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Comment on Gilligan, Claessen and Van den Bosch: Spatial and temporal dynamics of gene movements arising from deployment of transgenic crops

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Introduction

The paper by Gilligan, Claessen and Van den Bosch offers a very interesting and transparent analysis of the modelling of gene movements based on stochastic life-history models of plants, on metapopulation models (for assessing whether a plot will be occupied by a species or not) and on landscape models that may show, for instance, the impact of distances between plots on the dispersion of transgenic crops. The models presented in the paper consider many interactions and complexities like the stochastic behaviour of weather or the disturbance of a natural environment, which is relevant for the germination of seeds. It is interesting to see how concepts of stochastic metapopulation models, after appropriate modification, can be applied to the new research questions on the potential spatial distribution of transgenic crops.

Issues of concern

a. The paper discusses the application of metapopulation models in the analysis of the spatial distribution of transgenic crops. This raises the question whether sufficient information is available to identify the relevant parameters for the metapopulation models. It is well known that the extinction rates or the recolonization rates for various plots are difficult to estimate for traditional species. It will be even more complicated to assess these parameter values for transgenic crops, particularly if little experience is available on how these species will compete with other species under potentially very different circumstances. It would be worthwhile to analyse these complications in more detail, because they will be extremely relevant for the *ex ante* assessment of the spatial distribution of transgenic crops.

b. The paper raises the question of how in the process of modification the characteristics of the plants can be chosen in such a way that the risk of undesirable spatial distribution of genetically modified crops can be reduced or minimized. This raises the question what lessons can be learned from the analysis for the desirable characteristics of transgenic plants, for instance with regard to germination or cross-pollination.

c. The paper analyses the distances that should be considered in order to separate GMO crops sufficiently from non-GMO crops. Although the analysis seems

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scientifically correct, the question may be raised whether in practice farmers will always comply with the regulations, and whether undesired dispersion of the GMO crops may occur, despite the precautionary measures. If only one or a few farmers – for whatever reason – plant GMO crops in the neighbourhood of traditional crops the dispersion of the GMO crop may already occur and the traditional crop will be affected with GMOs.

d. Finally, I would like to indicate that the paper focuses on the *ex ante* analysis of the risk of dispersion of transgenic crops under rather 'normal' circumstances. For a proper risk assessment it will be the combination of some very unlikely events that may have tremendous negative impacts on the natural environment as a result of the introduction of transgenic crops. This very small probability of a highly undesirable or catastrophic event is one of the most complicated factors to assess in making decisions on the introduction of GMOs. Despite the fact that the paper contributes a lot to resolving some of the urgent questions in this domain, this fundamental issue seems – at least to me – to remain unsolved.