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CECILIA

Central and Eastern Europe Climate Change Impact and Vulnerability Assessment

Specific targeted research project

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D6.4: International workshop and course for decision makers to learn more about the effective use of water in agricultural crop production

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Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

6.4 International workshop and course for decision makers to learn more about the effective use of water in agricultural crop production

Introduction:

In October 6-8, 2008, we organized an international workshop and course for decision makers to learn more about the effective use of water in agricultural crop production in Jois, Austria. Around 35 participants from 13 different countries (fig 1) attended this workshop. The participants were from three different European projects:

- CECILIA (Central and Eastern Europe Climate Change Impact and Vulnerability Assessment)
- COST Action 735 (Impacts of Climate Change and Variability on European Agriculture (CLIVAGRI))
- ADAGIO (Adaptation of Agriculture in European Regions at Environmental Risk under Climate Change)

In addition local decision makers were invited to the workshop.



Fig 1: The 13 countries from the participants of the international workshop and course for decision makers to learn more about the effective use of water in agricultural crop production in Jois, Austria

Program of the workshop:

The international workshop was opened by the three project leaders of ADAGIO, CECILIA and COST Action 734. Afterward the workshop was split into two sessions:

- a) Session one: Analysis of conditions for a need of improved water use efficiency in agriculture
- b) Session two: Measures to improve water use efficiency in agriculture

Session one: Analysis of conditions for a need of improved water use efficiency in agriculture

1. Adaptation options for agriculture to increasing drought conditions. *Josef Eitzinger, Austria*

After a shortly description of the climate change in Europe as well as possible impacts on agriculture, adaption options, like follows, were discussed:

beyond irrigation:

- protection against evapotranspiration (reducing wind speed: hedge rows, agroforestry systems etc.; increasing conductance: mulching etc.; reducing available energy : shading etc.)
- adaptation of crop rotation; reducing spring crops, increasing winter crops (better use of soil water)
- reducing soil cultivation and improving soil structure (increasing soil water storage capacity)
- adaptation of crop growing period (seeding date etc.)
- change of crops and cultivars (e.g. for a better drought tolerance or water use efficiency)
- protection measures against soil erosion (hilly regions)
- improving soil functions and soil water storage capacity
- land use change (e.g. grassland to arable land / energy crops)

for irrigation:

- water saving irrigation systems (e.g. driple or sprinkler irrigation vs. flood irrigation) can significantly increase available water resources
- changes in irrigation strategy (e.g. deficit irrigation)
- introduction and use of water harvesting systems have a big potential for increasing crop water resources
- building/maintaining irrigation infrastructure (water distribution systems, channel design, ...)
- improving on-site irrigation scheduling (soil water sensors, careful observation, water balance models)

2. Estimating Change of Agroclimatic Conditions in the Central Europe using RCM Outputs. *Mirek Trnka, Czech Republic*

First results of RCM based analysis for Czech Republic as well as parts of their border countries were presented. The main problems of RCM in the investigated area are:

- the temperature and precipitation fields not sufficiently well represented in the control climate;
- spatial incoherency of climate parameters in RCM domain (some features shifted by dozens of km);
- model is too wet under the control climate conditions.

3. Agrometeorological conditions in Vojvodina: past, present and future tense. *Branislava Lalic, Serbia*

In a first part an identification and preparation of data and models in the investigation area were done. Afterward assessment of CC impact on agrometeorological indices was presented.

4. Water use in Italian agriculture: analysis of rainfall patterns, water storage capacity and irrigation systems. *Simone Orlandini, Italy*

Simone Orlandini reported about the availability and use of water in agriculture in Italy. Hereby several aspects concerning irrigation and water storage methods were considered.

