

**Original Article****Research on Land Evaluation Marks within Ciceu Hills for Bearers Cropping (*Aronia melanocarpa* and *Goji lycium barbarum*)****BOT Amalia Ioana\*, Ioan PĂCURAR, Sânziana PAULIUC, Ioana Claudia UARĂ***University of Agricultural Sciences and Veterinary Medicine, Faculty of Agriculture, Mănăstur St., No. 3-5, 400372 Cluj-Napoca, Romania*Received 20 April 2015; received and revised form 15 May 2015; accepted 20 May 2015  
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**Abstract**

In the modern era, man begins to realize the importance of environment and the natural resources for a sustainable development of the society in optimal conditions. The attention given on environmental and natural resources protection, as well as on agrobiodiversity, also is increasing every day, so that soil tillage system must attend these fundamentals in order to practice organic and sustainable farming by applying the best agricultural techniques. These modern practices are based on land evaluation marks, regardless the type of crop or variety of soil and area, that are going to be the subject of this method of research, land evaluation mark. The area of study, Ciceu Hills, by the natural conditions of climate and microclimate, relief, lithological composition of the substrate and because of the existence in the area of bearers cropping, represents an excellent framework for studying the suitability of *Aronia melanocarpa* and *Goji lycium barbarum* shrubs which have numerous phitopharmacies properties that bring many benefits to human health.

*Keywords:* organic farming, land evaluation mark, suitability, shrubs, degraded land.

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**1. Introduction**

The environment has provided the necessary resources of food and shelter through time for all creatures on earth, including for the species that are at the pinnacle of evolution, humans. With the development of intellectual capacity, there were discovered new means of facilitating the daily life by permanently ensuring the resources we need. Humans were forced to carry out certain activities that would provide the necessary food and raw materials, activities which led to the development of the main environmental components and agriculture also: soil, climate, plants and animals.

The soil, due to its fundamental property, *fertility*, constitutes the main mean of production in agriculture, being one of the natural resources which contributes to the social and economic development of mankind [4].

For a sustainable development of agriculture, in the modern era conditions where the attention is increasing more on environmental protection, natural resources and agrobiodiversity, soil tillage should attend to the basis of organic farming by applying the best crop technologies.

All these farming activities performed in optimal agrotechnique conditions that lead to maximum profit with the lowest costs, are based on qualitative assessment and economic values of land, namely the process of land evaluation marks [5, 9].

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This present study aims to determine the suitability of land within Ciceu Hills with the purpose of achieving seedlings with new species of fruit and forestry breeder shrubs, such as *Aronia melanocarpa* and *Goji lyceum barbarum* (figure 1). The study area is included into the agricultural land use and with an agricultural, conventional and intensive orchards use [2]. Agricultural land must be protected from natural and anthropogenic

degradation factors in the idea that a certain segment of the population from the area depends on the quality of this land in order to achieve significant harvest over time. Establishing new seedlings with these species of shrubs, that bring a considerable profit would provide locals a decent living and also would develop the local farming market by promoting local products and offering support for the agrobiodiversity of the species.



**Figure 1.** *Aronia melanocarpa* (left) and *Goji lyceum barbarum* (right) [10]

The studied species have a high concentration of natural useful compounds, substances that allow their extraction in industrial quantities. *Aronia melanocarpa* is a fruit and ornamental shrub original from North America, known in common name as „black mountain ash”. The fruits of aronia (chokeberries) are known as medicinal products with numerous therapeutic properties: they share P-vitamins, hypotensive, antioxidant, chemoprevention and gastroprotective action [3].

Besides the antioxidant compounds, chokeberries also contain anthocyanins, vitamins, organic acids and minerals.

The antocyanins (natural dyes) are biologically active molecules that protect cells from the damaging effects caused by free oxidative radicals, with anticancer effect, which is why it is increasingly promoted and traded worldwide, with the aim of having a healthy lifestyle [6, 8].

*Goji lyceum barbarum* in common name „sea buckthorn fence” is a fruit shrub native from Tibet, being considered “the biomedical ambassador of China”. The phitopharmaceutic qualities of goji fruits are given by the high content of antioxidants (table 1), vitamins, amino acids, minerals and fatty acids.

