Application for authorisation of SYHT0H2 soybean import in the European Union under Regulation (EC) No 1829/2003

PART VII: SUMMARY

This document is complete as of July 2012. Since it is submitted as one part of a regulatory application, which is subject to an on-going regulatory review, it may be subject to later amendment or replacement. The information may also be supplemented with additional material requested by regulatory authorities. As such, it may only be considered properly with reference to those later amendments or supplementary materials and in the context of the dossier as a whole.

PART VII

SUMMARY

APPLICATION FOR AUTHORISATION OF SYHT0H2 SOYBEAN UNDER REGULATION (EC) 1829/2003

1. GENERAL INFORMATION

1.1. Details of application

(a) Member State of application

Germany

(b) Application Number

Not available at time of submission

(c) Name of the product (commercial and other names)

SYHT0H2 soybean

(d) Date of acknowledgement of valid application

Not available at time of submission

1.2. Applicant

(a) Name of applicant

Syngenta Crop Protection AG, Basel, Switzerland acting on its behalf and through its affiliated companies.

(b) Address of applicant

Syngenta Crop Protection AG
Schwarzwaldallee 215
CH- 4058 Basle
Switzerland

(c) Name and adress of the representative of the applicant established in the Union (if the applicant is not established in the Union)

Syngenta Crop Protection NV/SA
Avenue Louise, 489
B-1050 Brussels
Belgium

1.3. Scope of the application

(a) GM food

☒ Food containing or consisting of GM plants

☒ Food produced from GM plants or containing ingredients produced from GM plants

(b) GM feed

☒ Feed containing or consisting of GM plants

☒ Feed produced from GM plants

(c) GM plants for food or feed use

☒ Products other than food and feed containing or consisting of GM plants with the exception of cultivation

☐ Seeds and plant propagating material for cultivation in the EU

1.4. Is the product or the uses of the associated plant protection product(s) already authorised or subject to another authorisation procedure within the Union?

No ☒

Yes ☐ (in that case, specify)

1.5. Has the GM plant been notified under Part B of Directive 2001/18/EC?

Yes ☐

No ☒ (in that case provide risk analysis data on the basis of the elements of Part B of Directive 2011/18/EC)

Risk analysis data on the basis of the elements of Part B of Directive 2001/18/EC is provided in the application.

1.6. Has the GM plant or derived products been previously notified for marketing in the Union under Part C of Directive 2001/18/EC?

No ☒

Yes ☐ (in that case, specify)

1.7. Has the product been notified/authorised in a third country either

previously or simultaneously?

No ☒

Yes ☐ (in that case, specify the third country and provide a copy of the risk assessment conclusions, the date of the authorisation and the scope)

1.8. General description of the product

(a) Name of the recipient or parental plant and the intended function of the genetic modification

SYHT0H2 soybean is a genetically modified soybean that is produced by *Agrobacterium tumefaciens*–mediated transformation. Where cultivated, the intended function of the genetic modification of SYHT0H2 soybean is to facilitate the control of weeds by providing tolerance to HPPD-inhibiting herbicides, such as mesotrione, and to herbicides containing glufosinate ammonium.

(b) Types of products planned to be placed on the market according to the authorisation applied for and any specific form in which the product must not be placed on the market (seeds, cut-flowers, vegetative parts, etc.) as a proposed condition of the authorisation applied for

This application under Regulation (EC) 1829/2003 covers the import, food and feed use and processing of SYHT0H2 soybean. It does not cover cultivation.

(c) Intended use of the product and types of users

It is intended that SYHT0H2 soybean will be used as any other conventional soybean for all food, feed and industrial purposes.

(d) Any specific instructions and/or recommendations for use, storage and handling, including mandatory restrictions proposed as a condition of the authorisation applied for

The characteristics of SYHT0H2 soybean and products derived from it are not different from those of its conventional counterpart. SYHT0H2 soybean has been shown to be as safe and as wholesome as existing varieties of soybean. Therefore, there are no specific instructions or recommendations for use, storage and handling of SYHT0H2 soybean.

(e) If applicable, geographical areas within the EU to which the product is intended to be confined under the terms of the authorisation applied for

The SYHT0H2 soybean and derived products is suitable for use as any other soybean under the terms of the authorisation applied for.

(f) Any type of environment to which the product is unsuited

This application under Regulation (EC) 1829/2003 covers the import, food and feed use and processing of SYHT0H2 soybean. It does not cover cultivation.

(g) Any proposed packaging requirements

The characteristics of SYHT0H2 soybean and products derived from it are not different from those of its conventional counterpart. SYHT0H2 soybean has been shown to be as safe and as wholesome as existing varieties of soybean. Therefore, there are no specific instructions for packaging.

(h) Any proposed labelling requirements in addition to those required by law and when necessary a proposal for specific labelling in accordance with Articles 13(2), (3) and 25(2)(c), (d) and 25(3) of Regulation (EC) No 1829/2003. In the case of GMO plants, food and/or feed containing or consisting of GMO plants, a proposal for labelling has to be included complying with the requirements of Annex IV, A(8) of Directive 2001/18/EC

A proposal for labelling has been included in the application. This includes the labelling requirements outlined by Regulation (EC) No 1829/2003 and Annex IV of Directive 2001/18/EC. SYHT0H2 soybeans will therefore, be labelled as "genetically modified soybean" and products derived from it will be labelled as "containing (or produced from) genetically modified soybean". Since SYHT0H2 soybean and derived products are not different from those of its conventional counterpart, no additional labelling is required.

