

Ecological Vineyards Governance Activities for Landscape's Strategies

Deliverable T 1.2.1

Structural Analysis of Selected Areas and Vineyard Mapping. Study area: Crmnica area in Montenegro

Responsible Partner

Foundation Business Start-up Centre Bar (PP8)

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FINAL VERSION

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Project Summary

ECOVINEGOALS promotes sustainability and resilience in the winemaking industry by encouraging the transition of intensive viticulture towards agroecological management systems that protect natural habitats and landscapes, while reducing chemical and fossil fuel inputs and harmful emissions. The project aims to enhance stakeholders' skills in participatory local governance, to strengthen transnational cooperation and provide specific transnational instruments to promote, support and manage the agroecological transition.

Expected results

- Sharing between partners in the ADRION countries of fundamental concepts and practices necessary for the transition from intensive viticulture management systems, towards agroecological management methods.
- Improvement of the participatory local governance skills of decision makers and all other viticulture stakeholders, both public and private, to jointly develop and define strategies and plans aiming to protect natural habitats and rural landscapes.
- Transnational communication, cooperation, and exchange between regional authorities and civil society organizations concerning common objectives to protect vulnerable environments, to promote ecosystem services, to prevent or mitigate climate change, and to avoid social conflicts in land use.
- An increase in the number and quality of tools and strategies available to support the planning and management of the agroecological transition of viticulture systems in the region.

Partnership:

PP1- LP	LAG EASTERN VENICE, VEGAL (IT)
PP2	Autonomous Province of Trento, PAT (IT)
PP3	Chamber of Agriculture and Forestry of Slovenia, KGZS-Zavod GO (SI)
PP4	Research Centre of the Slovenian Academy of Sciences and Arts, ZRC SAZU (SI)
PP5	Agency for rural development of Istria Ltd. Pazin, AZRRI (HR)
PP6	Association for the promotion of employment, vocational training and education, INFORMO (HR)
PP7	Business Development Center Kragujevac, BDCKG (RS)
PP8	Foundation Business Start-up Center Bar, BSC BAR (ME)
PP9	Municipality of Bar, BAR (ME)
PP10	Mediterranean Agronomic Institute of Chania, CIHEAM MAICh (EL)

Associated Partners (APs):

General Union CISL Cultivators Venice (IT)
Bio district of production and biological community of central-eastern Venice - BIO VENICE (IT)
IAL - Innovation Learning Work S.r.l. - Social enterprise (IT)
AIAB-Italian Organic Agriculture Association (IT)
Agroecologiki SP (EL)
Municipality of Topola (RS)
Šumadija winemakers association (RS)
Ministry of Agriculture and Rural Development (HR)
Agroecology Europe (BL)

INDEX

INTRODUCTION.....	7
ACTIVITY T 1.1.....	7
Deliverable T1.1.2	7
1. IDENTIFICATION PILOT AREA, STAKEHOLDER AND INDICATORS.....	8
1.1 PILOT AREA AND LANDSCAPE UNIT IDENTIFICATION	8
1.2 LOCAL STAKEHOLDER IDENTIFICATION	8
1.3 USE OF INDICATORS.....	8
2. OUR VISION ON AGROECOLOGY	9
2.1 GENERAL PRINCIPLE OF AGROECOLOGY	9
2.2 AGROECOLOGY APPLIED TO VINEYARD	9
2.3 THE DEBATE WITH FARMERS AND STAKEHOLDERS ON AGROECOLOGY	9
2.4 CONCERN.....	9
2.5 EXPECTATION	9
3. FARMERS QUESTIONNAIRE	10
4. AGROECOLOGICAL BEST PRACTICES.....	10
5. WEB MEETING AND EVENT	10
CONCLUSION	11
REFERENCES.....	11

INTRODUCTION

General objectives of the project are to define a common vision among the partners on agroecological principles and methods to be applied in vineyards, to promote agroecological transition in fragile viticulture areas, preserving ecosystem and traditional landscapes, identification of suitable tools and procedures, within a transnational agroecological strategy of the Adrion area in order to define integrated action plans in selected wine areas in partner regions.

