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Present research and possible project on water management

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The production process of modern agriculture enters with the natural cycles of ecosystems. In the effort to improve yields, the agroecosystems are so constantly subjected to actions of disturbance that ecosystem self-regulation may become impossible. As we grow more aware of the risks this exploitation involves, increasing efforts are being made to achieve an integration for a development compatible with the necessary respect of the environment, particularly in rice growing where large amounts of water, fertilizers and, sometimes, pesticides are required for high productions.

Rice sustainability in Mediterranean climate is strongly correlated to water availability for appropriate irrigation practices. A better water management in all types of rice-based cropping systems has to be defined and, in some cases, remodeled not only due to the scarcity, pollution, parasite diffusion, etc...

These issues were discussed during the last seminar "Futurewater management for rice in Mediterranean countries", which was held at the RRTC, Sakha, from September 5 to Sept. 6, 1998. Several scientists attended the seminar from different areas in order to share informations, present the state of art of their country and to discuss on future common strategies for better facing common problems.

In Egypt many field experiments have been carried out to increase water efficiency and productivity. Some early variety, able to produce high yield with less water, are already available and some improved techniques in water management (i.e. different intervals of water distribution, reduction of water level during certain phases of the cycle, different methods of sowing and planting and tillage methods) have been evaluated in order to give answers to the emerging water scarcity and increasing water salinity.

In Italy experiments, carried out both in field and lysimeters, were conducted to assess the performance of several rice genotypes under non flooded conditions and to compare the effects of flooded and dry cultivation methods on the production and on the water and nitrogen cycles. The evolution of weeds in both the irrigation methods was studied and described.

Grid sampling and geostatistics were adopted in a field study in Italy to analyze the structure of available water content (AWC) space variability in a field where rice is grown under non-flooded conditions. These analyses will probably lead to a better efficiency of water use and a better results obtained with the available rice growth simulation model.

In Turkey experiments carried out were focused on the effects on water stress on growth and production of rice.

In Spain and in Hungary different water management was compared to study the effect on water efficiency and rice production.

In Spain the preliminary studies showed that the two new irrigation systems allowed saving water without decreasing yield.

In Hungary field experiments were conducted to study the influence of different irrigation systems on water economy and performances. The following methods have been compared:

- ☐ continuous flooding with broad cast seed into water,
- ☐ flush and flooded water drilled seed into dry soil,
- ☐ periodically flushed with drilled sowing into dry soil,
- ☐ sprinkler irrigated rice drill seed into dry soil.

In Romania studies which are carrying out aim at assessing cultivars performances in presence of soil salinity.

In Morocco other field experiments have been carried out in order to evaluate new strategies in water management.

From previously described studies common goals emerged: to improve the present water management, to share information and idea on new agrotechnique able to save the quality of water. The next step in this direction could be to provide to the enlarging group of agronomist working on rice based cropping systems a common tool (data-bank with integrated geographic information system GIS) useful for advanced system analysis, simulations, education and training and knowledge diffusion ('extension')

As already indicated in a past meeting (MEDORYZAE N°6) the main objectives could be:

- ☐ Collection, organization, utilization (via the same tool such data-bank and GIS) of data coming from different nature (type of soil, and climate, agrotechniques, water management).
- ☐ Optimization of existing knowledge on:
 - cultivars behavior and physiology in different environments
 - crop nutrition
 - crop protection
 - weed control.
- ☐ Definition of vulnerability of rice areas.
- ☐ Definition of agrotechniques in presence of limiting factors or constraints.
- ☐ Definition of protocols for data collection standards in conducting field or greenhouse experiments.

The most important advances for research on rice could be:

- ☐ The identification of the most suitable methodologies to build the embryo of a dynamic Mediterranean Rice Laboratory (MERLA) to be connected to the other existing data banks.
- ☐ The definition of a reliable tool for surveying of rice production at a basin and/or national level, useful for better planning natural resources.

