German Federal Office of Consumer Protection and Food Safety

Annual report of the work of the Central Committee on Biological Safety in the year 2010

(**BVL 104/2011/4**)

21st report after the Genetic Engineering Act came into force

The report of the work of the Central Committee on Biological Safety in the year 2010 will be announced in the following.

Berlin, March 7, 2011

German Federal Office
of Consumer Protection and Food Safety
On behalf of

Dr. Inge K r u c z e k

Index

Abbreviations

BfN	Federal Office for Nature Conservation
BfR	Federal Institute for Risk Assessment
BMELV	Federal Ministry for Food, Agriculture and Consumer Protection
BVL	Federal Office for Consumer Protection and Food Safety
EC	European Community
EEC	European Economic Community
EFSA	European Food Safety Authority
EU	European Union
FLI	Friedrich Loeffler Institute, Federal Research Institute for Animal Health
GenTG	Genetic Engineering Act
GenTSV	Genetic Engineering Safety Regulations
GMO	genetically modified organism
JKI	Julius Kühn Institute
PEI	Paul Ehrlich Institute
RKI	Robert Koch Institute
ZKBS	Central Committee on Biological Safety

Technical abbreviations are explained in the text.

1 Introduction

1.1 Background to the ZKBS

The Central Committee on Biological Safety (ZKBS) is an expert committee comprising twenty members and twenty deputy members. The members are experts from various specialist fields and their deputies are experts from the same specialist background. The ZKBS examines and evaluates questions relevant to safety in genetic engineering according to the regulations of the Genetic Engineering Act (GenTG) and advises the Federal Government and Federal States (Bundesländer). The ZKBS provides position statements for the appropriate authorities, particularly on safety or containment level assignment for genetic engineering operations, required safety measures in genetic engineering facilities and possible risks associated with release or placing on the market of genetically modified organisms (GMO). In its recommendations it takes into account international developments in the area of genetic engineering safety. The members of the ZKBS and their deputies perform their activities voluntarily.

The ZKBS is based at the Federal Office for Consumer Protection and Food Safety (BVL) which belongs to the operating area of the Federal Ministry for Food, Agriculture and Consumer Protection (BMELV). The members of the ZKBS and their deputies are appointed for the duration of three years by the BMELV in agreement with the Federal Ministries for Education and Research, of Economics and Technology, for Employment and Social Services, for Health as well as for the Environment, Nature Conservation and Reactor Safety.

The ZKBS has a chairperson, supported by two vice-chairpersons, and reaches its decisions either at a general meeting or by a written procedure. The members of the ZKBS and their deputies are sworn to secrecy. The meetings are not public, but the ZKBS publishes general position statements and reports on its work to the public each year.

1.2 Development of genetic engineering in Germany and other member states of the European Union

Legal development

The work of the ZKBS is based on the Genetic Engineering Act (GenTG), passed in 1990, and has been revised many times since then. The Act for reforming the Genetic Engineering Laws from April 1, 2008 came into force on April 5, 2008. The ZKBS was extended therewith by experts in the specialist fields of agriculture, nature conservation, plant protection and toxicology.

Genetic engineering operations and genetic engineering facilities

The term “genetic engineering operations” primarily covers the creation and handling of GMOs. Depending on the required safety, i.e. containment level, genetic engineering operations must be registered or approved by the appropriate state authorities and carried out in a genetic engineering facility which also has to be registered or approved depending on the required containment level. Genetic engineering facilities can be a laboratory, a production plant, a greenhouse or facilities for keeping animals.

Participation of the ZKBS in such notification or approval procedures has changed since the Genetic Engineering Act (GenTG) came into force in 1990. Initially, the ZKBS provided a

position statement on all genetic engineering operations that were submitted for registration or approval. Since the amendment of the GenTG at the end of 1993, only genetic engineering operations at containment level 3 and 4 and such genetic engineering operations at containment level 2 that cannot be compared to other operations the ZKBS has previously provided a position statement for are to be examined and evaluated by the ZKBS. However, the ZKBS also receives requests for position statements if the assignment of a genetic engineering operation to containment level 1 is uncertain.

Since the GenTG came into force in 1990, 1693 applications for containment level assignment of genetic engineering operations and evaluation of the required technical safety measures have been submitted to the ZKBS. 42 applications were submitted in the year of this report and the ZKBS provided 43 position statements; at the end of the year three applications were still under review and were completed in 2011, four position statements relating to applications provided in 2009 were completed in the year of this report. Additionally, the BVL has been informed by state authorities about 606 position statements on genetic engineering operations in the year of this report. Table 1 lists the position statements from 2010 based on their containment level.