ACTIVITY T 1.1

Construction of shared methods and criteria for the identification of agro-ecological systems, viticulture areas and pilot viticulture farms in each region involved.

This activity is carried out through a review of definitions on agroecology and of experiences and practices already known and available to be applied to viticulture. The activity is carried out by PP2 (Provincia Autonoma di Trento), in collaboration with all other PPs, in order to achieve a shared transnational construction of tools that will allow selection of wine-growing areas of experimentation and of the pilot farms, as well as the choice of multi-criteria indicators that will allow monitoring of their agroecological and economic-productive performance.

Deliverable T1.1.2

This report would be a document able to explain the transnational modality of consultation between partners implemented in order to share definitions, objectives and methodologies for selection of demonstrative viticulture areas and agroecological vineyards.

This report is produce by 7 Project Partners:

- Provincia Autonoma di Trento (PAT)
- Vegal
- AZZRI
- KGZS
- BDCKG
- BAR
- CIHEAM-Maich

Each Project Partner will explain what are methodologies adopted in each country to promote transnational develop of Agroecology in Vineyard.

The COVID-19 pandemic did not allowed meeting and organization of events, for this reason all the project was implemented by web meeting and virtual events which allowed the develop of the ECOVINEGOALS project.

Report T1.1.2 will be implemented by only web meetings or with local meetings between stakeholders. No physical transnational event has been organized and performed but it was only possible to carry out consultation modalities between partners via web, virtual way or some meeting at local level in the presence of few people.

1. IDENTIFICATION PILOT AREA, STAKEHOLDER AND INDICATORS

1.1 PILOT AREA AND LANDSCAPE UNIT IDENTIFICATION

According to the 2016 Law on Wine and 2017 Decision of Government of Montenegro, Montenegro's viticulture area is currently classified into three regions: Montenegrin coastal region (four sub-regions), Montenegrin basin of Skadar Lake (seven sub-regions) and Montenegrin north (four sub-regions). Montenegrin wine growing and viticulture area was classified as an Adriatic grape-growing region, with two sub-regions (the Montenegrin coast and the area of Skadar Lake). However, in the 1970s, the new zoning classified the grape-growing regions into two viticulture zones: the Montenegrin coast and the Titograd area (*Savić and Vukotić, 2018*). Montenegrin viticulture area is still undiscovered.



Figure 1: Montenegrin grape growing regions¹

Montenegro is Mediterranean country located between the latitudes of 41° 52' and 43° 32' N and the longitudes of 18° 26' and 20° 21' E. Intensive grape cultivation of grapes takes place only in the central and southern parts of the country and up to an altitude of 400 meters above sea level. In the region of Lake Skadar basin, grapes are cultivated at even higher altitudes (>450 m), while in the coastal regions, grapes are mainly grown at lower altitudes, nearby the sea. Montenegrin viticulture area (vineyards surface) is estimated at almost 2700ha. This surface is characterized by

¹ Source: Savić et al., 2018. <https://zuns.me/sites/default/files/Vino%20i%20hrana%20%5bunutra%5d.pdf>

the fragmented relief and strong impact of Mediterranean climate that is under the impact of Adriatic Sea, Skadar Lake and vicinity of high mountain massifs. This area represents geographical, climatic, geological and pedological unit with numerous common properties that have an impact of the finale product – grape and vine. Adequate pedo-climatic conditions enable production of all vine categories and production of table grapes of each epoch of maturation. Montenegrin grapes are characterized by an early ripening stage, high sugar content and low acid content. The peak of sugar accumulation happens during the end of August and September.

