Towards Flexible Coexistence Regulations for GM crops in the EU

Vers des réglementations flexibles en terme de coexistence pour les cultures transgéniques dans l'Union européenne

Hin zu flexiblen Koexistenzregelungen für genetisch veränderte Feldfrüchte in der EU

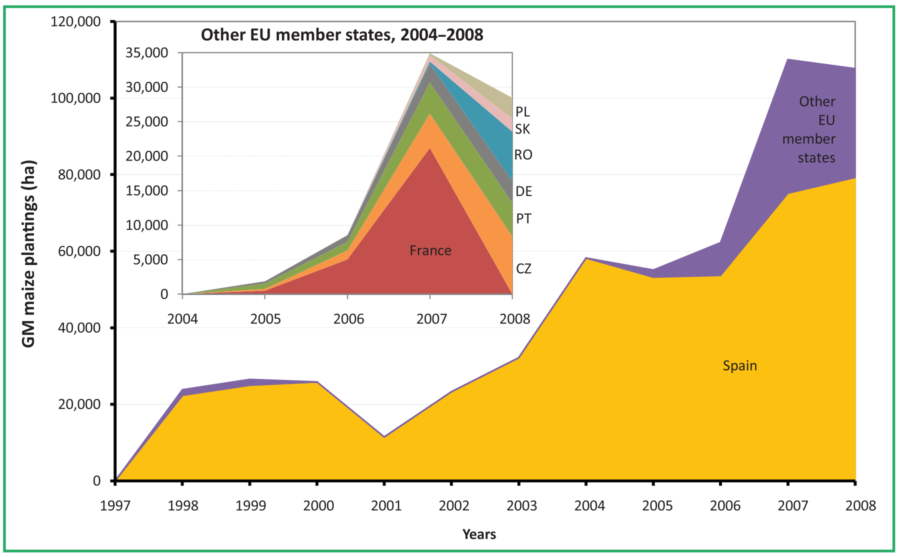
Matty Demont, Yann Devos and Olivier Sanvido

With the adoption of Regulation (EC) No. 1829/2003 on genetically modified (GM) food and feed, the European Union (EU) adopted a coexistence policy that specifically aims at enabling the side-by-side development of different cropping systems. To ensure the ability of farmers to make a practical choice between conventional, organic and GM crop production, the European Commission (EC) published detailed and pragmatic recommendations for the development of national coexistence regulations. According to these recommendations, coexistence regulations are to be developed and implemented at national or regional levels. In previous work we argued that, despite the EC recommendations, the implementation of national/regional coexistence regulations is a challenge that might unnecessarily hamper the adoption of GM crops in the EU. We postulated that currently implemented or proposed coexistence strategies do not comply with some key coexistence principles established by the EC; these strategies are not: (i) science-based; (ii) feasible; (iii) regionally proportionate; and (iv) economically proportionate (i.e. cost-effective). The main take-home message for EU policymakers was that compliance to the key principles would imply building in a certain degree of *flexibility* in national/regional coexistence regulations (Demont and Devos, 2008; Devos, Demont, and Sanvido, 2008; Demont *et al.*, 2008; Devos *et al.*, 2009). In this article, we explore how policymakers can implement this recommendation in practice. GM maize is thereby used as a case study, as it is the only GM crop planted over a significant area in the EU (Figure 1).

Why coexistence needs to be regulated

As various sources can contribute to on-farm mixing of agricultural products, it is impossible to completely avoid the unintentional presence of GM material in non-GM crop products. Potential sources of on-farm mixing include the use of impure seed; cross-fertilisation due to pollen flow between neighbouring fields; the occurrence of volunteer plants originating from previous GM crops; and mixing of plant material in machinery during sowing, harvesting and post-harvest operations (Devos, Reheul and De Schrijver, 2005; Sanvido *et al.*, 2008; Devos *et al.*, 2009). Because the unintentional presence of GM material can affect the market acceptability of non-GM crop products, GM crop adopters may induce a negative externality (loss in value) for adjacent non-GM crop farmers through on-farm (gene) mixing. To minimise this negative externality, the EU set a 0.9 per cent tolerance threshold as the maximum level of authorised GM material that may be contained in food and feed without having to be specifically labelled as containing GM material

Figure 1: Evolution of GM maize plantings in the EU during the last decade, 1997–2008



Notes: The currently planted GM maize varieties express the insecticidal protein Cry1Ab from *Bacillus thuringiensis* (Bt-maize), which confers resistance against the European and Mediterranean corn borer. In 2008, France banned the cultivation of maize MON810 on its territory. *Abbreviations:* CZ = Czech Republic; DE = Germany; PL = Poland; PT = Portugal; RO = Romania; SK = Slovakia.
Source: Devos *et al.* (2008).

