest altitude). The fertility of the soil is considered moderated, and the limitations of the soil dept due to bedrock are severe to extreme severe (i.e., the medium soil profile is 1 m). Due to climate conditions, the presence of forests, orchards, and vineyards, is highly important [6].These facts paved the reasons why this village was chosen as a case - study in 2010: (1) remote distance to Sibiu, (2) placed in a protected area, (3) not changed the ratio between forest/grassland, and agricultural land for more than 2 centuries, (4) and having a permanent crick water supply. Based on these, the real needs and gaps for conserving plant genetic resources for food and agriculture (PGRFA) including landraces for Romania were analyzed and finally the first red listing methodology of crops varieties was published [7]. Based on this experience, we understand further that the same type of localities may help us to understand how to define new terms for the European Union countries facing today the dramatic effects of climate change. Such terms should be self-sufficiency described above and the need to understand the relevance of wood networking for this area in case of extreme drought conditions.

Historical background. The land use is almost unchanged for more than 2 centuries when speaking of forests, grasslands, and agricultural lands based on Fiscal Conscription of Transylvania from 1750 [24]. In this regard, today we can speak of a balanced ratio for land use shared between forest (i.e., 1,239 ha), arable land (i.e., 1,250 ha) and grassland (i.e., 1,411 ha) that was almost unchanged in the past 2 centuries and also defining it as a heterogenous agricultural landscape. From an agricultural point of view, the communism did not touch this ration but only the land use inside the agricultural land (i.e., it unifies the plots in major plot areas for the intensive cultivation of large surfaces of different field cereals [27, 29]. The second attribute relevant for agriculture is that this region is highly humid during the year and due to the microclimate and summertime's fog stagnation. Also, it can be recognized as a hot spot for wheat leaf rust (*Puccinia recondita* f.sp. *tritici*) starting with the Fiscal Conscription of Transylvania and excellent resources for wheat breeding program [41, 52]. The third attribute relevant for the scope of this article is that the agricultural land provides good conditions for maize cultivation, early season legumes, legumes generally, potatoes, orchards, and vineyards.

Householder property description. The total number of properties is 568, and 37 of these are public properties and three are not inhabited.

A decreasing trend of living population in Ațel Commune was registered immediately after 1990, when 1,277 persons were recorded. However, today the population is stabilized at around 1,300, with a proportion of 46.88% active persons and 18.57% retired persons [11].

Considering the average number of persons per household as 3.11%, it can be considered that the village can be considered among the best oriented for sustainable development if the future landscape planning is preserving the same historical structure.

The structure of population ethnicities is as follows: 84% Romanian, 8.86% Rhoma, 4.58% Saxons, 2.37% Hungarian, 0.46% Slovaks and other ethnicities 0.08% (Fig. 1) and emphasizes the multicultural values of the place also [34].

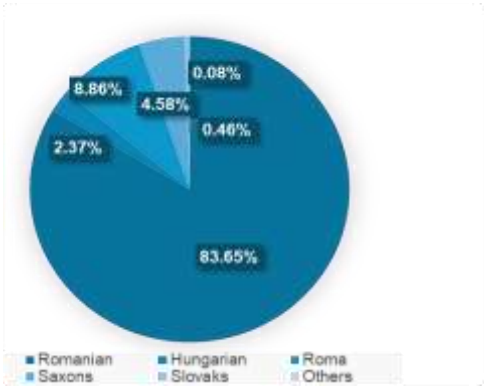


Fig. 1. The ethnic structure of Ațel locality, Sibiu County, Romania. It can be observed that the Saxon ethnics are only 4.58%.
Source: Graphic based on official reports [11].

Limitations analysis of the householders' properties.

All 19 properties have been surveyed and organized in three groups for three different positions of the villages. The main argument to be analysed is due to the position inside the village: (1) close to the forest and remote distance from the centre downstream the crick, (2) close to the crick and central and (3) close to the forest and central. This argument is also supported by the heterogenous landscape of the village, following a main central road that is parallel with the crick. The general description of the properties is below.

Map 3. First group of investigated Saxon home-gardens belongs to householders close to the forest of Ațel, Sibiu County, Romania. It comprises 5 properties, wooden fenced.
Source: Google Maps, https://www.google.com/maps, Accessed on 6 Sept. 2024 [23].

First group of householders.Five neighboring properties towards the exit of locality, to Mediaș have been chosen, and covering a total area of around 1 ha (i.e., 9,938.82 m^2, 46°09'45"N 24°27'49"E) (Map 3).

