Theme I – Agriculture and forests

Parallel session A – Monday 10th March 14:00-15:30

ID Nº: [235]

Title: **CRITICAL ANALYSIS OF QUANTITATIVE CLIMATE VULNERABILITY ASSESSMENTS TO GUIDE AGRICULTURAL ADAPTATION**

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´Vulnerability' has emerged to be one of the central concepts within research on climate and environmental change. It is an inclusive and appealing concept to use, despite its complexity. There are many definitions, interpretations and attempts to identify and conceptualise vulnerability. This lack of consensus has resulted in various approaches to perform vulnerability assessments, both quantitatively and qualitatively.

Climate change and variability have direct and indirect impacts on many aspects of agriculture that can result in challenges as well as opportunities. For northern Europe, climate change related opportunities are more prominently found in scientific literature than for other parts of the globe. However without a proactive development of adaptation strategies, any possible opportunities that may arise with a more favourable climate cannot be taken advantage of. Hence there is a need to consider adaptation even related to the positive effects of climate change on agriculture and for research on climate vulnerability in Nordic agriculture. The challenge is to conduct reliable and valid vulnerability assessments that effectively can be used as decision support for regional stakeholders, such as farmers, extension officers and county administrative boards.

Our research indicates that the choice of weighting and summarising method, as commonly applied in quantitative composite indices, highly determines the vulnerability, as various methods result into significantly different vulnerability rates. This demands an increased transparency concerning methodological choices and uncertainties when displaying vulnerability assessments, for instance, in geographic visualisation.

This study identifies sensitivity and adaptive capacity indicators that have historically been shown to reduce vulnerability of agricultural production to climate variability. We suggest a novel method that enables the transparent assessment of these indicators, as well as relevant parameters related to climate change and variability, which implies that vulnerability could be explored depending on individual stakeholders' prioritization of indicators as well as the choice of indicator weighs.

Presenter

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Conference on European Climate Change Adaptation
Research and Practice

ID Nº: [84]

Title: **A MULTI-SCALE CLIMATIC ANALYSIS OF VITICULTURAL TERROIRS IN THE CONTEXT OF CLIMATE CHANGE**

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Global change in climate affect regional climates and hold implications for viticulture worldwide. Many studies have addressed the issue of the impact of climate change on viticulture in most of the wine regions worldwide, yet few studies are devoted to observing and simulating both climate and climate change at the “terroir” scale (local scale). However, phenological variations as well as difference in grapes/wine quality are often observed within short distances in a wine-region and are related to local characteristics (slope, soil, seasonal climate...). These local environmental variations are crucial in the specificity of a given location and need to be investigated systematically in order to be considered in the context of a rational policy of viticultural adaptation to climate change at local scale.

Since 2008, a team of multidisciplinary and international research on spatial analysis and climate modeling at terroir scales in the context of global climate change was built up within the ANR-TERVICLIM and GICC-TERADCLIM programs.

Our scientific approach aims to develop a methodology based on climate and agronomic in-situ observations and on spatial modeling of climate, which permits to assess spatial variability of atmospheric parameters at terroir scales. Compared to agronomic observations (phenology, sugar amounts.), this study allows to defining the specific climate of a terroir. By resolving the lack of data at fine scales, this work allows to improving the understanding on climate changes that may appear in viticultural terroirs and thus to improving the assessment of the potential economic impacts. This methodology is developed and applied to several international famous vineyards, where climate characteristics play an important role on the quality of wine. The complementarity of various experimental sites allows to studying the local agroclimate characteristics of terroirs in different macro climatic conditions. This type of approach on the understanding of the functioning of the climate system at fine scales and the introduction of methods of measurements (agroclimatic) and spatial modeling techniques involve expertise of a pluridisciplinary research team. Results of these programs highlighted significant spatial variability of climate over very short distances. In terms of temperatures, spatial differences generated by local conditions are very often greater than the increase in temperatures simulated by the different scenarios of IPCC for the next 50 years. Vine growers adapt their practices to this spatial variability of climate that partly determines the characteristics and uniqueness of their wines.

Presenter

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ID Nº: [93]

Title: **BIODIVERSE LEGUME-RICH SOWN PERMANENT PASTURES: AN ADAPTATION AND MITIGATION TOOL FOR SUSTAINABLE ANIMAL PRODUCTION IN MEDITERRANEAN AREAS UNDER CLIMATE CHANGE**

Authors: David Gomes Crespo[1]
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In the European Mediterranean region there are large areas of poor natural pastures, most of them occupying marginal soils of low fertility, particularly due to a very low content in organic matter (SOM) and phosphorous (P).

Although most pasture legumes are of Mediterranean origin, their contribution to improve pastures in Europe has been relatively insignificant.