(European Commission, 2003). Since the market itself fails to provide incentives for correcting possible crop value losses, additional government policy intervention is justified. Whether the negative externality would really induce a market failure, depends upon the demand for non-GM crops; only if the non-GM crops demand is substantial, will they be sold on the market at a higher price than GM crops. The gains from specialisation in non-GM crop production are called *non-GM rents*, whilst those from growing GM crops are *GM rents*. Hence, it is the balance between GM rents following the adoption of GM crops and price premiums paid for non-GM crops that largely dictates the share of GM and non-GM crops and thus the necessity for coexistence (Demont and Devos, 2008). To protect farmers from negative externalities of GM crop cultivation, policymakers need to define legal coexistence rules, which ensure that crop value losses are either prevented or minimised (*ex ante*), or reimbursed (*ex post*).

What EU policymakers currently propose

Member States are currently implementing or developing both *ex ante* coexistence regulations and *ex post* liability schemes to ensure coexistence between different cropping systems (Beckmann, Soregaroli and Wesseler, 2006). *Ex ante* coexistence regulations specify preventive on-farm measures to warrant compliance with the legal 0.9 per cent tolerance threshold for approved GM material in non-GM crop products. *Ex post* liability schemes cover questions of liability and the duty to redress the incurred economic harm once adventitious mixing in a non-GM crop product has occurred.

In the case of maize, cross-fertilisation due to pollen flow between neighbouring fields represents the major potential biological source of on-farm mixing: maize is a cross-pollinated crop, relying on wind for the dispersal of its pollen; there are no cross-compatible wild relatives of

maize in Europe; most shed maize seeds and seedlings do not survive winter cold in many European regions; and maize is not able to survive as feral populations outside cropped areas due to its high degree of domestication (Devos, Reheul, and De Schrijver, 2005; Sanvido *et al.*, 2008). Although different preventive on-farm measures could be implemented to reduce cross-fertilisation in maize, several member states are currently proposing

> "Les barrières à pollen sont une mesure de coexistence facilement négociable entre agriculteurs voisins."

isolation distances as the only coexistence measure to comply with legal tolerance threshold requirements (European Commission, 2006). Isolation distances define a fixed minimum distance between GM and non-GM crop fields of the same species. The use of isolation distances is a widely accepted on-farm coexistence strategy as cross-fertilisation levels in maize rapidly decrease with increasing distance from the pollen source (Devos, Reheul, and De Schrijver, 2005; Messeguer *et al.*, 2006; Sanvido *et al.*, 2008). The responsibility for implementing coexistence measures lies with GM crop adopters as they are the 'newcomers' in European agriculture (European Commission, 2003). Currently proposed isolation distances range from 15 to 800 m with 200 m being frequently favoured. Devos, Demont, and Sanvido (2008) recently emphasised that imposing large and fixed isolation distances around GM maize fields by law does not satisfy any of the four conditions necessary for a successful coexistence: such large isolation distances are: (i) excessive from a scientific point of view; (ii) difficult to implement in practice; (iii) rarely proportional to the regional heterogeneity in the agricultural landscape; and (iv) not proportional to the farmers' basic economic incentives for coexistence. Therefore, in the next section we propose alternative approaches for introducing flexibility into coexistence regulations.

