



Development of a quick Monitoring index as a tool to assess Environmental impacts of TRANsgenic crops (DEMETRA)



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Regione Toscana



Ente Parco Regionale  
Migliarino San Rossore  
Massaciuccoli



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CENTRO DI RICERCA E GESTIONE  
DEI TERRENI AGRARI  
ALBERGHI E FORESTALI

# DEvelopment of a quick Monitoring index as a tool to assess Environmental impacts of TRANsgenic crops (DEMETRA)

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# Preface

**Cristina Vettori<sup>1</sup>, Laura Bartalucci<sup>2</sup>, Carla Lazzarotto<sup>2</sup>, Donatella Paffetti<sup>3</sup>, Antonio Perfetti<sup>4</sup>, Davide Travaglini<sup>5</sup>**

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In 2008 the Community program LIFE + gave the opportunity to present projects to develop and deepen the theme of the environmental risk assessment of Genetically Modified Organisms (GMOs), through the development of specific environmental monitoring systems. At that time Italy was outlining a legislative framework which suggested the need to define the rules of coexistence to fulfill its obligations under Community law and comply with the national legislation in force (Law n.5/2005). In this regulatory framework, the Tuscany Region promoted the idea of developing a LIFE + project on the theme of GMOs monitoring, to try to fill the gap related to the lack of standardized tools to carry out environmental monitoring of GMOs and, at the same time, respond to the need to protect its territory from risks determined by transgenic crops.

The DEMETRA (DEvelopment of a quick Monitoring index as a tool to assess Environmental impacts of TRANsgenic crops) project contributes to building a shared basis at Community level for the monitoring of GMOs into the environment, whether they are directly cultivated for commercial purposes, whether they are used in a given place for research purposes.

The main objective of the Project was the creation of an innovative instrument to rapidly address monitoring efforts that Public Bodies should implement in their territories when transgenic crops are cropped. Particularly on when, where and how the data collection should be switched on.

Where, when and how to address the efforts of Public Authorities in the General Surveillance for the monitoring of possible collateral effects of Genetically Modified Plants (GMPs) is the main objective of this project.

An objective that is particularly relevant for those public bodies who have to manage directly those issues related with the commercial cropping of GMPs (as in the case of Italian Regions).

This project has been developed starting from the assumptions highlighted in the “Outcomes of the EC Working Group on Guidance Notes supplementing Annex VII of Directive 2001/18/EC” (F. Graef, A. De Schrijver, B. Murray), which indicate that:

- there is no guidance as to how existing monitoring programs and data infrastructure

- schemes may support GMO monitoring,
- there is no legal framework to regulate the coordination and harmonization of GMO monitoring data,
  - monitoring data should include standardized numerical raw data ready to be analyzed with an informative system.

The DEMETRA project aims particularly at addressing the latter bullet point, with the creation of a quick monitoring index (QMI) to rapidly assess the potential risk generated by a selected range of transgenic crops in well determined ecosystems or biotopes.

The index will take into account:

- the level of risk posed by a range of transgenic crops potentially used in the study areas and
- the potential interactions of these GMPs with some relevant biological, physical and climatic parameters that will be collected and studied in some sites of the study areas.

The index has been equipped with a Geographic Information System (GIS) which, provided with geographic data, will be useful to monitor and map the level of risk generated by transgenic plants in a determined area, either these GMPs are really cropped or that their presence is only simulated.

### *Project outputs*

The QMI and GIS platform provided with necessary data, can be used as a tool to map the level of environmental risk posed by transgenic crops to specific ecosystems.

Moreover, the project enlists guidelines to correctly choose the elements to be considered during the setting up of a monitoring system.

In addition, this project has given the possibility to generate a starting point for biodiversity in areas where transgenic crops have never been used. The resulting data-sets, reported in the chapters of this book, can be used when transgenic crops enter in common use, allowing a comparison among observed parameters linked to biodiversity.

The system has been studied to be really transferable in other situation, but it will work effectively only where a wide range of environmental information is already collected, stored and easy available for Environmental Risk Assessment (ERA) and GIS applications.

The project has contributed also to the objectives of the Commission Communication COM (2006) 216 final: "Halting the loss of Biodiversity by 2010 – and beyond" with particular regard to:

- Policy area 1:

Objective 1 "To safeguard the EU's most important habitats and species", as the project was aimed at define correct GMO monitoring system for sensitive areas;

Objective 5 "To substantially reduce the impact on EU biodiversity of invasive alien species and alien genotypes", as the project was aimed at individuate particular risks in the use of GMOs, which can be considered as "alien genome";

- Policy area 4:

Objective 10 “To substantially strengthen the knowledge base for conservation and sustainable use of biodiversity, in the EU and globally”, as the project was aimed at directly improve the knowledge on biodiversity and biodiversity trends.

To reach its objectives the project has foreseen the following activities:

- Collecting, analyzing and selecting already known parameters linked to weather local conditions, soil functionality, trophic chains, landscape uses, biodiversity and biodiversity loss to generate a model, which is the basis for the generation of a Risk Assessment method.
- Assessing the suitability of data collected with the most relevant monitoring systems and selecting the most relevant ones for the definition of the quick monitoring index (QMI).
- Developing the index so to express the potential perturbation that transgenic crops could pose to a certain ecosystem or biotope in condition of different intensity of cultivation.
- Identifying and creating specific study sites to generate simulations of the application of the QMI.
- Creating a GIS platform to run the modeling system.
- Developing guidelines and best practices to apply monitoring schemes in high risk areas.

Furthermore, the project is expected to contribute and to improve the knowledge for the development of European policies to prevent risks in the commercial use of GM crops.