UNIVERSITY OF AGRICULTURAL SCIENCIES AND VETERINARY MEDICINE ”ION IONESCU DE LA BRAD ” IASI

IMPACT STUDY

FOR THE PROJECT

ANALYSIS OF THE OPPORTUNITIES FOR ADAPTING THE ROMANIAN VINEYARD ECOSYSTEMS TO THE NEW ENVIRONMENTAL AND COMPETITIVE CONTEXTS

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1. OUTLINE OF THE RESEARCH PROJECT

1.1. General situation at national and international level in the specific field in which the project is proposed

The project fits into the broader theme of conservation and integrated management of agricultural areas affected by global warming and drought focusing on the Romanian vine ecosystem.

Computer simulation of climate scenarios forecasts the future weather. G. V. Jones (2005) estimates the impact of future climate changes on vineyards. He forecasts a mean global warming of 2.04 ºC for the next 50 years (2000-2049), with greater climatic changes in the Northern hemisphere compared to the Southern hemisphere. The last IPCC Report suggested that the mean world temperature would grow by 1.4^0- 5.8^0C until 2100 and the world rainfall amount would decrease by 5-20% (Dragomir, 2007).

The impact of global changes in Romania showed that aridity would increase especially during the crop growing season (Paltineanu et al., 2007). Consequently, choosing and acclimatizing the resistant varieties play a decisive role in drought control.

Since 1983, there were some concerns about the impact of the climatic changes on the viticulture in Europe. After studying the situation of Alsace, E. Dûchene and C. Schneider (2004) found that the period between bud formation and harvesting was advanced and became shorter, while grapevine ripeness took place under conditions of high warming. Rainy periods and alternating temperatures, caused by global warming, are the main threats for viticulture. The results of recent studies seam support the hypotesis that global warming will determine the change of vines towards cooler and higher areas.

Although vine has a greater adaptive capacity to extreme conditions of hydrophily or xerophily, the water deficit during the dry years disturbs the main plant physiological processes, having negative effects on vine stock vegetation and their production capacity. Water stress and, related to it, water deficit, have severe effects when they are caused rapidly because they show a great intensity and are accompanied by high temperatures. Short-term water stress induces the following main effects: i) the closure of stomata, followed by decreases in CO_2 supply, which results in the reduction of the leaf area, ii) the wilting of tendrils and young shoots, iii) change of leaf insertion angle, iv) change of leaf colour, v) shoot growth cessation, vi) reduction in mean length and root diameter. In the long term it is possible to observe the following effects: i) growth of roots (Soar and Loveys, 2007) and voluntary abscission of the leaves, changes in the orientation of leaves (Palliotti et al., 2008), ii) variations in the photosynthesis pigments, dimension and density of the stomata (Gomez-Del Campo et. al., 2003) and xylem elements (Lovisolo and Schubert, 1998), iii) increase in the capacity of water retention in the tissues (Patakas and Noitsakis, 1999), iv) reduction of the size and thickness of the leaves (direct consequence of the limitation of the division and expansion of the cells), v) thickening of the cuticle, vi) increase in the vexing variation of the elasticity in the cell walls (Pakatas and Noitsakis, 1997), vii) variations of the lipid composition of the leaves (Tuomi et al., 2008) and in the hydric permeability of the leaves surfaces (Keller, 2005).

Many investigations were also aimed to define methods of water stress control by irrigation and to create new varieties with increased resistance to drought. These studies have shown that vines could survive the periods when moisture is below the optimum value, by means

of two mechanisms: avoiding excess water from tissues and increasing the root absorption capacity.

The water stress of a vine is balanced with a resistance mechanism composed of elusion/tolerance (from a definition of Levitt, 1972). With the elusion the plant tries to maintain a high hydric potential even when it is under drought conditions. When the condition cannot be maintained the plant tissues suffer from water loss. The plant reacts or maintains the water contained in the tissue or tolerates the lowering.

When the stress is severe the regulation of the photosynthesis is determined by the non-stomatic mechanism: principally the restriction of the activity of photosynthetic enzymes from the lowering of the transportation of the mesophyll and the level of the electronic conduction the of membrane of the thylakoid and a reduction of the capacity of regeneration of the RuBisCo (Medrano et al., 2003). Over a certain level the plant must count on its' own tolerance to dehydration.

The investigations conducted until today pointed out only the exterior effects of water stress, without deepening the physiological and biochemical modifications it induced in plants and without taking into account the important role of stock in providing vine resistance to drought. These studies have also shown that the moisture conditions below optimum values had a great influence on vine physiological processes, affecting both grape growth and ripeness and, finally, the grape both yield quality and quantity. Worldwide, a special importance is given to vine resistance to drought, the effect of water stress on main physiological and biochemical plant processes is being studied, plant nutrition under different water regimes, water efficiency under water stress conditions, the effect of water stress on quantitative and qualitative grape yield and on vine stock vigour (Boselli et al., 1998, 2006; Di Vaio et al., 2001).

Thanks to the refinement and the widespread diffusion of more efficient analytical techniques the knowledge of hydric stress factors of the plant on the secondary metabolism of the skins of the grapes, the polyphenols and particular aromatic smells have been deepened.

Seeing that many secondary metabolics (the compounds of natural phenols, the carotenoids, the terepenes, the metossipirazines and other molecular factors of the protection of other vital metabolic roles of the cells) whose concentration can vary according to the depending on the biotypes and or abiotics stress, the study of their variation has become fundamental for the definition of the "quality" of the grape.

At the end of the 80's Matthews and Anderson (1988) in a study conducted on Cabernet Franc in California, highlighted the effects of hydric stress that determined the increase of the concentration of polyphenols in the skins. The effects of the hydric stress accumulated in the secondary metabolics of the skins, in particular total polyphenols and anthocyans, have been described in many other studies on Cabernet Sauvignon (Dry et al., 2001 Kennedy et al., 2002) Cabernet franc (Matthews et al., 1990), Moscato di Alessandria (Pedeira dos Santos et al., 2007), Sangiovese (Poni et al., 2007).

The effect of the hydric deficiency specifically referring to flavonoids not anthocyans has been less researched. A slight increase in the expression of the leucoanthocyanidine–reducing agent is observed from the conditions of anticipated hydric deficiency: this increase does not correspond to a significant increase in the concentration of the proanthocyanidines (Castellarin et al., 2007).

Present work relating to the effects of hydric stress on the quality of the aromatic composition of the grapes and on their profiles are still relatively few. There is slightly more knowledge concerning the hydric stress factors on the carotenoids. The recent identification and

characterization of a specific carotenoids deoxygenation of grapes whose activity has been correlated to wine with the accumulation of 3-idrossi-β-ionone creates significant aromatic impact (Mathieu et al., 2005).

World climatic changes have determined some climatic trends, which were found also in Romania, but here, strangely, the vine growing seems to be favoured by global warming. Global warming could lead to modification of the map of the viticultural regions, vines could be grown from the South to the North.

Recent researches, also conducted at the University of Agricultural Sciences and Veterinary Medicine of Iasi, have shown that the area favourable for vine growing has changed ranging towards North in Romania and wine quality has increased. The high sugar content from ripe grapes has guaranteed superior quality wine. At the same time, a long warm autumn favours good harvests by stimulating the differentiation of vine buds and shoot maturing (Jitarita Ana, 2006). Other recent studies have shown that the efficiency of the vine yield could be diminished by abiotic stress, which is represented by drought, freezing temperatures and soil salinity.

The objectives of different modern research projects involved the testing of the patterns of resistance gene expression to the abiotic stress, for discovering the mechanisms of tolerance to stress and stimulating the understanding of the genetic base of this reaction, which is involved in wine quality (Cramer G., Cushman J., 2005). Within this context, due to the interrelationship between genotype and phenotype, the study of phenotypic expressions (morpho-anatomical, phyisiological, biochemical and behavioural), related to vine resistance to the abiotic stress generated by global warming, is very actual.

Also the study of the economic impact of global warming on agriculture and the analysis of sustainability of the mitigation measures play a relevant role.

One of the most recent advances made in response to the early studies was to recognize that economic agents – in this case, farmers and the various private and public institutions that support agriculture – would adapt to climate changes in ways that would tend to mitigate negative impacts and take advantage of positive impacts.

Another important advance in research was to recognize that there would be substantially different local, regional and global impacts. As data and modelling capability has improved, it has become increasingly clear that there are likely to be substantial adverse changes in some particularly vulnerable regions, but there is also likely to be positive changes in other regions (Parry et al 2004). Collectively the regional and global impacts are not likely to be large, and may even prove to be positive (Antle, 2008).

Recent studies have also found that the impact of climate change on agriculture, notably in the U.S, is likely to be adverse overall, though the northern states will benefit. This finding is challenged by Deschenes and Greenstone (2007), who link annual fluctuations in weather to reported profits and yields in the same year and conclude that the impact of global warming on U.S. agriculture is likely to be either insignificant or mildly beneficial overall. Mendelsohn (2009) presents tests which show that predicted overall climate-change impacts are negative, robust, and large, ranging from 40-percent yield declines (slow-warming scenario) to 80-percent yield declines (fast-warming scenario) by the end of the century. Other studies have been focused at the country level considering the impact of climate change on the overall economic system (Roson, 2003). The economic value of the impacts of climate change is assessed by Carraro and Sgobbi (2007) for different economic sectors and regions. Ruth et al. (2007) present a review of economic studies for the United States and relates them to predicted impacts of climate change.

All these studies have never analysed individual sectors, industries or the supply chain which represent, as in the case of wine (Begalli et Al., 2003), specific development conditions.

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1.2. General and specific scientific objectives of the project

The project's objectives take into account the most relevant challenges the Romanian wine sector will face in the next years. They are primarily determined by the new environmental and competitive contexts, that involves:

a) the market demand dynamics and the equilibrium conditions of supply and demand;
b) the impact on the cultivation of vines caused by the climatic changes, that are mainly related to global warming;
c) the gaps in the Romanian wine sector compared to the main production countries, both in the "old" and the "new" worlds;
d) the need to overcome the traditional weakness of the Romanian wine sector, that are connected to the social, economic and structural aspects;
e) the environmental sustainability of the processes concerning the adoption of new techniques in the Romanian vine ecosystems to reduce the effects of global warming.

On this basis the **overall objective of the project** is to provide new scientific knowledge and operational methods to enhance and improve the agro-productive potential of different vine varieties under stress climatic conditions in Romania.