How flexibility can be built into *ex ante* coexistence regulations

Ex ante regulatory flexibility
Allowing farmers to discuss who implements coexistence measures would be a first step towards ensuring a feasible coexistence that is both regionally and economically proportionate. In *ex post* liability

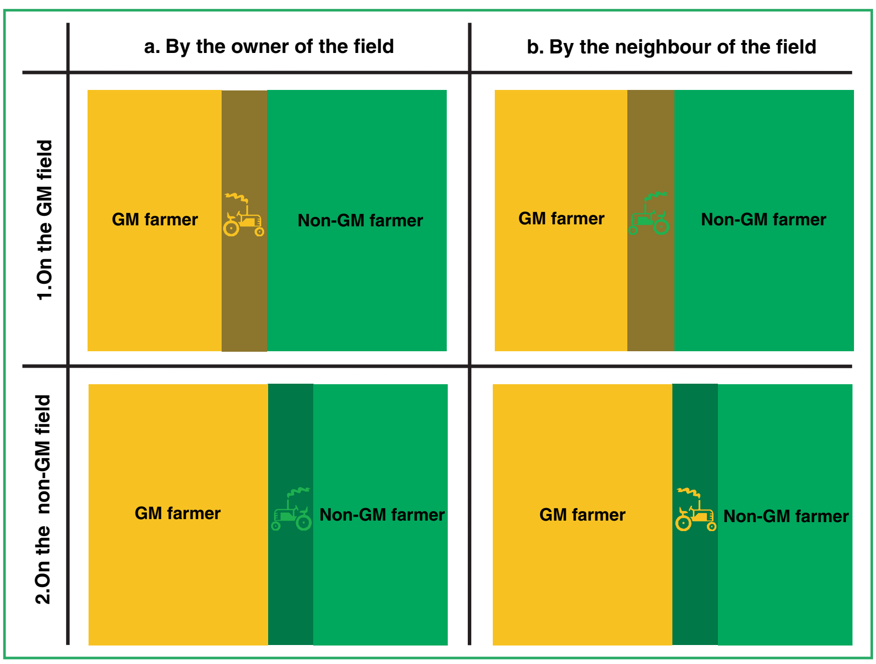
schemes, the *newcomer principle* requires GM crop adopters to redress incurred economic harm once the content of GM material in a non-GM crop product exceeds the legal tolerance threshold of 0.9 per cent. The newcomer principle could, however, be applied on two alternative areas of responsibility. Applying it on *civilian responsibility* obliges GM crop farmers to be the only ones to undertake coexistence measures on their GM crop fields (termed respectively 'GM farmers' and 'GM fields' for brevity hereafter), whereas applying it on *financial responsibility* forces them to bear only the financial burden of these measures, regardless of who is implementing them. The first interpretation introduces *regulatory rigidity* in coexistence regulations, whilst the second one entails *regulatory flexibility*: it allows farmers that adopt GM crops to contract out the implementation of coexistence measures to their non-GM neighbours in return for a compensatory payment in case the latter option is cheaper (Demont *et al.*, 2009).

Most of the currently proposed coexistence regulations incorporate both *ex ante* and *ex post* regulatory rigidity. Relaxing some of the regulatory rigidity in *ex ante* regulations might reduce the regulatory burden on certain agricultural options and avoid jeopardising economic incentives for coexistence (Demont and Devos, 2008). Instead of solely specifying fixed isolation distances, policymakers could additionally prescribe pollen barrier widths, giving farmers the option to substitute isolation distances with pollen barriers. They could furthermore leave neighbouring farmers the option to decide where and by whom the pollen barrier is planted.

Farm level flexibility through negotiable pollen barrier recommendations

Allowing farmers to negotiate the implementation of alternative coexistence measures could be a second step forward to ensure a coexistence which is regionally and economically proportionate. Pollen barriers, for example, are effective coexistence measures that could be negotiated against isolation distances. Planting a pollen barrier of conventional maize could, for example, allow farmers to reduce the proscribed isolation distance by 2 m for each row of buffer planted. Maize pollen barriers bordering the outer parts of the maize field reduce the extent of cross-fertilisation between neighbouring maize fields much more effectively than an isolation distance of bare ground of the same width (Della Porta *et al.*, 2008). This is because a pollen barrier increases the distance towards the inner field parts, in turn increasing the distance GM pollen has to travel for cross-fertilisation (Devos, Reheul, and De Schrijver, 2005). Moreover, a pollen barrier of maize produces competing pollen and/or may serve as a physical barrier to air and consequently pollen flow. Research results confirmed that the outer plant rows in a recipient maize field function as a zone that safeguards the centre of recipient fields (Messeguer *et al.*, 2006). With a maize barrier of 10–20 m, the remaining maize harvest in the field thereby rarely exceeds the threshold of 0.9 per cent GM material. Pollen barriers are moreover better-suited to build in flexibility into coexistence measures than isolation distances as they are planted with non-GM crop varieties of the same crop, which makes them more *interchangeable* among neighbouring farmers that grow the same crop (Demont and Devos, 2008). Furthermore, pollen barriers encourage voluntary coordination among neighbouring farmers due to their smaller distance requirements, compared to isolation distances.

