



# Dynamics of horticulture distribution in the mountainous landscapes of Samtskhe-Javakheti, according to census documents of the 16<sup>th</sup>–20<sup>th</sup> centuries

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**Abstract:** The paper examines the spread of gardening in the Samtskhe-Javakheti region and assesses its dynamics in the current situation. It aims to study the distribution of gardening and its correspondence with natural landscapes, focusing on the concentration of gardening in specific landscape units and the extent of gardening in various landscapes. The research is based on two key documents: *The Great Book of the Gurjistan Vilayet* and an agricultural census conducted at the beginning of the 20<sup>th</sup> century.

**Keywords:** horticulture, census documents, landscape, Samtskhe-Javakheti, mapping

## 1. Introduction

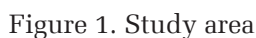
Gardening has historically held great importance in the South Caucasus, especially in Georgia. In earlier eras, particularly during the Middle Ages, gardening encompassed two main aspects: one was agricultural and economic, focusing on the cultivation of orchards and the resulting economic benefits, while the other involved gardens designed for aesthetic and recreational enjoyment. The latter typically featured decorative and shade-producing plants and were mainly found in urban areas or at royal residences; in the context of a strong feudal system, these gardens were often exclusive to the affluent feudal lords. During the tumultuous late Middle Ages in Georgia, the number of gardens surrounding royal and feudal

palaces was relatively sparse. Our research in the Samtskhe-Javakheti region – a significant area that was part of the Ottoman Empire from 1555 to 1829 and later the Russian Empire from 1829 to 1917 – highlighted this point. While several census documents have been compiled for this region, they do not specifically address gardens as elements of landscape architecture. However, they do offer detailed information on fruit trees, notably their distribution and yield [1], [2]. Two documents from the late 16<sup>th</sup> century and another from the first half of the 18<sup>th</sup> century cover only a small segment of the area, primarily detailing settlements that are largely uninhabited today [3]. In the *Description of the Kingdom of Georgia*, Vakhushti Bagrationi categorizes one area in the vertical distribution of vegetation and agricultural activity as a “fruit vineyard”, which is contrasted with a zone that he describes as “unvineyard-unfruit” [4]. Given the longstanding historical evidence that fruit growing has been a crucial agricultural sector in the region, it can be inferred that these agro-structures are significant landscape units related to specific geographical areas. The mountainous regions of Georgia often exhibit a combination of fruit cultivation alongside vineyards, coexisting as both integrated and separate plantings. Their distribution typically aligns with river valleys and terraced slopes in intermountain ravines and canyon-like valleys, demonstrating an optimal utilization of favourable hydrothermal conditions, even when agricultural land is limited within certain landscapes.

In our work, we attempted to study and analyse the areas and forms of fruit tree distribution, both by administrative-territorial units and by natural landscape units. According to the description, fruit tree culture is described as both ornamental and for plantations. However, in past centuries, there was no precise description of the extent and proportion of the various fruit trees. This complicates the issue of determining diversity and limits the scope of discussion on the types of fruit trees that were widespread in the study region. However, to give a general idea of the existing picture, apple, pear, mulberry, plum, apricot, cranberry, plum, and quince plantations are typical in the region. For the most part, their use was related to food purposes, both in the form of fruit and various products. Also, mulberry cultivation was important in terms of sericulture [5–6], which, however, has declined since the 20<sup>th</sup> century, and, currently, horticulture is not being developed in this direction.

## 2. Study area

Samtskhe-Javakheti, one of the regional administrative regions of Georgia, is located in the southern part of the country and unites six administrative municipalities. The major relief units include the intermontane valley plains, mountain plateaus, and mountain ranges, which belong to the Lesser Caucasus and Adjara-Trialeti mountain systems [7].



Since the number of fruit trees in the census documents was given in aggregate form, we could not rely on data on individual fruit tree species. However, it was not easy to find more accurate data at the end of the 16<sup>th</sup> century and the beginning of the 20<sup>th</sup>. Therefore, *The Great Book of the Gurjistan Vilayet* [1] and the document *The 1923 Agricultural Census of the Georgian SSR* are quite valuable materials for reflecting the picture of their distribution [8]. The distribution of orchards on old maps is presented in a very general form. In the Vakhushhti Batonishvili Atlas [9], we can see the location of their distribution only conditionally, while they are shown in more detail on topographic maps of the 20<sup>th</sup> century at a scale of 1:25,000. However, in our case, we preferred to use this material only for orientation and to show their distribution using satellite photos.