(i) Estimated potential demand

(i) In the Union

There are no anticipated changes to the intake/extent of use of soybean as a result of the introduction of SYHT0H2 soybean to the soybean supply. It is anticipated that the introduction of SYHT0H2 soybean will replace some of the soybean in existing food and feed products.

(ii) In export markets for EU supplies

There are no anticipated changes to the extent of soybean production in export markets for EU supplies as a result of the introduction of

SYHT0H2 soybean products.

(j) Unique identifier in accordance with Regulation (EC) No 65/2004

The unique identifier assigned to this product in accordance with Regulation (EC) No 65/2004 is SYN-ØØØH2-5.

1.9. Measures suggested by the applicant to take in case of unintended release or misuse as well as measures for disposal and treatment

Soybean cannot survive without human intervention and is a poor competitor. The characteristics of SYHT0H2 soybean and derived products are not different from those of its conventional counterpart, apart from the intended tolerance to HPPD-inhibiting herbicides, such as mesotrione, and to herbicides containing glufosinate ammonium.

The scope of this application does not include cultivation of SYHT0H2 soybean in the EU. In the unlikely event that small amounts of soybeans from SYHT0H2 soybean accidentally found their way into the environment, this would represent extremely low levels of exposure and the survival of these soybeans to produce flowering plants would be very unlikely. In addition, volunteers could be easily controlled using any of the current agronomic measures taken to control other commercially available soybean.

The SYHT0H2 soybean and derived products have been shown to be as safe and as wholesome as existing varieties of soybean. Any unintended releases or misuse can be dealt with in the same way as any other conventional soybean.

2. INFORMATION RELATING TO THE RECIPIENT OR (WHERE APPROPRIATE) PARENTAL PLANTS

2.1. Complete name

(a) Family name

Leguminosae

(b) Genus

Glycine Willd.

(c) Species

Glycine max (L.) Merr.

(d) Subspecies

Not applicable

(e) Cultivar/breeding line or strain

'Jack' variety

(f) Common name

Soybean

2.2. Geographical distribution and cultivation of the plant, including the distribution within the Union

Soybean was domesticated in China between the 11th and 17th century B.C. and cultivation extended throughout southern Asia, and until 17th century A.D. began to be introduced and cultivated in other Asian countries: such as Indonesia, Japan, Philippines, Vietnam, Thailand, Malaysia, Nepal and Northern India. It is now cultivated in over 35 countries worldwide and is the most prevalently grown oilseed. The major producers worldwide are the U.S., Brazil, Argentina, and China; while the largest EU soybean producers are Italy, Romania, France, Austria and Hungary.

This application requests authorization for food and feed uses, and for import and processing and does not include cultivation in the EU.

2.3. Information concerning reproduction (for environmental safety aspects)

(a) Mode(s) of reproduction

Soybean is considered a self-pollinated species that is propagated commercially for food use by seed. Artificial hybridisation is used to

breed commercial cultivars. The soybean flower stigma is receptive to pollen approximately 24 hours before anthesis and remains receptive 48 hours after anthesis. The anthers mature in the bud and directly pollinate the stigma of the same flower. As a result, soybeans exhibit a high percentage of self-fertilisation, and cross pollination is usually less than one percent. A soybean plant can produce as many as 400 pods, with two to twenty pods at a single node. Each pod contains one to five seeds. Neither the seedpod, nor the seed, has morphological characteristics that would encourage animal transportation

Self-pollination occurs before flowers open, which makes cross-pollination events very rare.

(b) Specific factors affecting reproduction

Temperature response and photoperiodism control soybean flowering as soybean is a quantitative short day plant, and flower more quickly under short days. These factors therefore control cultivar adaptation.

(c) Generation time

Soybean is an annual crop planted from November to September in the Southern Hemisphere, and April to May in the Northern Hemisphere.

The seed will germinate when the soil temperature reaches 10°C and will emerge in a 5-7 day period under favourable conditions. Soybean grows best at air temperatures of 25 ºC and 35 ºC and the life cycle, which is region dependant, can vary between 100 to 160 days.

In new areas of soybean production an inoculation with. *Bradyrhizobium japonicum* is necessary, for optimum efficiency of the nodulated root system. Soybeans do not yield well on acid soils and the addition of limestone may be required. Soybeans are often rotated with such crops as corn, winter wheat, spring cereals, and dry beans.

2.4. Sexual compatibility with other cultivated or wild plant species (for environmental safety aspects)

Other cultivated plant species: The sexual compatibility of soybean with other cultivated plant species is limited to *Gycine* species. Soybean is a self-pollinated species, but natural cross-polination can occur at low rates with variability according to seson and genotype.

However, the scope of this application dos not cover the cultivation of SYHT0H2 soybean in the EU. Therefore, any outcrossing between SYHT0H2 soybean and cultivated *Glycine* varieties is highly unlikely.

Wild plant species: No wild relatives of soybean are present in Europe. Therefore, soybean cannot exchange genes with any other wild species in the EU.

2.5. Survivability (for environmental safety aspects)

(a) Ability to form structures for survival or dormancy

Soybean is an annual crop with seeds being the only survival structures. Mature soybean seeds have no innate dormancy and commercial soybean are selected for lack of dormancy. Soybean seeds are sensitive to cold and are unlikely to survive winter freezing temperatures.