Figure 2: Four different farmer coordination systems for planting and harvesting maize pollen barriers in the context of coexistence of maize cropping systems



Notes: yellow area = GM field, green area = non-GM field, brown area = pollen barrier on GM field, dark green area = pollen barrier on non-GM field, yellow tractor = GM farmer, green tractor = non-GM farmer.

Four different systems could be envisaged to manage pollen barriers (Figure 2): pollen barriers could either be planted on the GM or non-GM field (rows 1–2); and they could subsequently be harvested either by the owner or neighbour of the field (columns a–b).

System 1: In the case of Bt-maize (expressing the Cry1Ab protein), a realistic option for the GM farmer would be to plant and harvest the maize pollen barrier on his own fields (system 1a). This is because Bt-maize growers are contractually enforced to adopt insect resistance management (IRM) measures in case their Bt-maize planting area exceeds 5 ha. A refuge zone of 20 per cent of the Bt-maize area has to be planted with conventional maize in order to delay

transgenic traits, agricultural fields and regions. Growing fodder maize, for instance, is cheaper than buying it on the market. If farmers want to feed their animals with non-GM fodder maize, they will be reluctant to apply system 2 and devote part of their fields to pollen barriers as this would imply that they have to buy more expensive non-GM fodder maize on the market. Cultivating and planting pollen barriers on neighbours' fields (system b) give rise to transaction costs due to moral hazard. If the non-GM farmer, for instance, cultivates the pollen barrier on the GM farmer's field (system 1b), the former has incentives to lower the quality of his services as he is not the owner of the crop. The opposite holds if the GM farmer harvests the pollen barrier on the non-GM farmer's field (system 2b): he has economic incentives for cheating by underreporting his neighbour's yields. However, by planting and cultivating the pollen barrier on their own fields (system a), farmers substitute transaction costs for losses of economies of scale. Planting the pollen barrier on the GM farmer's field (system 1a) creates losses of economies of scale in the case of GMHR maize as the GM farmer has to manage two different weed management systems on a single field. Planting the pollen barrier on the non-GM farmer's field (system 2a) also generates losses of economies of scale as the non-GM farmer has to separately sell limited quantities of non-GM crop products, potentially containing traces of GM material. Finally, additional transaction costs may arise in collecting information, planning and negotiating coexistence measures among farmers.

the potential resistance development in lepidopteran target pests. Both coexistence and IRM requirements could be combined since the refuge zone could also serve as a pollen barrier. Moreover, by sowing the pollen barrier/refuge zone with conventional maize around a Bt-maize field, sowing machinery can be 'cleaned' from GM seed remnants to avoid potential seed mixing.

In the case of GM herbicide resistant (GMHR) maize, applying two different weed management systems on a single field may not be practical. To gain economies of scale, the farmer opting for GMHR maize could contract out the planting and cultivation of the pollen barrier on his field to the neighbouring non-GM farmer (system 1b) and reimburse parts of the neighbour's cultivation costs (such as sowing and herbicide treatments). The farmer growing GMHR maize could subsequently harvest his entire field, including the pollen barrier, and sell his crops as 'GM'. Either way, the GM farmer would incur opportunity costs by foregoing *GM rents* (economic benefits of the GM crop technology) on the entire area of the pollen barrier.