5. Discussing some elements of energy balance and water balance of sustainable crop production. *Tor Haakon Sivertsen, Norway*
Discussions about sustainable management of a local region, the level of a state or a nation as well as the global level were in this presentation addressed.
6. The effective use of water in Romanian agricultural crop production and specific measures for adaptation to climate change impact. *Mateescu Elena, Romania*
A case study for the pilot station Calarasi for recommendation to improve effective use of water by crops was presented. The results of this study can be summarized as follows:
 - climate change effects on crop water use efficiency can be positive or negative depending on the crop type, severity of climate scenarios, CO₂ concentration levels and local climate conditions;
 - the winter wheat WUE greatly increases under climate change conditions, particularly in the case of increased CO₂ levels;
 - the maize WUE decreases
 - winter wheat crop used the soil available water more efficiently than maize;
 - high CO₂ gives more grain yield for less water consumed;
 - the irrigation application that increases grain yield and minimizes evapotranspiration is likely to increase more significantly the efficiency of water utilization by the both crops;
7. Changes of water demand of agricultural crops in the region Marchfeld under climate change scenarios. *Sabina Thaler, Austria*
The effects of different climate change scenarios on different crops in Marchfeld, Eastern Austria were analysed. Different aspects and questions in this regard, such as the irrigation water requirement to hold the present yield level in the future, were discussed.
8. Water balance in Marchfeld as measured by a Lysimeter. *Peter Cepuder and Reinhard Nolz, Austria*
A comparison of FDR measurements in Lysimeter and field in the Marchfeld region, Eastern Austria, were presented.
9. Testing agro-climatic indices for yield predictions in long term experiments. *Henrik Eckersten, Sweden*
By testing different agro-climatic indices for winter wheat predictions in Sweden could be find:
 - winter temperature is a good predictor of yield, in the north and in the past
 - in the dry location further south, high summer temperatures increasingly reduce yield
 - in the less dry location, high temperatures are not related to reduced yields
 - influence of precipitation on yield is less clear, but wet autumn seems good and wet spring bad
 - remains: to test combined models
10. Regional climate modelling with focus on the Northern Serbia. *Dragutin Mihailovic, Serbia*
The main aims of this presentation were:
 - climate change prediction is a “Grand Challenge” modelling problem.
 - gaia hypothesis
 - numerical solution of energy balance equation that leads to chaos
 - uncertainties in definition of parameters in land-surface modelling
 - examples of regional climate modelling with emphasising the Northern Serbia
11. Do Croatian agro meteorological parameters fit in the regional overview? *Visnja Vucetics, Croatia*
The main aims of Visnja Vucetics presentation were:

- temperature and precipitation regimes in Croatia
- a correlation between temperature and precipitation
- linear trends of temperature and precipitation
- a comparison of results with a neighbouring region
- projections of temperature and precipitation at the end of 21st century and impact on climate change on maize production

Session two: Measures to improve water use efficiency in agriculture

12. Recommendations for effective water use in agriculture under changing climate – perspectives from Italy. *Domenico Ventrella, Italy*

Challenges for irrigation management in Italy could be:

- saving water and increasing of WUE
- deficit irrigation scheduling
- partial root zone drying
- using of low-quality water resource
- optimize the water use of basin scale

13. Irrigation water use efficiency - Experimental results from Danubian Lowland. *Pavol Nejedlik, J. Takaz and B. Siska, Slovakia*

Statistical evaluation of the efficiency of the irrigation of crop production was studied on a field stationary experiment.

14. Recommendations for effective water use in agriculture under changing climate – perspectives from Poland. *Leszek Labedzk, Poland*

Short-term adjustments (e.g. earlier planting or sowing, deep plowing) as well as long-term adjustments (e.g. changes of land use, changes in farming systems, new land management techniques, new irrigation management strategies) were presented.

15. Vulnerability of agricultural productivity around Lake Neusiedl due to climate change. *Gerhard Soja and W. Friesl-Hanl, Austria*

Assessment of the dependence of agricultural yields on precipitation and temperature in northern Burgenland:

- methodology:
 - comparison of crop yields 1997-2005 with respective meteorological conditions
 - comparison: 2003 (corresponding to the scenario 115,0 m) with the period 1997-2005
- results: Functions for assessing yield reductions in dependence on temperature and precipitation changes.
- usability: for the economic assessment of climatic scenarios which affect lake water level, too.