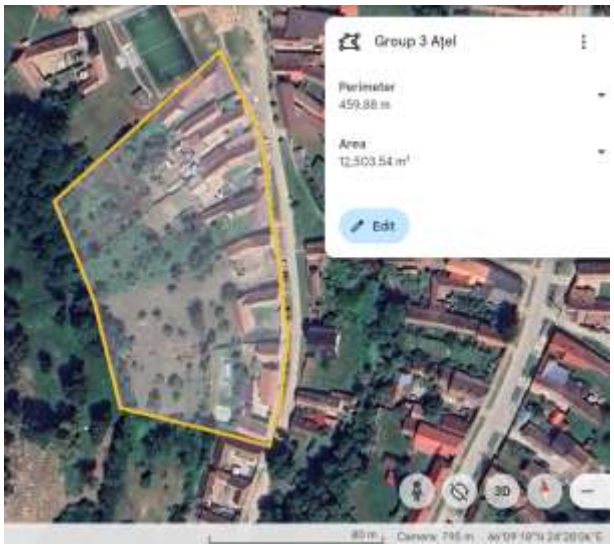
The analysis of the arable land map reveals that all five gardens present extremely severe land limitations due to the bedrock (i.e., an average of 1 m depth) (Map 2). However, the climate conditions overcome all negative effects of land limitations analysis (i.e., precipitation, annual average temperature) based on the local and traditional management of the agricultural land for more than eight centuries. All home-gardens are at the limit of the forest, wooden fenced, and a slope of 1% [1].

Group 2 comprises 6 properties and covers an area of around 12,500 m^2 (Map 4, GPS coordinates: 46°09'34"N 24°27'52"E). The analysis of the arable land map also reveals that all six gardens present severe land limitations due to the bedrock (i.e., the average depth of the soil profile goes down to 1.5 m) (Map 4). These properties are close to the church group, and better conditions for gardening are also ensured by the climate conditions and local/ traditional management of the agricultural land [1]. All gardens are at the end limit of the crick of the village, with an excellent water supply during the summertime. We mention that the crick is permanent and only for severe droughts can it disappear.

Map 4. Second group of investigated Saxon home-gardens belongs to householders close to the crick in the central area of Ațel, Sibiu County, Romania. It comprises 6 properties, wooden fenced.
Source: Google Maps, https://www.google.com/maps, Accessed on 6 Sept. 2024 [23].

Group 3 comprises 8 properties and covers an area of 12,500 m^2 (Map 5, GPS coordinates: 46°09'20"N 24°27'57"E). The analysis of the arable land map reveals that all eight gardens

present severe land limitations due to bedrock (i.e., 1.5. m depth as an average) (Map 2). However, due to forest limitations the climate conditions overcome all negative effects also based on the local and traditional management of the agricultural land. All gardens are at the limit of the forest, wooden fenced, and a slope of 1.5% [1]. This group of houses is surrounding the Evangelic Church and best positioned from a defending point of view for the XIII century.



Map 5. The third group of investigated Saxon home-gardens belongs to householders, central and close to the forest of Ațel, Sibiu County, Romania. It comprises 8 properties, wooden fenced.
Source: Google Maps, https://www.google.com/maps, Accessed on 6 Sept. 2024 [23].

Self-sufficiency analysis. The main goal of this article is to investigate the vegetable needs self-sufficiency for 19 families and one year long. Usually, families owning greenhouses are the major stakeholders for the circular economy in the village. They are well integrated at the local level for selling seedlings and vegetables and in the surrounding villages and Mediaș city. Self-sufficiency also depends on the favourites species for the householders to broaden the diversity of the cultivated species. In this regard, the householders are dividing into the cultivation cycle for the spring, summer, and autumn periods of time.
Table 1 presents the results of the survey. As major discussion subjects are as following: home-garden areas, family adult members, integration in the circular economy, and covering self-sufficiency in vegetables.

Table 1. Self-sufficiency analysis for vegetable needs and covering 19 families in Ațel locality, Sibiu County, Romania. The data are collected on anonymous base and emphasizing the needs for one year long starting with 2010, 2018, 2023.