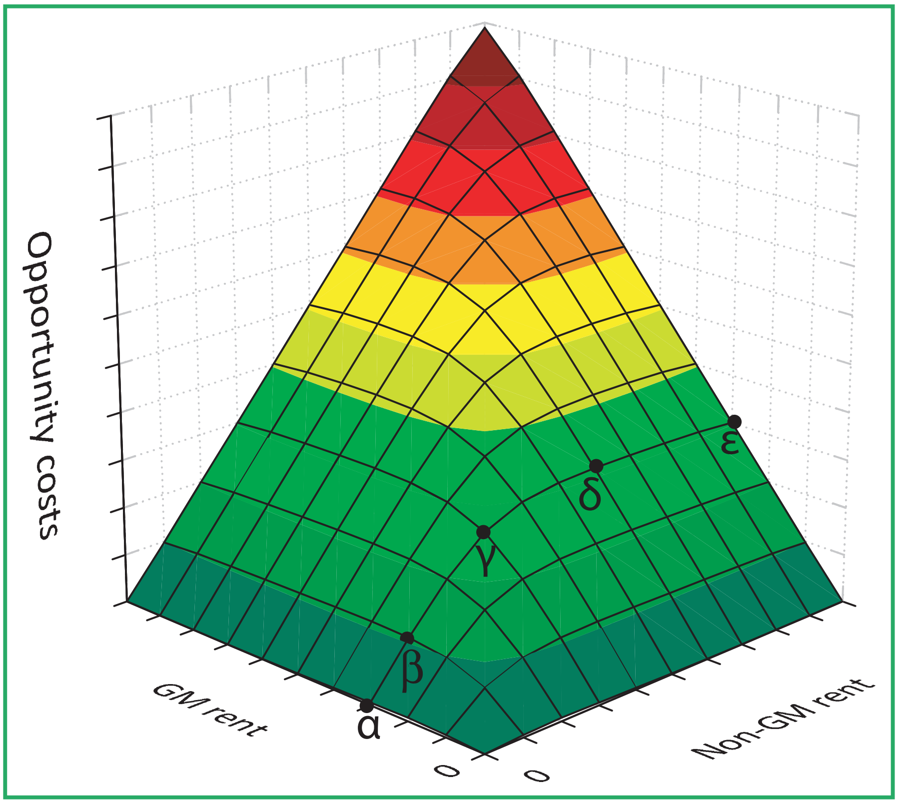
System 2: If GM rents are high relative to non-GM rents, farmers opting for GM crops have incentives to contract with non-GM crop neighbours to plant the pollen barrier on the neighbours' fields. Field margins next to the neighbouring farmer's GM fields serving as a pollen barrier could be harvested by the non-GM farmer separately, and be delivered to the collector as being 'GM' (system 2a). However, in doing so, he would forego any economies of scale as he is prevented from harvesting and selling his full non-GM crop production in a single lot. To take advantage of economies of scale, the GM farmer could therefore harvest the field margin on the non-GM farmer's field and sell his entire harvest in a single lot as 'GM' (system 2b). In both cases, the farmer opting for GM crops would have to compensate the neighbouring non-GM farmer for the foregone non-GM rents (opportunity costs).

“Pollenbarrieren können als Koexistenzmaßnahme zwischen benachbarten Landwirten leicht ausgehandelt werden.”

While the placement of the maize pollen barrier determines the magnitude of opportunity costs, operational and transaction costs may not only vary among the four systems, but also among farmers, maize uses (grain or silage),

One can reasonably assume that farmers will choose the system among the four proposed ones that minimises total (opportunity, transaction and operational) costs as a function of the relative magnitude of GM and non-GM rents (Demont *et al*., 2009). Flexible coexistence regulations that support the use of pollen barriers implicitly provide room for cost-minimising behaviour as farmers can negotiate who plants and where to plant the

Figure 3: Opportunity costs of pollen barriers as a function of GM and non-GM rents



Notes: The edge of the half-pyramid graph was smoothed as farmers are not expected to abruptly switch from one system to the other. Colour transitions represent combinations of GM and non-GM rents with equal opportunity costs.