Volunteers are killed by frost during the year they were produced or are easily controlled by current agronomic practices including cultivation and the use of selective herbicides. Soybean is incapable of sustained reproduction outside of domestic cultivation and is non-invasive of natural habitats

(b) Specific factors affecting survivability

Survival of soybean is dependent upon temperature, seed moisture, genotype, and stage of development. Soybean cannot persist as a weed. Soybean seed can only survive under a narrow range of climatic conditions.

2.6. Dissemination (for environmental safety aspects)

(a) Ways and extent of dissemination

Soybean dissemination can theoretically be accomplished through seed and pollen dispersal. However, soybean pods and seed do no have dispersal mechanisms that facilitate movement of these structures over long distances, nor are they adapted for animal passage through morphological adaptations. Soybean seed is primarily disseminated through human activities or intervention such as planting, harvesting and transport.

(b) Specific factors affecting dissemination

Soybean seeds have a relatively large seed size and in general very few are disseminated by the human activities described above. Although vertical wind movements can lift pollen up high in the atmosphere and distribute it over significant distances, concentrations of viable pollen considerably decrease with height and distance from the source. Hence, only low levels of cross-pollination could occur over longer distances under suitable conditions.

2.7. Geographical distribution within the Union of the sexually compatible species (for environmental safety aspects)

There are no wild relatives of soybean in Europe.

2.8. In the case of plant species not normally grown in the Member State(s), description of the natural habitat of the plant, including information on natural predators, parasites, competitors and symbionts (for environmental safety aspects)

Not applicatble, as soybean is commercially cultivated in the European Union.

2.9. Other potential interactions, relevant to the GM plant, of the plant with organisms in the ecosystem where it is usually grown, or used elsewhere, including information on toxic effects on humans, animals and other organisms (for environmental safety aspects)

Soybean is known to interact with other organisms in the environment including insects, birds, and mammals. It is susceptible to a range of fungal diseases and, insect and nematode pests, as well as to competition from surrounding weeds. Soybean is extensively cultivated and has a history of safety for environmental safety aspects.

3. MOLECULAR CHARACTERISATION

3.1. Information relating to the genetic modification

(a) Description of the methods used for the genetic modification

SYHT0H2 soybean is a GM soybean that is produced by *Agrobacterium*-mediated transformation.

(b) Nature and source of the vector used

SYHT0H2 soybean has been produced by using *Agrobacterium*-mediated transformation using the vector pSYN15954.

(c) Source of donor DNA used for transformation, size and intended function of each constituent fragment of the region intended for insertion

The size, source and intended function of each constituent fragment of the regions intended for insertion into SYHT0H2 soybean is described below:

The region of plasmid pSYN15954 intended for insertion contains the gene *avhppd-03*, derived from oat (*Avena sativa* L.); and the gene *pat*,

derived from *Streptomyces viridochromogenes*. The pSYN15954 plasmid consists of three cassettes: 1) an *avhppd-03* cassette, which contains the gene *avhppd-03* regulated by the figwort mosaic virus (FMV), 35S, and tobacco mosaic virus (TMV) enhancer sequences, the synthetic minimal plant (SMP) promoter sequence, and the nopaline synthase (NOS) terminator sequence, 2) a *pat-03-01* cassette, which contains the gene *pat-03-01* regulated by the 35S promoter sequence and the NOS terminator sequence, and 3) a *pat-03-02* cassette, which contains the gene *pat-03-02* regulated by the cestrum yellow leaf curling virus promoter sequence (CMP), TMV enhancer sequence, and the NOS terminator sequence.

***avhppd-03* cassette**		
Vector component	**Size (bp)**	**Description**
Intervening sequence	282	Intervening sequence
FMV enhancer	194	Figwort mosaic virus (FMV) which increases gene expression
Intervening sequence	6	Intervening sequence
35S enhancer	293	Cauliflower mosaic virus 35S enhancer region.
Intervening sequence	20	Intervening sequence
SMP promoter	39	Synthetic minimal plant (SMP) promoter, from the cestrum yellow leaf curling virus promoter
Intervening sequence	5	Intervening sequence
TMV enhancer	68	The 5′ non-coding leader sequence (called omega) from tobacco mosaic virus functions as a translational enhancer in plants
Intervening sequence	3	Intervening sequence
avhppd-03	1320	The gene *avhppd-03*, derived from oat, encodes a AvHPPD-03 enzyme that catalyzes the formation of homogentisic acid, the aromatic precursor of plastoquinone and vitamin E biosynthesis. Expression of *avhppd-03* in plant cells confers an HPPD-inhibitor-tolerance phenotype.
Intervening sequence	16	Intervening sequence with restriction sites used for cloning.
NOS terminator	253	Terminator sequence from the nopaline synthanse (NOS) gene of *A. tumefaciens*
Intervening sequence	8	Intervening sequence.

***pat-03-01* cassette**		
Vector component	**Size (bp)**	**Description**
35S promoter	521	Promoter region of cauliflower mosaic virus
Intervening sequence	24	Intervening sequence
pat-03-01	552	*Streptomyces viridochromogenes* strain Tü494 *pat* gene encoding the selectable marker PAT. PAT confers resistance to herbicides containing glufosinate ammonium (phosphinothricin).
Intervening sequence	33	Intervening sequence
NOS terminator	253	Terminator sequence from the nopaline synthase gene of *A. tumefaciens*
Intervening sequence	8	Intervening sequence
CMP promoter	654	Promoter and leader sequence from the cestrum yellow leaf curling virus.
Intervening sequence	5	Intervening sequence
TMV enhancer	68	A translational enhancer in plants
Intervening sequence	10	Intervening sequence.
pat-03-02	552	*S. viridochromogenes* strain Tü494 *pat* gene encoding the selectable marker PAT. PAT confers resistance to herbicides containing glufosinate ammonium (phosphinothricin).
Intervening sequence	28	Intervening sequence
NOS terminator	253	Terminator sequence from the nopaline synthase gene of *A. tumefaciens*
Intervening sequence	77	Intervening sequence.