Table 1 Safety evaluated genetic engineering operations in Germany in 2010 (as of December 2010)

Position statement provided by	Containment level	Number
State Authority	S1	199
State Authority	S2	407
ZKBS	S1	3
ZKBS	S2	17
ZKBS	S3	20
ZKBS	S4	3

In Germany, a total of 6047 genetic engineering facilities have operating approval (as of December 2010). The BVL was informed by the relevant state authorities about 274 new genetic engineering facilities going into operation in 2010. Table 2 lists the genetic engineering facilities according to the kind of operator and level of safety measures for the facilities.

Table 2 Genetic engineering facilities in Germany (as of December 2010)

Operator	Containment level	Number
Public	S1	3583
Public	S2	1266
Public	S3	87
Public	S4	4*
Private	S1	906
Private	S2	191
Private	S3	10

* Two genetic engineering facilities at containment level 4 are already in service, two further facilities are under construction.

Further information on genetic engineering operations and genetic engineering facilities as well as on organisms, cell lines and vectors used in genetic engineering operations is provided on the BVL website: http://www.bvl.bund.de.

It is not possible to compare genetic engineering operations or genetic engineering facilities with other EU member states, since no information is available.

Deliberate release

Shall GMOs during an experiment be introduced into the environment for a limited period of time and in a limited area it is a matter of “deliberate release”. According to the GenTG one must apply for approval for every intended release which can be granted if the planned release will present no hazard to humans and the environment. In case there already exists an approval for placing on the market for the GMO which shall be introduced into the environment, a separate approval is not required.

Since April 1, 2004 the BVL has been responsible as the overall Federal Authority for approving the release of GMOs in Germany. The BVL reaches its decisions in conjunction with the Federal Office for Nature Conservation (BfN), the Federal Institute for Risk Assessment (BfR) and the Robert Koch Institute (RKI). The ZKBS, the Julius Kühn Institute (JKI) and the relevant authorities of the Federal States involved provide position statements on the planned release. In the case of release of genetically modified vertebrates or genetically modified microorganisms that are to be used with vertebrates, the Friedrich Loeffler Institute (FLI) is also involved. Other EU member states are informed about the release application and can take a position on it.