In the case of satellite photos, we gave preference to high-quality photos available within the ArcGIS base map, where the orchards in the region are depicted in high resolution. However, our goal was not to differentiate between them, as it was essential to analyse the situation at the end of the 16<sup>th</sup> century and the beginning of the 20<sup>th</sup>. For this purpose, we prepared 3 GIS layers, one of which reflected the settlements at the time of the 1595 census (where we have included

the calculated amount of fruit harvest). Two layers reflect the administrative divisions that existed in 1595 and 1923. In 1595, the territory included in the Gurjistan vilayet, which is today within the borders of Georgia, was united into six *livas* (*sanjaks*), which in turn were divided into 18 districts (*nahiyas*). In 1923, the territory was united into three *mazras*, which were then divided into 27 communities. According to the research we conducted, the central zones and terroirs of their distribution were identified [10]. However, the landscape picture of the distribution of fruit trees is also interesting. For this, we relied on the landscape map compiled by us in 2024, which has a scale of 1:10,000 and differentiates 43 typological units. Accordingly, based on the landscape units, it became possible to discuss which landscapes were most relevant for fruit growing and what trends the existing situation experienced in the subsequent periods, including the Soviet, post-Soviet, and current eras.

#### 4. Results and discussions

According to the census results, it is known how many settlements had orchards, and its changes do not show a positive trend. As a result of the 2014 census, the total number of fruit trees in the region was 664, of which approximately 2/3 fall within the municipalities of Aspindza and Adigeni, where the areas of the plantations are approximately similar to each other, and almost ¼ is cultivated in the Akhaltsikhe municipality. The area of fruit trees in the remaining municipalities is significantly smaller. In total for this period, approximately 200,000 fruit trees were registered in the region. As for fruit tree varieties, approximately 40% of them were apple plantations, and approximately 23% were peach, plum, and cherry plum plantations [11]. The remaining fruit trees (mulberry, cherry, cherry, pear) occupy relatively more minor areas. The varieties are not described in the 16<sup>th</sup>-century documents, although their quantity is mentioned, which is understandable since the census was conducted for the purpose of collecting taxes, and its primary goal was to impose taxation on a specific type of product. After the annexation of the Samtskhe-Javakheti territory by the Ottomans, the region was subject to imperial administrative arrangements. The territory within the boundaries of present-day Georgia was united into six *livas*, which were divided into districts (*nahiya*), a total of 18 *nahyas*, and the amount of fruit trees was distributed according to administrative units as follows.

According to the table above, it can be seen that the most significant part of the fruit trees is concentrated within the Akhaltsikhe basin. At the same time, the second, relatively minor concentration centre is located in the canyon-like valley of the Mtkvari River in the Aspindza-Tmogvi-Vardzia section.

Table 1. Administrative units and amount of fruit trees harvested (tons) – according to the 1595 census

| <b>Liva</b>                | <b>Nahiya</b> | <b>Number of settlements<br/>with fruit trees</b> | <b>Harvest (t)</b> |
|----------------------------|---------------|---------------------------------------------------|--------------------|
| Alkaltsikhe                | Mzvare        | 11                                                | 34.02              |
|                            | Chrdili       | 14                                                | 14.602             |
|                            | Ude           | 9                                                 | 9.205              |
|                            | Kvabliani     | 0                                                 | 0                  |
|                            | Atskuri       | 2                                                 | 27.51              |
|                            | Altunkala     | 20                                                | 1.75               |
|                            | Otskhe        | 2                                                 | 2.1                |
|                            | Aspindza      | 18                                                | 16.555             |
|                            | Tchatcharaki  | 15                                                | 25.55              |
|                            | <b>Total</b>  | <b>91</b>                                         | <b>131.292</b>     |
| Khertvisi                  | Khertvisi     | 13                                                | 14.735             |
|                            | Tke-Javakheti | 0                                                 | 0                  |
|                            | Buzmareti     | 0                                                 | 0                  |
|                            | <b>Total</b>  | <b>13</b>                                         | <b>14.735</b>      |
| Akhalkalaki                | Akhalkalaki   | 2                                                 | 0.875              |
|                            | Tmogvi        | 5                                                 | 5.215              |
|                            | Nialiskuri    | 2                                                 | 1.253              |
|                            | <b>Total</b>  | <b>9</b>                                          | <b>7.343</b>       |
| Childiri                   | Kanarbeli     | 1                                                 | 2.1                |
|                            | Total         | 1                                                 | 2.1                |
| Fotskhovi                  | Chrdili       | 4                                                 | 3.85               |
|                            | <b>Total</b>  | <b>4</b>                                          | <b>3.85</b>        |
| Petre                      | Petre         | 2                                                 | 1.575              |
|                            | Kashveti      | 0                                                 | 0                  |
|                            | <b>Total</b>  | <b>2</b>                                          | <b>1.575</b>       |
| <b>Total in the region</b> |               | <b>119</b>                                        | <b>160.895</b>     |