3.2. Information relating to the GM plant

3.2.1. Description of the trait(s) and characteristics which have been introduced or modified

SYHT0H2 soybean is a genetically modified soybean which produces two new proteins:

1. The AvHPPD-03 protein that confers tolerance to HPPD-inhibiting herbicides, such as mesotrione; and,
2. The PAT protein that confers tolerance to herbicide products containing glufosinate ammonium.

3.2.2. Information on the sequences actually inserted or deleted

(a) The copy number of all detectable inserts, both complete and partial

The insert in SYHT0H2 soybean is present at a single locus and inherited as a single gene in a Mendelian fashion. There are no extraneous T-DNA fragments of plasmid pSYN15954 inserted elsewhere in the soybean genome and there is no backbone sequence from transformation plasmid pSYN15954 in the SYHT0H2 soybean.

The SYHT0H2 soybean contains a single copy of *avhppd-03*, four copies of *pat*, a single copy of the *avhppd-03* enhancer complex sequence, two copies of the 35S promoter, two copies of the CMP promoter, two copies of the TMV enhancer (contained in the *pat-03-02* cassette), and five copies of the NOS terminator.

In addition to sequencing, Southern blot analysis demonstrated the absence of further copies of the insert or vector sequence elsewhere in the genome.

(b) In case of deletion(s), size and function of the deleted region(s)

Not applicable.

(c) Sub-cellular location(s) of insert(s) (nucleus, chloroplasts, mitochondria, or maintained in a non-integrated form), and methods for its determination

Statistical analysis of the segregation data indicated that the SYHT0H2 soybean insert segregated according to Mendelian principles and showed that the SYHT0H2 soybean insert had been integrated into the soybean nuclear genome.

(d) The organisation of the inserted genetic material at the insertion site

Sequencing and Southern data have demonstrated that SYHT0H2 soybean contains a single DNA insertion consisting of two inverted and partial

copies of pSYN15954 T-DNA centred on the right border proximal regions.

(e) In case of modifications other than insertion or deletion, describe function of the modified genetic material before and after the modification as well as direct changes in expression of genes as a result of the modification

Not applicable.

3.2.3. Information on the expression of the insert

(a) Information on developmental expression of the insert during the life cycle of the plant

SYHT0H2 soybean was produced by genetic modification to express the genes *avhppd-03* and *pat*. Therefore these soybean plants produce the transgenic proteins PAT and AvHPPD-03.

Tissues from SYHT0H2 soybean plants were analyzed by enzyme-linked immunosorbent assay (ELISA) to compare the concentrations of PAT and AvHPPD-03.

The analyses were performed on key plant tissues collected from SYHT0H2 soybean plants at different sampling times across the growing season. To control for background effects, the corresponding tissues from a conventional counterpart were also analyzed.

The concentrations of AvHPPD-03 and PAT measured in SYHT0H2 soybean plants grown at several locations confirmed the levels of these proteins in various tissue types and developmental stages across four different field environments.

(b) Parts of the plant where the insert is expressed

As summarised above, studies to evaluate the range of expression of the proteins AvHPPD-03 and PAT in different tissues of SYHT0H2 soybean have been conducted. The concentration of proteins AvHPPD-03 and PAT were measured in leaves, roots, and seed from SYHT0H2 soybean. Concentrations of AvHPPD-03 and PAT were quantifiable in all SYHT0H2 soybean tissues analyzed.

3.2.4. Genetic stability of the insert and phenotypic stability of the GM plant

Molecular analyses showed that the inserts have been stably integrated into the plant's genome in SYHT0H2 soybean. In addition, the genetic and phenotypic stability of the insert in SYHT0H2 soybean has been assessed by Southern blot and protein expression analyses.

3.2.5. Information (for environmental safety aspects) on how the GM plant differs from the recipient plant in:

(a) Mode(s) and/or rate of reproduction

No changes in the reproduction compared to the conventional counterpart have been observed in agronomic assessments conducted with SYHT0H2 soybean.

(b) Dissemination

No changes in the dissemination compared to the conventional counterpart have been observed in agronomic assessments conducted with SYHT0H2 soybean.

(c) Survivability

No changes in the survivability compared to the conventional counterpart have been observed in agronomic assessments conducted with SYHT0H2 soybean.

(d) Other differences

No changes in the reproduction, dissemination or survivability compared to the conventional counterpart have been observed in agronomic assessments conducted with SYHT0H2 soybean.

In summary, the results of these studies indicate that the genetic modification to produce SYHT0H2 soybean does not result in any biologically relevant agronomic or phenotypic differences related to reproduction, dissemination or survivability of SYHT0H2 soybean.

3.2.6. Any change to the ability of the GM plant to transfer genetic material to other organisms (for environmental safety aspects)

(a) Plant to bacteria gene transfer

The horizontal gene transfer from GM plants to bacteria with subsequent expression of the transgene is regarded as a highly unlikely event under natural conditions, especially in the absence of selective pressure. No changes in the ability of the SYHT0H2 soybean to transfer genetic material to other organism are expected compared to conventional soybean since no sequences have been introduced to allow this to occur.