The center of Montenegrin viticulture, which includes both the public and private sectors, is located in the vicinity of Podgorica and Lake Skadar. At this territory, state-owned company “Plantaže 13th of July” dominates in domain of wine growing and processing, having more than 2,300 ha in its possession. This company, famous for having the biggest one-piece grape complex in Europe, mainly produces wine grapes (*Vranac, Krstač, Kratošija, Cabernet Sauvignon, Merlot and Chardonnay*) and table grapes (*Cardinal, Ribier, Muscat Italy, etc*) (Savić and Vukotić, 2018).

However, for the purpose of ECOVINEGOALS project implementation, the wine-growing and viticulture area “Plantaže” vineyards (territory of Podgorica) are not going to be taken into consideration. The pilot area will be limited to the territory of municipality of Bar.

European Union co-funded project “*Technical Support to Renewal of Viticulture Zoning of Montenegro*” produced maps of regions, sub-regions and new potential sub-region in wine growing and viticulture area of Montenegro. According to these proposals, wine growing areas of Bar municipality belong to the regions of Skadar lake basin (sub-region of Crmnica), Montenegrin coast (sub-region of Budva – Bar) and Adriatic hinterland. Therefore, ECOVINEGOALS project will be implemented within the sub-regions of Crmnica, Budva-Bar and Adriatic hinterland.

- 1- Skadar Lake basin comprehends the area slightly inclined from north-west to south-east. Grapevine is cultivated up to 300-400 meters above sea level. This is the most developed viticulture area in Montenegro. Number of officially registered conventional and organic producers is constantly increasing, while the vine quality is getting much better.

Sub-region *Crmnica* is located at the southern part of Skadar Lake basin, belonging to the territory of Bar Municipality. This sub-region is well-known as being the extremely convenient area for grapevine production. Crmnica may be considered as a mosaic consisting of 25 scattered villages within the narrow belt between southern shore of Skadar Lake basin and steep ridges of Sutorman (1185 meters a.s.l.) and Rumija. The climate altered Mediterranean, with warm summers and rainy winters. Average air temperature in July equals to 24.6°C, while the average air temperature is 14.4°C. Total amount of precipitation is 2162 mm, while the total sun duration amount 2400 hours.