However, in the late sixties/early seventies, the author, inspired in their use in Southern Australia (most as mono-specific swards to improve pasture productivity and soil fertility) developed in Portugal a system, named “biodiverse legume-rich sown permanent pastures” (BLRSPP) in which different mixtures, well adapted to a particular soil and rain condition, each one composed by 10 to 20 species/cultivars, chosen among 36 species and more than100 cvs. of annual self reseeding legumes and grasses, eventually associated with perennial summer dormant/drought resistant grasses, legumes or others, all from Mediterranean origin, have proved to increase by 2-3 fold the carrying capacity of the natural pastures and withstand considerable inter-annual variability induced by climate change (e.g. more frequent and prolonged droughts, water logging).

Provided the soil is properly fertilized (particularly with P) and the grazing management is appropriate, BLRSPP are long lasting and keep a high content of legumes, able to increase symbiotic N fixation by 60-130 kg/ha/year, and produce at low cost high pasture yields of excellent quality.

These pastures are very efficient in increasing SOM, improve soil fertility, water holding capacity and life in the soil, and simultaneously prevent soil erosion and act as fire brakes when strategically included in forestry areas. The increase in SOM derives from the incorporation in the soil of animal faeces and non grazed plant residues (roots, stems and leaves), being estimated in 0,2-0,4 % per year in the top 10 cm layer and approximately half of that in the 10-20 cm layer, depending on initial SOM, pasture yield and grazing management. Roughly, the above increase in SOM corresponds to a sequestration of atmospheric CO2 in the top soil layer ranging from 5 to10 t/ha/year. Another contribution of BLRSPP to reduce green house gases in the atmosphere comes from their role in replacing industrial N fertilizer by symbiotic N, since for each kg of synthetic N, 8 kg of CO2 enter the atmosphere.

So far, about 400,000ha have been established with BLRSPP, most in the “montado/dehesa” agro-forestry system, in which carbon sequestration is increased by the incorporation of the deciduous leaves of the oaks.

Apart from a good adaptation to climate change, as proved by many examples of BLRSPP which are persisting for more than 35 years, this type of pastures has already contributed to a sustainable increase in animal production, and to mitigate the effects of global warming through the annual sequestration of more than 2 million t of atmospheric CO2.

Presenter

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ID Nº: [161]

Title: # AGROSCENARI, A NATIONAL PROJECT ON ADAPTATION OF ITALIAN AGRICULTURE TO CLIMATE CHANGE

Authors: Domenico Vento[1]; Giovanni Dal Monte[1]; Francesca De Lorenzi[2]; Marcello Donatelli[3]; Gabriele Dono[4]; Stanislao Esposito[1]; Vittorio Marletto[5]; Francesco Masoero[6]; Massimiliano Pasqui[7]; Sergio Pellegrini[8]; Luigi Perini[1]; Pier Paolo Roggero[9]; Pieranna Servadio[10]; Raffaella Zucaro[11]

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Agroscenari is the short name for "Adaptation scenarios of Italian Agriculture to Climate Change", an interdisciplinary project (2009-2014), coordinated by the Italian Agricultural Research Council (CRA) and supported by the Ministry of Agricultural, Food and Forestry Policies (MiPAAF). The project aims at developing adaptation strategies to climate change for Italian agriculture. To achieve this goal decision-making tools are being developed through the analysis of representative agricultural systems in relation to future climate scenarios, taking into account both biophysical and socio-economic factors.

The project addresses climate change adaptation in six study areas: three in the north and three in the south of Italy, including some of the most relevant national production systems: viticulture, olive growing, rainfed cereals, intensive irrigated horticulture, intensive fruit growing, dairy cattle farming. The project consists of ten subprojects dealing with local near-future climate scenarios in the six study areas: agricultural mechanization, impacts of climate change on the main cropping systems, adaptation through substitution of crops and varieties, animal husbandry, irrigation, land and soil degradation, crop pathogens and parasites, phenology, economic strategies. A peculiar feature of Agroscenari is the design of a conducive science-policy interface at the regional and national scale, around concrete issues and through the involvement of local stakeholders, covering a wide range of situations of Italian agriculture.

Most of the research work is based on two sets of climate scenarios for the near future, one deriving from the EU FP7 Ensembles project, statistically downscaled on the study areas for the period 2021-2050, and the other computed with a regional model on a shorter period: 2020-2030. Future projections show that temperatures will generally increase over all study areas in all periods, though with large heterogeneity, while seasonal precipitation will increase only in spring and autumn in the Po river valley (northern Italy), and decrease in all other cases.

The main preliminary results include, among others, projected spatial distribution of olive tree cultivars in southern Italy, tests of new feed for milk cows and pigs from non irrigated crops, analysis of expected changes in irrigation demand for several crops and sites, evaluations of economic and financial effects of climate change on specific cropping systems, improved modelling tools, improved seasonal forecasting of irrigation demand, identification of threshold climatic changes for soil organic carbon content variations in different cropping systems, phenological scenarios and data bank.

Some results from Agroscenari were mentioned in the "Rural development and climate change" White Book published online in 2012 by MiPAAF. A final conference is foreseen in October 2014, to present Agroscenari results and discuss adaptation of Italian agriculture to climate change.

Presenter

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