**Table 1.** The level of antioxidants withingoji berries and chokeberries [11]

Aliments	Level of antioxidants (mol TE $\mu$ /100g)
Goji berries	25000
Chokeberries	16200
Pomegranate	10450
Cranberry	2750
Blackberry	2650
Strowberry	2475
Spinach	2450
Brussel sprout	2225
Beet	2210
Orange	1475
Onion	875
Carrot	275

Goji berries contain a unique mix of nutrients: 18 amino acids, 21 minerals (calcium, zinc, iron, phosphorus, magnesium etc.) and some of the most important vitamins: A vitamin, C vitamin, E vitamin and B complex vitamins.

Also, goji berries contain amino acids and a wide range of carotenoids with strong antioxidant effect and solar phytoprotection, beta-carotene and lutein among them.

Goji berries also stands out by its high content of antioxidants, especially carotenoids that have the ability to reduce the risk of muscle degeneration, offers protection against oxidative stress, reduces weariness and strengthens the ability to protect the body against harmful agents, decreasing the risk of cancer [3].

This study aims to establish new crops with this new species of shrubs in order to reduce land degradation trend from Ciceu hills and to offer a decent living to locals.

The study is based on land evaluation marks in order to determine the degree of suitability of shrubs on crop requirements based on natural conditions of soil, climate, microclimate, hydrography and relief from the area, as well as the improvement measures required for a substantial and long lasting profit.

## 2. Material and Method

The main purpose of research, determination of the level of suitability of soils in Ciceu Hills in order to achieve new crops with species of fruit and forestry breeder shrubs such as *Aroniamelanocarpa* and *Goji lyceum barbarum*, is performed by using the following materials and methods of research: characterization of soil cover using the methodology developed by ICPA Bucharest, conducting chemical analysis and carry out qualitative land evaluation marks based on the methodology elaborated by D. Teaci and improved at ICPA Bucharest.

## 3. Results and Discussions

Achieving the necessary conditions for a sustainable and organic agriculture is based on land evaluation marks.

The main objectives of land evaluation marks, such as estimating the output, specifying the most rational distributions crops and determine the limitative factors of soil production capacity, accomplish successfully the current requirements of sustainable agriculture for any type of crop or soil analysis.

Based on the methods of mapping and land evaluation marks, degraded and less productive lands will be identified and soils will be physico-chemical characterized.

Thus, based on the research above and on existing literature information about the soil requirements of shrubs and also on the natural conditions existing in the area, a new crop with these species will increase, aside from the existing orchard crops (especially apple, plum and cherry) that already exist.

At the same time, based on the increasing requirement of chokeberries and goji berries on worldwide market, as well as on account of the high proportion quality-price, significant results can be achieved taken into account the financial and socio-economic aspects, that will lead in the end to a sustainable development of the area.

## 4. Conclusions

The ever-growing population appeals for growing and better quality agricultural yields.

Among the measures that could lead to enhancement of agricultural production, all-important are those relating to the introduction in agricultural cycle the unproductive land and increase production per unit area.

Solving these problems is based, primarily, on complete knowledge of soil as the primary mean of agricultural production [1]. The importance and necessity for achieving a general soil study through land evaluation mark method of lands located in the area of research, Ciceu Hills, is given by the presence in the area of intensive and conventional orchard crops. Also, the natural conditions of climate and microclimate, relief and lithological composition of the substrate forms an excellent framework for studying the suitability of *Aronia melanocarpa* and *Goji lyceum barbarum* towards the pedoclimatic conditions.

Shrubs trees, chosen as subject for this study have outstanding plant protection properties, bring considerable benefits to human health; their cultivation can bring substantial profits to the detriment of other shrubs like blackberry, raspberry, rier and sea buckthorn, while the minimum conditions of cultivation which are necessary for growth and development are in the area that will be studied in detail.

Moreover, by determining the optimal technology for their cultivation, marginal lands will be protected against natural and anthropogenic degradation factors, therefore stipulating an increase of production capacity for less productive lands.

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