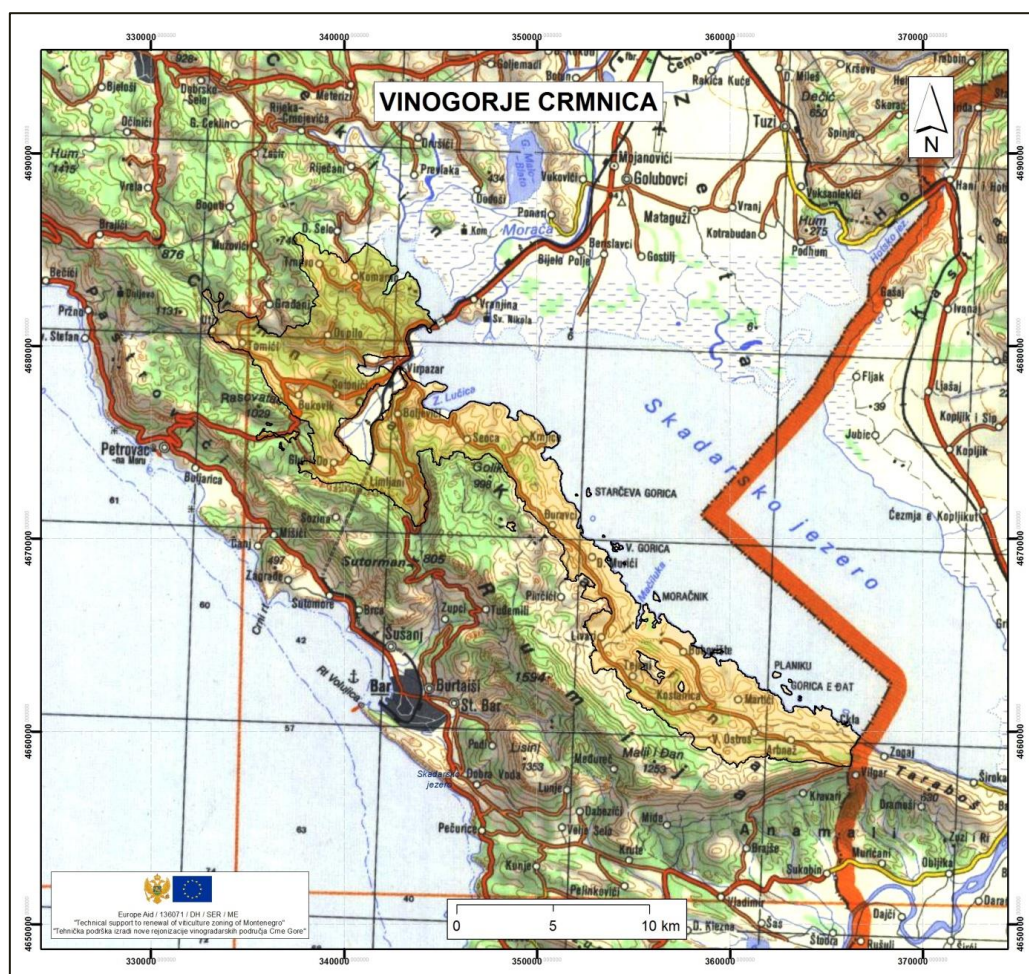


Figure 2: Sub-region Crmnica²

- 2- Montenegrin coastal region covers the marine zone from Croatia on north-west to Albania on south-east. This is narrow belt, parallel to the sea, separated from the mainland by the mountains: Orjen, Lovćen, Sutorman and Rumija. Grapevine is cultivated up to 500-600 meters above sea level. This region is visited by large number of tourists, interested in sightseeing and numerous cultural-historical objects as well as amazing natural beauties.

Sub-region Budva-Bar is located at the central part of Montenegrin coastal zone. This sub-region is divided from the central mainland by mountains Lovćen, Patrovačka gora and Rumija (territory of Bar municipality, 1593 meters above sea level). Budva-Bar subregion is characterized by typical Mediterranean climate, warm summers and rainy winters. Grapevine is cultivated from 40 to 350 meters above sea level. Topography is hilly and sloppy, while the largest valleys are Barsko and Mrkovsko field. Average air temperature equals to 15.6°C, while the maximum average is 23.4°C (July). During the year, average precipitation amount is 1357 mm. This area is known as one of the sunniest in Montenegro, having about 2531 hours of sun duration. The most important grapevine variety is Vranac, while in the previous period, there is an increment in vineyards under

² Source: Technical Support to Renewal of Viticulture Zoning of Montenegro
<http://www.mpr.gov.me/biblioteka/dokument?pagerIndex=18>

Rizling and Cabernet Sauvignon varieties.