The **project's specific aims** are:

1) The evaluation of climatic change as a risk factor on the different species of vines during the annual biological cycle.
2) The delimitation in time of the main phenological phases of the annual biologic cycle of the vine varieties to be studied concerning climatic conditions imposed by the global warming to evaluate the impact of the changing climatic conditions on the capacity of the plants to adapt and improve agro-productive potential.
3) The evaluation of the eco-physiological reactions of different varieties of vine in relation to the conditions of climatic stress caused by the global warming. in order to test some physiological methods to increase the resistance of the vine varieties to the climatic stress conditions; through this results the project wants to encourage the adoption of new processes to highlight the value of the agro-productive results.
4) The evaluation of the impact of more resistant vine varieties on the performance regarding the quality and quantity of the grapes produced.
5) The evaluation of the impact of more resistant vine varieties on the environmental sustainability of the new viticulture with particular regards to the reduction of the residuals due to chemical fertilizers and pesticide treatments, as well as to the valorisation of links with meso and micro-zones.
6) The evaluation of the economic impact determined by resistant vine varieties in terms of private and public costs and benefits; in order to define efficient policy measures to support the adoption of innovation and to evaluate the impact of alternative solutions using the cost-benefit analysis methods.

1.3. General estimation of the prospective impact of the research results

The proposed project, in coherence with the overall and specific objectives stated above, has different types of expected results.

Advances in the knowledge concerning: i) the effects of the climatic stress conditions on vine cultivation in the Moldavian region; ii) the plant's adaptation mechanisms for different vine

varieties in various viticulture ecosystems; iii) the identification of integrated patterns of behaviour to push innovation processes characterized by environmental and economic sustainability. These results will be disseminated through: articles published in national and international scientific reviews (recognised by CNCSIS or indexed by CAB International), articles in proceedings of national and international scientific conferences (enclosed the scientific symposiums of the Romanian U.S.A.M.V.), working papers discussed in the project's seminars, reports which represents deliverables of the work packages described above. Up-dated lists of these research products will be available on the project's website. Definitive lists with summaries of the contents of research products will be published into specific reports.

Identification of new technological processes which can be directly implemented by farmers. The project provides results, using the case study approach, which can be applied in the vineyard design, planting and management to improve the agro-productive potential. These results are supported by studies on the economic sustainability both for private and public stakeholders. They also take into account the different viticulture areas of north-east Romania as well as the strengths and weaknesses of the spreading into the wine sector. Intermediate and final reports, a guide, a compendium and proceedings of conferences and seminars represent specific outputs for these kind of results.

Development of R&D capacity in the host institution. These kind of results are both *qualitative* and *quantitative*. *Qualitative results* involve the cross-dissemination of scientific knowledge inside the project research group through seminars, meetings, discussions in large and small groups. These results will involve each level of researches who will share the multidisciplinary approach characterizing the methodology implemented by the project. The impact of qualitative results on young project's researchers (also including Ph.D students and PhDs) is emphasized through their wide participation in all phases of research also involving the dissemination activities. *Quantitative results* concern the work opportunities that the project will provide for young researchers (ten) and laboratory technicians (eight). Thanks to the project implementation these people will find temporary jobs (three years). It will permit them to acquire specialized competencies which can be use in the labour market, not only in an academic career.

Competitive improvement and sustainable development. Further results of the project are: i) the definition of benchmarks to measure the competitiveness improvement and coherence with the sustainable development principles at micro, meso and regional levels; ii) the identification, through an interactive discussion process with policy makers and stakeholders, of policy recommendations and measures to provide effective implementation of the scientific and technological results. Specific output for these results are the Vin.Eco.Challenge Compendium and the Final Report to NASR.

1.4. **Period of execution and breakdown of research**

The project's duration is 36 months.

It is articulated in four methodological stages: first context analysis, second primary data collection and analysis, third in depth case studies and fourth a synthesis of findings, impact evaluations and policy recommendations.

The four stages are broken down into nine work packages (WP 1 to 9); two additional work packages cover management and coordination (WP 10), and dissemination, information and publicity (WP 11) activities.

A list of the project activities, which are articulated by stages and WPs, is reported below. For each WP there are also reported deliverables and person-months.

Stage 1 – Analysis of the environmental, agro-productive and competitive contexts

WP 1 – Context Analysis.

Activity 1.1

Analysis and synthesis of the evolution of the pedo-climatic conditions in the research areas , in order to determine the dynamics of the climatic risk factors in the last 20 years that can influence grapevine cultivation. This activity involves the time series data collection of meteorological parameters concerning mean monthly data for temperature and precipitation, as well as for other climatic parameters needed in calculating the FAO recommended Penman-Monteith reference evapotranspiration: sunshine hours, air humidity, wind speed. Also the data collection and analysis of the climatic water deficit (WD) and the depth of soil carbonates (DC) will be done.

Activity 1.2

Analysis of previous studies concerning the risk factors for the vine cultivation in each phenological phase. This activity concerns the comparative evaluation of results obtained by other researchers on the effects of climate changing on qualitative and quantitative performance of vine varieties.

Activity 1.3

Data collection and analysis of the vineyards structure in the regions of Moldavia. This analysis concerns the identification of: i) vine varieties; ii) rootstocks; iii) plant density; iv) training systems; v) the classification of viticulture areas and varieties.

Activity 1.4

The economic study involves macro and meso analyses. The recent dynamics of "structure-conduct-performance" of the wine sector at national and regional levels are analysed taking into account the new international competitive scenarios. Using databases from official statistical sources and results of previous studies, the strength and the weakness factors of the wine supply chain of the N-E region of Romania will be highlighted. It is in order to define the positioning of the vine segment in the regional and national contexts and to analyse constraints and opportunities of introducing process innovations to mitigate the effects of climate change on the vineyards' yields and quality.

WP 1 Deliverables:

D1.1: Multi-thematic literature database of the study areas (month 3)

D1.2: Multidisciplinary methodological report (month 4)

D1.3: Multidisciplinary strategic report (month 6).

WP 1 Person-months: 31.0.

Stage 2 - Primary data collection, analysis and modeling

WP2 – Climatic studies

Activity 2.1

Monitoring of daily, monthly and annual climatic factors (temperature, precipitation, solar radiation) during 2010-12 (three vegetation and resting periods). Reporting of results to the multi-media and environmental requirements of different vine varieties in order to identify possible risk factors for different climatic conditions.

Activity 2.2
Monitoring during the three subsequent vegetation growth periods of the thermic regime. It concerns the sum of temperature degrees (global thermic balance), the annual average temperature, the useful thermic balance and the active thermic balance. It is in order to determine the biological thresholds delimiting the length of the different phenological phases.
Activity 2.3.
Monitoring during the same three vegetation growth periods of the hydric regime by using the quantity of rainfall (monthly and annual sum of precipitation), the precipitation distribution over the year and the percentage of air humidity.
Activity 2.4
Monitoring during the same three vegetation growth periods of the insolation regime. It concerns the determination of some basic indicators as: solar radiation, period of sunshine, sunlight hours. The parameters mentioned above will be calculated by the following synthetic indicators related to different vine varieties: hydro-thermic coefficient, helio-thermic index and bio-climatic index.
Activity 2.5
Recording of data previously collected and statistical analysis.
WP 2 Deliverables:
D2.1: Climatic database with updates (months 6, 18, 30)
D2.2: Descriptive summary reports (months 8, 20, 32).
WP 2 Person-months: 38.0.
WP 3 – Meso-scale studies of viticulture areas
Activity 3.1
Analysis and identification of soil associations, to connect the geology and the typical landscape of the areas under study to identify natural *terroir* units.
Activity 3.2
Classification of soil data into soil groups. These data will be used to refine the determined slope-aspect-altitude units. These soil categories will be based on the water holding and drainage characteristics, as well as on factors affecting root growth.
Activity 3.3
Due to the significant effects of temperature, relative humidity, wind and rain on grapevine yield and vegetative growth as well as on wine characters and quality, meso-scale climatic data will be collected and studied.
Activity 3.4
A network of weather stations with associated experimental plots will be established within commercial vineyards in the studied vine-growing areas. Phenological data as well as yields and vegetative growth data will be noted and standard winemaking practices will be used for meso-vinification. Differences between areas will be tested using sensory analysis techniques.
Activity 3.5
Statistical analysis
WP 3 Deliverables:
D3.1: Soil and viticulture database with updates (months 6, 18, 30)
D3.2: Descriptive summary reports (months 8, 20)
D3.3: Maps of vine potential cultivation in area of study (month 30)
D3.4: Report on likely typologies of viticulture zoning areas (month 32).
WP 3 Person-months: 62.0.

WP 4 – Phenological Studies

Activity 4.1

Determination of phenology and maturity curves: dates of budding, flowering, fruit-set, veraison and harvest will be recorded after Baggiolini's stages on vine varieties growth up in areas of research.

Activity 4.2

Determination of the impact of the main factors linked to berry growth, technological and phenol maturities. It will be done in the period from veraison to harvest analysing the grape's samples which will be taken for each variety under study. The factors taken into account and collected are as follows: grape weight, °Brix, titratable acidity, pH, tartaric and malic acids, total anthocyanins (red varieties) and flavonoids.

Activity 4.3

Study on the evolution of the resting period through the analysis of: i) the trend of minimum temperatures during the winter season, ii) the length of the resting period and the iii) budding advance. The data will be used to evaluate the sensitivity of vine varieties to frost damages.

Activity 4.4

Identification of specific behavioural models.

WP 4 Deliverables:

D4.1: Descriptive summary reports (months 8, 20)

D4.2: Report on likely patterns of phenological behaviour (month 32).

WP 4 Person-months: 65.0.

WP5 - Eco-physiological studies

Activity 5.1

Data collection and analysis of negative low temperatures during the resting period to test the viability and capacity of bud blooming through the determination of the blossoming energy in different resting phases. Biochemical analysis will be conducted during this activity in order to determine indicators, which are relevant in undergoing the resting phonological phase. These indicators are represented by: i) the total water content and in its various forms (free water and bound water), ii) the total glucose content and in its different forms (starch, soluble glucoses), iii) the content of soluble and insoluble proteins (amino acids and amides).

Activity 5.2

This activity is focused on the eco-physiological reactions of some vine varieties under stress conditions caused by the global warming, following manifestations of morph-anatomic, physiological and biochemical nature at different organs of the plant during its biologic cycle. The eco-physiological responses will be interpreted through the analysis of relations with quantitative and qualitative values of the grape production. The following physiological parameters will be evaluated and interpreted: i) relative water content; ii) water potential; iii) stomata conductance; iv) infrared thermometry; v) chlorophyll fluorescence. These measures are related to: transpiration, leaf cooling and stomata conductance. They provide a better measure of the canopy water status.

Activity 5.3

Morph-anatomic analysis of the structural peculiarities of various aerial organs (offshoots, vine shoots, leaves and buds) during different phenological phases. This activity will specifically concern the morphology and anatomy analysis of shoots, buds and foliar limb (characteristics of epidermis protective tissue: secondary modifications of cell walls, stomata arrangement and number; density of ribs, wideness of mesophyle cell layer), floral organ-genesis.

