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KENMERK CGM/180426-01
ONDERWERP Advies import en verwerking van gg-koolzaad MS11xRF3

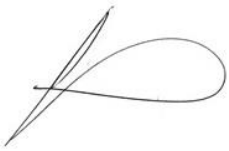
Geachte mevrouw van Veldhoven,

Naar aanleiding van een adviesvraag betreffende de vergunningaanvraag voor import en verwerking van genetisch gemodificeerde koolzaad MS11xRF3 (EFSA/GMO/NL/2017/143), ingediend door Bayer CropScience LP, deelt de COGEM u het volgende mee.

Samenvatting:
De COGEM is gevraagd te adviseren over de mogelijke milieurisico's van import en verwerking van genetisch gemodificeerde (gg-) koolzaad MS11xRF3. Deze koolzaad is tolerant voor glufosinaat-ammonium bevattende herbiciden en beschikt over een gecontroleerd bestuivingsmechanisme.
De COGEM is van mening dat de moleculaire karakterisering van MS11xRF3 voldoet aan de eisen van de COGEM. Er zijn geen redenen om aan te nemen dat de geïntroduceerde eigenschappen het verwilderingspotentieel van de gg-koolzaad vergroten, behalve op locaties waar glufosinaat-ammonium wordt gebruikt.
Koolzaad kan kruisen met zijn wilde verwant Raapzaad. De COGEM kan op voorhand niet uitsluiten dat er als gevolg van 'gene flow' op termijn 'stapeling' van transgene eigenschappen in koolzaadplanten kan optreden. Mogelijk zou een combinatie van transgene eigenschappen of een interactie tussen producten van deze transgenen tot een potentieel schadelijk milieueffect kunnen leiden. Op basis hiervan acht de COGEM het noodzakelijk dat er bij gg-koolzaad verplicht gemonitord wordt op locaties waar de kans het grootst is wilde gg-koolzaadpopulaties als gevolg van gemorst zaad aan te treffen, zoals langs spoorwegen. De COGEM is van mening dat het monitoringsplan hiermee moet worden uitgebreid alvorens de vergunning voor import en verwerking van MS11xRF3 kan worden afgegeven.

De door de COGEM gehanteerde overwegingen en het hieruit voortvloeiende advies treft u hierbij aan als bijlage.

Hoogachtend,



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Voorzitter COGEM

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Import and processing of genetically modified oilseed rape MS11xRF3

COGEM advice CGM/180426-01

- The present application (EFSA/GMO/NL/2017/143) concerns the authorisation for import and processing for use in food and feed and other products (containing or consisting) of genetically modified (GM) oilseed rape MS11xRF3;
- Oilseed rape MS11xRF3 was produced by conventional crossbreeding of the two GM parental lines;
- Oilseed rape MS11xRF3 expresses genes of a pollination control system, i.e. the *barnase* gene (present in MS11) which confers male sterility and two copies of the *barstar* gene (present in MS11 and RF3) which restores male fertility. It also expresses two copies of the *bar* gene (present in MS11 and RF3), which confers tolerance to glufosinate-ammonium containing herbicides;

- Feral oilseed rape populations occur across the Netherlands, with a small number of plants (25 or less) per location, along distribution routes and handling areas as a result of spillage of oilseed rape seeds during transport and transshipment;
- Oilseed rape can hybridise with *Brassica rapa* which is a common plant along Dutch roadsides. To a lesser extent it can also hybridise with *Brassica juncea* and *Brassica oleracea*;
- Stable incorporation (introgression) of genes from *B. napus* into wild populations of *B. rapa* and *B. napus* may be possible;
- There are no indications that the introduced traits alter the fitness of oilseed rape MS11xRF3. Herbicide tolerance gives the plant advantage in places where glufosinate-ammonium herbicides are used for weed control;

- The molecular characterisation and bioinformatic analyses of MS11xRF3 have been updated and meet the criteria of COGEM;
- Oilseed rape MS11xRF3 itself does not pose a risk to the environment in the Netherlands;
- There are no indications that the introduced traits alter the fitness of oilseed rape MS11xRF3 under natural conditions, except in places where glufosinate-ammonium herbicides are used for weed control;
- In the long term, prolonged use of herbicides may lead to the establishment of feral GM *B. napus*, including plants with stacked events, or feral GM *B. rapa* harbouring GM traits like herbicide tolerance;
- The monitoring plan does not meet the minimal requirements for, import and processing of GM oilseed rape for use in food and feed and should include monitoring along transport routes (including roadsides and railway beddings) and transshipment areas;
- Because of the insufficient monitoring plan COGEM cannot advise positively on the application, import and processing of MS11xRF3 oil seed rape for use in food and feed.