Households	Household (m^2)	Home garden (m^2)	Solar garden	Family members no	Merket selling	Self -sufficiency covering in vegetables
1.1. Forest border	1,700	1,000	No	4	Buying	80%
1.2. Forest border	1,800	1,100	No	5	Buying	80%
1.3. Forest border	1,600	800	100 m^2	4	Yes	120%
1.4. Forest border	1,300	500	No	2	Buying	100%
1.5. Forest border	2,600	1,000	No	3	Yes	120%
2.1. Crick border	1,700	1,060	150 m^2	4	Yes	120%
2.2. Crick border	2,600	1,200	No	5	Yes	130%
2.3. Crick border	3,000	2,000	No	4	Yes	130%
2.4. Crick border	1,600	1,100	100 m^2	4	Yes	110%
2.5. Crick border	2,000	1,250	No	4	Yes	135%
2.6. Crick border	1,600	1,000	No	2	Yes	210%
3.1. Evangelical Church	1,400	700	No	2	Yes	150%
3.2. Evangelical Church	1,400	600	100 m^2	3	Yes	100%
3.3. Evangelical Church	1,000	500	No	2	Yes	110%
3.4. Evangelical Church	1,800	800	No	4	Yes	100%
3.5. Evangelical Church	1,600	900	No	4	Yes	100%
3.6. Evangelical Church	1,800	1,000	No	4	Yes	120%
3.7. Evangelical Church	1,700	1,100	No	3	Yes	140%
3.8. Evangelical Church	1,800	1,100	80 m^2	2	Yes	150%

Source: based on original data from 2010, 2015, 2022.

The survey is made based on respecting the privacy of the involved persons. It can be observed from Fig. 1, that the main poll of home-gardens is covering between 200 and 400 m^2/adult persons and officially recorded for the village. Only three householders, marked in red, are depending on other

vegetable production and are also integrated into the circular economy at the local level based on their statements. The rest of the householders are producing more vegetables to be included in the circular economy or as raw food materials either as home processed food (i.e., pickles, gems, compotes) or as greenhouse products (seedlings and other mature vegetables such as spinach, lettuce, green onion, and garlic).

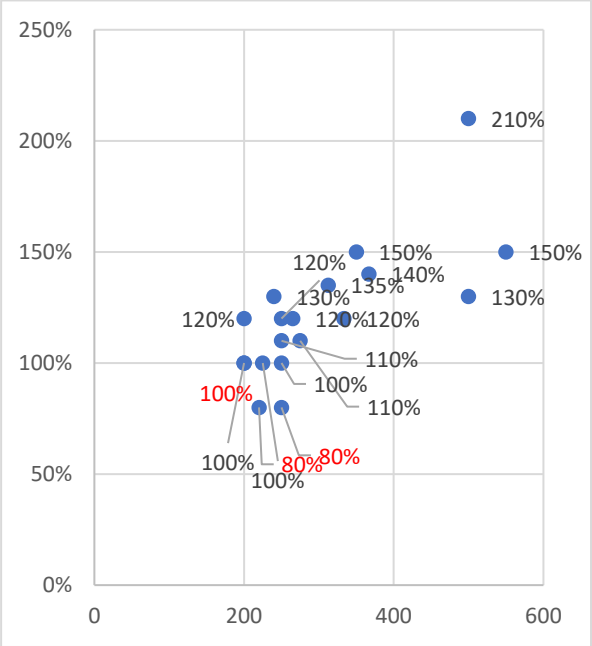


Fig. 2. Self-sufficiency analysis for cultivated vegetable in home-gardens of Ațel, Sibiu County, Romania. Three householders marked in red cannot afford to cover their needs but are part of the local circular economy.
Source: based on original data: 2010, 2015, 2022.

Photo 1. Household landscaping, orchard, vineyard and home-garden prepared for springtime Ațel, Sibiu County, Romania.
Source: Original photo taken in 2010.

The list of vegetables cultivated is presented in Table 2. The food needs of a household in the rural area are relevant to be taken into consideration when self-sufficiency is studied to enable developers to understand the future land planning consequences on food security.
An image of the landscaping of home-gardens can be analysed in Photo 1. The householder has already the knowledge for associating different vegetables for their cultivation as well as different types of technologies that are integrated already into the local knowledge (i.e., cultivating crops in solar and greenhouses) (Photo 2 and Photo 3).

Photo 2. Capsicum sp. Seedlings from garden solar in Ațel, Sibiu County, Romania
Source: Original photo taken in 2018.

Photo 3. Spinach cultivation in garden solar, Ațel, Sibiu County, Romania.
Source: Original photo taken in 2023.