Activity 5.4
Statistical analysis and identification of patterns of behaviour.
WP 5 Deliverables:
D5.1: Descriptive summary reports (months 8, 20)
D5.2: Report on the likely patterns of eco-physiological behaviour (month 32).
WP 5 Person-months: 69.0.
WP6 – Social-Economic Studies
Activity 6.1
Structural and organisational analysis of the wine chain in the viticulture areas under study. The institutional and functional approaches will be combined with each other in order to individualise the key stakeholders within the wine chain as well as the key relationships between them. During this activity primary data will be collected through direct interviews with representative witnesses.
Activity 6.2
Analysis of the entrepreneurship texture in the vineyard segment. For this purpose a survey on a probabilistic sample will be realized using a specific questionnaire. The primary data collected will concern: i) farm structures and investments, ii) family social structures and organization, iii) farmers skills, iv) vineyard production choices, v) economic performance.
Activity 6.3
Analysis of the economic and environmental sustainability of vineyard production through the development of financial and environmental budgets in the sample of companies previously determined.
Activity 6.4
Statistical analysis and identification of entrepreneurial dominant patterns of behavior.
WP 6 Deliverables:
D6.1: Descriptive summary report (month 12)
D6.2: Socio-economic database (month 20)
D6.3: Report on likely patterns of entrepreneurial behaviour (month 32).
WP 6 Person-months: 48.0.
WP 7 – Integrated behavioural models
Activity 7.1
Presentation and multi-disciplinary discussion of the results of each work package (from WP 2 to 6).
Activity 7.2
Experimental design and multivariate statistical analysis in order to connect the results obtained in the previous work packages.
Activity 7.3
Elaboration of integrated behavioural models of vine varieties to climate change. The impact of climate changes and the consequent ecosystems adaptations will be tested at the following single levels: viticulture area, variety, vineyard management conditions, farm structure and socio-economic typology.
WP 7 Deliverables:
D7.1: Partial report (month 24)
D7.2: Final report on likely integrated patterns of behaviour (month 32)
D7.3: Report on the evaluation of the environmental and economic impact of climatic change on vine cultivation in the regions of study (month 32).

WP7 Person-months: 25.0.

Stage 3 – Case studies: In-depth impact assessment by vine varieties and areas

WP 8 – In-depth case studies

Activity 8.1

Testing and verification of partial and integrated models previously determined in the case studies (about 20) selected within the viticulture areas of research. It is in order to evaluate the variability of the behaviour related to: the geographical area, variety, vineyard's management and structure, farm management and structure typology. For each of these aspects specific statistical tests will be calculated to check how well the integrated models defined at stage 2 fit the real situation in the different case studies. For this purpose methods of the analysis of variance and correlation analysis will be used. The primary data collection for this activity involves the realisation of experimental fields and the experiments design in collaboration with vineyard farmers within areas of research. The minimum surface for each experimental field is one hectare which will be located in the centre of the vineyard. The varieties chosen for the research are some autochthonous vines as: Feteasca Alba and Neagra, Muscat Ottonel. These varieties will be compared with international vines cultivated in same areas (notably among these: Cabernet Sauvignon, Pinot Noir, Merlot, Chardonnay, Pinot Gris and Blanc).

Activity 8.2

Data analysis to delineate the agro-ecological zoning models. During this activity statistical multivariate techniques will be used in order to achieve an articulated and accurate description of each vineyard ecosystem.

Activity 8.3

Taking into account the specific models performing each ecosystem this activity focuses on the identification of new technical solutions for the vineyard's layout, planting and management in the different phases. It is in order to meet the objectives of environmental sustainability previously defined. For this purpose experimentation using hormonal treatments, organic and chemical fertilization will also take place.

Activity 8.4

Impact evaluations on the yields and the quality of grapes and wines obtained by micro and meso wine processing activities. For this purpose an integration between quantitative observations of grape-wine production at different plant phases, analytical and sensory parameters will take place.

Activity 8.5

Cost-Benefit Analysis (CBA) to evaluate the adoption of the new technical solutions. These techniques will be applied at micro and meso levels and they will permit the comparison of the performance results of the different case studies.

Activity 8.6

Application of economic and environmental budget methodologies in each case study to evaluate the impact in terms of sustainable development for private and public organisation.

Activity 8.7

Estimation of the propensity to innovation of farmers through a survey conducted on a significant sample of farmers using a specific questionnaire. Through this activity it will be possible, by the application of probabilistic models, to estimate the potential impact of dissemination of results in the local wine business system.

WP 8 Deliverables:
D8.1: Individual (draft) case study reports from each of study areas (32)
D8.2: Report on comparative analysis between case studies and likely patterns (month 33)
D8.3: Practical guide for farmers to implement the results of research (month 34).
WP 8 Person-months: 70.

Stage 4 – Synthesis of multidisciplinary results, potential impacts and recommendations
WP 9 – Synthesis and policy recommendations
Activity 9.1
The multidisciplinary group will draft a first summary of the project results based on the outcomes of WP 1 to 8; deliverables of these work packages will serve as an input; the first summary is presented in the form of a discussion paper. The paper will be circulated among all the people involved in the research project and, as far as appropriate, the key actors involved in the case studies and representatives of relevant institutions and stakeholders. Everybody will provide feedback to the discussion paper and a revised draft will be prepared.
Activity 9.2
The revised discussion paper will be used to feed project results into processes related to the development of a new viticulture in the different scenarios under study. It is in order to illustrate best practice in vineyard's design, planting and management.
Activity 9.3
Preparation of a first draft of the final synthesis report in which policy recommendations for effective approaches of dissemination of results will be formulated; these recommendations will be differentiated between areas and administrative levels.
Activity 9.4
Development of new concepts and methods of viticulture. Definition of what knowledge and innovation infrastructure is required to support the implementation of results.
Activity 9.5
Finalisation of the synthesis report on the overall results of the project.
WP 9 Deliverables:
D9.1: Vin.Eco.Challenge Compendium (month 36).
WP 9 Person-months: 30.

Stages 1 to 4 *- WP 10: Project management and coordination*
Activity 10.1
Project office setting-up to ensure daily monitoring and support of the logistics of the project.
Activity 10.2
The Project Manager (PC) will prepare a draft Technical Annex (TA) for the project and coordinate it. Based on the TA the PC will ensure that the project will run according to schedule with regard to structure, timing and deliverables, and within budget.
Activity 10.3
Project planning and critical paths: Technical coordination and project status will be monitored and reported for the scheduled periods in cooperation with the Scientific Committee (SC), composed by WP Leaders, which will be on the task level detail. Identification of critical paths to avoid or minimize risk management will be provided to make sure that time, cost and scope are bounded. Related to this is a full sharing of information and a stimulation of open communication between project management structures and between them and stakeholders.

Activity 10.4
Project meetings: The PC will be responsible for the scheduling, agenda definition, moderation and documentation of project meetings. The PC and SC will look for ways to formally or informally cooperate with and invite relevant policy makers and researchers to the project workshops and/or other project partner meetings.
Activity 10.5
Administrative coordinator: The PC will provide project templates, tables and forms concerning progress reporting and cost statements. The establishment of a time phased budget baseline al WP level for all WP leaders will help them keep time with cost. A manual with instructions, how to fill all appropriate templates and forms will be provided to all WP leaders in due time. Update reviews of the project progress will also be delivered to the WP leaders in order to keep records updated all the time throughout the project. The presentation of documented cost estimates in case of changes prior to the agreed actions will also be provided to all the partners.
Activity 10.6
Internal and external reporting: Periodic reporting on all project levels will be performed. Reporting templates every six months will be provided to all WP leaders.
WP 10 Deliverables:
D10.1: Minutes of project's meetings, work shops and seminars (months 4, 10, 16, 24, 28, 34)
D10.1: Periodical progress reports and cost statements (months 12, 24 and 36)
D10.2: Final report to the NASR (month 36).
WP 10 Person-months: 42

Stages 1 to 4 – *WP 11: Dissemination, information and publicity*
Activity 11.1
Dissemination to the wider public – Set-up and maintenance of an interactive project web site. A web site for Vin.Eco.Challenge will be set-up at the start of the project and will be updated in regular intervals based upon the material and information provided by the WP leaders. The website will include a news section on the project and related issues.
Activity 11.2
Dissemination of knowledge to and from policy makers and key stakeholders. The main objective is to facilitate a strong interaction between science and policy, at different institutional levels, to allow constant feedback in both directions. An initial plan for using and disseminating knowledge will be developed and update regularly. It contains the project dissemination planning (project flyer, meetings, workshops, conferences).
Activity 11.3
Project's newsletters, brochures and other information as well as advertising materials will be produced, both in electronic and paper format. It is in order to support the dissemination strategy and secure an effective information exchange between the project's members, policy makers, stakeholders and the scientific community.
Activity 11.4
Capacity building program. This activity is addressed to young researchers, Ph. Doctors and Ph.D students involved in the project. The upgrading of skills in research and development of these people is a priority objective of the project. For this purpose an intensive activity of specialised seminars will be organised to discuss project methodologies and results. This educational activity will cover both specific and multi-disciplinary fields.

Activity 11.5
Final project symposium. A final project symposium will be held in order to synthesize and disseminate the methods and results emerging from Vin.Eco.Challenge. In the conference the practical guide for farmers developed in WP 8 and the Vin.Eco.Challenge compendium (WP 9) will be presented and disseminated.
WP 11 Deliverables:
D11.1: Comprehensive, operational project website (month 4)
D11.2: Report on scientific publications and presentations related to Vin.Eco.Challenge and the results of the final symposium (month 34)
D11.3: Summaries of Advisory Board meetings (months 8, 20, 32)
D11.4: Half yearly newsletter to be sent out both in electronic and paper form (months 6, 12, 24, 30 and 36)
D11.5: Multimedia collection, on the website, of all informational and advertising products (months 6,12, 24, 30, and 36)
D11.6: Report on capacity building activities (month 30)
D11.7: Report on the dissemination of knowledge created in Vin.Eco.Challenge, describing the measures undertaken for knowledge dissemination within and outside the project (month 34)
WP 11 Persons-months: 30.

The schedule of activities brokendown by stage and WP is represented in the Gantt diagram (Chart 1).
To provide clear evidence of the project results in terms of obtainable outcomes and defining the methods and timing of verification lists of the project deliverables and milestones are reported in tables 1 and 2.

