DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

The aim of this project is to evaluate the possibility of mycotoxins produced by *Fusarium* sp. degradation using *Trichoderma* sp. The project is focused on evaluation of particular metabolic pathways of mycotoxins degradation, including those where toxins with modified chemical structure may occur. The study framework also include the assessment of selected mycotoxins metabolites absorption ability by human epithelial cells. The purpose of this project is to verify the hypothesis that the enzymatic system of *Trichoderma* fungi allows an effective degradation of mycotoxins. The factors affecting the mycotoxins degradation will be evaluated (this include pH, incubation time or temperature). Subsequently chemicals produced through mycotoxins degradation will be identified using specialized equipment. In the next steps some sophisticated chemicals processes will be utilized to isolate / synthetize identified chemicals.

Purified chemicals that are degradation products of *Fusarium* fungi toxins will be assessed in respect of absorption ability by the human epithelial cells. Human intestinal cell lines will be used in in vitro testes.

The impact of global warming on cereal production can be very significant and harmful, as the ripening of cereals in Southern and Central Europe will take place much earlier than today. The occurrence of these unfavorable weather phenomena also significantly affects the well-being of cereal plants through increased pest pressure, as well as increased fungal diseases incidence that effectively reduce yield and increase mycotoxins contamination.

Fusarium head blight (*FHB*) is the one of the most important and frequently occurring cereal diseases. Due to the huge threat posed by *FHB*, organic production of cereal grains without the use of fungicides can be very difficult. Even when fungicides are included in the plant protection program it is not possible the eliminate fungal diseases completely.

Therefore, efforts are undertaken to find an appropriate method that will allow effective crop plant protection with reduced use of pesticides.Those include biological methods of cereal plants protection. It has already been demonstrated that *Trichoderma* acting as an antagonistic fungi might be used to suppress fungi of the genus *Fusarium*. This produce an pesticide – free option for plant pathogen fighting. However not much is known on the ability of such fungi to degrade mycotoxins present in cereals. There is also lack of knowledge on the characteristics of the chemicals produced in such metabolic pathways. Up to date there is no data from *in vivo* experiments on toxicity of *Fusarium* toxins metabolites produced by the living organisms. Difficulties to access a pure compounds of that type is frequently a main limitation in lunching of such toxicological research. The low availability of standards and a high degree of complexity of an *in vivo* tests creates a barrier in obtaining information on the health effects caused by the metabolized mycotoxins. In vitro testes performed on human cell lines might produce some preliminary data on toxicological properties of such metabolized compounds. In the Applicant's opinion - the proposed research concerns a very important issue from the point of view of agricultural sciences. Up to now, antagonistic fungi of the *Trichoderma* genus have been shown to be a potential means of combating pathogenic organisms. Currently, the possibilities on the use of these organisms against *Fusarium* pathogenic fungi is intensively explored. However there are still several issues that have to be thoroughly investigated in respect to *Trichoderma* use for plant protection. This include the recognition of mycotoxins metabolic pathways. Newly discovered substances may pose a potential threat in respect to food safety (those chemicals might be present in food). From this point of view, there is a need to conduct research on the safety of these substances. One of the elements of such a research might include assessment of mycotoxin / metabolites absorption through the intestinal epithelium cells.

Considering the above statements, in the authors' opinion, the proposal will contribute in a special way to the state of art. The proposed research can potentially contribute to the discovery of new properties of *Trichoderma* fungi (in the context of degradation properties against *Fusarium* mycotoxins), which may be a desirable feature (if their toxicity is lower than their parent toxins). On the other hand the results of this project might provide data whether the newly formed metabolites are less, more or also comparatively toxic like their parent substances, towards the small intestine cells (evaluated *in vitro*).