A complete list of vegetable species cultivated in the surveyed home-gardens is listed in Table 2. Some of the seeds or seedlings are local, as is the example of onion seeds which are a mixture of white and red onion varieties used by the locals. They consider that this mixture is more adapted to their needs and taste (Photo 5).

Photo 4. Local onion, red and white mixed on purpose, Ațel, Sibiu County, Romania
Source: Original photo taken in 2018

Photo 5. Maize as commodity for the household feed use in Ațel, Sibiu County, Romania
Source: Original photo taken in 2023.

The same situation is for yellow maize seeds when used as a commodity for feeding animals (Photo 5). They are not using current maize varieties and prefer to cultivate local landraces [8].

The analysis of Fig. 3 revealed that pea (*Pisum sativum* L.) is not very popular, even the crop species is archaic and cultivated for more than 6,000 years in South-East Transylvania [18]. Also, other crop species, such as rosemary and fennel, very popular in traditional Saxon home-gardens are cultivated only by 5 householders of 19. This is also a subject of social choice related to crops cultivation, that should be relevant when considering food security. Multiculturality in the rural area becomes important to support further the conservation of more crop species in home-gardens of Romania.

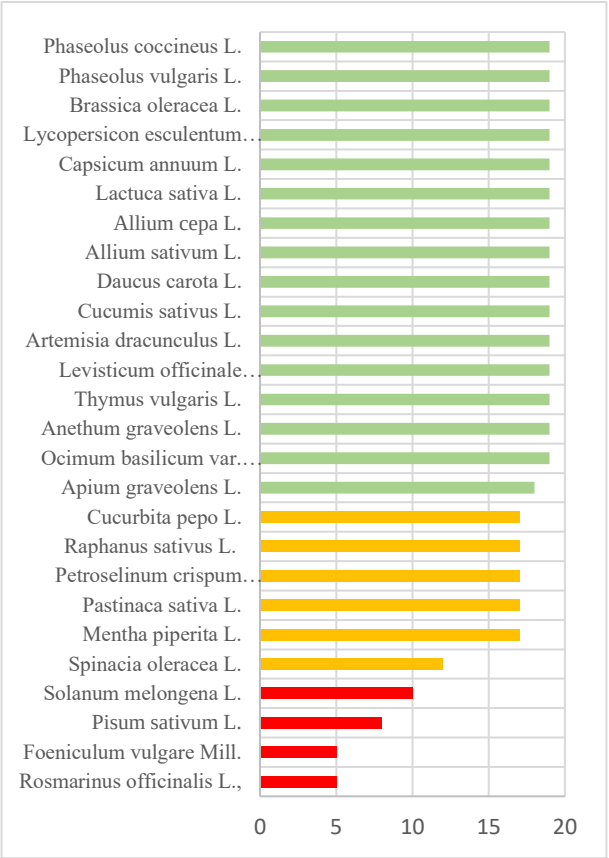


Fig. 3. The distribution of more common vegetables cultivated in home-gardens, It can be seen that at least 4 crops species are not very common such as Rosemary, fennel, pea and solanum melongena. Atel, Sibiu County, Romania
Source: based on original data: 2010, 2015, 2022

Table 2. The most common vegetables surveyed in Ațel locality, Sibiu County Romania. Their integration into the circular economy is based on the local merchandizes exchanges as raw or processed food

Crop latin name	Origin	Home-gardens
Ocimumbasilicum var. album (L.) Benth., Pl. Asiat. Rar. 2: 13 (1830)	Local	19
Rosmarinus officinalis L.,	Local	5
Anethum graveolens L.	Local	19
Mentha piperita L.	Local	17
Thymus vulgaris L.	Local	19
Levisticum officinale W.D.J.Koch	Local	19
Artemisia dracunculus L.	Local	19
Apium graveolens L.	Local	18
Pastinaca sativa L.	Local	17
Petroselinum crispum (Mill.) Fuss	Local	17
Foeniculum vulgare Mill.	Local	5
Cucumis sativus L.	Local/ trade	19

Daucus carota L.	Local/ trade	19
Raphanus sativus L.	Local/ trade	17
Allium sativum L.	Local	19
Allium cepa L.	Local	19
Pisum sativum L.	Local/ trade	8
Lactuca sativa L.	Local/ trade	19
Capsicum annuum L.	Local/ trade	19
Lycopersicon esculentum Mill.	Local/ trade	19
Solanum melongena L.	Local/ trade	10
Brassica oleracea L.	Local/ trade	19
Spinacia oleracea L.	Local/ trade	12
Phaseolus vulgaris L.	Local/ trade	19
Phaseolus coccineus L.	Local/ trade	19
Cucurbita pepo L.	Local/ trade	17

Source: based on original data: 2010, 2015, 2022.