Table 1 - Deliverables list

Del. No.	Deliverable name	WP No.	Nature(*)	Dissemin. Level (**)	Delivery date
D1.1	Multi-thematic literature database of areas of study	1	O	PU	3
D1.2	Multidisciplinary methodological report	1	R	RE	4
D11.1	Comprehensive, operational project website	11	O	PU	4
D10.1	Minutes of project's meetings, workshops and seminars	10	R	PP	4, 10, 16, 24, 28, 34
D1.3	Multidisciplinary strategic report	1	R	PP	6
D11.4	Half yearly newsletter to be sent out both in electronic and paper form	11	R	PU	6, 12, 24, 30, 36
D11.5	Multimedia collection, on the website, of all informational and advertising products	11	O	PU	6, 12, 24, 30, 36
D2.1	Climatic database with updates	2	O	PP	6, 18, 30
D3.1	Soil and viticulture database with updates	3	O	PP	6, 18, 30
D3.2	Soil and viticulture descriptive summary reports	3	R	PU	8, 20
D4.1	Vine phenology descriptive summary reports	4	R	PU	8, 20
D5.1	Vine eco-physiology descriptive summary reports	5	R	PU	8, 20
D2.2	Climate descriptive summary reports	2	R	PU	8, 20, 32
D11.3	Summaries of Advisory Board meetings	11	R	PU	8, 20, 32
D6.1	Meso-economic descriptive summary report	6	R	PU	12
D10.2	Periodical progress reports and cost statements	10	R	RE	12,24,36
D6.2	Socio-economic database	6	O	PP	20
D7.1	Partial integrated report	7	R	PU	24
D3.3	Maps of vine potential cultivation in areas of study	3	O	PU	30
D11.6	Report on capacity building activities	11	R	PU	30
D3.4	Report on likely typologies of viticulture zoning areas	3	R	PU	32
D4.2	Report on likely patterns of phenological behaviour	4	R	PU	32
D5.2	Report on likely patterns of eco-physiological behaviour	5	R	PU	32
D6.3:	Report on likely patterns of entrepreneurial behaviour	6	R	PU	32
D7.2	Final report on likely integrated patterns of behaviour	7	R	PU	32
D7.3	Report on the evaluation of the environmental and economic impact of climatic change on vine cultivation in the regions of study	7	R	PU	32
D8.1	Individual (draft) case study reports from each of research areas	8	R	PP	32
D8.2	Report on comparative analysis between case studies and likely patterns	8	R	PU	33

D8.3	Practical guide for agricultural consultants and farmers to implement the results of research	8	O	PU	34
D11.2	Report on scientific publications and presentations related to Vin.Eco.Challenge and the results of the final symposium	11	R	PU	34
D11.7	Report on the dissemination of knowledge created in Vin.Eco.Challenge, describing the measures undertaken for knowledge dissemination within and outside the project	11	R	PU	34
D9.1	Vin.Eco.Challenge Compendium	9	O	PU	36
D10.3	Final report to the NASR	10	R	RE	36

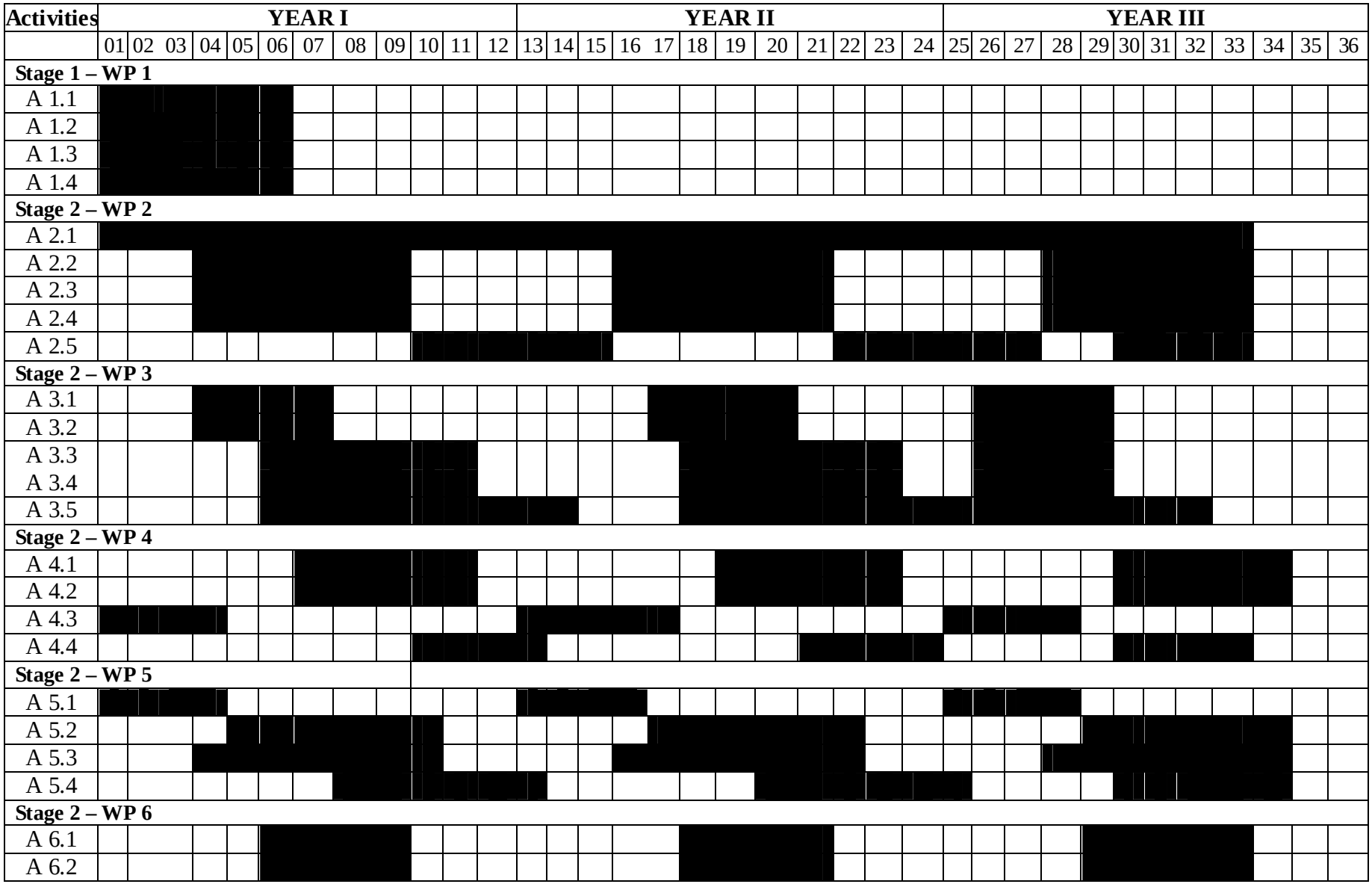
(*) R=Report; O=Other

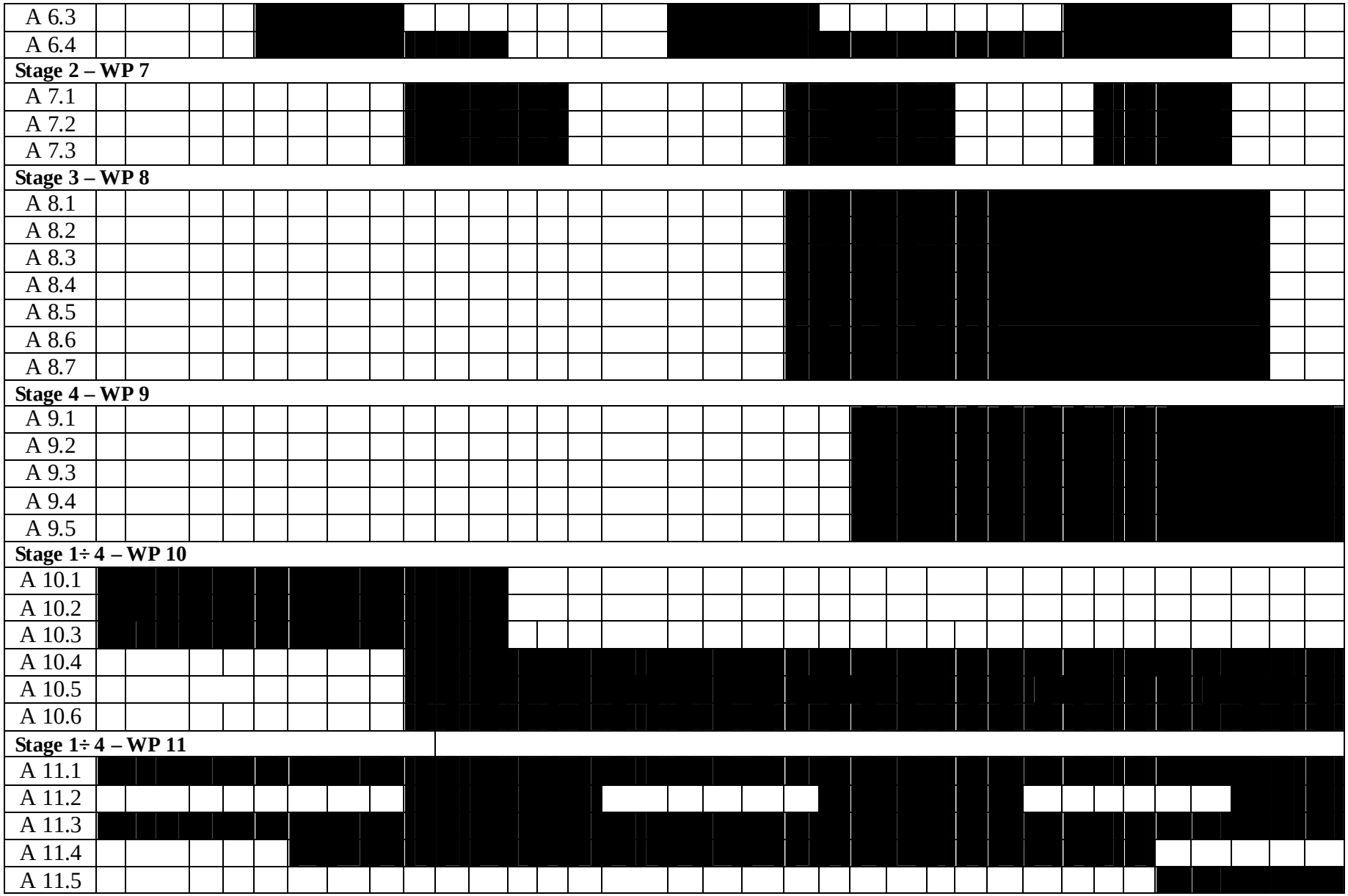
(**) PU=Public; PP=Restricted to partecipants in the project; RE=Restricted to the management structure (PM, PO, AB, SC).