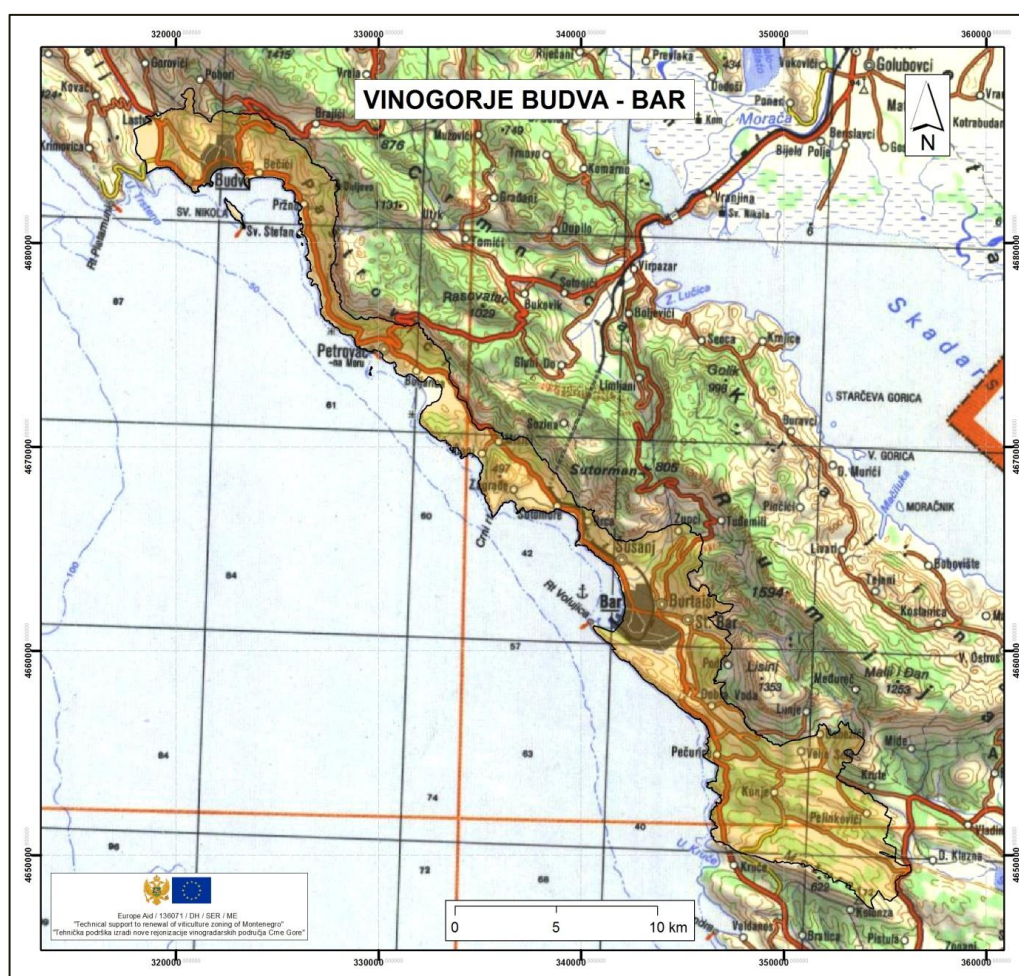


Figure 3: Sub-region Budva-Bar³

- 3- The Adriatic hinterland wine region includes a large number of wine growing oases located at higher altitudes above the Montenegrin coast region. The wine growing oases of the Adriatic hinterland region that are located within the territory of Bar municipality are: Dapčevići-Grdovići (eastern part of Dobra Voda, Bar), Podi (eastern part of Zaljevo, Bar) Stari Bar – Turčini (northern from Old Town of Bar), Tuđemili (north-east from Bar) and Gradac (northern Bar). This sub-region is currently considered as potential, since even though there are fruitful vineyards there are still no officially registered producers of grape nor wine. Average air temperature goes from 4.4°C (January) to 22°C (August), while the precipitation level is minimal in July (40-60 mm).

³ Source: Source: Technical Support to Renewal of Viticulture Zoning of Montenegro
<http://www.mpr.gov.me/biblioteka/dokument?pagerIndex=18>



Figure 4: Region Adriatic hinterland⁴

According to the Spatial plan of municipality of Bar 2020 (draft version), vineyards represent about 1.58% (281 ha) of total arable agricultural land. Also, 153 officially registered agricultural holdings have vineyards within their properties. It is estimated that 959,500 vine grapes exist at the territory of Bar municipality, with positive trend of increment during the last few decades.

Pilot areas will be chosen from sub-region Bar – Budva and predominantly Crmnica in order to implement activities within ECOVINEGOALS project.