pollen barrier. This is in accordance with EC recommendations explicitly mentioning that coexistence strategies should be cost-effective and economically proportionate. This can be explained through a three-dimensional graph that depicts opportunity costs in relation to GM and non-GM rents. Farmers' opportunity costs are equal to the area of their implemented pollen barriers multiplied by GM rents (system 1) or non-GM rents (system 2). If all farmers choose to plant pollen barriers on their GM fields at the expense of foregoing GM rents, opportunity costs of pollen barriers can be represented as a simple two-dimensional linear function of GM rents. The higher the GM rents, the higher are the opportunity costs of pollen barriers. If farmers are free to choose between planting pollen barriers on GM fields (and foregoing GM rents) or planting pollen barriers on neighbours' non-GM fields (and compensating them for non-GM rents foregone), they will choose the cheapest system given both rents. If we represent average opportunity costs of planting pollen barriers in a population of farmers, we obtain the half-pyramid graph presented in Figure 3.

Opportunity costs are represented along the vertical Z-axis and GM and non-GM rents along the horizontal X and Y-axes, respectively. The half-pyramid graph illustrates the proportionality of average opportunity costs of pollen barriers to economic incentives for coexistence. If one of the incentives

> “Pollen barriers are an easily negotiable coexistence measure among neighbouring farmers.”

is lacking, strictly speaking there is no coexistence issue and opportunity costs of pollen barriers are zero (along the horizontal X and Y-axes). Consider the transect $\alpha\beta\gamma\delta\epsilon$ in the vertical ZY plane. If non-GM rents are small compared to GM rents (point α), farmers opting for GM crops will tend to contract out the planting of pollen barriers to their non-GM crop neighbours (system 2) in return for a compensation payment proportional to non-GM rents. If the latter increase (e.g., to point β), compensation payments will proportionally increase until non-GM rents approach GM rents (point γ) where farmers start switching from system 2 to system 1 by planting pollen barriers on GM fields. If non-GM rents further rise (point δ), opportunity costs level off to a maximum threshold equal to the GM rent (point ϵ) as farmers will tend to keep pollen barriers on GM fields which implies that opportunity costs are not affected by the magnitude of non-GM rents. Note that the vertical distance between the origin (0,0) and point ϵ equals the horizontal distance between the origin and α. A similar transect can be obtained in the ZX plane by holding non-GM rents constant and varying GM rents. In other words, opportunity costs will generally not tend to exceed the lowest of both rents. Opportunity costs will only continuously rise if both rents increase at the same pace (on the half-pyramid's edge) or if one of the rents is zero while the other one is increasing (in the vertical planes).

National/regional level flexibility through plural coexistence measures

Through the subsidiarity principle, the EC favours an approach that leaves it up to Member States to develop and implement management measures for coexistence (European Commission, 2003). This enables design of coexistence measures that are specific to farm structures, farming systems, cropping patterns and natural conditions in a region. Flexible measures would also allow adaptation to the heterogeneity of GM rents as farmers are heterogeneous with respect to field conditions, managerial expertise, education, market access and pest infestation. The requested flexibility could be built in by allowing plural advisory coexistence measures that are not only negotiable between farmers on a case-by-case basis, but that are also adaptable to different regional and local situations. Although such a case-by-case-based approach will demand much administrative effort, it may be a third step forward in making coexistence workable in practice, and in reaching appropriate (i.e. regionally and economically proportionate) coexistence at the regional and landscape level.

Recommendations for policymakers

In its Communication to the Council and the European Parliament, the EC has clearly emphasised that coexistence measures should not go beyond what is necessary to ensure that the unintentional presence of GM material in non-GM crop products remains below the legal labelling threshold. While some member states have taken this advice into account, others decided to propose or adopt measures that aim at keeping the amount of GM material present in non-GM crop products as low as possible. In some cases, proposed measures, such as large and fixed isolation distances between fields of GM and non-GM maize, appear to entail greater efforts for GM crop growers than necessary, which raises questions about the proportionality of these measures. Although the EC recognises the legitimate right of Member States to regulate the cultivation of GM crops, it stresses that any approach needs to be proportionate to achieve coexistence (European Commission, 2006, p. 6). We argue that in order to achieve the objectives set for coexistence, national and/or regional policymakers must introduce a degree of flexibility in *ex ante* coexistence regulations. This flexibility could be built into regulations at different levels: (i) at the regulatory level by relaxing some of the regulatory rigidity in *ex ante* regulations; (ii) at the farm level by allowing the substitution of a certain proportion of the prescribed isolation distances by pollen barriers (e.g. 10–20 m in the case of maize); and (iii) at the national and/or regional level through plural coexistence measures, consistent with heterogeneity of farming in the respective country/region. Pollen barriers, which are easily negotiable among neighbouring farmers, could be an alternative to mandatory isolation distance requirements in the context of coexistence; they would reduce the regulatory burden to some agricultural options and avoid jeopardising the economic incentives for coexistence.