Table 2 - List of milestones

Milestone number	Milestone name	WP (s) involved	Expected date (month)	Means of verification
1	Project start and consolidation	WP 10, 11	4	D10.1
2	Completation of context analysis	WP 1	6	D1.3
3	Completation of primary data collection, analysis and modelling	WP 2, 3, 4, 5, 6, 7	20	D2.2, D3.2, D4.1, D5.1, D6.1, D7.1
4	Completation of in-depth case studies	WP 8	32	D8.2, D8.3
5	Completation of project's report	WP 9	36	D9.1, D10.3

Chart 1 - Gantt diagram




A 6.3
A 6.4
Stage 2 – WP 7
A 7.1
A 7.2
A 7.3
Stage 3 – WP 8
A 8.1
A 8.2
A 8.3
A 8.4
A 8.5
A 8.6
A 8.7
Stage 4 – WP 9
A 9.1
A 9.2
A 9.3
A 9.4
A 9.5
Stage 1÷ 4 – WP 10
A 10.1
A 10.2
A 10.3
A 10.4
A 10.5
A 10.6
Stage 1÷ 4 – WP 11
A 11.1
A 11.2
A 11.3
A 11.4
A 11.5

1.5 Project budget

Code	Expenditure	Expenditure value	Eligible value	Non-eligible value	Non-reimbursable financial assistance value
DIRECTLY ELIGIBLE COSTS					
Costs for R&D activities					
	Personnel costs	2.645.160	2.645.160	0	2.645.160
	Procurement of tangible assets	1.134.000	1.134.000	215.460	1.134.000
	Procurement of intangible assets	0	0	0	0
	Procurement of services	282.000	282.000	53.580	282.000
	Overheads	12.000	12.000	2.280	12.000
	Procurement of substances, materials, plants, laboratory animals, consumables and other similar items	894.000	894.000	169.860	894.000
Project information and publicity *(only for research organizations)*		420.000	420.000	79.800	420.000
Project management *(only for research organizations)*		585.250	585.250	0	585.250
TOTAL PARTIAL		**5.972.400**	**5.972.400**	**548.779**	**5.972.400**
INTEGRALLY NON-ELIGIBLE COSTS					
1	Value added tax	548.779		548.779	
TOTAL NON-ELIGIBLE EXPENDITURE		548.779		548.779	
TOTAL GENERAL		***6.521.179***	***5.972.400***	***548.779***	***5.972.400***

1.6. Planning the project management

The core of the project management structure is represented by three organs continuously interacting between them: i) the Project Coordinator (PC), ii) the Administrative Board (AB), iii) the Scientific Committee (SC).

The Project Coordinator (PC) will run the project on a day-to-day basis. His responsibilities are: i) implementation of the decisions taken by AB; ii) communication between the project and the NASR; iii) follow-up decision making between board meetings; iv) administrative management tasks; v) organisation, planning and control of the project; vi) puntual delivery of reports and deliverables to the NASR; vii) efficient administration of the project; viii) provision of strategic consulting; ix) timetable, quality of the development and the results of the whole project; x) coordination of the scheduled meetings.

In addition, the project operates a Project Office (PO) for its entire duration. The PO will be set-up to ensure daily monitoring and support of the logistics of the project management, taking also care of all administrative, scientific and financial issues.

Formalised regular reporting on the status of the project is an integral part of the quality management of the project. In order to make appropriate decisions, the AB needs to be properly informed about the status of the project. The PC will establish this as a part of the management activities for the project. Thus, twice a year, every 6 months, he will provide a Project Status Report with the ongoing progress of the project and specific recommendations so that compliance with deliverables, milestones, performance and cost requirements will be ensured.

The Administrative Board (AB) will be formed by the PC, the Administrative Director (who will assume the role of Project Manager from the administrative point of view), the Responsible for the Scientific Research of the host institution, nominated by the Rector. The AB will be responsible to decide for all critical issues at hand. It will be capable of addressing issues of high priority on short-term basis. The members of this board will maintain permanent contact and will be able to respond in timely manner should a situation requiring quick decision occur, mostly from the administrative area.

The AB is established to specifically address strategic and contractual decisions concerning the project. It takes remedial action based on advice from WPLs in the event of milestones being missed or deliverables not being available. AB's main responsibilities are: i) to coordinate and manage items that affect the contractual terms of the project; ii) to take decisions on technical issues and perform the review of the deliverables of the project; iii) accepts the interim and final reports of the partners and recommends to the Coordinator to accept or to refuse them; iv) makes proposals for new actions and relocation of the planned resources, if needed; v) advises and coordinates the preparation of project and dissemination strategy.

The Scientific Committee (SC), with all the WP Leaders (WPLs), one for each work package, will be scientifically responsible for the development and the implementation of the methodology according to the objectives of the project in all stages of the work plan.

The leader of each WP can decide necessary changes within the scope of their own WP. If the problem cannot be resolved within the work package level, it should be referred to the PC and ultimately to the SC.

The WPL is in charge of producing the expected deliverables within his WP. His detailed responsibilities are: i) coordinate and supervise all WP technical and professional activities; ii) provide control reports and plans; iii) initiate work, discussions, workshops, visits and papers; iv) control the quality of the deliverable products.

The project's management structure also concernes a Reference Area Advisory Board (RAAB), which includes the Reference Area Leaders (RAL), one for each area where the project will operate. Members will preferably be representatives of administrations and entrepreneurs' associations. Each RAL will be responsible for: i) technical coordination within the RA; ii) contacts with end users, stakeholders for the efficient RA work; iii) organize RA meetings

according to the respective needs of the project. The RAAB will meet twice a year and give feedback to the RALs for their reference area status, exchange of information etc., data valuable to the RA work as well as connections with local and regional stakeholders.

A National Advisory Board (NAB) will include one representative of each RAAB, about 5 regional/national level policy makers and stakeholders which are not involved through the Reference Areas of Vin.Eco.Challange. The NAB is planned to meet twice a year in order to transfer the local and regional experience to national level. It is directly linked with the PC through the PO.

The organization structure and procedures have been planned to reduce as much as possible the primary management risks involving: i) transparency and self-containment of decision mechanisms, ii) rapidity of decision-making (coupled with delegates responsibility and pro-active management), iii) efficiency of executive mechanism, iv) unwarranted bureaucracy. The respect of the four efficiency principles mentioned above will also permit to reduce the risks connected to the management of so different competencies notably in relation to the co-integration of various methods and approaches to reach common results. Furthermore, the composition of the project implementation team consists of members that are very experienced in the research fields involved by the project, while the role of coordinator as manager of multidisciplinary teams is excellent.

Through the interaction between PM, AB and SC adjustments in the work planning that might become necessary can be decided upon.

The assessment of progress and results will directly be ensured by the direct involvement of relevant institutions and stakeholders in the research process. (Interim) research results will be presented and critically examined in a series of consultations on projects level. A presentation of the main results to the RAAB at two important stages of the project will ensure a more substantial assessment of progress and results.

Again, the organisational interface with local and regional stakeholders as well as with a wide number of vineyards will considerably reduce risks of inefficiency in the spreading of results into economy.

1.7. Presentation of partnerships proposed and their contribution to achieving the results

Not applicable

1.8. Experience of the project manager: CV, recent results etc.

DIEGO BEGALLI, was born in Verona (Italy) on September 23rd 1957. He is a Full Professor of Rural Economics and Appraisal at the Faculty of Economics of the University of Verona.
In 1981 he obtained a Degree in Agricultural Science – Specialization "Agricultural Economics", at the University of Bologna and in 1990 a Ph.D. in "Agro-Food Economics and Policy" at the University of Padova.
His academic career is almost 30 years long: Professor's Assistant, Institute of Agricultural Economics and Policy, University of Verona (1982-86). Professor's Assistant, Institute of Business Economics and Management, University of Udine (1987-88). Researcher, Faculty of Agriculture, University of Udine (1988–92). Associate Professor of Rural Economics and Appraisal, Faculty of Agriculture, University of Udine, (1992–00). Full Professor of Rural

Economics and Appraisal, Faculty of Agriculture, University of Udine, (2000–02). Full Professor of Rural Economics and Appraisal, Faculty of Economics, University of Verona, (2002 ----------). During this period he has gained extensive teaching experience: Associate Professor for the course of Agribusiness at the Faculty of Agriculture of the University of Udine (1992-00). Professor for courses of Agribusiness, Farm Economics and Management, Agro-Food and Wine Marketing at the Faculty of Agriculture of the University of Udine (2000–02). Professor for courses of Agro-Food and Wine Marketing, Wine Business Economics and Management, Agribusiness, at the Faculty of Economics of the University of Verona (2002 ----------). He has also been a Lecture for other courses in the same field at the Faculties of Engineering (University of Udine) and Mathematics, Physics and Natural Sciences (University of Verona). In 2008-09 he has been a guest Lecturer for the course of Project Management at the University of Agricultural Science and Veterinary Medicine "Ion Ionescu de la Brad", Iasi, Romania.

The wide experience and the high qualification reached in the research activity is proved by his participation, both as coordinator and as a member of research units, in several research projects financed by the National Council of the Research (CNR), the Ministry of Universities and Research (MIUR), the European Union (see the CV below). He mainly developed his research skills in the following fields: Integrated rural development; Agro-food policies and the evaluation of their impact on agricultural revenues; Economics and policy of the agro-food system; Farm economics and management; Agro-food and wine marketing.

For these research fields he has been a member of the European Commission evaluation board for the 6th Framework Programme (2002-06) and he has been confirmed for the 7th Framework Programme (2007-13).

He is author of over 80 publications including volumes, chapters and articles in volumes, articles in reviews, articles in proceedings, research reports and working papers.

He is a member of the most relevant scientific associations and academies both at national and international level.

As reported in the annexed CV, Prof. Diego Begalli is also member of the administation board of the Consortium INAS. It is a joint body between the Universities of Florence, Naples and Verona, which signed a collaboration agreement with the University "Ion Ionescu de la Brad" in 2008. The stable presence of Prof. Diego Begalli in Iasi, as research project coordinator, represents a relevant opportunity to reinforce the existing links.

Prof. Diego Begalli has also wide experience in the management of multidisciplinary research centres and/or groups, concerning the vine and wine sector. As reported in his CV he has been director of the Interuniversity Centre of Vine and Wine (CIVE). It was a multidisciplinary centre between the Universities of Padova and Verona in which all the competencies (from biology to marketing) concerning the education and research in the wine sector are involved.

In this case, the integration, through his presence, of all relevant competencies for vine and wine sector, will ensure at the same time: i) the adoption, at the R&D level, of a multidisciplinary approach, which represents a prerequisite for tackling the wine chains (multidisciplinary) problems; ii) a direct impact of results into wine economy; iii) an efficient cross-dissemination of new knowledge between fields of research and human resources with different levels of experience in R&D activities; iv) the realization of a stable multi-disciplinary research group in the vine and wine sector in the University of Agricultural Science and Veterinary Medicine "Ion Ionescu de la Brad" with permanent education programmes for BA/BSc students and young Ph.D researchers.

Diego Begalli had also significant experience as entrepreuneur or member of administration and

entrepreneur boards in private companies.