1. Introduction

The present application (EFSA/GMO/NL/2017/143), filed by Bayer CropScience LP, concerns import and processing of genetically modified (GM) oilseed rape MS11xRF3, for use in food and feed. Oilseed rape MS11xRF3 was produced by conventional crossbreeding of the two GM parental lines. GM oilseed rape MS11xRF3 is tolerant for glufosinate-ammonium containing herbicides by expressing the enzyme phosphinothricin N-acetyltransferase (PAT) and it expresses a pollination control system. The renewal of the authorisation of oilseed rape MS8xRF3[1] for import and processing for use in food and feed, which contains the same transgenic traits (*bar*, *barnase* and *barstar*) as MS11xRF3, is ongoing.

2. Previous COGEM advices

COGEM has advised on import and processing of the parental line MS11[9] and import, cultivation and processing of the parental line RF3[2,7,8]. In 2013, COGEM issued a generic advice on aspects relevant for import and processing of GM oilseed rape in the Netherlands.[3] COGEM issued several opinions in which it advised negatively on import and processing of GM oilseed rape events including the events MS8, RF3 and MS8xRF3 (see section 5).[4,5,6,7,8].

Recently COGEM issued an opinion on the parental line MS11.[9] MS11 is a male sterile line that, according to the applicant, will not be commercialised as a stand-alone product and will only be used for the production of hybrid seed. Import of MS11 will not take place. Therefore, COGEM had no objections to the monitoring plan as it was irrelevant. COGEM was of the opinion that the hypothetical import and processing of MS11 poses a negligible risk to the environment in the Netherlands.[9]

3. Environmental risk assessment

3.1 Aspects of the wild-type crop

Oilseed rape (*Brassica napus*) is a member of the *Brassicaceae* family, which also includes *Brassica rapa*, *Brassica juncea*, *Brassica oleracea* (cabbage), *Brassica nigra* (black mustard) and *Brassica carinata* (Ethiopian mustard). *B. napus* is a hybrid that originates from the interspecific hybridisation of *B. oleracea* and *B. rapa*.[3,10]

B. napus reproduces by self- and cross-pollination. It produces high amounts of pollen, which are dispersed by both wind and insects. In fields, the average rate of cross-pollination is 30%. The seeds of *B. napus* develop in a fruit, and are small, light and produced in large quantities.[3,11,12]

In the Netherlands, *B. napus* is grown as a crop and its seeds are imported for oil production. Wild *B. napus* populations grow on disturbed soil. *B. napus* is able to form volunteers in distributed environments near roadsides, railways and handling areas. The spillage of oilseed rape seeds during transport and transshipment has led to the establishment of feral populations, with a small number of plants (25 or less) per location, along distribution routes and handling areas.[13]

Oilseed rape can cross-pollinate with its more common wild relative *B. rapa* and to a lesser extent with *B. juncea* and *B. oleracea*.[3,11] Oilseed rape x *B. rapa* hybrid plants have been observed in the Netherlands.[14] Stable incorporation (introgression) of genes from *B. napus* into wild *B. rapa* has not been documented in the Netherlands, but has been reported in Canada.[15]

Conclusion: Wild *B. napus* populations exist in the Netherlands. *B. napus* can hybridise with its wild relative *B. rapa.* Therefore, GM volunteers from spilled seeds can lead to dispersal of genes to wild populations of *B. napus* and *B. rapa.*

3.2 Description of the introduced genes and traits

Oilseed rape MS11xRF3 was produced by conventional crossbreeding of the two GM parental lines.

Introduced genes	Encoded proteins and expression pattern	Traits
barnase (in MS11)	Encodes for the Barnase ribonuclease protein, which is expressed in the anther tapetal cell layer during pollen development.[16]	Confers male sterility.
barstar (in MS11 and RF3)	Encodes for the tapetal-cell-specific Barstar ribonuclease-inhibitor protein.[17]	Restores male fertility.
bar (in MS11 and RF3)	Phosphinothricin N-acetyltransferase (PAT) enzyme.[18]	Tolerance to glufosinate-ammonium herbicides.
See references for a detailed description of the traits		

3.3 Molecular characterisation

Previously, COGEM evaluated the molecular characterisation of the two parental lines and considered these to be adequate.[2,7,9,19]

The applicant confirmed by Southern blot analyses and by sequencing of the transgenic loci of MS11xRF3, that the hybrid contains the transgenic inserts of both MS11 and RF3, and that no rearrangements of these inserts occurred.