Further Reading

- Beckmann, V., Soregaroli, C. and Wesseler, J. (2006). Coexistence rules and regulations in the European Union. *American Journal of Agricultural Economics*, 88: 1193–1199.
- Della Porta, G., Ederle, D., Bucchini, L., Prandi, M., Verderio, A. and Pozzi, C. (2008). Maize pollen mediated gene flow in the Po valley (Italy): source–recipient distance and effect of flowering time. *European Journal of Agronomy*, 28: 255–265.
- Demont, M. and Devos, Y. (2008). Regulating coexistence of GM and non-GM crops without jeopardizing economic incentives. *Trends in Biotechnology*, 26: 353–358.
- Demont, M., Daems, W., Dillen, K., Mathijs, E., Sausse, C. and Tollens, E. (2008). Regulating coexistence in Europe: Beware of the domino-effect! *Ecological Economics*, 64: 683–689.
- Demont, M., Daems, W., Dillen, K., Mathijs, E., Sausse, C. and Tollens, E. (2009). On the proportionality of EU spatial ex ante coexistence regulations. *Food Policy*, 34(6).
- Devos, Y., Demont, M., Dillen, K., Reheul, D., Kaiser, M. and Sanvido, O. (2009). Coexistence of GM and non-GM crops in the EU. A review. *Agronomy for Sustainable Development*, 29: 11–30.
- Devos, Y., Demont, M. and Sanvido, O. (2008). Coexistence in the EU – return of the moratorium on GM crops? *Nature Biotechnology*, 26: 1223–1225.
- Devos, Y., Reheul, D. and De Schrijver, A. (2005). The co-existence between transgenic and non-transgenic maize in the European Union: A focus on pollen flow and cross-fertilization, *Environmental Biosafety Research*, 4: 71–87.
- European Commission (2003). Commission Recommendation of 23 July 2003 on guidelines for the development of national strategies and best practices to ensure the coexistence of genetically modified crops with conventional and organic farming. *Official Journal of the European Communities*, L189: 36–47.
- European Commission (2006). *Report on the implementation of national measures on the co-existence of genetically modified crops with conventional and organic farming*, European Commission, Brussels, http://ec.europa.eu/agriculture/coexistence/sec313_en.pdf
- Messeguer, J., Peñas, G., Ballester, J., Bas, M., Serra, J., Salvia, J., Palaudelmàs, M. and Melé, E. (2006). Pollen-mediated gene flow in maize in real situations of coexistence. *Plant Biotechnology Journal*, 4: 633–645.
- Sanvido, O., Widmer, F., Winzeler, M., Streit, B., Szerencsits, E. and Bigler, F. (2008). Definition and feasibility of isolation distances for transgenic maize. *Transgenic Research*, 17: 317–355.

Matty Demont, Principal Agricultural Economist, Africa Rice Center (Africa Rice), Saint-Louis, Senegal and previously Centre for Agricultural and Food Economics, Katholieke Universiteit Leuven, Leuven, Belgium.
Email: m.demont@cgiar.org

Yann Devos, Post-Doctoral Researcher, Department of Plant Production, Ghent University, Ghent, Belgium.
Email: yann.devos@ugent.be; yann.devos@efsa.europa.eu