16. Impact of climate change on lake Neusiedl. *Gerhard Kubu, Austria*

Impact of climate change on Lake Neusiedl considering climate scenarios for the 2020 and 2040:

- significant increase of evaporation
- increasing sensibility of the water balance to even small variations of precipitation conditions
- higher frequency of low water levels
- increasing risk for a dry out of the lake
- uncertainties and assumptions within the study may weaken or amplify the presented trend

17. Agrometeorological Indices in the Phenology of Crops in Central Greece. *R. Nicholas Dalezios, Greece*

Objectives of this presentation were:

- use of Vegetation condition index for the assessment of cotton phonological features
- zoning of cotton productive areas
- cotton production assessment for different climatic zones

18. Possible Changes in Recurrences of the Grain Crops Productivity Anomalies in some European Regions Corresponding to Different Climate Change Scenarios. *Artyom Pavlovsky, Russia*

Main purposes of investigation were

- to develop the methodology of crop productivity statistical modeling based on the regression ensemble approach.
- to design the multifactor regression models of the productivity annual anomalies for winter and spring wheat in Northern European countries.
- to calculate the forecasting estimates of possible changes in recurrence of crop productivity anomalies.

19. Using weather stations in order to improve irrigation scheduling. *Bernhard Pacher, Austria*

A weather station helps

- to get real-time micro-climatic information
- to compute Evapotranspiration
- to use the same data for disease models
- to monitor soil moisture
- to correlate irrigation with ETo, soil moisture, soil salinity, precipitatin, ground water level, etc. -
- to understand what's going on and take better irrigation decisions

20. Irrigation practices and problems in the Marchfeld region. *Wolfgang Neudorfer, Austria*

21. Adaptation of Bulgarian irrigation under Climate Change. *Vesselin Alexandrov, Bulgaria*

Adaptation measures to improve management efficiency and use of existing irrigation systems and elaboration of technological and technical means for irrigation

- to prepare up-to-date strategy and new program for the rehabilitation and restructuring of irrigation management and improving the efficiency of use of the existing irrigation infrastructure;
- to change legislation and regulation in the irrigation sector taking into consideration the altered agricultural conditions, the experience from the reforms carried out so far and to ask for free use of the technologically established hydromeliorative infrastructure and service facilities on the territory of the associations;
- to implement proper educational and training programs with emphasis on major issues on the involvement of users of water and the general public on drought problems;
- preparation of information materials for water users on the benefits and good practices of agricultural crop irrigation.
- determining the vulnerability of agricultural crops under climate changes, long term droughts and water deficit in the major agroclimatic regions in the country, respectively their impact on the quantity and quality of the yield from them;
- reassessment of the water and irrigation norms and legislative provisions of irrigation, new zoning for the irrigated crops in the country;
- development and application of optimized irrigation regimes for the major agricultural crops for various agroclimatic regions in the country;

- research on the effect from irrigation and sustainability of yields under various water saving methods and irrigation technologies;
- creation and application of mineral fertilization systems and integrated weed fight during cultivation of agricultural crops under irrigation conditions;
- application of proper moisture preserving technologies and techniques for soil treatment in irrigated lands;
- adaptation and introduction in practice of information and advisory system for irrigation necessity forecast and defining the parameters of the irrigation regime for the irrigated crops;
- technology changes for irrigated crop cultivation in various agroclimatic regions under water shortage conditions;
- use of new cultivars and hybrids that adapt better to water deficit.

22. Soil water content and soil climate in Central Europe under various climate change scenarios.
Petr Hlavinka, Czech Republic

An introduction of the SoilClim model with results of calibration, soil water balance analysis, soil climate identification and prognosis for selected climate change scenarios were presented.

All presentation of this international workshop can be found:

http://www.adagio-eu.org/international_workshop_jois.html