Environmental risk assessment studies in Bulgaria

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The UNEP-GEF project on the Implementation of the National Biosafety Framework of Bulgaria provides funds and assistance to Bulgaria to further develop and implement its national biosafety framework. The aim of the project is that by 2005 Bulgaria has a workable and transparent national biosafety framework that is in line with its international obligations.

This project also aims at studying the environmental impact of four transgenic crops: alfalfa, tomato, potato, and strawberry, in greenhouse or small field trials conditions. These crops will be used as model cases for 4 groups of plants (cross pollinated, self pollinated, vegetatively propagated and perennial ones) with highest relevance to the Bulgarian specificities and agricultural priorities:

- **alfalfa** is a **cross pollinated crop,** largely planted in Bulgaria, the most economically important plant for feed use, which has plenty of wild relatives in the natural flora in our country. This is the crop, which has one of the richest arthropod fauna. Evaluating the impact of the GM-alfalfa on both insects considered as pests and the beneficial ones, most of which are pollinators, will contribute to build up, among other, knowledge of how to deal with cross pollinated GM crops posing environmental risk concerns in the context of Bulgarian environment.

- **Tomato** would be used as model of **self pollinated crop,** which is the horticulture plant with highest economic importance, even "emblematic" for the country's export. The newly introduced trait (resistance to viral infection) allows performing comparative studies on the status and dynamics of a tomato field ecosystem both under normal sanity conditions and under virus infection pressure. Tomato is largely used for direct consumption therefore naturally a genetic modification in such plant causes highest concerns in the public. The nutritional preferences of several groups of organisms (nematode, insects, and mammals) will be studied, respectively. The results of such a study are considered to be of direct benefit for decision-making process both for deliberate release into environment and for food use and processing.
- **Potato** is a vegetatively propagated plant, largely used as food. Potato crop is planted in Bulgaria and it is object of import as well. The assessment of the impact on target and non target insects in the context of the Bulgarian arthropod fauna will be beneficial when taking informed

decisions especially with relevance of the cases of transboundary movement of Bt potato crops according to the Cartagena Protocol on Biosafety.

- **Strawberry** is perennial food plant, with rich soil microflora and arthropod fauna. Strawberry and the small fruits are meant to be the commercial niche of the country before and especially after Bulgaria joins the EU in 2007, thus enhancing the concerns for the gene flow into conventional and organic field. The assessment of the gene flow and horizontal gene transfer will be of crucial importance both in long term scientific aspect and for decision-making.

- **Tobacco** is another self pollinated crop of great importance in many regions in the world. According to FAO the world's production of tobacco for the year 2000 is estimated on 6.1 million tons and the expected production for the year 2010 is 7.1 million tons. Bulgaria is one of the leading countries producers of oriental tobacco in the world and this crop is of great importance for our economy. The modern agricultural biotechnology is applied successfully in AgroBioInstitute in order to improve the existing cultivars and to optimize the tobacco production, reducing the costs and raising the incomes. The development of the modern biotechnological tobacco depends in a great extend on the consumers' and public conception. One of the most important concerns about this technology is the potential environmental impact of the new developed GM crops. In the modern global world agricultural production is often exported as products for consumption and processing and also as a seed material. Not only the farmers, but the whole society is concerned very much about the impact of these crops on the environment. This study, which is joint study between AgroBioInstitute and RIKEN, Yokahoma, Japan, is concentrated on the risk evaluation of transgenic tobacco lines resistant to wild fire disease. Two field trials with these lines were carried out for evaluation of the gene flow. The transgenic plants were surrounded by not transgenic control plants from the same cultivars and the progeny of the controls was screened for the presence of the transgene. Biochemical analyses were also performed for evaluation of the quality of the GM tobacco.

The project will provide information and practical experience for the prompt application of the Bulgarian Law for GMO, which is a step towards the harmonization of Bulgarian legislation and standards with the EU. It will provide tools to the fulfillment of the responsibility of the country to comply with Biodiversity Convention and the Cartagena Protocol concerning GMO.

The collected data and the developed protocols for assessment and monitoring of the effect of transgenic alfalfa, tomato, potato, strawberry and tobacco varieties on the studied key biotic components of their respective crop agro ecosystems will ultimately benefit the work of the future supervising governmental commission under the Bulgarian GMO legislation.