Figure 2. Fruit tree plantations in the Mtkvari River canyon (Nijgori)



Figure 3. Fruit trees in the Kvabliani River Gorge

In total, the land fund where orchards were cultivated covered 20,710.9 ha. This is the total land fund within the boundaries of the cultivated lands of the mentioned settlements, among which, there were, of course, not only orchards, being mixed with vineyards, vegetables, orchards, and annual crops, but still it tells us about the area of cultivated lands where orchards were cultivated with different frequencies.

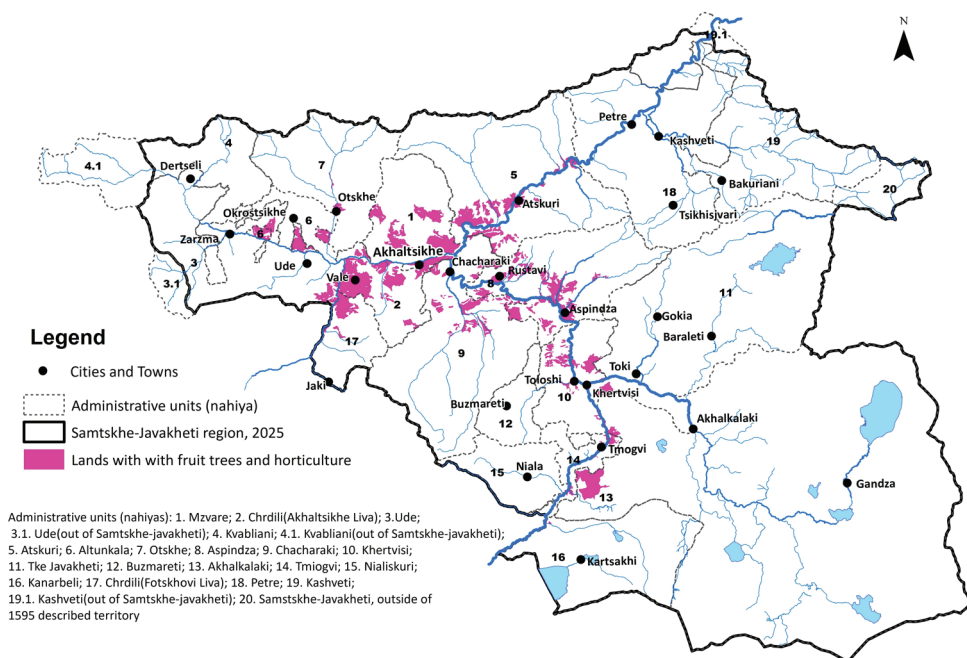


Figure 4. Land fund where orchards were fully or partially cultivated

A comparison of this data with the 1923 census data shows that fruit tree plantations have increased significantly, which means that the share of fruit trees in cultivated land has been increasing during this period, as evidenced by the amount of harvest. The table below gives their exact areas and the yield obtained.

Table 2. Fruit tree plantations, areas (ha) and yield obtained (t)

| <i>Mazra</i> (administrative unit) | Community    | Fruit gardens (ha) | Fruit (tons)   |
|------------------------------------|--------------|--------------------|----------------|
| Akhalkalaki                        | Alastani     | 2.8                | 42.5           |
|                                    | Baraleti     | 0                  | 0              |
|                                    | Gorelovo     | 0                  | 0              |
|                                    | Diltska      | 5.8                | 86.66          |
|                                    | Eshtio       | 0                  | 0              |
|                                    | Kondura      | 0                  | 0              |
|                                    | Kulikami     | 0                  | 0              |
|                                    | Okami        | 20.492             | 307.38         |
|                                    | Satkha       | 0                  | 0              |
|                                    | Khertvisi    | 95.16              | 1,427.36       |
|                                    | <b>Total</b> | <b>124.26</b>      | <b>1,863.9</b> |