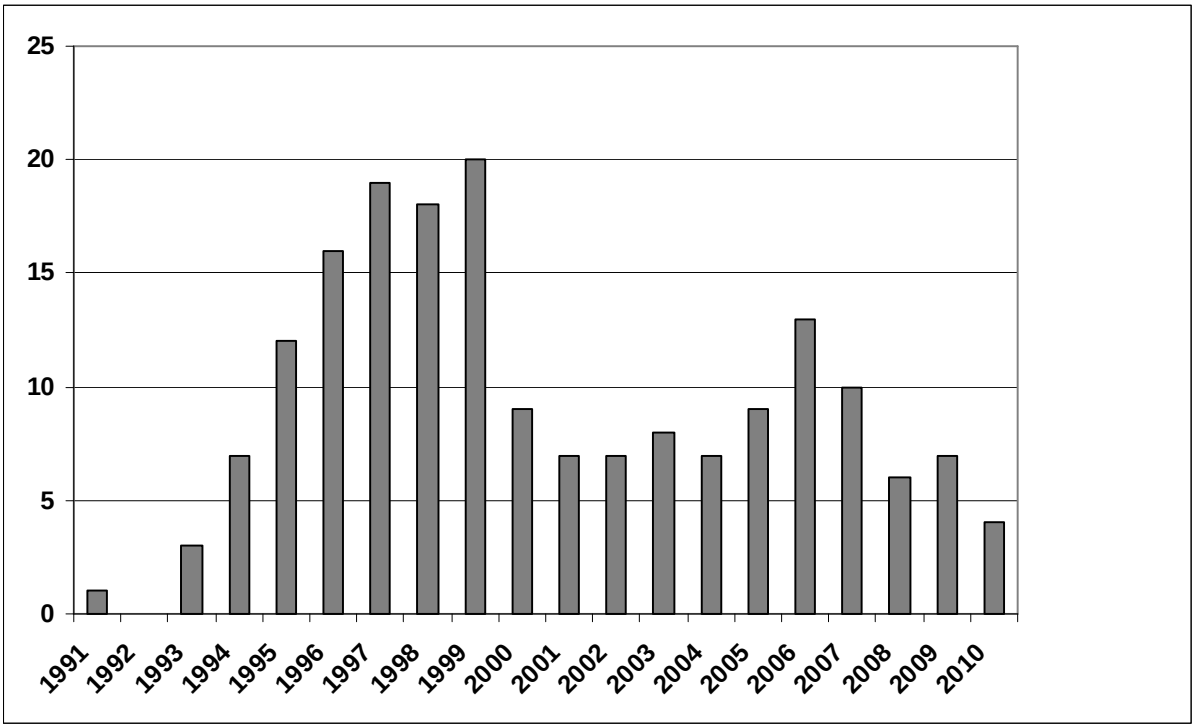

Figure 1 Number of approved releases in Germany since the GenTG came into force in 1990 (as of December 2010)

In 2010, five new applications were filed with the BVL; however, a decision was not reached for any of them by the end of the year. In 2010, four approvals relating to applications submitted in the previous year were granted. In addition there were four subsequent notifications for further locations of approved releases in 2010. Figure 1 summarizes the annual number of approvals for release since the Genetic Engineering Act came into force in 1990. Subsequent notifications of further locations on approved releases according to the simplified procedure (decision of the EU Commission from November 4, 1994 on stipulating simplified

processes for the intentional release of genetically modified plants according to Article 6 Paragraph 5 of the Directive 90/220/EWG of the council, 94/730/EC) are not taken into account. The decrease in the frequency of approvals after 1999 corresponds to a decrease in applications for approval.

In 2010 three subsequent notifications of further locations on approved releases according to the simplified procedure were filed with the BVL. All of them were approved: Potatoes with modified carbohydrate metabolism and fungal resistance of the company BASF Plant Science GmbH, sugar beets with herbicide tolerance of the company Planta Angewandte Pflanzengenetik und Biotechnologie GmbH and sugar beets with herbicide tolerance of the company Syngenta Seeds GmbH.

A comparison of the registered applications from various member states of the EU is given in Table 3, showing the following selected years: the current report year of 2010, the previous years 2009, 2008, 2007, 2006 and 2005 and the year 1999, when the highest number of applications was submitted and approved in Germany.

Table 3 Applications for approval of deliberate release of genetically modified crops by the member states of the EU (as of December 2010).

Land	1999	2005	2006	2007	2008	2009	2010
Belgium	8				1	2	
Czech Republic		2	5	5	3	7	2
Denmark	4	1	2	5	2	4	
Finland	3	1			1	2	2
France	60	22	17	16		1	1
Germany	22	9	13	9	6	5	5
Great Britain	11		1	2	1	1	1
Greece	6						
Hungary		10	7	9	3		2
Iceland						1	
Ireland			1				1
Italy	47	1					2
Lithuania				2			
Poland		3	3		3	1	6
Portugal	1	3	5	1	2	1	1
Romania				14	9	21	5
Slovakia					4	2	4
Spain	56	20	41	45	45	64	51
Sweden	16	8	6	4	4	4	7
The Netherlands	19	3	8	5	2	1	4

The table shows that the number of applications for approval of deliberate release of genetically modified crops has decreased since 1999 not only in Germany, but generally in the EU (except for Spain). This conclusion cannot be drawn for Poland, the Czech Republic, Hun-

gary, Bulgaria, Romania and Slovakia, since they joined the EU only in 2004 (Romania only in 2007) and no information is available for the period before.

Since the GenTG came into force, a total of 2596 applications for the release of genetically modified plants have been submitted within the EU. No information has been submitted by the EU member states not included in Table 3.

Placing on the market

"Placing on the market" of GMOs or products containing GMOs refers to each kind of propagation like giving away or selling, unless they are not intended to be used for a genetic engineering operation in a genetic engineering installation or for an approved deliberate release. Placing GMOs on the market requires approval. Since an approval for placing a GMO on the market is met through an EU-wide procedure, it applies to all member states of the EU. The BVL is the competent German authority, and in conjunction with the BfN, BfR and RKI, provides position statements on applications for placing GMOs on the market. Before this, however, the ZKBS presents position statements to the BVL on applications made in Germany for approval of placing on the market according to the Directive 2001/18/EC, previously 90/220/EEC. The JKI also provides the BVL with a position statement, and in the case of genetically modified vertebrates or genetically modified microorganisms that are to be used with vertebrates, also the FLI and Paul Ehrlich Institute (PEI).