CURRICULUM VITAE

Position within the Project: Project Coordinator

0. **Last name:** Begalli
1. **First name:** Diego
2. **Date and place of birth:** 23th September 1957, Verona (Italy)
3. **Citizenship:** Italian
4. **Marital status:** Married
5. **Education:**

Institution	**Period**	**Degrees or diplomas**
Technical High School "Cangrande della Scala" – Verona (Italy)	1971-76	General Certificate of Secondary Education
Faculty of Agriculture – University of Bologna (Italy)	1976-81	Degree in Agricultural Science – Specialization Agricultural Economics
Faculty of Agriculture – University of Padua (Italy)	1987-90	Ph.D. in Agro-Food Economics and Policy

6. **Professional experience:**

Institution	**Period**	**Position**	**Description**
University of Verona (Italy) – Institute of Agricultural Economics and Policy	1982-1986	Research Assistant	
University of Udine (Italy) – Institute of Business Economics and Management	1986-88	Professor's Assistant	Agricultural Economics
University of Udine (Italy) – Faculty of Agriculture	1988-92	Researcher	Rural Appraisal and Accounting
University of Udine (Italy) – Faculty of Agriculture	1992-00	Associate Professor	Agribusiness
University of Udine (Italy) – Faculty of Agriculture	2000-02	Full Professor	"Agribusiness"; "Farm Economics and Management";

			"Agro-Food and Wine Marketing"
University of Verona (Italy) – Faculty of Economics	2002 ----------	Full Professor	"Agro-Food and Wine Marketing"; "Wine Business Economics and Management"; "Agribusiness".
University of Padova and University of Verona (Italy)	2003-06	Director	Interuniversity Centre for the Viticulture and the Oenology (CIVE). Responsible for setting up a new university structure which has now been running since 5 years.
European Union Commission	2004-06	Member	Board of evaluators 6th FP
Universities of Florence, Naples and Verona (Italy)	2006----------	Member	Administration Council Consortium INAS
Universities of Florence, Naples and Verona (Italy)	2006----------	Member	Board of professors of the Ph.D. on "Wine and Sustainable Development Economics".
European Union Commission	2007----------	Member	Board of evaluators 7th FP
Experience in enterprises:			
BDG SnC – Construction Company	1983-86	Entrepreneur	Member of the Entrepreneur Board
Forbest Management Srl – Consultant Company	2007----------	Entrepreneur	Member of the Administration Council
Consorzio Sviluppo Impresa	2009----------	Employer	Project contract

7. **Academic titles:** Researcher (1988-92); Associate Professor (1992-00); Full Professor (2000---------)
8. **Foreign languages:** Italian (1st language); English (excellent); French (good); Romanian (elementary).

9. Patents, if applicable (maximum 5): ----------

10. Publications, if applicable (maximum 5, the most relevant to the project domain):

Begalli D., Berni P., Capitello R. (1996), "The competitive strategies of the wine industry in the typical production areas: a case study analysis", *Rivista di Economia Agro-Alimentare*, n. 1. (article in review).

Bassi I., Begalli D. (2001), *The cooperatives firms strategies in the competitive structure of the wine chain in Friuli Venezia-Giulia*, Università degli Studi di Udine, Udine. (volume).

Begalli D., Berni P., Capitello R., Pavignani S. (2003), "The wine chain", in AA.VV. *Rapporto 2003 sul Sistema Agro-Alimentare del Veneto*, Veneto Agricoltura, Legnaro (volume).

Begalli D. (2006), "Farm choices and institutional policies in the landscape dynamics: the case of a high quality viticulture area", in Marangon F. (edited by) *Gli interventi paesaggistico-ambientali nelle politiche regionali di sviluppo rurale*, Franco Angeli, Milano. (chapter in book).

Begalli D., Codurri D. (2007), "Territorial wine systems and cooperative marketing for the typical wines: the Soave case study", Menghini S. (edited by) *Il ruolo del settore vitivinicolo nei processi di sviluppo sostenibile*, Franco Angeli, Milano. (chapter in book).

11. Member of professional associations:

Italian Association of Agricultural Economics (SIDEA). Italian Association of Agro-food Economics (SIEA). Study Centre for the Territorial Economics and Appraisal (CeSET). European Association of Agricultural Economists (EAAE). International Association of Agricultural Economists (IAAE). International and Agribusiness Management Association (IAMA).

12. Specializations and qualifications: Very good statistical and econometric ITC advanced knowledge.

13. Experience (including managerial experience) in other national/international programmes/ projects: (selection)

Programme/project	**Position**	**Period**
E.U. "Integrated Rural Development"	Member of the international research group	1982-84
National Council of Research (CNR) "Increase of the Productivity of the Agricultural Resources" (IPRA)	Member of the national research group	1981-86
National Council of Research (CNR) Project "Advanced Research for Innovation in the Agricultural System" (RAISA).	Member of the national research group	1987-91
UE-DGVI Concerted Action "Quality and Competitiveness of European Rices".	Member of the international research group	1992-96
UE – Objective 5B "Farm Efficiency Analysis for the Dairy Sector in the Mountain Regions".	Member of the national research group	1997-00
Nigerian Agip Oil Company (NAOC) "Integrated Rural Development Project in Bayelsa State".	Coordinator of the international research group	2000-02

National Council of Research (CNR) "Economic and Market Analysis of the production processes for sustainable agriculture in Italian agricultural and agro-food system".	Coordinator of the research group	2000-02
Minister of Education and Research (MIUR) "The Environmental and Landscape Interventions in the Regional Rural Development Policies".	Coordinator of the research group	2004-06
Minister of Education and Research (MIUR) "The Role of the Wine Sector in the Sustainable Development Processes".	Coordinator of the research group	2005-07
Veneto Region Project "Wine-Motion".	Coordinator of the research group	2006-08

15. List of the most important publications/patents*:* <u>short list</u> excluding the 5 publications reported above.

<u>Volumes</u>:

Begalli D., Berni P., Capitello R. (2000), *Farm efficiency and prospects for the dairy sector in the mountain regions: the case of the Baldo and Lessinia Mountain Communities*, E.U. DGVI – Regione del Veneto – Università degli Studi di Verona, Verona.

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Begalli D., Berni P., Boatto V., Capitello R., Defrancesco E., Galletto L., Rossetto L. (2004), *Analysis and perspectives of the wine sector in Veneto*, Veneto Agricoltura, Legnaro (Padova).

<u>Chapters and articles in volumes</u>:

Begalli D., Berni P., Capitello R. (1999), "The Italian consumers perceptions for the typical products: the case of an IGP rice", in L. Lagrange (edited by), *Signes officiels de qualité et développement agricole*, Clermont Ferrand.

Begalli D., Berni P., Capitello R., Dalla Bernardina E. (2005), "Qualitative attributes and hedonic price for the sparkling wines" in Blogowski A., Lagrange L., Valceschini E. (edited by) *Au nom de la qualité. Quelle(s) qualité(s) demain, pour quelle(s) demande(s)?*, ENITA, Clermont Ferrand.

<u>Articles in reviews:</u>

Begalli D., Berni P., Spellini L. (1995), "Strategies of the rice processing industry in the area of Vialone Nano Veronese", *Cahiers Options Méditerranéennes*, vol. 15, n. 2, CIHEAM, Montpellier.

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Begalli D., Berni P., Capitello R. (2005), "An occasion-based segmentation approach to the wine market in Denmark" , *International Journal of Food and Agribusiness Marketing*, Vol. 17, n. 1.
Articles in proceedings:
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Begalli D., Berni P., Capitello R., Spellini L. (1996), Strategies of the retail of rice in a district of great tradition in cultivation, *Proceedings of the 44th Seminar of EAAE*, Wissenschaftsverlag Vauk, Kiel.
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2. SCIENTIFIC IMPACT OF THE PROJECT

2.1. Specific research developments in the study field. Identifying "blanks" on the knowledge map in the field approached. Contributions to developing knowledge in the field.

Taking into account the literature review already developed in paragraph 1.1, an important "blank" in the field approached with the proposed project concerns the knowledge of mechanisms of adaptation of vine plants to climatic stress conditions in the sub-areas under study for specific varieties of great relevance for the local vineyard ecosystems. As stated above global warming seems to lead to a modification of the map of the viticulture regions with "local specific" effects on wine quality and vine yields that are not clear. Within this context, due to the interrelationship between genotype and phenotype, the study of phenotypic expressions (morph-anatomical, physiological, biochemical and behavioural), related to vine resistance to the abiotic stress generated by global warming, is very actual notably in relation to the differentiated patterns of behaviour of specific combinations environment-soil-vine. As is well known these combinations are the basis to support competitive strategies based on differentiation to enter effectively the international market. As consequence the redefinition on this base of maps of viticulture zoning represents a fundamental means to support the adoption of sustainable innovation forecasting the effects on quantitative and qualitative production performance.

The same kind of blank also characterizes the economic background. In this field the literature is very rich on the issues of the climate change impact on the overall economy, but relevant holes exist in relation to the estimation of the effects into a specific sector. From this point of view the focus of the proposed project on the wine sector is actual and relevant because it helps advances in the state of the art concerning: i) new methodological aspects for the analysis of the effects at the supply chain level; ii) the evaluation of the economic impact for the overall wine supply chain and for its different actors; iii) the evaluation of the private and public benefits and costs; iv) the individuation of the policy instruments to support adaptation and mitigation strategies.

The management of vine territorial ecosystems affected by global warming and drought needs new integrated approaches taking simultaneously into account the impacts in terms of: i) modifications of the eco-physiological and phenological profiles of vine plants, ii) vineyard zoning modifications, adaptation of wine growing techniques and effects on the yields, iii) the quality of grapes and wines, iv) organization and economic adaptation at the wine chain and business level. A vineyard ecosystem has to be considered as a complex system in which changes in one of the components just mentioned, determine adjustments in all other components and as a result the whole system. Furthermore these patterns of behaviour are changing across regions, areas and micro areas. They represent the basis on which new differentiation strategies facing the international competition can be developed. At these two levels (integration between approaches and spatial specificity) the state of the arts in this research field presents relevant "blanks" on which the proposed project is designed to have significant contributions.

Specific advances in the knowledge determined by the project results concern the following research themes: i) the effects of the climatic stress conditions on vine cultivation in the Moldavian vineyard sub-areas; ii) the plant's adaptation mechanisms for different vine varieties within these viticulture ecosystems; iii) the identification of integrated patterns of behaviour to push innovation processes characterized by environmental and economic

sustainability.

2.2. Cross-specialization of the project and perspective applications in related fields

The integration between different fields of research (agro-meteorology, biology and physiology, viticulture, oenology and economics) represents one of the relevant originalities of the project. In such a way cross-dissemination of knowledge and cross-specialization effects, through the adoption of a multidisciplinary approach, will already be reached inside the research team during the project implementation. More specifically, results from phenology and eco-physiology studies will help the identification of trends and changes of viticulture zoning areas addressing the research paths concerning vineyard's layout, planting and management. These aspects will affect, in turn, wine quality and production performance redirecting research objectives and themes in oenology. The social-economic studies approach the evaluation of the economic and environmental sustainability due to the adoption of different innovation solutions. These results will also address the research objectives and methods in viticulture and oenology in order to respect the principles of sustainable development under the environmental, social and economic specificities of study areas.

