Foreword

Current agronomy issues, *approaches and* complementary features

From Agropolis International thematic directory n°12
"Agronomy – Crops and cropping systems)
(July 2012 – 68 p. – 2nd edition)

The following constituents account for the uniqueness of Agronomy in the scientific field:

- strong biophysical science foundations, through analysis, experimentation and modelling of the functioning of soil-plant-pest systems in crop fields, which are approached as complex systems.
- more recent, yet now well established (especially in France), foundations in research on farmers' practices, which are considered as items subjected to socioeconomic factors that are assessed on the basis of biophysical and technical aspects of cropping.
- research firmly grounded on cropping system engineering, with its scientific interrogations focused more on problem solving than on specific processes or theories.
- this approach applies to a broad range of items ranging from plants to territories, in addition to cultivated fields and cropping systems on farms.

This *Dossier* illustrates the combination of these four aspects of modern agronomy through examples of research projects conducted by research units whose work is focused within all or part of this scientific field.

The examples cover a broad range of plants (annual, perennial, etc.), grown in tropical or Mediterranean conditions, with low or high inputs (labour, fertilizers, pesticides, energy) and more or less mechanized cultivation, thus highlighting the generic nature of this agronomy and the tools and methods involved.

To illustrate the targeted aspect of this research, the present document is organized in five chapters that each covers a major challenge for agriculture in the 21st century:

- ensuring high quantity and quality production to fulfil food and non-food needs of a growing population with cropping systems that utilize non-renewable resources (water, energy, phosphorus, etc.) more efficiently
- minimizing the impact of crops on biogeochemical cycles in order to reduce gas and solute emissions into the environment, to contribute to waste recycling, while preserving soil resources and quality
- controlling pest populations and optimizing pesticide treatments by designing cropping systems that—via ecological processes—maintain a level of plant health that is consistent with increasingly ambitious economic and environmental objectives
- preserving water resources by developing farming systems that more efficiently utilize this resource, which will become scarcer in most Mediterranean and tropical regions, while releasing less pollutants into groundwater and rivers
- developing and disseminating innovations in order to achieve a combination of these various functions expected by stakeholders in an area considered in all its diversity and in a global change setting.

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(UMR System)

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