In the EU-wide processes it is distinguished whether the GMO may be used as food or feed [since 1997 regulation (EC) No. 258/97 for food, since 2004 regulation (EC) No. 1829/2003 for food and feed] or not. Products derived from GMOs that are not used as food or feed and that do not contain organisms capable of replicating (e.g. clothing made of cotton) require no approval for placing on the market. Table 4 lists those GMOs that have been approved for placing on the market in the EU for the year under report.

Table 4 GMOs approved by the EU for placing on the market in the year 2010

Product	Genetic Modification	Purpose
Cotton MON1445	herbicide resistance	FF
Cotton MON531	insect resistance	FF
Cotton MON531xMON1445	herbicide resistance, insect resistance	FF
Cotton MON15985	insect resistance	FF
Cotton MON15985x1445	herbicide resistance, insect resistance	FF
Cotton LLCotton25	herbicide resistance	FF, IP
Potato EH92-527-1 „Amflora"	modified ingredient	FF, C
Carnation Moonaqua	modified flower colour	IP
Carnation Moonlite	modified flower colour	IP
Carnation Moonshadow 1	modified flower colour	IP
Carnation Moondust	modified flower colour	IP
Maize MIR604	insect resistance	FF, IP
Maize 59122 „Herculex"	herbicide resistance, insect resistance	FF, IP
Maize MON88017	herbicide resistance, insect resistance	FF, IP
Maize 59122xMON88017	herbicide resistance, insect resistance	FF, IP
Maize NK603	herbicide resistance	FF, IP

Maize 59122xNK603	herbicide resistance, insect resistance	FF, IP
Maize 59122x1507xNK603	herbicide resistance, insect resistance	FF, IP
Maize MON810	insect resistance	FF, IP; C*
Maize MON88017xMON810	herbicide resistance, insect resistance	FF, IP
Maize MON89034	insect resistance	FF, IP
Maize MON89034x NK603	herbicide resistance, insect resistance	FF, IP
Maize 1507xNK603	herbicide resistance, insect resistance	FF, IP
Maize NK603xMON810	herbicide resistance, insect resistance	FF, IP
Maize T25	herbicide resistance	FF, IP, C
Maize MON863	insect resistance	FF, IP
Maize MON863xNK603	herbicide resistance, insect resistance	FF, IP
Maize MON863xMON810	insect resistance	FF, IP
Maize MON863xMON810xNK603	herbicide resistance, insect resistance	FF. IP
Maize 1507	herbicide resistance, insect resistance	FF, IP
Maize 1507x59122	herbicide resistance, insect resistance	FF, IP
Maize 1507xNK603	herbicide resistance, insect resistance	FF, IP
Maize GA21	herbicide resistance	FF, IP
Maize Bt11	insect resistance	FF, IP
Maize Bt11x GA21	herbicide resistance, insect resistance	FF, IP
Rape GT 73	herbicide resistance	FF, IP
Rape T45	herbicide resistance	FF, IP
Rape MS8xRF3	herbicide resistance, male sterility	FF, IP
Soy MON40-3-2	herbicide resistance	FF, IP
Soy A2704-12	herbicide resistance	FF, IP
Soy MON89788	herbicide resistance	FF, IP
Sugar beet H7-1	herbicide resistance	FF

Abbreviations:
- IP: import as replication-competent GMO and processing
- FF: food and feed
- C: cultivation in the EU
- C*: cultivation ban on MON810 in Germany based on the suspension of the approval for placing on the market according to § 20 Para. 2 GenTG

In contrast to release experiments limited to a particular location and time, the agricultural cultivation of genetically modified plants is not limited to a particular location or experimental year. Cultivation of genetically modified plants can only take place if placing genetically modified seeds on the market for the purpose of introducing them into the environment has been approved. Approval for placing on the market is initially limited to ten years.

Since 2004, strict rules apply in the EU for the approval and labelling of genetically modified food and feed. The European Food Safety Authority, EFSA, is responsible for the scientific evaluation. Genetically modified food and feed that were placed on the market in the EU before 2004 are permitted to remain on the market for a transitional period of time. Subse-

quently, reapplication for their placing on the market must be made. In addition, a standardized certification process for each GMO must be available.

