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GMO contamination of seeds

To the editor:

Since November, the transgenic maize variety Starlink has turned up in nearly one-tenth of 110,000 grain tests performed by US federal inspectors, according to a report from the US Department of Agriculture released recently. It is becoming increasingly obvious that the prevalence of Aventis's StarLink, which has yet to be approved for human consumption, is far greater than the small area of crop land on which it originally grown.

In the past few months, European traceability and labeling requirements, as foreseen in amended regulations for GMOs (ref. 1) and the problem of GMO contamination of conventional seeds have again caused serious trade concerns in the United States. Shocked by the need for a buy-back program for seed corn containing potentially allergenic Cry9C protein, the American Seed Trade Association has called for global adoption of practical seed GMO thresholds[2].

Currently, the European Commission discusses tolerance levels for contaminations and proposed temporal and spatial limitations for the use of GMOs in areas of seed production specific for different plant species according to pollination characteristics and seed longevity. But there is also a continuing discussion about the extent and consequences of contamination and whether thresholds for contamination and measures for seed production can really solve the problems. Complex mechanisms of pollen dispersal over long distances may practically preclude the attainment of uncontaminated seeds using conventional strategies for seed production.

Pollen dispersal of up to 0.75 % at 500 m and the need for acknowledgment of a potential movement of maize pollen by bees and long-range transport under certain weather conditions have recently been summarized in a report of the UK National Pollen Research Unit[3]. Ecological consequences of seed contamination with GMOs are unclear, as outcrossing, selective advantages, and introgression into natural or agricultural ecosystems are not well understood, and the probability of gene flow is a function of the spatial scale of the presence of gene donors[4]. Consequently, the EU Scientific Committee on Plants states that contaminations are inevitable. In particular, a zero level of unauthorized GM seeds from third countries is unobtainable in practice and would have severe consequences for GM field trials, and for evaluation of new GM plant varieties[5]. Also an enforcement of such measures would be problematic as, because of a lack of international databases of DNA sequences and robust analytical procedures, unauthorized GM material from third countries may not be detected at all.

The real risks arising from the contamination of seeds with GMOs remain poorly understood. Clearly, risks and benefits of GMOs may vary on a case-by-case basis. However, there are as yet no data to suggest that contamination of seeds with GMOs in most cases will result in environmental risks, because at least for GMOs with recent types of modification, no invasiveness or better persistence than their conventional counterparts has been shown[6]. Ecological research even points to the fact that the use of specific GM plants in adequate agricultural environments may have ecological benefits[7].

Also, for the production of food or feedstuff, contamination of seeds with approved GMOs does not pose a risk. Approval of GMOs under almost all international regulations comprises an intensive analysis of toxic or allergenic components according to the principle of the substantial equivalence with the comparable conventional organisms[8]. Moreover, the implementation of tolerance levels for seed contamination would not deal with the problem of allergenicity of seed contamination with nonauthorized GMOs from field trials, as already nanogram amounts of protein—amounts below any tolerance levels for contamination—theoretically could elicit allergic responses in some cases. In addition, labeling regulations for foods containing GMO-derived constituents would not really profit from the attempt to keep tolerance levels for seed contamination as small as possible: In fact, there is very little correlation between maximal tolerance levels for labeling foods as genetically modified (e.g., according to the European Novel Food regulation) and the degree of contamination of seeds because of seed crop management and practices of food processing.

What in fact may be the problem is that around the world, many citizens and consumers explicitly demand GM-free production of food and feed, such as is the case in organic farming, where GM crops are not permitted[9], or in particularly valuable natural ecosystems, where introduction of GM varieties could have harmful effects.

Establishing tolerance levels in combination with temporal and spatial limitations for seed production may not suffice to enable this. In fact, the flow of recombinant genes resulting from natural gene dispersal, further breeding practices using GMOs, and the demise of terminator strategies and continued propagation of seeds by farmers are all likely to result in significant contamination of ecological systems and food production chains.

Taking all these factors into account, I believe a potential solution could be to produce seeds in areas where it has been ensured that no GMOs, or at least no GM varieties of the same or closely related species, have been grown. Therefore, the idea of GMO-free areas for nature protection and seed production, such as recently discussed in Europe, would merit special attention.

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