⁴ Source: Source: Technical Support to Renewal of Viticulture Zoning of Montenegro
<http://www.mpr.gov.me/biblioteka/dokument?pagerIndex=18>

1.2 LOCAL STAKEHOLDER IDENTIFICATION

During the previous period, project team members together with engaged external experts identified local stakeholders with whom they established intensive collaboration, regarding numerous previous activities with Business Center Bar and Municipality of Bar. At the territory of municipality of Bar (sub-regions of Bar-Budva and Crmnica), there are three associations on local level that gathers vine growers and vine producers:

1. Association of vine growers and vine producers *Crmnički vranac* (established on July 31st 2009, authorized person *Ilija Klisić*).
2. Association of vine growers and vine producers *Crmnica-Bar* (established on December 6th 2012, authorized person *Miodrag Leković*)
3. Association of vine growers and vine producers from *Crmnica* and *Paštrovići* (established on Decembar 31st 2014, authorized person *Vladimir Nikaljević*)

All the activities during the project implementation will include active participation of representatives from all the above mentioned non-governmental associations as direct beneficiaries of project outcomes. Small and middle vine producers in Montenegro have begun their expansion. Middle sized vine producers are the ones having vineyards from 0.5 to 5 ha and from 5000 to 20 000 grapevines and those will be mainly involved in the project implementation. Also, small sized producers (less than 5000 grapevines), especially beginners in viticulture who recently established new plantations will be involved as well.

Beside the involvement of grapevine growers and vine producers, additionally identified stakeholders are: local government (Municipality of Bar) and Tourism organization of Bar as well as other private tourist agencies and providers of tourist services on local level, as well as Ministry of Agriculture and Rural Development, MONTEORGANICA – accredited institution for control and certification in organic agriculture and Agency for protection of nature and environment of Montenegro on national level.

1.3 USE OF INDICATORS

Indicators are used for identifying and quantifying, at different scale of observation (field, farm, and landscape unit), the actual situation of the pilot areas and the future changes, after the adoption of agro-ecological practices. Those indicators should be used for the purpose of information collection for further discussion on the different themes and an ongoing learning process among partners and stakeholders.

According to the Deliverable T.1.1.1, indicators may be classified according agri-environment, economic, social and landscape cultural heritage issues and for different themes. In the following Table, identified sub-indicators by Montenegrin partners are shown.

Agri-Environment indicators that could be used in Montenegrin pilot areas are: soil health (soil texture, erosion level estimation, soil pH, macro-nutrients level and eventual deficiencies – soil agrichemical analysis on pilot areas); water use efficiency (rainfall amount, type of irrigation method, water harvesting techniques, variation in water availability); pesticide risk (risk of natural resources contamination, adaptation of proposed management practices in deliverable T.1.1.1 related to pesticide use); fertilizer pollution risk (source of minerals, management of fertilizers, sources of nutrients,

measures to prevent fertilizers leaching), management regime, biodiversity (use of cover crops, green manure plants etc.), protected areas (quantitative and qualitative indicators).

Economic sub-indicators that could be used in Montenegrin pilot areas are: profitability (net farm income and trend of the last five years), vine health (longevity), value chains (transportation, storage, processing, distribution and marketing), and externalities (positive and negative).

Social sub-indicators that could be used in Montenegrin pilot areas are: right employment (wage rate, level of in- and out-migration for permanent or seasonal work), land tenure (Ostrom (2009) methodology), food security (value will be given by answering to eight proposed questions), knowledge, learning and innovation (farmers education level, research institutes presence, extension services), social equity (gender in-equality and social exclusion/inclusion levels).

Landscape Cultural Heritage sub-indicators that could be used in Montenegrin pilot areas are: aesthetic landscapes and ecology (opportunity for walking, agritourism, visit to vineyards), the architectural heritage and local production (spatial structure of vineyard architecture, presence and loss of building with traditional wine architecture, building materials and presence of drywalls), land cover type and area (artificial areas, agricultural area not vineyard, vineyard, natural area, water, disturbing and attractive elements), landscape structure (diversity, connectivity and fragmentation).

2. OUR VISION ON AGROECOLOGY

2.1 GENERAL PRINCIPLE OF AGROECOLOGY

Agroecology represents a science based on ecological concepts that defines more environmentally oriented principles and supports socially sensitive approaches in order to optimize interactions between biotic factors in a sustainable manner, by incorporating those dogmas into every step of production chain system.