Even the research paths in genetics can be influenced and addressed by the multidisciplinary results of the proposed project. In fact the relevant theme is not just the identification of the resistance factors to global warming of different vine varieties, as already stated in previous research, but how it will contribute to manage complex systems in various environmental and climatic conditions. On this basis the core objective becomes the evaluation of the potential effects of genetic research on the other components of vine ecosystems also considering if "second best" solutions might be preferable.

2.3. The potential generated by the project results for fundamental knowledge and the possibility of applying the results to real life

The contribution of project's results to develop knowledge in the involved research fields has already been described in par. 2.1.

In order to highlight the possibility of applying results to real life the project will permit the identification of new technological processes which can be directly implemented by farmers. It provides results, using the case study approach, which can be applied in the vineyard design, planting and management to improve the agro-productive potential and quality of grapes and wines. These results are supported by studies on the economic sustainability both for private and public stakeholders. They also take into account the different viticulture areas of north-east Romania as well as the strengths and weaknesses of the spreading into the wine sector. On this basis the project will also provide results in terms of competitive improvement and sustainable development through: i) the definition of benchmarks to measure the competitiveness improvement and coherence with the sustainable development principles at micro, meso and regional levels; ii) the identification of policy recommendations and measures to provide effective implementation of the scientific and technological results.

Specific output for these results are Intermediate and final reports, a technical guide for farmers and consultants, proceedings of conferences and seminars, the Vin.Eco.Challenge Compendium and the Final Report to NASR.

The project will also contribute to the development of R&D capacity in the host

institution**.** These kind of results are both *qualitative* and *quantitative*. *Qualitative results* involve the cross-dissemination of scientific knowledge inside the project research group through seminars, meetings, discussions in large and small groups. These results will involve each level of researches who will share the multidisciplinary approach characterizing the methodology implemented by the project. The impact of qualitative results on young project's researchers (also including Ph.D students and PhDs) is emphasized through their wide participation in all phases of research also involving the dissemination activities. *Quantitative results* concern the work opportunities that the project will provide for young researchers and laboratory technicians.

2.4. Analysis of scientific risks in carrying out the project and suggesting a management approach to these risks

At the time of the project planning there are no significant risks foreseeable.

The organization structure and procedures, described in par. 1.6., have been planned to reduce as much as possible the primary management risks involving: i) transparency and self-containment of decision mechanisms, ii) rapidity of decision-making (coupled with delegates responsibility and pro-active management), iii) efficiency of executive mechanism, iv) unwarranted bureaucracy. Overcoming these four critical points will also permit to reduce the risks connected to the management of so different competencies notably in relation to the co-integration of various methods and approaches to reach common results. In order to manage this risk the composition of the project team consists of members that are very experienced in the research fields involved by the project, while the role of coordinator as manager of multidisciplinary groups is excellent.

Through the interaction between the Project's Coordinator, Administration Board and Scientific Committee adjustments in the work planning that might become necessary can be decided upon.

The assessment of progress and results will directly be ensured by the direct involvement of relevant institutions and stakeholders in the research process. (Interim) research results will be presented and critically examined in a series of consultations on projects level. A presentation of the main results to the Reference Area Advisory Boards at two important stages of the project will ensure a more substantial assessment of progress and results.

Again, the organisational interface with local and regional stakeholders as well as with a wide number of vineyards will considerably reduce risks of inefficiency in the spreading of results into economy.

3. SOCIAL IMPACT OF THE PROJECT

3.1. Description of the main social problems the research project may solve

The project results will have a positive impact on some strategic aims of the National Rural Development Programme (NRDP) 2007-13, notably concerning axis 1 "Improving the competitiveness of agricultural and forestry sector" and axis 2 "Improving the environment and the countryside".

In relation to axis 1, the expected results will affect the specific measures connected to priority 2 "Improving the competitiveness of the farms observing the principles of sustainable development" and priority 3 "Restructuring and modernizing the agricultural and forestry

products processing and marketing sectors, while observing the principles of sustainable development".

With respect to axis 2 the results will have a positive impact on priority 2 "To contribute to the sustainable rural development by encouraging agricultural land users to introduce or continue methods of agricultural production compatible with the improvement of the environment, including biodiversity, water, soil and rural landscape".

The proposed project also takes into account some objectives stipulated in the **"**National strategy on short, medium and long-term diminution of drought effects, prevention and control of land degradation and desertification", adopted at the meeting of the National Committee to Combat Drought, Land Degradation and Desertification (CNCSDTD) from 15th April 2008, notably:

• recovery of production and protection capacity of natural ecosystems and crops affected by drought and desertification;

• improvement practices of using water, soil and vegetation resources, which proved to be unsustainable over time;

• promoting knowledge and monitoring drought, land degradation and desertification at all levels, so that the measures of diminishing, preventing and controlling these effects become efficient.

On this basis the project addresses an issues of great relevance for the implications both at the environmental and the social-economic level. It concerns the effects of climate change on the vine ecosystem and the study of new mitigation measures of these effects.

The earth is being affected by global warming. The increase in the concentration of CO2 in the atmosphere has caused the greenhouse effect. One of the most serious problem is the presence of extreme weather conditions. Other phenomena are the increase in the frequency of tropical days during summer, the shortening of the winter period with higher average temperatures.

At the world level, long-term measures are required for preventing and diminishing the effects of climatic changes, such as: afforestation programmes, pollution reduction, restoration and modernization of anti-erosion barriers. In agriculture, the solutions and recommendations for developing actions to prevent and mitigate the effects of the climate variability should include the entire complex of cultural crop management measures, irrigations and interference actions.

The occurrence of climatic change in Romania during the last decade through an increase of droughts and floods have generated a negative impact on the productivity of crops and the loss of biodiversity of fauna and flora. Dragomir (2007) estimated that drought affected 7 million hectares (48%) of the farming area, and floods damaged 6 million hectares, diminishing the crop yield by 30-50%.

There is uncertainty about the impact of global warming on the vine growing in Romania. Vine seems apparently favoured by the climatic changes. Again, global warming could lead to modifying the map of the vine-growing region, situating the areas fit for vine growing to the North. The proposed project can significantly contribute to solve these uncertainties increasing the level of knowledge determining more efficient investments planning processes.

The contribution of agriculture to mitigate the effects of climate change concerns not only the forestation of agricultural land, to facilitate the purification of the atmosphere, or the use of biomass, as a source of renewable energy. It also concerns the selection and introduction of varieties of plants resistant to new climatic parameters which need less chemical fertilizers and anti-parasitic treatments which in turn reduce the amount of CO2 gas. From this point of view the

selection of plants and varieties resistant to diseases and pest attacks is a further challenge for a modern and sustainable viticulture in which the proposed project is involved.

The need to improve the state of art in these fields takes into account the structural disadvantages of the Romanian wine sector where the transfer of innovation from research to production happens in the medium to long period. From this point of view the weaknesses are mainly represented by: i) the high incidence of small farms, ii) the high age of farmers especially among small farms, iii) the dominance of subsistence or semi-subsistence viticulture systems, iv) the significant issues of generational replacement.

The performance in the wine processing segment has improved significantly in the last decade thanks to investments made by the SAPARD program. Nevertheless, much remains to be done to improve the competitiveness and adapt the Romanian production to EU standards in terms of quality, food safety and organization of the wine marketing system. There are also significant regional structural disparities, especially between the grape-growing region of the south-east and the rest of the country, including the north-east, that need to be mitigated.

The connection highlighted above between the project objectives and the strategic actions of the National Rural Development Programme emphasizes the importance of the proposed theme in terms of results applicable directly into the economy. It also integrates different relevant axes of the rural development strategy as the competitiveness of farms and the sustainable development.

The proposed project is important for agricultural and environment research, because it assures the accumulation of knowledge and valuable scientific results in fields of economic importance. These are the fields of plant growing and the improvement of the ecological resources from the north-east area of Romania, the lowering of human impact and the developing of sustainable viticulture agro-ecosystems.

Another important social impact concerns the development of the R&D capacity in the host institution already discussed in the previous point 2.3. It involves the work opportunities generated by the project for young researchers and laboratory technicians. Thanks to the project implementation these people will find temporary jobs (three years). It will permit them to acquire specialized competencies which can be used in the labour market, not only in an academic career.

3.2. Identifying target groups

The project's results impact on different typologies of beneficiaries: i) ***educational and research institutions***; ii) the ***economic system of reference*** in the research areas.

In relation to the first typology the most relevant entities can be identified as: i) *graduates, PhD students, PhD graduates* involved in the project as young researchers or technicians; ii) *departments* of the host institution participating in the research; iii) the *administrative staff* recruited specifically for the project; iv) the *administrative division* of the host institution; v) the *host institution* as a whole.

Graduates, PhD students, and *PhD* receive qualitative benefits from the project in terms of acquisition of skills that can be used effectively in the labour market. *Departments* of research receive tangible and intangible benefits. The first concerns the enhancing of labs involved in the project; the second is about the development of new skills which reinforce significantly the departments' R&D capacity. The project will also form new skills in the administration field connected to project management and coordination. As a consequence: i) the *administrative staff* recruited for the project will acquire skills which represents significant opportunities in the labour

market; ii) the *administrative division* of the host institution can check these staff during the project and employ them, if necessary, to perform also in the future these skilled tasks in the host institution. The *host institution* as a whole draw direct benefits from enhancing both the R&D capacity and the project management and coordination skills.
With respect to the second typology of beneficiaries (economic system of reference), results impact on: i) *farmers*; ii) *agricultural consultants*.
Farmers who have made available to the project their vineyards to for the experiments can implement the new technological processes tested with the research project. *Agricultural consultants* who participated as stakeholder in the project will receive benefits through attendance at scientific seminars, meetings and conferences. These two groups of beneficiaries are relevant means of spreading of results on a much larger number of vine growers.

3.3. Direct and indirect effects of the project on the community. Estimation of the evolution of indicators of a social type following the implementation of the project

The project will produce direct effects on the target groups inside educational and research institution as**:** i) *graduates, PhD students, PhD graduates* involved in the project as young researchers or technicians; ii) *departments* of the host institution participating in the research; iii) the *administrative staff* recruited specifically for the project; iv) the *administrative division* of the host institution; v) the *host institution* as a whole. As stated in point 3.2., we will also have direct impact on: i) *Farmers* who make available to the project their vineyards for the experiments; ii) *Agricultural consultants* who participate as stakeholders in the project. As described in the previous point, the last group will receive direct benefits through: i) attendance at scientific seminars, meetings and conferences; ii) the publication of the technical guide for farmers as well as the project's compendium, intermediate and final reports.

Indirect benefits will be received by: i) *PhD students* in the fields of agriculture and food science; ii) *university students* who are taking a degree in the same fields; iii) *students* attending high school in agriculture; iv) the *NASR* and the *scientific community* as a whole. *PhD students* are those who are not involved in the research project. They will benefit indirectly from project results through attendance of seminars and the research activities (using databases and other project results) aimed at preparing the doctoral thesis. Other students (*university students, students* attending high schools) will benefit from the project through books and other teaching materials that can be used during their training. The *NASR* and the *scientific community* as a whole will benefit through the quality of publications made by the members of the research group which will also contribute to increase the R&D competitiveness at national level.