Among the weeds 30 plant species were identified (Table 3).

Rural areas from Sibiu County, that were established by the Saxons, more than 8 centuries ago preserve the characteristics of an unchanged functional rural landscape for more than 100 years.

The main characteristics of these villages today in terms of agriculture is that most of the landowners, or householders, are interested in self-sufficiency for food production.

Considering only vegetable cultivation it can be considered that self -sufficiency is covered at the community level; even 3 of 19 owners cannot afford to cultivate vegetables as their needs for one year.

The circular economy in Ațel is functioning at the community level based on these 19 householders' surveys, only considering the raw food or feed materials covering the needs for one year.

Moreover, some of the householders are producing more vegetables to be sold as such or as primary food products (i.e., 5 of the 19) in the neighboring localities.

The investigation in the wild flora is relevant to understand the need to promote this type of rural area for biodiversity conservation and maintaining the soil fertility for long term.

Table 3. The wild herb species present in the Saxon and local home-gardens of Ațel, Sibiu County, Romania.

No.	Scientific name
1.	*Achillea millefolium* L.
2.	*Agropyron repens* (L.) P.Beauv.
3.	*Agrostis stolonifera* L.
4.	*Agrostis tenuis* Sibth.
5.	*Bothriochloa ischaemum* (L.) Keng
6.	*Danthonia provincialis* DC.
7.	*Equisetum arvense* L.,
8.	*Festuca glauca* var. rupicola Schur
9.	*Festuca pratensis* Huds.
10.	*Geranium robertianum* L.
11.	*Glyceria maxima* (Hartm.) Holmb.
12.	*Hypericum perforatum* L.
13.	*Juncus acutus* (L.) subsp. Acutus
14.	*Matricaria chamomilla* L.
15.	*Melissa officinalis* L.,
16.	*Molinia caerulea* (L.) Moench
17.	*Nardus stricta* L.
18.	*Onobrychis viciifolia* Scop.
19.	*Papaver somniferum* L.
20.	*Phragmites australis* (Cav.) Trin. ex Steud.
21.	*Plantago lanceolata* L.
22.	*Plantago major* L.
23.	*Polygonum aviculare* L.
24.	*Polygonum aviculare* L.
25.	*Portulaca oleracea* L.
26.	*Portulaca oleracea* L.
27.	*Symphytum officinale* L.
28.	*Taraxacum officinale* F.H.Wigg.
29.	*Trifolium repens* L.
30.	*Trifolium pratense* L.

Source: based on original data: 2010, 2015, 2022.

Therefore, for future it will be relevant that the Margalef index should be explored for future rural areas development [10]. In this regard it will be essential for the future rural area development strategies to include the need for the preservation of all native species no matter their role in agricultural productivity, due to their more important ecological role [19].

It is relevant that the native tree species, including domesticated tree species, be integrated into the rural area landscaping for continuing the maintenance of species communication at the root level, extremely important for land restauration [22].

This will become more relevant for Ațel, as the bedrock is a limiting factor for agriculture as well as the water access for long periods of droughts due to climate change.
In this regard, it is essential to go further and to understand the negative potential of completely removing native species from rural areas by analyzing the different examples all over the world on land restoration for rural areas [12, 32, 51].

CONCLUSIONS

Self-sufficiency studies are important for ensuring food security for the long term in rural areas, especially now when we are facing the dramatic effects of climate change. The self-sufficiency study's results are also paving the way for our research to understand the mechanisms of the circular economy functioning at the householder as well as at the rural community level. Once known very well, self-sufficiency as a concept that includes all peculiarities of agricultural landscapes in rural areas may open a new way of thinking about landscape planning at the village level by considering the resilience of local communities too, facing climate change and political crises, and ensuring food security for future generations. As we can understand from these studies the preservation of these heterogenous agricultural landscapes from the former province of Transylvania, present in Sibiu and Brașov counties of Romania [3], they may provide us different clues to understand how the rural communities can develop best and may be used as best practices in this regard. They are also essential for biodiversity conservations well as for the maintenance of original landscaping in close communication with wild nature, with a special focus also on native wild species conservation.

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