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IN THE SPOTLIGHT

Plant Material Inactivation
Why / How

Interview with Prof. Dr. Patrick Rüdelsheim, Partner & General Manager of Perseus BV, at the occasion of the publication of the COGEM study Report (CGM 2020-05) on "Plant material inactivation - How to eliminate seed and plant lots commingled with non-authorised GM material".

Why should plant material be inactivated?

Europe has a very strict regulatory regime for genetically modified organisms (GMO). Only GMO that have been authorised can be used within the scope of the authorisation. As approvals and applications of GM plants and crops are more advanced in other parts of the world, it occasionally occurs that such GM plants end up in plant material in Europe. Examples of incidents with non-authorised GM crops in recent years include Petunia varieties that were found to be genetically modified, and seeds of GM crops (maize, soybean or oilseed rape) detected in conventional seeds for sowing and in fields. Such inadvertent presence of non-authorised GM events in plant materials destined for sowing or planting or that is already in the field may then trigger a decision from the GMO authorities that the material must be inactivated.

Are there specific requirements for inactivation?

Inactivation does not necessarily mean destruction.
Rather it indicates that the material must be treated in a way that it cannot impose any threat to health or the environment. For instance composting can be adequate for certain vegetative parts and allows an alternative use of the biomass. Yet, this example also shows that the method of choice will largely depend on the type of plant material: composting may not be suitable for mature seeds as these may remain viable when the composting temperature isn't sufficiently high.

Our study therefore considered in detail different type of materials (e.g. seed, tubers, vegetative parts) as well as different categories of plants (e.g. grasses, cereals, legumes) in order to understand the challenges that some materials bring when they must be inactivated.

In this respect it is also important to note that the commingling may concern GM plants that have been authorised for import as viable material for processing and food and/or feed use in the EU. In this case, some of the environmental risks have already been determined and other handling options (such as direction for food and/or animal feed) may be allowed.

Finally, The applicability of certain methods is determined by the availability of expensive equipment and suitable facilities. An autoclave may be appropriate for inactivating small quantities, yet this may not be compatible with large batches of soiled material. Ideally, inactivation occurs as close as possible to the site where the material is discovered. However, the most efficient inactivation methods may require transportation. During transportation care must be taken that no material is lost.

How was the study conducted?

Adventitious presence of non-authorised GM events not only originates from events authorised for commercial release elsewhere in the world, but also from inadvertent commingling of GM material during research and development and field trials. We made an inventory of species for which GM events are known that have reached this field trial stage, confirming the broad botanical range with nearly 160 species. A selection of species was further classified in 13 categories based on type of life cycle, winterhardiness of the plant and its survival/dissemination structures, secondary seed dormancy, pollination method, presence of sexually compatible species, seed shatter, and potential to form feral populations.

At the same time, inactivation methods were identified and described with a specific focus on applicability, advantages and shortcomings. They were grouped according to the primary mode of action (physical, biological, mechanical or chemical).

The adequacy of the different methods for inactivating the different GM plant categories was evaluated, linking information on the biology of the plants with the applicability and efficacy of the inactivation methods. A decision tree as well as a summary table were developed to assist authorities and users in the identification of the most suitable methods depending on the type of material and/or stage of development.

Has the report been reviewed?

This study was commissioned by the Netherlands Commission on Genetic Modification (COGEM), an independent scientific advisory body that provides advice to the government on the risks to human health and the environment of the production and use of GMOs, and informs the government of ethical and societal issues linked to genetic modification.

The study was supervised by an independent expert Advisory Board of the COGEM. Upon their approval, the report was discussed by the COGEM. Finally, it has been presented with a recommendation to the Netherlands Minister for Infrastructure and Water Management.

What is the best way to inactivate plant material?

Several inactivation methods are available, such as composting, ploughing, herbicide spraying, incineration. Depending on the species and growing stage, one or the other method is more suitable. In order to have a ready-to-use guideline, this report presents an inventory and classification of inactivation methods in relation to the plant species and development stage.

How can I get the study report?

This COGEM study reports perfomed by Perseus is available for downloading free of charge at https://cogem.net/app/uploads/2020/12/CGM-2020-05-Plant-material-inactivation.pdf

Founded in 2003, Perseus BV is a service company dedicated to biosafety and biotechnology regulatory services. With science based assessment of safety at the core of its activities, Perseus' services extend to biorisk management in all project phases (contained use, confined trials, commercial applications, movement of materials, imports and stewardship) and cover biotechnology applications in the agrifood chain, food industry, industrial deployment, as well as clinical & medical developments.

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