Other indirect beneficiaries include: i) *other vine-growing farmers*; ii) the *local wine chain* competitiveness; iii) the *National Agency for Agricultural Consultancy*; iv) *Agricultural Municipal Chambers*; v) *farmers associations*; vi) *municipalities and counties representatives*; vii) *population*. All the entities between them (directly or indirectly) concerning vine producers (i, ii, iii, iv, v) will benefit from project results through: i) their implementation in the production process; ii) the increase of knowledge and the consequent improvement of the quality of public and private services of technical assistance in agriculture. Other institutional entities will benefit through: i) the improvement of the quality of the life of the residents; ii) more effective environmental protection; iii) induced social-economic growth in the local territorial systems; iv) the compliance with the principles of sustainable development.

The measurement of the potential public benefits for the different types of target groups

as well as the identification of the most effective policy mesasures to maximise these benefits represent relevant project ativities (see WPs 6, 8, 9). Nevertheless specific indicators that will be used during these activities and benchmarks of reference in terms of results can already be identified. They concern: i) the creation of new jobs in vine growing farms and wineries (20 workers with employment contracts of indefinite duration and 100 temporary jobs); ii) the creation of new jobs in the host institution (6 in total and 4 in R&D) and in other public and private R&D institutions (other 10 positions); iii) the potential number of students that will benefit from the project results (100 students per year including also high schools); iv) the potential number of consultants that will benefit from the project results (10 per year).

3.4. Analysis of social risks in carrying out the project and suggesting a management approach to these risks

The innovative social aspects, which can be identified as risks of the project involve: i) the selection of appropriate personnel for activities; ii) training the staff to acquire and apply modern techniques of research and implement a multidisciplinary approach; iii) building stable and lasting relationships with the relevant stakeholders; iv) provide an efficient dissemination of project results.
The management procedures to be implemented to avoid or mitigate the risks mentioned above are described as follow.
Personnel selection: i) Definition within the Scientific Committee of objective parameters of assessment for each WP; ii) Strengthening of sharing of the research objectives and methods within the Scientific Committee also intensifying interpersonal relationships; iii) Applying the participation and transparency principles to help the integration of new research team members.
Training the staff: An intensive activity of seminars and workshops within the project structure to discuss methodologies, intermediate and final results has been planned. Applying the participation principle will further assure effective capacity building actions based on the "learning by doing" approach. Partecipation to international relevant conferences and symposiums and exchanges of experience with foreign institutions will reinforce the training activities mentioned above.
Links with stakeholders: The project management structure, described in depth in point 2.4 of the application form, planned an intensive networking with relevant stakeholders through Reference Area Leaders (RAL), Reference Area Advisory Boards (RAAB) and the National Advisory Board (NAB). Taking into account that the project integrates basic and applied research approaches this networking is considered a key element for its success.
Dissemination: Dissemination of the project results is considered a core support activity. The dissemination efficiency is a conditioning factor for spreading information to target groups. For mitigating this type of risks the project integrates different methods of dissemination and interpretation of results. As evidence of the key role attributed to the these activities the project invests an adequate budget share (7%) to WP 11 (dissemination, information and publicity).

4. ECONOMIC IMPACT

4.1. The prospective economic impact of the project

In relation to the project objectives stated in point 1.2. the research is focused on the wine sector which presents a positive trade balance, contributing to reduce the deficit of the Romanian agro-food system (1.3 billion euro in 2005). Nevertheless it presents unsolved problems, especially at the level of vine cultivation, on which the project wants to help.

Firstly, the vine production for the premium grape varieties decreased by 16% in the period 1998-2005. With an average production of 30 hl of wine per hectare, the Romanian productivity is well below the EU average (50 hl/hectare). The conversion of hybrid vines, the valorisation of the autochthonous varieties and the improvement of the performance for the international varieties in the Romanian context are critical points to enter the international market.

On this basis, one of the most important aspects to improve the competitiveness of the wine sector is the identification of plants and varieties enable: i) to satisfy the market demand which is orientated towards quality, and ii) to stabilize and increase the amount of grapes produced. The productivity growth is mandatory to reduce the gaps between Romania and Western European countries (notably Italy, France, Spain) and to face the effects on production caused by climate change, which are amplified by deficiencies in infrastructure, especially in irrigation systems.

All these aspects are closely connected to the general objective of SOP IEC "to enhance the Romanian enterprises' productivity and to reduce the gaps to the average productivity at the EU level". Furthermore, the proposed project is focused on a sector with an economic strategic relevance for the Romanian agro-food system. Again, about 20 vineyard farms of the most important vine-growing areas of Moldavia will participate in the project through the provision of land on which experiments in the field will take place. On this basis it is possible to obtain a quick transfer of the project results to agriculture. In such way the project will have both direct and indirect effects on the economy. Firstly the results will be directly applicable into the vineyard companies. Secondly the same companies will be copied by other farmers providing the dissemination of the project's results to the entire local area.

As previously stated the project will also create the conditions to push the spreading of new technological solutions and recommendations for enhancing the technology of vine growing and improve the competitiveness of the wine chain in the local areas. It will result in increased production and quality of grapes and wines.

Such expected impact is ensured by the institutional sustainability conditions of the host institution, notably concerning: i) the high scientific qualification of the research team; ii) the availability of well-structured labs; iii) the involvement within the project of the administrative division of the host institution which presents good expertise in the field of project management. Economic impact has also been determined by the capacity building actions towards farmers and agricultural consultants. Furthermore the networking and the dissemination activities characterizing the WP 11 will ensure an effectively implementation of the project benefits into economy, also in the medium-long term.

4.2. Identifying the economic domains that may use for manufacturing, production, service delivery the research results

The project results focus on multiple issues and involve various economic domains.

Firstly, the evaluation of the impact of the most relevant risk factors due to climatic changes on different vine varieties will permit to the identification of behavioural patterns of plants under stress conditions in the Moldavian wine regions. On this basis new physiological methods and technological solutions to increase the resistance of vine varieties will be tested with the aim of improving the agro-productive potential. As a consequence also the improvement of the eonomic performance can be evaluated at different levels (farm, micro-zone, county and region).

Because of the different interactions between environment, soil and vine different solutions will be produced in terms of vine-growing practices, specific methodological and operational protocols will be suggested to farmers and agricultural consultants. These protocols will involve both the vine-growing and the wine processing segments. The project, in fact, will also provide results in terms of wine quality performance linked to the adoption of the vine-growing practices and technological solutions previously identified.

The identification of integrated behavioural models also take into account economic evaluations by using cost-benefit analysis methods applied both to private and public goods, will provide comprehensive information on the alternative solutions. It permits the maximizing of the benefits at each level and the recommendation of the most efficient policy measures.

4.3. The economic impact estimated in key beneficiary domains

The project impacts on applied research and operational choices of vineyard farmers in the North-East region of Romania. Benefits for farmers will materialized in the possibility of introducing varieties more resistant to stress conditions using performant technologies in each specific vine ecosystem. The agro-productive potential both in quantitative and qualitative terms will be improved. The net revenues will increase as a consequence of higher market attractiveness and prices.

At regional and national levels the competitiveness of the whole wine chain will be improved and gaps compared to EU will reduced. The competitive degree of the wine chain in the N-E of Romania is expected to increase at least of 10% in the five years after the project implementation.

At local territorial system level the global revenue and the quality of life will also be increased.

4.4. Presentation of target groups (consumers and producers) that may use the research results and quantification of prospective benefits / costs

Target groups that may directly use the research results are notably represented by: i) vine-growing producers that have also a wine cellar; ii) vine growing producers without a cellar; iii) wine business; iv) agricultural consultants. Benefits are expecting in the short term for people deirectly involved within the project. Medium and long term benefits are expected for vine growing producers, wine business and consultants that will be reached after the project implementation. The cost-benefit analysis to quantify the economic impact of the project results

covers specific project activities. Because a minimum increase in term of competitiveness has been targeted at 10% an economic improvement of revenues is expected over this level.

Even the so called social impact on local communities can be considered an economic benefit. The environmental sustainability of the project results implementation cannot be considered separately from economic sustainability. As consequence, environmental budgets at farm and territorial levels and the evaluation of positive and negative externalities in the local and regional contexts. Also the maintenance and conservation of native cultivars determines economic benefits to local communities. These benefits will be quantified in terms of lower costs for avoiding the lose of biodiversity and local heritage linked to the authocthonous vine varieties.

As stated above another type of target groups are represented by graduates, PhD students, PhD involved as young researchers or technicians in the research project. The economic benefits can be evaluated, even in this case, in terms of opportunity costs represented by the lower costs of training for the host institution. The value of salaries paid through the project for three years can be considered as a reliable way of measuring.

4.5. Analysis of the economic and financial risks in carrying out the project and suggesting a management approach to these risks

The following risks related to the financial forecasting of the project can be identified: i) Estimated costs and duration of research activities; ii) The selection of in-depth case studies; iii) The real response of plants in the experimental design; iv) The estimation of long-term benefits and costs. The following tools and procedures can be implemented to mitigate these risks.

Costs and duration of research activities: The project management structure and the networking described in point 1.6. has been designed to avoid or reduce these risks. Interactions between the Project Coordinator, Administrative Board and Scientific Committee, supported by continuous relationships with stakeholders should ensure an efficient management of these sources of risk. The schedule of activities, deliverables and milestones represent other means to manage this type of risks.

Selection of case studies: The expertise of the project management team, sharing of roles between its members, the long experience of the Project Coordinator in the management of multidisciplinary groups notably in applied researches represent relevant elements of mitigation for these risks. The networking with stakeholders and the Reference Area Leaders is also in this case an important organizational mechanism of risks management.

Response of plants: the duration planned for the research should be enough to mitigate these risks.

Long term benefits and costs: The multidisciplinary approach proposed in this project with a relevant contribution provided also by social-economic competencies should completely avoid tese risks.

5. CONCLUSIONS BASED ON THE IMPACT ANALYSES PROPOSED

Conclusive considerations can be summarized as follow:

- The proposed project focused on a problem of great relevance for the research community and the environmental challenges of the society.

- Original elements of the project are the multidisciplinary approach, the complexity linked to the integration of different fields of skills, the elaboration of integrated patterns of behaviour of vine ecosystems.
- The project results provide scientific advances and new technological solutions directly implementing into economy by the most relevant target groups.
- The project implements effective training activities on young researchers improving the R&D capacity of the host institution.
- Creation of new jobs in R&D and in the wine chain business are expected.
- The project impacts on the environmental profile, quality of life and the potential revenue creation of rural communities.
- The project helps the implementation of the National Rural Development Programme.
- The economic impact involves at the same time private and public goods and institutions.