| <b>Mazra (administrative unit)</b>                        | <b>Community</b> | <b>Fruit gardens (ha)</b> | <b>Fruit (tons)</b> |
|-----------------------------------------------------------|------------------|---------------------------|---------------------|
| Akhaltsikhe                                               | Adigeni          | 32.9                      | 493.8               |
|                                                           | Atskuri          | 59.9                      | 897.6               |
|                                                           | Ale              | 81.532                    | 1,222.98            |
|                                                           | arkhani          | 51.9                      | 778.26              |
|                                                           | Idumala          | 36.08                     | 541.2               |
|                                                           | Klde             | 63.55                     | 953.2               |
|                                                           | Lepisi           | 48.7                      | 730.9               |
|                                                           | Ude              | 180.9                     | 2714.1              |
|                                                           | Uraveli          | 66.9                      | 1003.9              |
|                                                           | Akhaltsikhe city | 13.6                      | 204.4               |
|                                                           | <b>Total</b>     | <b>636.01</b>             | <b>9,540.2</b>      |
| Gori (communities within the Gurjistan vilayet territory) | Akhaldaba        | 1.86                      | 27.8                |
|                                                           | Bakuriani        | 0                         | 0                   |
|                                                           | Borjomi          | 5                         | 75.2                |
|                                                           | Gujareti         | 0                         | 0                   |
|                                                           | Dviri            | 1.1                       | 16.35               |
|                                                           | Kvishkheti       | 9                         | 135.7               |
|                                                           | sagveri          | 0                         | 0                   |
|                                                           | <b>Total</b>     | <b>17</b>                 | <b>255</b>          |
| <b>Total in the region</b>                                |                  | <b>777.3</b>              | <b>1,1659.2</b>     |

The fruit harvest has increased by approx. 72 times, which is a very high figure. This indicates a change in agricultural practices or suggests that the sector was temporarily weakened at a particular time. This is also evidenced by the fact that the amount of wine harvest has decreased by 14 times compared to 1595 [10].

If we compare the ratio proportionally, it turns out that in 1595 the actual fruit plantations amounted to 10,726 ha, which is relatively small and means that they constituted 0.05% of the total land fund. As for their stepwise distribution, approx. 45% were located in the lower mountain landscapes, while approx. 54% were concentrated in the middle mountain landscapes. A slight spread characterized the upper mountain landscapes. Below is a map showing the distribution of this land fund according to the landscape's hypsometric levels.

The intermountain valleys, which include the valleys of the Mtkvari and Kvabliani rivers in the lower mountain and middle mountain belts and the Paravani, Kartsakhi, and Buzmareti intermountain plains in the upper mountain belt, covered the most significant part of the distribution of fruit trees, accounting for almost 80%. About 9% fell on mountain plateaus, and in river canyons it was about 7%. In addition to the relief forms, we paid attention to the coincidence of fruit trees and their distribution zones with the main types of ecosystems of the region. The map we prepared below shows the intersection of the fruit-bearing land fund with natural ecosystems.

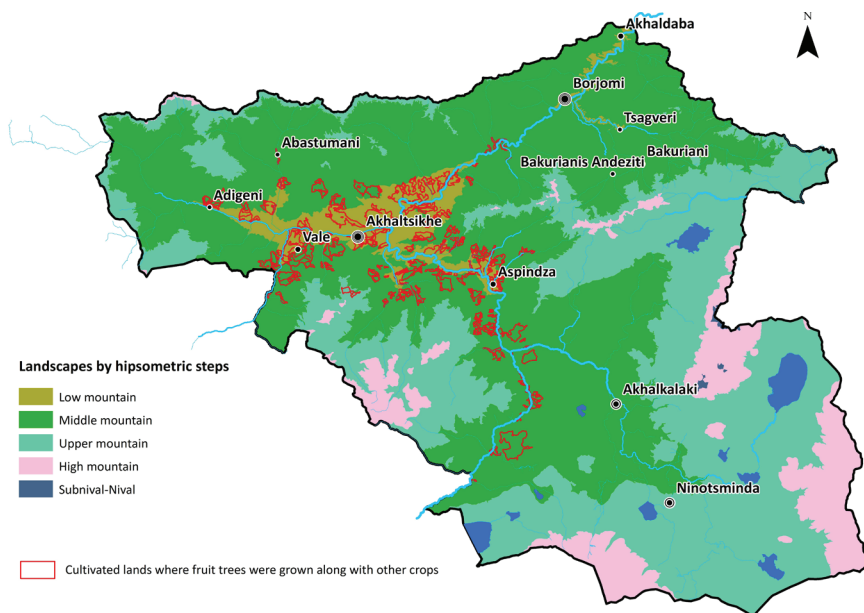


Figure 5. Land fund where orchards were fully or partially cultivated, according to the hipsometric levels of the landscape