The applicant also updated the bioinformatic analyses of the inherited inserted elements, and the sequences spanning the insertion sites at the 5' and 3' flanking regions using recent databases.

According to the applicant, no essential endogenous genes were disrupted at the insertion sites, and analysis of the putative products of the open reading frames spanning the 5' and 3' junctions of the inserts, did not generate any protein sequence similarity with known allergens, toxins or other biologically active proteins.

The molecular characterisation was conducted according to the criteria previously laid down by COGEM.[20] The results from the updated molecular characterisation do not provide indications that MS11xRF3 could pose a risk to the environment.

Conclusion: The molecular characterisation of oilseed rape MS11xRF3 is adequate and no indications for potential environmental risks were identified.

3.4 Phenotypic and agronomic characteristics

The applicant evaluated the phenotypic and agronomic characteristics of oilseed rape MS11xRF3. The results of the phenotypic and agronomic evaluation do not give reason to assume that the introduced traits alter the fitness of oilseed rape MS11xRF3 under natural conditions. Herbicide tolerance gives the plant advantage in places where glufosinate-ammonium herbicides are used for weed control.

Therefore, COGEM is of the opinion that there are no indications that that this GM oilseed line poses an environmental risk.

Conclusion: There are no indications that the introduced traits alter the fitness of oilseed rape MS11xRF3 under natural conditions.

4. Food/feed assessment

This application is submitted under Regulation (EC) 1829/2003, therefore a food/feed assessment is carried out by EFSA and national organisations involved in the assessment of food safety. In the Netherlands, a food and/or feed assessment for Regulation (EC) 1829/2003 applications is carried out by RIKILT. The outcome of the assessment by other organisations (EFSA, RIKILT) was not known when this advice was completed.

5. Post-market environmental monitoring (PMEM)

The applicant supplied a general surveillance plan as part of the PMEM. COGEM is of the opinion that a more elaborate PMEM plan is needed. As explained below, COGEM is of the opinion that the current PMEM plan does not meet the minimal requirements for import and processing of GM oilseed rape for use in food and feed (see e.g. [4,5,6,7,8]).

Feral MS11xRF3 oilseed rape populations can arise at roadsides, railways and handling areas where spillage of seeds occurs during transshipment and transport. Plants arising from spilled MS11xRF3 seeds will have a selective advantage over other plants in places where glufosinate-ammonium containing herbicides are used for weed control (for example along railways[21]). Prolonged use of herbicides may lead to the establishment of feral herbicide tolerant GM *B. napus*, including plants with stacked events. This has been observed in *B. napus* cultivation areas in Canada and USA and Australia, that are sprayed with herbicides.[22,23,24]

B. napus is able to cross-pollinate with its more common wild relative *B. rapa* and hybrid populations are present in the Netherlands.[14] Also, stable incorporation of transgenes from *B. napus* into wild *B. rapa* (introgression) has been reported.[15] Gene flow of GM traits could potentially lead to incorporation of transgenes into the gene pool of *B. rapa* and lead to the establishment of feral *B. rapa* with GM traits like herbicide tolerance.

It cannot be excluded that a possible combination of GM traits and/or a possible interaction between gene products, expressed by the genetic modification, may result in an adverse effect. In the view of COGEM, PMEM (i.e. general surveillance) is *the* instrument to identify such (in)direct, unanticipated, delayed, potentially adverse environmental effects.[4,5,6,7,8]

Based on these considerations, COGEM is of the opinion that the monitoring plan of MS11xRF3 should include monitoring along transport routes (including roadsides and railway beddings) and transshipment areas. When GM oilseed rape is observed, *B. rapa* populations in the vicinity of the observed population should be monitored as well. This is a prerequisite to grant an authorisation, import and processing for use in food and feed of all GM oilseed rape events.[6] Therefore, COGEM is of the opinion that the PMEM plan of MS11xRF3 needs to be adapted before a market authorisation is granted.

6. Overall conclusion

There are no indications that expression of the introduced traits will alter the fitness of oilseed rape MS11xRF3 under natural conditions. Import and processing of MS11xRF3 poses a negligible risk to human health and the European environment. However, in the long term, prolonged use of herbicides may lead to the establishment of feral GM *B. napus*, including plants with stacked events, or feral GM *B. rapa* harbouring GM traits like herbicide tolerance. COGEM is of the opinion that the current monitoring plan is insufficient and should include monitoring along transport routes and transshipment areas. Therefore, COGEM cannot advise positively on the application for import and processing for use in food and feed of MS11xRF3 oilseed rape.

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