(b) Plant to plant gene transfer

The genetic modification in SYHT0H2 soybean is not intended to change

any of the typical crop characteristics of soybean (except for the tolerance to herbicide products). Observations from field trials have confirmed that the agronomic and phenotypic characteristics of SYHT0H2 soybean have not changed in comparison with the conventional counterpart, and therefore, there is no increase or decrease in the potential for plant-to-plant gene transfer of SYHT0H2 soybean compared to traditional soybean. Gene transfer from SYHT0H2 soybean to other sexually compatible plant species is not possible since soybean has no wild relatives in the EU. In addition, since the scope of this application does not include authorisation for the cultivation, the likelihood of dissemination of pollen to other plants (including cultivated soybean plants) is considered to be negligible.

4. COMPARATIVE ANALYSIS

4.1. Choice of the conventional counterpart and additional comparators

SYHT0H2 soybean were compared with the conventional counterpart that had not been genetically modified. Commercial varieties were also included in the comparison where possible.

4.2. Experimental design and statistical analysis of data from field trials for comparative analysis

The experimental design for comparative analysis was in accordance with the latest EFSA guidance. To evaluate whether biologically significant changes in composition occurred in SYHT0H2 soybean plants compared to the conventional counterpart, trials were planted at eight locations in the U.S. in 2010. The locations of the trial sites were selected to be representative of the range of environmental conditions under which soybean varieties are expected to be grown. At each location, plants were grown in a randomized complete block design where four replicate plots per entry were planted.

4.3. Selection of materials and compounds for analysis

Based on guidance of the OECD, soybeans from transgenic plants and conventional counterpart plants were analysed for proximates (including starch), minerals, amino acids and selected fatty acids, anti-nutrients and vitamins. Forage (whole plants) from transgenic soybean plants and conventional counterpart plants were analysed for proximates.

Most components of forage and seed from SYHT0H2 soybean did not differ in composition when compared to the conventional counterpart soybean and to the reference varieties; and that the only statistical difference observed would have a

negligible impact on the overall nutritional composition of SYHT0H2 soybean when compared with conventional soybean varieties.

These data support the conclusion that SYHT0H2 soybean is compositionally equivalent to conventional soybean, apart from the introduced traits of herbicide tolerance.

4.4. Comparative analysis of agronomic and phenotypic characteristics

To confirm that the soybean plants are equivalent in agronomic characteristics compared to the conventional counterpart, apart from the introduced traits, SYHT0H2 soybean plants were grown randomised with commercial reference varieties at eight U.S. locations in 2010. Selected agronomic and phenotypic traits were assessed and compared. Data were collected for multiple agronomic characteristics which are those typically evaluated by professional soybean breeders and agronomists, and represent a broad range of characteristics throughout the development of the soybean plant. The results of these trials showed that SYHT0H2 soybean is agronomically and phenotypically equivalent to conventional soybean, apart from the introduced traits.

Germination results also indicate that SYHT0H2 soybean is not likely to be a plant pest and is not likely to have increased weediness potential. These combined results provide evidence for lack of plant pest potential for SYHT0H2 soybean.

4.5. Effect of processing

SYHT0H2 soybean will be produced and processed in the same way as any non-GM soybean and there is no evidence to suggest that the expression of the proteins produced by SYHT0H2 soybean (AvHPPD-03 and PAT) will influence this processing in any way.

5. TOXICOLOGY

(a) Toxicological testing of newly expressed proteins

SYHT0H2 soybean plants produce the proteins AvHPPD-03 and PAT, that respetively confer tolerance to HPPD-inhibiting herbicides, such as mesotrione, and to glufosinate ammonium herbicides.

To demonstrate the safety of each newly expressed protein, a series of studies have been conducted. In addition, existing data on the history of safety of the AvHPPD-03 and PAT proteins have also been taken into account. The assessment confirms that both of the newly expressed

proteins, PAT and AvHPPD-03, are not structurally or functionally related to proteins which have the potential to adversely affect human or animal health; they are rapidly degraded in *in vitro* digestibility assays; none of the gene sequences or their donors are known to be pathogenic to humans and no pathogenic sequences have been introduced; both AvHPPD-03 and PAThave no significant amino acid homology to known mammalian protein toxins; AvHPPD-03 and PAT are unlikely to be allergenic; AvHPPD-03 and PAT show no acute oral toxicity in mammalian studies; and, there is no evidence to suggest that protein digestion is altered as a result of repeated exposure to the proteins or to expect accumulation of these proteins with repeated exposure.

(b) Testing of new constituents other than proteins

Soybean is a common source of food and feed and has a long history of safe use. SYHT0H2 soybean has been modified to produce the AvHPPD-03 and PAT proteins. No other new constituents apart from these proteins are expected to be produced in SYHT0H2 soybean and compositional analyses have confirmed the compositional equivalence of SYHT0H2 soybean to conventional soybean. Therefore, no testing of any other constituent is considered necessary.

(c) Information on natural food and feed constituents

SYHT0H2 soybeans and forage have been found to be compositionally equivalent to conventional soybean varieties except for the presence of the intended traits.

These analyses showed that the levels of the components measured had not changed beyond the natural variation in soybean. No consistent patterns emerged to suggest that biologically relevant changes in composition or nutritive value of the soybeans or forage had occurred as an unintended result of the expression of the novel proteins in SYHT0H2 soybean.

