

The AMIGA project: Assessing and Monitoring the Impacts of Genetically modified plants on Agro-ecosystems

Genetically modified crops (GMPs) have experienced a fast adoption rate in areas such the Americas and Asia, while their acceptance is still a controversial issue in Europe. The concern for a possible environmental impact, particularly on the biodiversity, is one of the main reasons of such skepticism. The risk assessment framework for the commercial approval of GMPs has recently been reinforced by the European Food Safety Authority (EFSA).

The EU-funded research project AMIGA (www.amigaproject.eu) which ended last May, is the largest project about the biosafety of GMPs in the European Union and is completely publically funded. Its aim was to provide stakeholders, academia and the society at large with scientifically sound results on the sustainability and practical indications on environmental risk assessment for GMPs, the largest adopted products of green biotechnology.

The Italian ENEA was the research institute coordinating this project which is operated by 21 international institutions from Europe and the contribution of INTA from Argentina. Fifty-four months of laboratory, field experiments and mathematical modelling were conducted to practically test the efficacy of the EFSA Guidelines and their scientific background. Having on board several of the senior authors of the EFSA Guidance Document enabled the AMIGA Consortium to validate in different EU regions the approach to ERA as envisaged by European authorities. Studies were conducted according to jointly established protocols using maize and potato, the two only GM crops ever authorized for cultivation in Europe, as case studies. Several

aspects of the ecology of agro-ecosystems were monitored to characterize receiving environments in different regions. Baseline diversity in the two agro-ecosystems was addressed by conducting surveys in commercial fields; while surveys did not indicate a drastic difference of arthropod assemblage structure with respect to existing literature data, some spatial gaps were filled, and a general northward shift of several herbivore species was noted. The project also provided the measurement with an unprecedented accuracy of potential effects of GM crops on non-target soil organisms. The selection of focal species according to their ecological criteria was conducted with *ad hoc* studies on earthworms and potato herbivores. Analyses of economic effects of cropping GMPs in Europe were conducted with newly developed bio-economic models and special attention was given to estimate the compatibility of insect resistant GMPs with integrated pest management approaches. Modelling was also widely adopted to predict long-term and landscape effects as well as to support post market environmental monitoring. The general results of the project reinforce the belief that in Europe the environmental risk assessment can be effectively conducted according to high scientific standards, and practical proposals to European risk managers and risk assessors were formulated by the AMIGA Consortium.

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