2 Structure of the ZKBS

The ZKBS brings together experts from various specialist fields. The specialist fields represented are defined in the GenTG and must be covered by the structure of the ZKBS. This makes it possible to institutionalize and access a broad range of factual knowledge for the tasks performed by the ZKBS as defined by the GenTG, namely the evaluation of microorganisms as donor and recipient organisms in genetic engineering operations, containment assignment for genetic engineering operations, the evaluation of technical safety measures in genetic engineering facilities as well as the evaluation of release and placing on the market of GMOs. The members of the ZKBS are listed in table 5.

The composition of the ZKBS depicted in table 5 corresponds to the GenTG.

Table 5 Specialist areas and members of the ZKBS (as of December 2010)

Specialist area	Member	Representative member
	Experts according to § 4 Para. 1 No. 1 GenTG	
Microbiology	Prof. Dr. Regine Hakenbeck University of Kaiserslautern	Prof. Dr. Klaus Lingelbach University of Marburg
Cell biology	Prof. Dr. Bernd Gänsbacher Technische Universität München	tba
Virology	Prof. Dr. Dr. h.c. Herbert Pfister University of Köln	Prof. Dr. Edgar Maiß University of Hannover
Virology	Prof. Dr. Angelika Vallbracht University of Bremen	Prof. Dr. Klaus Überla University of Bochum
Genetics	Prof. Dr. Jürgen Wienands University of Göttingen	Prof. Dr. Alfons Gierl University of München
Genetics	Prof. Dr. Uwe Sonnewald University of Erlangen-Nürnberg	tba
Hygiene	Prof. Dr. Uwe Groß University of Göttingen	Prof. Dr. Werner Solbach University Hospital of Schleswig-Holstein, Campus Lübeck
Ecology	Prof. Dr. François Buscot Helmholtz Center for Environmental Research GmbH, Halle	Dr. Walter Durka Helmholtz Center for Environmental Research GmbH, Halle
Ecology	Prof. Dr. Stefan Vidal University of Göttingen	tba
Plant breeding	Dr. Patrick Schweizer Leibniz Institute of Plant Genetics and Crop Plant Research (IPK), Gatersleben	Prof. Dr. Chris-Carolin Schön Technische Universität München, Freising

Technical safety	Dr. Uwe Bücheler Boehringer Ingelheim Pharma GmbH & Co. KG, Biberach a.d. Riß	Dr. Sven Deutschmann Roche Diagnostics GmbH, Penzberg
Toxicology	tba	Prof. Dr. Pablo Steinberg University of Veterinary Medicine Hannover

Specialists according to § 4 Para. 1 Nr. 2 GenTG

Employment protection	Frank Gerschke State Authority for Occupational Health and Safety, Potsdam	Dr. Hans-Josef Riegel Berufsgenossenschaft Rohstoffe und chemische Industrie (BG RCI) Köln
Trade unions	Prof. Dr. Dr. h.c. Wilfried Wackernagel University of Oldenburg	tba
Agriculture	Prof. Dr. Norbert Lütke Entrup South Westphalia University of Applied Sciences, Soest	tba
Nature conservation	tba	tba
Research-funding organizations	Dr. Ingrid Ohlert Deutsche Forschungsgemeinschaft (DFG), Bonn	Prof. Dr. Ralph Bock MPI for Molecular Plant Physiology, Potsdam OT Golm
Environmental protection	Dr. Gerd Neemann BLaU Environmental Studies Göttingen	Prof. Dr. Thomas Eikmann University of Gießen
Consumer protection	Sigrid Lewe-Esch Working Group of Protestant Housekeeping Managers of the German Protestant Women's Federation e.V., Duisburg	Jutta Jaksche Federation of German Consumer Organizations e.V., Berlin
Economy	Dr. Siegfried Throm Association of Research-based Pharmaceutical Companies, Berlin	Dr. Anja Matzk KWS SAAT AG, Einbeck

Abbreviation: tba: to be assigned

Since July 2007, Prof. Dr. Dr. h.c. Herbert Pfister has been the chairperson of the ZKBS. Vice-chairpersons are Prof. Dr. Angelika Vallbracht and Prof. Dr. Uwe Groß (as of December 2010).

Newly appointed in the year under report were: Prof. Dr. Ralph Bock as the deputy member for the specialist field of research-funding organizations, Prof. Dr. Alfons Gierl as the deputy member for the specialist field of genetics, Prof. Dr. Werner Solbach as the deputy member for the specialist field of hygiene and Prof. Dr. Uwe Sonnewald, who had so far been the deputy member for the specialist field of genetics, as the representative member for this field. Prof. Dr. Doris Marko, Prof. Dr. Alfred Pühler and Prof. Dr. Andreas Podbielski have re-signed. The extension of the appointment of Dr. Manfred Keilert as the deputy member for the specialist field of trade organizations was not completed in the year of this report.

