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GENETIC MODIFIED ORGANISMS (GMO) WILL NOT PROVIDE A SUSTAINABLE DEVELOPMENT OF AGRICULTURE

Boris Boincean, Doctor in Agricultural Sciences (Dr hab.), Professor
e-mail: *bboincean@gmail.com*
Selectia Research Institute of Field Crops, Balti, Republic of Moldova

Abstract. Discussions regarding the importance of GMO for sustainable development of agriculture are ongoing Meantime, the arguments in favor of GMO are not justified and confirmed by real agricultural practices. In order to promote a more sustainable agriculture a higher diversity of crops is required together with a larger genetic diversity by using classical methods of plant breeding.

Introduction. The issue of GMO application in agriculture, mainly as seeds, belongs to the concept of agriculture intensification [1, 2, 3]. At the moment there are two distinct approaches (concepts, visions):

– agroecological (holistic, systemic) one which is providing a sustainable development of agriculture in a longer period of time.

– technological (simplistic, reductionistic) one based on industrial model of agriculture intensification oriented towards achieving a maximum level of yields and profit during a short period of time. The last vision is dominated nowadays. It is a kind of extractive and speculative agriculture.

Discussions. The affirmations regarding higher levels of yields for GMO crops are not justified and unproved by real agricultural practice. According to the report prepared by the international experts: „GMO Myths and Truths. An evidence based „examination of the claims made for safety and efficacy of genetically modified crops (2012)", GMO crops have provided an extra field only in 5% cases in the yield experimental trials [4]. They are favorable for the appearance of „super weeds" and „super pests" with a high level of tolerance to even more toxic chemicals.

Transcontinental companies are interested to protect their intellectual property and to do marketing of both seeds and chemicals for pest, disease and weed control.

Unfortunately the technological (industrial) approach to agricultural intensification doesn't answer to challenges faced by modern agriculture (highly dependence from non-renewable sources of energy and their derivates; huge discrepancy between prices for industrial inputs and agricultural production which is reducing drastically the competitiveness of farmers; pollution and degradation of the natural resources; global warming; etc.).

Achievements in molecular biology have made our know ledge more profound at the cell level, but they have narrowed our understanding of real ways to a more sustainable agriculture. The molecular level is one hierarchically at lower level.

Than the ecosystem one the interactions at the ecosystem level, are significantly more complex and diverse than at the molecular level of each separate genotype. It is difficult to imagine how the implementation of one gene can change the whole organism which consists from thousands of genes.

The natural complexity is easier to manipulate than the genetic complexity.

At the moment and for the future the yields of crops are limited not by the genotypes, but by the unfavorable state of soil fertility. Our long-term field experiments at Selectia Research Institute of Field Crops (Balti, Republic of Moldova) have proved that the share of soil fertility in yield formation, for the majority of crops consist 80-95% [1,2]. The restoration of soil fertility is possible only in the frame of the ecosystem by recycling of water and nutrients, by preventing the infestation of crops by weeds pests and diseases, etc.

It means, that the solutions for the transitions to a more sustainable agriculture should be found at the ecosystem level, but not at the molecular level.

Agriculture requires structural changes at the landscape level in the frame of the whole ecosystem (farming systems).

The crucial problem for the modern (industrial, conventional) agriculture is the chronic insufficiency of organic matter returned to the soil relatively to the amount of soil organic matter mineralized for yield formation.

The reasons for such a situation are different:

- replacement of perennial by annual crops with a less abundant root system;
- excessive moldboard ploughing of soils;
- application of mineral fertilizers, especially nitrogen, contributing to higher degree of soil organic matter mineralization, etc.

Application of GMO seeds in agriculture is against the idea of achieving a more sustainable agriculture, because it doesn't reduce the dependence from nonrenewable sources of energy and their derivates as well as doesn't solve the ecological and social problems faced by the society in a longer period of time.

GMO seeds can cause toxic and allergic effects on human body as a result of using transgenic techniques comparatively with classical methods of crop breeding. The adaptation of a larger diversity of crops and genotypes in the frame of each species by using classical methods of crop breeding is significantly higher to different biotic and abiotic factors.

Oversaturation of the structure of sawing areas with similar crops on their biological and agrotehnical properties, neglecting of crop rotations, excessive moldboard ploughing and application of chemicals for pest, disease and weed control

are contributing to lasses of the regulatory capacities of the ecosystems. The simplification of agro ecosystem has short benefits. Unfortunately, the long-term negative consequences are not yet evaluated. Somebody has the pay for this.

Conclussions. The benefits advertised by transcontinental companies for GMO crops

(higher yields; better adaptation to climate changes; more profitable; less consumption of pesticides, etc.) are not justified and proved by real agricultural practices.

1. GMO crops proved to be:

– more toxic and allergenic to human body comparatively to naturally breaded crops;

– more vulnerable to economic crises and to global warming;

– less beneficial for the biodiversity both on soil surface and inside of the soil;

– unsuitable for providing food security and the reduction of poverty, etc.

2. Crop breeding by using classical methods has more advantages in maintaining biodiversity and yield potential, than transgenic techniques.

3. The fundamental solution for the transition to a more sustainable agriculture belongs to structural changes for the entire ecosystem at the landscape level, including sustainable and resilient management of soils, capable to provide ecosystem and social services.

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