(d) Testing of the whole GM food/feed

SYHT0H2 soybeans and forage have been found to be compositionally equivalent to conventional soybean varieties except for the presence of the intended traits. In addition, the transgenic proteins produced in SYHT0H2 soybean are digested rapidly, show a lack of acute toxicity and show no significant homology to known protein toxins. Also, the respective function and mode of action of these newly expressed proteins are known and there is no evidence of interaction of safety concern between the newly expressed proteins expressed in SYHT0H2 soybean. Therefore, no additional testing of the whole GM food/feed is considered necessary.

6. ALLERGENICITY

(a) Assessment of allergenicity of the newly expressed protein

The weight-of-evidence indicates that the newly expressed proteins produced by SYHT0H2 soybean are not likely to be a food allergen because:

1. None of the newly expressed proteins produced by SYHT0H2 soybean (PAT and AvHPPD-03) come from donors known to be a significant cause of food allergy,
2. AvHPPD-03 and PATdo not have biologically relevant amino acid sequence similarity to known or putative allergenic proteins,
3. AvHPPD-03 and PATare readily degraded in *in vitro* digestibility assays.

From these data, it can be concluded that AvHPPD-03 and PAT produced by SYHT0H2 soybean are highly unlikely to be allergenic.

(b) Assessment of allergenicity of the whole GM plant

Equivalence of SYHT0H2 soybean (with the exception of the introduced traits) to the conventional comparator 'Jack', was been demonstrated on the basis of compositional analysis. Therefore, no increased allergenicity is anticipated for SYHT0H2 soybean. In addition, further evidence to demonstrate the safe allergenic profile of SYHT0H2 was provided with a quantitative and qualitative assessment of potential differences in IgE binding to transgenic SYHT0H2 soybean, the non-GM conventional counterpart, and several commercial reference varieties of soybean.

The endogenous allergen content of SYHT0H2 is similar to the endogenous allergen content of 'Jack', the conventional counterpart. There is no evidence to suggest that SYHT0H2 soybean will have a greater allergenic potential compared to conventional, non-GM soybean varieties.

7. NUTRITIONAL ASSESSMENT

(a) Nutritional assessment of GM food

SYHT0H2 soybean is not intended to change the nutritional status of individuals or populations or to result in products with enhanced functionality. Compositional analysis and whole food safety tests have demonstrated that no unexpected alterations in nutrients and other food components have occurred and that no nutritional imbalances were introduced in SYHT0H2 soybean.

(b) Nutritional assessment of GM feed

SYHT0H2 soybean is not intended to change the nutritional status of livestock animals. Compositional analysis has demonstrated that no unexpected alterations in nutrients and other food or feed components have occurred and that no nutritional imbalances were introduced in SYHT0H2 soybean.

8. EXPOSURE ASSESSMENT – ANTICIPATED INTAKE/EXTENT OF USE

There are no anticipated changes to the intake/extent of use of soybean as a result of the introduction of SYHT0H2 soybean to the conventional soybean supply. It is anticipated that the introduction of SYHT0H2 soybean will replace some of the soybean in existing food and feed products. However, the genetic modification was not intended to change any of the compositional parameters in food and feed as confirmed by the results obtained from the extensive compositional assessment.

Furthermore, the expected levels of intake of the proteins PAT and AvHPPD-03, through maximum consumption and exposure assumptions considered, of SYHT0H2 soybean in the EU will be very low. Margins of exposure exceed over 50,000 and 500 for adults and over 28,000 and 300 for children with regard to AvHPPD-03 and PAT, respectively. Additionally, PAT is a well-known protein with a long history of safe use. This dietary exposure assessment supports the conclusion that the risk to consumers from SYHT0H2 soybean is negligible.

9. RISK CHARACTERISATION FOR THE SAFETY ASSESSMENT OF GM FOOD AND FEED

Soybean food and feed products have a long history of safe use. No significant native toxins are reported to be associated with the genus *Glycine*. The information presented in this application confirms that SYHT0H2 soybean and derived food and feed products are not different from those of its conventional counterpart.

10. POST-MARKET MONITORING ON GM FOOD/FEED

As described in Sections 4 to 9 above, the presence of SYHT0H2 soybean or its derived products in food and feed will not result in any nutritional changes. Therefore, post-market monitoring of SYHT0H2 soybean food/feed is not considered necessary.

11. ENVIRONMENTAL ASSESSMENT

11.1. Mechanism of interaction between the GM plant and target organisms

SYHT0H2 soybean has been developed to confer tolerance to certain herbicides. However, the scope of this application covers the import and food and feed use of SYHT0H2 soybean and derived products in the EU. Cultivation of these soybean products in the EU is not included in the scope. Therefore, exposure of target organisms to soybean leaves and roots of SYHT0H2 soybean will be highly unlikely.

11.2. Potential changes in the interactions of the GM plant with the biotic environment resulting from the genetic modification

(a) Persistence and invasiveness

Taking into account the results obtained in agronomic comparisons and the fact that the scope of this application does not include cultivation of SYHT0H2 soybean, which means that environmental exposure in the EU would be very low and localised, it can be concluded that: The genetic modification introduced in SYHT0H2 soybean has not altered agronomic and phenotypic characteristics of SYHT0H2 soybean associated with persistence or invasiveness potential compared to conventional soybean. In addition, the genes introduced in SYHT0H2 soybean will not confer any selective advantage or disadvantage to SYHT0H2 soybean compared to conventional soybean, apart from the intended modifications. Therefore SYHT0H2 soybean will not differ in persistence and invasiveness from conventional soybean.

In summary, the likelihood that SYHT0H2 soybean will become more persistent than the recipient or parental plants in agricultural habitats or more invasive in natural habitats as a result of importing SYHT0H2 soybean in the EU can be considered negligible.