3 Advisory activities of the ZKBS in 2010

3.1 Working methods

In 2010, six meetings of the ZKBS took place at the BVL in Berlin. Position statements of the ZKBS were usually adopted at these meetings. In addition, decisions were also made in written procedures if simpler questions not requiring detailed discussions between all the members had been submitted.

3.2 Working groups

A working group of the ZKBS has existed for many years to deal with preparing position statements of the ZKBS on applications for deliberate release approvals before these are presented to the plenum for passing a resolution.

A new working group was founded in 2010 to deal with the risk assessment of microorganisms which are generated using new techniques, in particular synthetic biology. The first meeting of this working group was held on December 7, 2010.

No further working groups were established in the year under report.

3.3 Advising the Federal Government

The Federal Government did not make demands on an advisory service by the ZKBS in the year under report.

Accepting the invitation of the chairman Prof. Pfister, the Federal Minister of Food, Agriculture and Consumer Protection Mrs. Aigner visited the ZKBS after the ZKBS meeting on November 9, 2010. Topics were the cooperation between the ministry and the ZKBS and the prospective tasks of the ZKBS in risk assessment of synthetic biology operations and products.

3.4 Advising competent authorities of the Bundesländer

Within the scope of administrative assistance, state authorities have asked the ZKBS for position statements on the following themes:

- Safety evaluation of genetic engineering operations with the purpose of identifying regulators of *Aspergillus flavus* aflatoxin biosynthesis

  The ZKBS advised genetic engineering operations at containment level 2 combined with numerous additional safety measures.

- Risk assessment of the expression of *Dengue virus* NS1 protein in *Escherichia coli* and established cell lines.

  The ZKBS advised genetic engineering operations at containment level 1.

- Risk assessment of the expression of a fusion protein consisting of the B subunit of *Escherichia coli* heat labile enterotoxin I and of the α2 subunit of the human inhibitory glycine receptor (Glra2) in *E. coli* and *Pichia pastoris*.

  The ZKBS advised genetic engineering operations at containment level 1.

- Risk assessment of genetic engineering operations with the parasite *Eimeria nieschulzi* and risk assessment of the installation and operation of a fluorescence-activated cell sorter.

  The ZKBS advised the installation and operation of the cell sorter at containment level 2. However, the enclosure of the cell sorter in a class 2 safety cabinet is not required.

- Modification of the general position statement of the ZKBS on frequently carried out genetic engineering operations based on the criteria of comparability: Gene transfer using retroviral vectors.

  The ZKBS evaluated the transfer of viral envelope proteins as a critical step and advised therefore individual risk assessment in the future.

3.5 Risk assessment of donor or recipient organisms

On June 15, 2010 the list of organisms which have been assigned to risk groups according to § 5 para. 6 GenTSV was updated and published. This list was lastly updated in 2009. The following microorganisms used as donor and recipient organisms in genetic engineering operations were assigned to a risk group according to § 5 in conjunction with Appendix 1 GenTSV in 2010:

Tabelle 6 Newly classified microorganisms (as of December 2010)

Organism	Risk group
Viruses	
Melanoma-associated endogenous retrovirus (MERV/HERV-K)	1
Thosea asigna virus, TaV	1
Porcine teschovirus-1, PTV-1, strain Teschen	3
Porcine teschovirus-1, PTV-1, strain Talfan	2
Equine rhinitis A virus, ERAV	2
Duck enteritis virus, DEV	2
Human bocavirus, HBoV	2
Human metapneumovirus, HMPV	2
Bluetongue virus 6, BTV-6	3
Bluetongue virus 6, BTV-6, characterized, European isolates	2
Bluetongue virus 8, BTV-8	2
Barley dwarf virus, BDV	1