2.2 AGROECOLOGY APPLIED TO VINEYARD

Traditional agricultural practices applied to vineyards as well as in other perennial crops farms serve as good and stable foundation for application of agroecological concepts in viticulture pilot areas of Bar, Montenegro. Currently, numerous grapevine growers use wood pools, combine grapevine with herbaceous crops and animal husbandry, know a lot about crop management practices in order to improve light interception and reduce disease pressure, manual harvest the grapes, mechanically combat the weeds, use irrigation only during the peak summer months etc. Therefore, those agroecological concepts will be presented to the widest audience possible (farmers registered in Associations) as well as presented new and innovative strategies and concepts.

2.2 THE DEBATE WITH FARMERS AND STAKEHOLDERS ON AGROECOLOGY

Agroecology practices are not foreign concepts to Montenegrin vine growers and producers, according to the fact that numerous traditional practices are still being implemented by farmers (manual harvesting, mechanical soil and weed management, occasional irrigation, inner rows cropping, mulching, green manure, organic manure utilization, bee keeping, animal husbandry symbiosis with vineyards etc.). Therefore, numerous farmers within three Associations of grapevine growers and vine producers are interested in learning more about agro-ecology and implement those concepts in their vineyards.

The initial steps would be to present the farmers which of their common practices are considered as agro-ecological practices and which of their practices could be additionally updated in order to be both ecological and sustainable. This method is considered as the starting point on agroecology within the pilot areas in Bar municipality.

2.4 CONCERN

The only current concern worth mentioning is uncertain situation with pandemic of COVID-19 that may unable direct communication with farmers and other relevant stakeholders, since that implementation of agroecology requires pertinent field work.

2.5 EXPECTATION

Acceptance of agroecological propositions to the farmers in pilot areas is expected. However, we are aware of the risks such as non-acceptance of innovative and foreign measures and timely required procedure of transition to agro-ecological viticulture.

3. FARMERS QUESTIONNAIRE

ECOVINEGOALS questionnaire for farmers is going to be used as original in English, but as well in translated form on Montenegrin in order to be able to establish active participation of farmers during the questionnaire filling.

For data insert, three types of methods will be used – terrain/field tours at vineyards and vineries; open discussion with registered representatives of grapevine growers and vine producers associations, as well as consultations with advisors working with National register grapevine growers and vine producers.

In the *Section 3: Farming Management*, information about soil type (texture classes) and organic matter content will be collected from Soil Map of Montenegro (1:50000). Soil types and sub-types will be determined according to the National soil classification system. Soil texture triangle will be used as an additional tool for soil properties verification (% of clay, % of sand, % of silt).

In the *Section 7: Knowledge on Agroecology and Organic Farming*, the following question will be added: *Do you know which institution does organic certification and control in Montenegro?*

In the *Section 8: Other Information*, the direct question about the intensity of their cooperation with local government and national authorities will be posed in order to determine their satisfaction.

4. AGROECOLOGICAL BEST PRACTICES

Agroecological best practices that are most likely to be implemented (or are already implemented) within the pilot areas in Bar municipality are (according to Deliverable

DT1.1.1 – draft version):