(b) Selective advantage or disadvantage

An assessment of whether the transfer of the newly introduced genes in SYHT0H2 soybean (*avhppd-03* and *pat*) could confer any selective advantage or disadvantage to other soybean plants or to sexually compatible wild relatives and the potential consequences of this transfer has been conducted. Taking into account the results obtained from the ERA, the results of the comparative safety assessment and the fact that the scope of this application does not include cultivation of SYHT0H2 soybean in the EU, the conclusion from the assessment is that the expression of *avhppd-03* and *pat* will not confer any selective advantage or disadvantage to SYHT0H2 soybean.

(c) Potential for gene transfer

The scope of this application covers the import and food and feed use of SYHT0H2 soybean and derived products in the EU. Cultivation of these soybean products in the EU is not included in the scope. Therefore, it is highly unlikely that SYHT0H2 soybean plants will grow in the EU.

There is also no change in the ability of SYHT0H2 soybean to transfer genetic material to other organisms when compared to conventional soybean. The horizontal gene transfer from GM plants to bacteria with subsequent expression of the transgenes is regarded as highly unlikely under natural conditions, especially in the absence of selective pressure.

Gene transfer from SYHT0H2 soybean to other sexually compatible plant species is not possible since there are no wild relatives of soybean in the EU any vertical gene transfer would be limited to other soybean plants. Therefore, it is highly unlikely that the import and food and feed use of SYHT0H2 soybean and derived products in the EU would lead to any adverse environmental effects due to plant-to-plant gene transfer.

Given the low levels of exposure to micro-organisms that could arise from the import and food and feed use of SYHT0H2 soybean in the EU and the characteristics of the transgenes, it is highly unlikely that horizontal gene transfer will occur. If gene transfer did occur, it is unlikely that the transgenes would become established in the genome of microorganisms in the environment or human and animal digestive tract. In the very unlikely event that any of the genes were established in the genome of microorganisms, no adverse effects on human and animal health or the environment are expected.

(d) Interactions between the GM plant and target organisms

The introduced traits confer tolerance to herbicides, therefore there are no target organisms.

(e) Interactions of the GM plant with non-target organisms

The scope of this application does not include cultivation of SYHT0H2 soybean in the EU, therefore potential immediate or delayed effects in the environment due to direct or indirect interactions between SYHT0H2 soybean plants and non-target organisms as a result of the import of SYHT0H2 soybeans or products for food and feed use in the EU can be considered highly unlikely.

(f) Effects on human health

Compositional analysis with SYHT0H2 soybean have confirmed that the SYHT0H2 soybean is equivalent in composition to conventional soybean and is as safe and nutritious as conventional soybean.

There is no reason to anticipate that SYHT0H2 soybean would result in a product that differs in toxicity or allergenic potential to humans. None of the proteins produced by SYHT0H2 soybean are known to be toxic or allergenic to humans and there are no known precedents where interactions between non-toxic proteins lead to toxic effects.

In summary, no adverse effects on human health or adverse consequences for the food chain are expected following consumption of food consisting, containing or derived from SYHT0H2 soybean.

(g) Effects on animal health

The potential adverse effects of importing SYHT0H2 soybeans or derived products into the EU on human or animal health have been assessed. Studies conducted with AvHPPD-03 and PAT show that these proteins are unlikely to be toxic to humans or animals. None of these proteins shows significant sequence identity to known protein toxins. In addition, AvHPPD-03 and PAT are unlikely to be allergenic.

The results obtained from the comparative analysis of composition of SYHT0H2 soybean with conventional soybean have shown that the levels of natural food and feed constituents have not changed beyond the natural variation in soybean and no evidence of unintended effects has been observed. The conclusion of this assessment is that SYHT0H2 soybean is as safe for use in feed as conventional soybean.

In summary, no adverse effects on animal health or adverse consequences for the food or feed chain are expected following consumption of feed consisting, containing or derived from SYHT0H2 soybean.

(h) Effects on biogeochemical processes

The scope of this application does not include cultivation of SYHT0H2 soybean in the EU. Interactions with target or non-target organisms that could lead to effects on biogeochemical processes are therefore highly unlikely.

In the unlikely event that small amounts of SYHT0H2 soybeans accidentally found their way into the EU environment, their survival would be very unlikely, as soybean is a highly domesticated plant and cannot survive without human intervention, especially under normal European climatic conditions. Moreover, these plants could be easily controlled using any of the current agronomic measures taken to control other commercially available soybean. In the unlikely event that some plants of SYHT0H2 soybean survived, the potential effects on biogeochemical processes as a result of interactions with target and non-

target organisms are likely to be the same as those effects resulting from cultivation of non-modified soybean.

In summary, the risk of adverse effects on biogeochemical processes resulting from interactions of SYHT0H2 soybean and target or non-target organisms can be considered negligible under the scope of this application.

(i) Impacts of the specific cultivation, management and harvesting techniques

Not applicable since the scope of this application does not include cultivation of SYHT0H2 soybean in the EU.

11.3. Potential interactions with the abiotic environment

The scope of this application does not include cultivation of SYHT0H2 soybean in the EU. Therefore, interactions of SYHT0H2 soybean with the abiotic environment are highly unlikely. In the unlikely event that small amounts of SYHT0H2 soybeans accidentally found their way into the EU environment, their survival would be very unlikely, as soybean is a highly domesticated plant and cannot survive without human intervention, especially under normal European climatic conditions. Moreover, these plants could be easily controlled using any of the current agronomic measures taken to control other commercially available soybean. In the unlikely event that some plants of SYHT0H2 soybean survive, the potential effects on the abiotic environment will be negligible.