Oat dwarf virus, ODV	1
Ageratum yellow vein virus, AYVV	2
Tomato yellow leaf curl Sardinia virus, TYLCSV	2
Tomato yellow leaf curl Malaga virus, TYLCMalV	2
Indian cassava mosaic virus, ICMV	1
Sri Lankan cassava mosaic virus, SLCMV	1
Cleome leaf crumble virus, ClLCrV	2
Euphorbia mosaic virus, EUMV	2
Cabbage leaf curl virus, CaLCuV	2
Sida micrantha mosaic disease associated virus	2
Sida yellow vein virus, SiYVV	2
Squash leaf curl virus, SLCV	2
Potato yellow mosaic virus, PYMV	2
Abutilon mosaic Brazil virus, AbMBV	2
Bacteria	
Protaminobacter rubrum	1
Eubacterium barkeri	1
Ruegeria pomeroyi	1
Vibrio cholerae O395-N1	2
Mycoplasma pneumoniae B176	2
Mycoplasma pneumoniae B170	2
Mycoplasma mycoides subsp. *capri*	2
Mycoplasma capricolum subsp. *capricolum*	2
Mycoplasma mycoides JCVI-syn1.0	2
Fungi	
Fusarium fujikuroi	1
Candida apicola	1
Candida bombicola	1

Risk assessments regarding the organisms listed above can be looked up on the BVL web-site under the heading “Genetic Engineering”, “Central Committee on Biological Safety”, in a list, a database or in short position statements (mainly in German) (http://www.bvl.bund.de).

3.6 Containment level assignment for genetic engineering operations

In 2010, the ZKBS provided 40 position statements on safety and containment level assignment for genetic engineering operations. The evaluated genetic engineering operations addressed the following questions and were assigned as follows:

Containment level 1

- Gene silencing in *Nicotiana benthamiana*
- Protein-protein interactions of the *Heliobacter pylori* proteome

Containment level 2

- Neurotoxicity of the virus causing Stomatitis vesicularis after pseudotyping
- Development of a live attenuated vaccine against *Porcine reproductive and respiratory syndrome virus*
- Regulation of signal transduction in the processes of activation, adhesion and migration of human cells of the immune system
- Expression of conotoxin genes in the *Nicotiana tabacum* plastid genome
- Development of clinical test samples: Vaccines against *Ebola* and *Marburg virus*
- Production of induced pluripotent stem cells using *Sendai virus*-based vectors
- Characterization of genes from *Nocardia nova* involved in degradation of guttapercha
- Production of an *Aeromonas salmonicida* working cell bank
- Infectious clones of geminiviruses and derived VIGS vectors in agrobacteria
- Production of an influenza vaccine
- Development of new vaccine candidates for Buruli ulcer disease
- Characterization of *Acinetobacter baumannii* genes/gene products of the DNA metabolism and of resistance and virulence determinants
- Function of putative type IV secretion system effector proteins from *Coxiella burnetii*
- Adenoviral oncolysis
- Secreted proteins of *Propionibacterium acnes*

<u>Containment level 3</u>

- Cellular interaction partners of influenza A viruses
- Host factors responsible for host range changes of avian influenza A viruses
- Antiviral agents in HCV cell culture systems
- Pathogenicity factors of *Bartonella* spp.
- Mechanisms of insulin resistance in HCV infections
- Lentiviral luciferase reporter vectors
- Structure and replication of coronaviruses from animal reservoirs

- Generation and characterization of plasmid carrying, knock out and transposon-tagged *Mycobacterium tuberculosis* and *Mycobacterium bovis* mutants
- Influenza virus gene products
- Production of recombinant bluetongue viruses
- SIV encoded miRNA miR-TAR-3p
- Development of genomic HCV replicon systems and of cell culture adapted infectious HCV
- HIV-1 latency
- Influence of microRNAs on HIV-1 infection
- Host factors of *Chikungunya virus* infection
- Mouse-adapted *Severe acute respiratory syndrome coronavirus*
- Development of a neutralization assay for detection of antibodies against different HIV-1 subtypes
- Genetic labelling of *Trypanosoma cruzi*
- Mutants of *Bacillus anthracis* and *Bacillus cereus* Biovar *anthracis*

Containment level 4

- Replication and pathogenesis of arenaviruses
- Functional domains of the *Nipah virus* envelope proteins
- Replication, morphogenesis and pathogenesis of filoviruses

3.7 Assessing technical safety measures in genetic engineering facilities

In addition to stipulating the safety measures for the evaluated genetic engineering operations according to the categories in the appendices of the GenTSV, in 2010 the ZKBS extensively examined the technical and building safety measures of specific genetic engineering facilities. The ZKBS produced position statements on the following topics:

- Influenza vaccine production in a containment level 2 manufacturing facility
- Substantial modifications of three already operating containment level 3 animal facilities
- Construction and operation of a containment level 3 genetic engineering facility
- Technical safety requirements for the production of a live attenuated vaccine against the *Porcine reproductive and respiratory syndrome virus*
- The type of coverage of a greenhouse for *Phytophthora infestans* resistant transgenic potatoes
- Containment level 4 animal facilities for analysis of arenavirus pathogenesis

3.8 Publication of general position statements

The ZKBS updated a general position statement on risk evaluation of primary cells from vertebrates and passed a general position statement on risk evaluation of *Escherichia coli* K12 containing the full length cDNA genome of SARS coronavirus under the control of the T7 RNA polymerase promoter. These statements were published in the Federal Bulletin and on the BVL website: www.bvl.bund.de.

Short position statements on risk assessment of microorganisms, including viruses, which are used as donor or recipient organisms in genetic engineering operations (listed in table 6 on page 13 f.), can be looked up on the BVL website only.

3.9 Position statements on releases

In 2010, the ZKBS provided position statements for the BVL on the five applications for approval of release of GMOs listed in Table 7. All five were supported by the ZKBS. In some cases additional safety precautions were advised. Four applications were approved by the BVL. Since the approval procedure of the genetically modified potato “Amflora” for placing on the market was already finished in March 2010, an additional approval process for release was not required.

3.10 Position statements on placing on the market

In 2010, the ZKBS did not provide a position statement on an application for placing on the market of GMOs according to the Directive 2001/18/EC. However, the ZKBS provided a position statement on the application EFSA-GMO-DE-2008-63 filed by the companies KWS Saat AG and Monsanto Europe S.A. for placing the genetically modified sugar beet H7-1 on the market according to the Directive 1829/2003/EC. The sugar beet H7-1 has a tolerance to glyphosate-containing herbicides due to the insertion of the gene *cp4 epsps* from *Agrobacterium tumefaciens*. The ZKBS assessed that harmful effects on the subjects of protection according to §1 No. 1 of the GenTG due to cultivation of the sugar beet H7-1 are not to be expected. However, the ZKBS recommended that as part of the monitoring process it should be recorded and documented, whether cultivation of the sugar beet H7-1 leads to changes in the field flora, which differ from changes caused by conventional sugar beet cultivation regarding adverse environmental effects. Furthermore, the ZKBS recommended counteracting the development of glyphosate resistance by means of crop rotation during cultivation of sugar beet H7-1 in Europe.

Table 7 Applications for approval of release of genetically modified plants on which the ZKBS provided a position statement in 2010.

Applicant	Plant	Transferred genes	Biological properties	Additional recommendations
University of Rostock	Potato	*cph*A_{Te} gene from *Thermosynechococcus elongatus* *npt*II gene from *E. coli*	biosynthesis of cyanophycine antibiotic resistance	crop rotation
BASF Plant Science GmbH, Ludwigshafen	Potato	fragment of the coding region of the *gbss* gene from the potato in sense- and antisense-orientation variant of the *ahas* gene from *Arabidopsis thaliana*	biosynthesis of amylase-free starch herbicide resistance	-
BASF Plant Science GmbH, Ludwigshafen	Potato “Amflora”	fragment of the *gbss* gene in antisense orientation *npt*II gene from *E. coli*	biosynthesis of amylase-free starch antibiotic resistance	-
Pioneer Hi-Breed Northern Europe Sales Division GmbH, Buxtehude	Maize	*cp4 epsps* gene from *Agrobacterium* sp. strain CP4 *pat* gene from *Streptomyces viridochromogenes* *cry*1F gene from *Bacillus thuringiensis* subsp. *aizawai* genes *cry*34Ab1 und *cry*35Ab1 from *Bacillus thuringiensis* strain PS149B1	herbicide resistance insect resistance	disruption of seed germination capacity monitoring in the subsequent year crop rotation (plants other than maize in the following year)
Pioneer Hi-Breed Northern Europe Sales Division GmbH, Buxtehude	Maize	*gat*4621 gene from *Bacillus licheniformis* modified gene *zm-hra* from maize *pat* gene from *Streptomyces viridochromogenes* *cry*1F gene from *Bacillus thuringiensis* subsp. *aizawai* genes *cry*34Ab1 und *cry*35Ab1 from *Bacillus thuringiensis* strain PS149B1	herbicide resistance insect resistance	disruption of seed germination capacity monitoring in the subsequent year crop rotation (plants other than maize in the following year)