- **Agroforestry**
 - Grapevine in combination with herbaceous crops and/or animal husbandry in order to create more efficient, productive and healthy land use systems. In the viticulture areas of Bar, Montenegro vineyards are often established together with other sub-tropical and continental fruit species (figs, peaches, apricots, pomegranate etc.), as well as vegetables and other herbaceous plants, as traditional practice.
- **Bio stimulants in viticulture**
 - Almost unknown practices in Montenegrin vineyards that have high potential to be introduced and actively used.
- **Vineyard Canopy Management**
 - Montenegrin grapevine growers are familiar with canopy management practices in order to optimize yield, improve fruit quality, reduce risk of diseases etc.
- **Cover crop and Green Manure in vineyard / Mulching**
 - In pilot areas of Crmnica and Bar-Budva sub-regions, all pilot vineyards already grow cover crops between the rows as traditional practice, as well as annual plants to be used as green manure. Mulching is used often to cover the soil under vines as well, mostly by dark plastic film.
- **Hand picking the grapes**
 - Manual harvest is highly dominant method of grape harvest. In the pilot areas, all grapevine growers practice manual harvesting.
- **High nature value farmland (HNV)**
 - The concept of High Nature Value is unknown to Montenegrin growers, however, it has a high potential to be successfully introduced in the pilot areas.
- **Mechanical Inter-row weed control in vineyard**
 - Mechanical inter-row weed control in vineyard is a common practice (ridging, harrowing, lawning).
- **Sustainable irrigation in vineyard**
 - Montenegro is not water scarce country, however, unequal distribution of precipitation leads to water shortage during the summer months. Therefore, sustainable irrigation practices without water wasting as well as certain traditional water harvesting techniques should be explained better and more close to farmers.
- **Mating disruption**
 - Pheromones have started to be used by Montenegrin farmers during the last decade and this practice has a high potential for further improvement.
- **Bird nests and shelter for bees and pollinating insects**
 - Beehives in the vineyards are present practice in certain vineyards at higher latitudes. During the initial discussion with farmers, according to the fact that there are some of them that are bee keepers as well, this practice has a high potential to be introduced.
- **Wood Poles**
 - Wooden poles are still most widespread vine brace in Montenegrin viticulture zone and all the farmers are already familiar with the benefits of their usage.
- **DSS to reduce the pesticides in viticulture**

- Decision support systems (DSS) can simplify complex agronomic decisions in order to forecast the most dangerous pests and diseases. These topics may be presented to farmers by experienced experts in pests and diseases management from Montenegro.
- **Resistant grape varieties**
 - Modernization of grape varieties with introduction of new, resistant one is strongly needed in order to encompass traditional viticulture.
- **Soil Fertility Monitoring and Erosion prevention**
 - Monitoring of soil fertility in GIS and methods for erosion prevention may be presented to farmers by experienced experts in soil science from Montenegro.
- **Wine routes as promotional tools for viticulture**
 - Wine routes are one of the most important instruments for the development of rural tourism recognized by local and national authorities, as well as non-governmental organizations and farmers.

5. WEB MEETING AND EVENT

The COVID-19 pandemic did not allow organization of meetings and events, and therefore all the project management activities so far were implemented through web meeting and virtual events that allowed successful development of the ECOVINEGOALS project as well as the local meetings with producers and associations. Thankfully to the above mentioned we were able to implement the deliverable and make a progress as it was initially planned.

CONCLUSION

Montenegro's viticulture area is currently classified into three regions: Montenegrin coastal region (four sub-regions), Montenegrin basin of Skadar Lake (seven sub-regions) and Montenegrin north (four sub-regions). Intensive grape cultivation of grapes takes place only in the central and southern parts of the country and up to an altitude of 400 meters above sea level. Montenegrin viticulture area (vineyards surface) is estimated at almost 2700ha. This surface is characterized by the fragmented relief and strong impact of Mediterranean climate that is under the impact of Adriatic Sea, Skadar Lake and vicinity of high mountain massifs. At the territory of municipality of Bar (sub-regions of Bar-Budva and Crmnica), there are three associations on local level that gathers vine growers and vine producers. Pilot areas will be chosen from sub-region Bar – Budva and predominantly Crmnica in order to implement activities within ECOVINEGOALS project. Middle sized vine producers are the ones having vineyards from 0.5 to 5 ha and from 5000 to 20 000 grapevines and those will be mainly involved in the project implementation. Agroecology practices are not foreign concepts to Montenegrin vine growers and producers, according to the fact that numerous traditional practices are still being implemented by farmers. Therefore, numerous farmers within three Associations of grapevine growers and vine producers are interested in learning more about agro-ecology and implement those concepts in their vineyards.

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