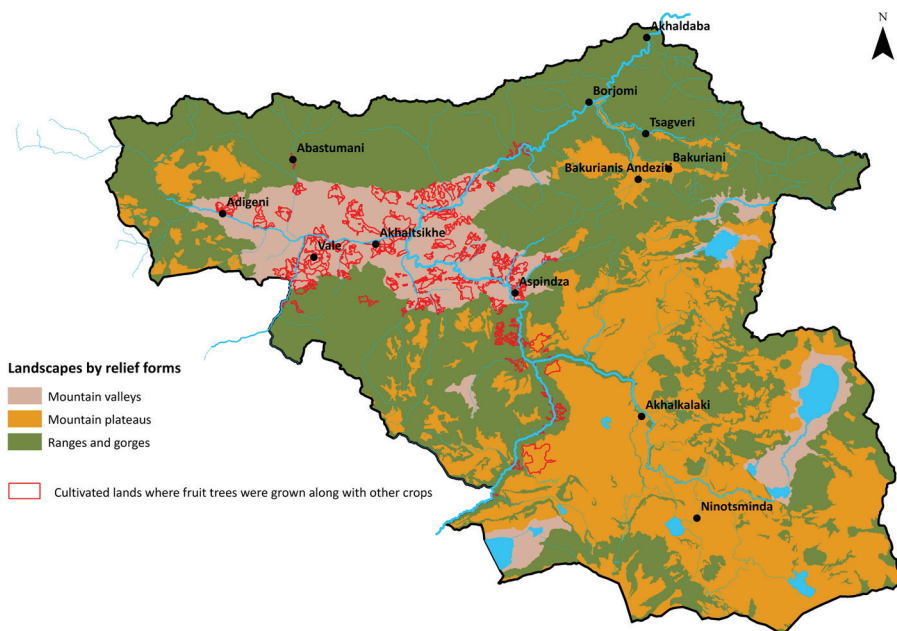


Figure 6. Land area where orchards were fully or partially cultivated, according to the main landforms