Olivier Sanvido, Research Scientist, Agroscope Reckenholz Tänikon Research Station ART, Zurich, Switzerland.
Email: olivier.sanvido@art.admin.ch

summary

Towards Flexible Coexistence Regulations for GM crops in the EU

The European Union (EU) is currently facing a challenge that might unnecessarily hamper the adoption of GM crops: regulating the coexistence of genetically modified (GM) and non-GM crops. Member states are currently implementing or developing both *ex ante* coexistence regulations and *ex post* liability schemes to ensure that both GM and non-GM crops can be cultivated in the EU. In this article, we explore in detail how national and/or regional policymakers can build in a certain degree of flexibility in *ex ante* coexistence regulations in order to reduce the regulatory burden on certain agricultural options and avoid jeopardising the economic incentives for coexistence. We use the example of GM maize as a case study, being the only GM crop planted over a significant area in the EU. We conclude that flexibility could be integrated into regulations at different levels: (i) at the regulatory level by relaxing some of the regulatory rigidity in *ex ante* regulations; (ii) at the farm level by allowing the substitution of isolation distances by pollen barriers; and (iii) at the national/regional level through plural coexistence measures, consistent with heterogeneity of farming in the EU.

Vers des réglementations flexibles en terme de coexistence pour les cultures transgéniques dans l'Union européenne

L'Union européenne (UE) est actuellement confrontée à un défi qui pourrait entraver inutilement l'adoption des cultures transgéniques : la réglementation de la coexistence de cultures transgéniques et non-transgéniques. Les États membres sont en train de mettre en œuvre ou de développer à la fois des réglementations de coexistence *a priori* et des dispositifs de responsabilité *a posteriori*, afin de permettre la coexistence des deux types de cultures dans l'UE. Dans cet article, nous envisageons en détail comment les décideurs de l'action publique au niveau national et/ou régional peuvent introduire un certain degré de flexibilité dans les réglementations de coexistence a priori afin de réduire le poids réglementaire de certaines options agricoles et d'éviter de compromettre les incitations économiques à la coexistence. Nous utilisons l'exemple du maïs transgénique, seul culture transgénique occupant une superficie non négligeable dans l'UE. Nous concluons que la flexibilité pourrait être intégrée dans les réglementations à différents niveaux : (i) au niveau réglementaire en assouplissant certaines des rigidités dans les réglementations *a priori*; (ii) au niveau de l'exploitation en permettant la substitution des distances de séparation par des barrièrs à pollen; et (iii) au niveau national/régional par le biais de mesures plurielles de coexistence, cohérentes avec l'hétérogénéité de l'agriculture européenne.

Hin zu flexiblen Koexistenzregelungen für genetisch veränderte Feldfrüchte in der EU

Die Europäische Union (EU) sieht sich momentan mit einer Herausforderung konfrontiert, welche die Einführung von genetisch veränderten Feldfrüchten unnötig erschweren könnte: Die Koexistenzregelungen von genetisch veränderten und nicht veränderten Feldfrüchten. Die Mitgliedsstaaten implementieren oder entwickeln gerade sowohl *ex ante* Koexistenzregelungen als auch *ex post* Haftungssysteme, um sicherzustellen, dass sowohl genetisch veränderte als auch nicht veränderte Feldfrüchte in der EU angebaut werden können. In diesem Beitrag beleuchten wir ausführlich, wie Politikakteure auf nationaler und/oder regionaler Ebene ein gewisses Maß an Flexibilität in ex ante Koextistenzregelungen einfließen lassen können, um die Regelungslast einiger Optionen in der Landwirtschaft zu reduzieren und die wirtschaftlichen Anreize zur Koexistenz nicht zu gefährden. Als Fallbeispiel ziehen wir genetisch veränderten Mais heran, der als einzige genetisch veränderte Feldfrucht großflächig in der EU angebaut wird. Wir kommen zu dem Schluss, dass Flexibilität auf verschiedenen Stufen in die Regelungen eingebaut werden könnte: (i) Direkt in die Regelungen selbst, indem die *ex ante* Regelungen weniger starr ausgestaltet werden; (ii) auf Ebene des landwirtschaftlichen Betriebs, indem Isolationsabstände teilweise durch Pollenbarrieren ersetzt werden könnten; und (iii) auf nationaler/regionaler Ebene durch vielfältige Koexistenzmaßnahmen, die der Heterogenität der Landwirtschaft in der EU Rechnung tragen.