3 Risk assessment of plant pharring and animal pharring

In August 2006, the European Commission approved the first animal pharring product for human use, ATryn®, which is now in phase III clinical testing in USA. More animal pharring products are expected to be commercialized soon, and plant-made pharmaceuticals from transgenic plants are also at an advanced stage before commercialization. However, these new production platforms for pharmaceuticals may have consequences to the environment, including animals and humans. Production of pharmaceuticals will now take place “out of the laboratory” – in some cases it will be totally uncontained. Thus pharring animals and plants may expose the near environment to the active products, or the GM animals and plants may disperse and affect other ecosystems.

The new production platforms challenge the present regulation which governs conventional pharmaceutical products, GM animals and plants, and animal welfare. Current legislation on these issues is complicated, in some cases overlapping, in other cases insufficient, and therefore new procedures and regulation are demanded. The intention of the following chapters is to present the unwanted environmental effects in relation to production of pharmaceuticals in GM animals and plants, and to shed some light on the current procedures used for estimation of effects. The benefits of pharring are included in chapters 1 and 2, risks relating to animal welfare are dealt with in chapter 4, and the legal aspects of this production are analysed in chapter 8.

3.1 Environmental risks and co-existence of plants genetically modified for production of pharmaceuticals

Production of genetically modified pharring crops brings up several challenges for regulators, risk assessors and plant pharring companies. Most of the challenges arise from the cultivation of these pharring plants in the open field, where dispersal of pharring plants, their transgenes and non-target effects to the environment are possible scenarios. Identification and evaluation of environmental hazards may be rather uncertain, as pharring plants often represent new combinations of trait, plant and environment – combinations not known from traditional plant breeding or previous trans-
genic plants. An uncontained field production is a risk, not only for the environment but also for plant pharming companies and the food and feed industry. Serious economic consequences might result if they are not able to prevent adventitious presence of pharming products in food and feed. Even in cases where there are no, or very minor, health or environmental risks associated with the production, the public is not likely to accept commingling, for social or ethical reasons (chapters 5 and 6).

3.1.1 Legal framework and basic principles of risk assessment of GM plants

To avoid adverse effects to human health and environment, the release of a GM plant to the open environment is preceded by an environmental risk assessment. The EU Directive 2001/18\(^1\) sets forth procedures for releasing GMOs into the environment and principles for the environmental risk assessment necessary in all cases. However, this regulation has been developed for food and feed and may not apply to the release issues raised by plants being used as production platforms for pharmaceuticals.

Risk assessment of GM plants is based on the information provided by the GM plant producer. For food/feed, EFSA (European Food Safety Authority) has provided a guidance document\(^2\) that sets out the information and procedure. No such guidelines exist for GM pharming plants yet, but they are under development by EFSA. EFSA has recently drafted its opinion on the risk assessment of GM plants for non-food and non-feed purposes including GM plants producing pharmaceuticals\(^3\): EFSA considers that the general requirements found in their guidance documents on GMO for food and feed, will also apply to GM plants for non-food and non-feed. However, as risks to humans and animals from accidental exposure might be a key point for some of the medicinal plants, the importance of exchange of information between EMEA (European Agency for the Evaluation of Medicinal Products (now European Medicines Agency) responsible for the clinical testing of medicinal products)) and EFSA is stressed. Box 3.1 summarizes the information that has to be provided for the risk assessment of GM food/feed plants. The EU Directive 2001/18 on the deliberate release GMOs sets forth two different authorization tracks. One track is for deliberate releases of GMPs for any purpose other than for placing on the market (Part B); these releases are limited both in time and area, and they are thoroughly monitored by the authorities. The other track (Part C) is for placing on the market of GMPs as or in products (includes cultivation, import, transport, processing, handling, storage). Part B procedures are national and authorization can be granted by the respective Member State;

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1. Directive 2001/18/EC.
2. EFSA 2004.