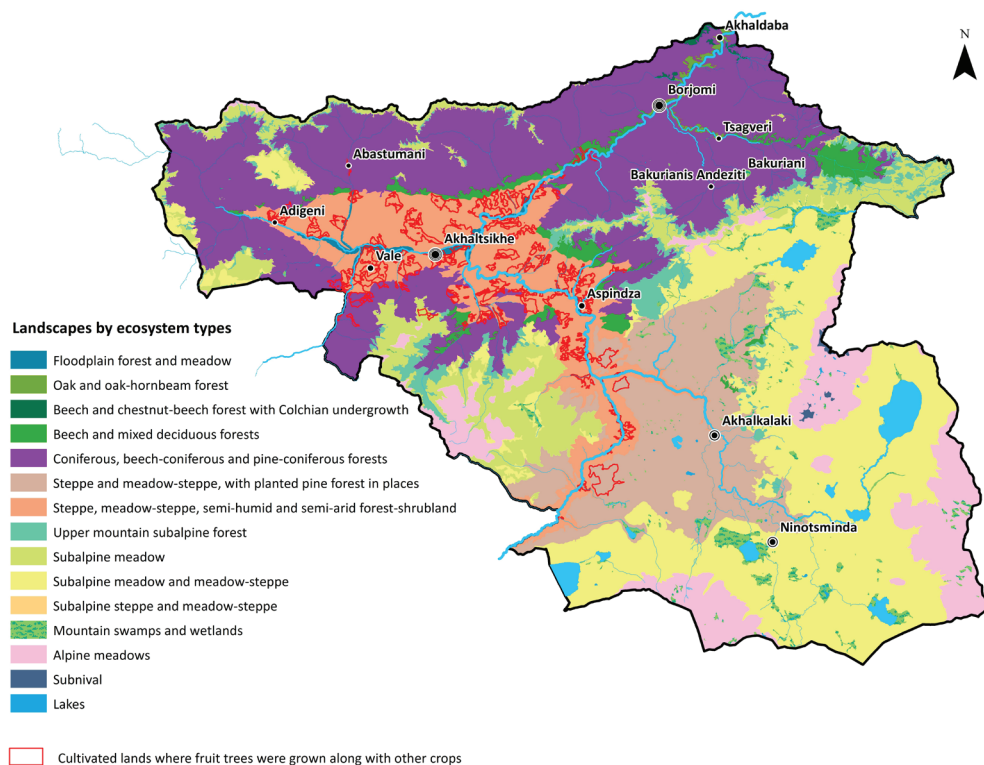


Figure 7. Land fund where fruit orchards were fully or partially planted, and its coincidence with natural ecosystems

Steppe and meadow-steppe ecosystems are found in the region in complexes with both forest shrubs and planted pine forests. Therefore, they are classified as different categories on the ecosystem map. However, in total, these two similar ecosystems cover 85% of the area of fruit trees. The remaining cultivated areas, where fruit trees were widespread, were connected to the areas of floodplain forests and dark coniferous and beech–dark coniferous forest ecosystems. In addition to them, small, insignificant areas were distributed among other ecosystems.

An accurate description of 1923 on the map was not possible, as the description is provided only by communities, and specific settlements are not specified. However, as shown in the table above, the trends and changes during the two mentioned periods are evident. Walnut orchards were not included in these areas, although according to data from 1595, the walnut harvest was approximately 90 tons, which is relatively low. Considering that fruit trees and walnuts have always characterized this area, we can assume that the low yield was caused by depopulation and the abandonment of orchards.

The increase in fruit areas by the beginning of the 20<sup>th</sup> century was, on the one hand, associated with the decline of grape cultivation. The decline in vineyards was likely also caused by the spread of Islam, as wine consumption decreased and became less economically important. On the other hand, the demand for fruit, fruit juice, and other products increased. In addition, during the Soviet period, a planned economy existed under state capitalism, which meant that the central government designated any sector of the economy as a priority or non-priority and developed agriculture accordingly. Therefore, since the Soviet period, the decline in the importance of fruit crops has been permanent. Following the collapse of the USSR, it became challenging to resume the rhythm of a private market economy. The population was not ready for this challenge, either in terms of attitude, professional knowledge, or financial capabilities, as a result of which fruit crops remain a less important sector. It is also worth noting that two specificities were identified in terms of fruit growing in the study region: 1. mulberry crops, which were used not only for their fruit but also for silkworm breeding, have entirely disappeared from economic activity today; 2. terraced fruit growing, which was characterized by high intensity within the framework of walled and unwalled terraces, although today they are overgrown and desolate, and their involvement in nature use is extremely low.

## Conclusions

Fruit growing and perennial crops were widespread and important agricultural sectors in the Samtskhe-Javakheti region. They were actively pursued in various landscape zones, as the population was concentrated in both the lower mountain and the middle and upper mountain belts. From the end of the 16<sup>th</sup> century to the 20<sup>th</sup> century, there was a tendency for fruit tree plantations to expand. However, Soviet-type economic planning halted this process, and the sector's importance subsequently decreased. Horticulture was mainly developed in intermountain valleys and river canyons and, to a small extent, on mountain plateaus. As for the hypsometric distribution, it was almost evenly distributed in the lower and middle mountain landscapes. A small part of the orchards corresponded to the coniferous and beech–dark coniferous forest ecosystems. However, a large part of them coincided with the mountain-steppe and meadow-steppe ecosystems. Mulberry and walnut crops were recorded separately in the field of orchards although their plantings increased in proportion to other fruit trees until the beginning of the 20<sup>th</sup> century. Orchards were characterized by valley and terraced cultivation, mainly in the vicinity of settlements. These structures represented a terroir characterized by the region's specific vegetation, creating a distinct cultural landscape appearance. Unfortunately, today, terraced and valley gardening is in decline, and its functional load has been significantly reduced, a result of Soviet-

type economic planning and the post-Soviet crisis, from which the region has not yet recovered. The restoration of gardening and the renewal and modernization of traditional forms would make a significant contribution to the region's economic development.

## Acknowledgements

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