11.4. Risk characterisation for the environmental risk assessment

Cultivation of soybean has a long history of environmental safety. Soybean has no weedy characteristics and there are no significant native toxins associated with the genus *Glycine*. The information presented in this application confirms that the environmental safety of SYHT0H2 soybean is not different from the conventional counterpart.

12. ENVIRONMENTAL MONITORING PLAN

(a) General (risk assessment, background information)

The scope of this application does not include cultivation of SYHT0H2 soybean. Environmental exposure to SYHT0H2 soybean could only occur in the unlikely event that small amounts of SYHT0H2 soybeans accidentally found their way into the environment in the EU. However, the survival of this soybean would be very unlikely as soybean is a highly domesticated plant and cannot survive without human intervention, especially under normal European climatic conditions. If germinated, SYHT0H2 soybeans could easily be controlled using any of the current agronomic measures taken to control other commercially available soybean.

An environmental risk assessment (ERA) has been conducted for SYHT0H2 soybean as recommended in the EFSA Guidance for risk assessment of food and feed from genetically modified plants and the EFSA Guidance on the ERA of GM plants, and taking into account the scope of this application. Risk assessment concepts described in recent scientific publications have also been used.

The overall conclusion of the ERA confirms that the import and food and feed use of SYHT0H2 soybean will not result in harmful effects on human or animal health or to the environment in the EU.

(b) Interplay between environmental risk assessment and monitoring

An ERA has been conducted for SYHT0H2 soybean according to the principles laid down in Annex II to Directive 2001/18/EC and Decision 2002/623/EC establishing guidance notes supplementing Annex II to Directive 2001/18/EC.

The scientific evaluation of the characteristics of SYHT0H2 soybean in the ERA has shown that the risk for potential adverse effects on human and animal health or the environment is negligible in the context of the intended uses of this GM soybean relative to:

- Persistence and invasiveness
- Selective advantage or disadvantage
- Potential for gene transfer
- Interactions between the GM plant and target organisms
- Interactions of the GM plant with non-target organisms
- Effects on human health
- Effects on animal health
- Effects on biogeochemical processes
- Impacts of the specific cultivation, management and harvesting

techniques
• Potential interactions with the abiotic environment.

(c) Case-specific GM plant monitoring (approach, strategy, method and analysis)

An ERA has been conducted in accordance with Annex II of Directive 2001/18/EC to evaluate potential adverse effects of SYHT0H2 soybean on human and animal health and the environment. The conclusions of this ERA confirm that the potential risks to human and animal health or the environment arising from the placing on the market of SYHT0H2 soybean can be considered negligible, under the scope of this application. Therefore, a case-specific monitoring plan is not considered necessary.

(d) General surveillance of the impact of the GM plant (approach, strategy, method and analysis)

General surveillance is not based on a particular hypothesis and it should be used to identify the occurrence of unanticipated adverse effects of the viable GMO or its use for human and animal health or the environment that were not predicted in the ERA.

The scope of this application does not include authorisation for the cultivation of SYHT0H2 soybean. Therefore, exposure to the environment will be limited to unintended release of SYHT0H2 soybeans, which could occur for example via substantial losses during loading/unloading of the viable commodity destined for processing into animal feed or human food products. Exposure can be controlled by clean up measures and the application of current practices used for the control of any adventitious soybean plants, such as manual or mechanical removal and the application of herbicides.

However, and in order to safeguard against any adverse effects on human and animal health or the environment that were not anticipated in the ERA, general surveillance on grain from SYHT0H2 soybean will be undertaken for the duration of the authorisation. The general surveillance will take into consideration, and be proportionate to, the extent of imports of SYHT0H2 soybeans, and use thereof in the Member States.

In order to increase the possibility of detecting any unanticipated adverse effects, a monitoring system will be used, which involves the authorisation holder and operators handling and using viable SYHT0H2 soybeans. The operators will be provided with guidance to facilitate reporting of any unanticipated adverse effect from handling and use of viable SYHT0H2 soybeans.

(e) Reporting the results of monitoring

The applicant/consent holder is responsible, under Regulation (EC) No 1829/2003, to inform the Commission of the results of the surveillance. Consistent with the EFSA guidance, the applicant will submit a General Surveillance Report containing information related to the monitoring on an annual basis.

13. DETECTION AND EVENT-SPECIFIC IDENTIFICACION TECHNIQUES FOR THE GM PLANT

For specific detection of SYHT0H2 soybean genomic DNA, a real-time quantitative TaqMan® PCR method has been developed by Syngenta. This detection method has been submitted for validation to the European Union Reference Laboratory (EURL) of the Joint Research Centre of the European Commission (EC-JRC) as part of this application.

14. INFORMATION RELATING TO PREVIOUS RELEASES OF THE GM PLANT (FOR ENVIRONMENTAL SAFETY ASPECTS)_

14.1. History of previous releases of the GM plant notified under Part B of the Directive 2001/18/EC and under Part B of Directive 90/220/EEC by the same notifier

No trials of SYHT0H2 soybean have been carried out in the EU.

14.2. History of previous releases of the GM plant carried out outside the Union by the same notifier

(a) Release country

U.S.

(b) Authority overseeing the release

EPA and USDA

(c) Release site

Various sites across the U.S.

(d) Aim of the release

Research and development.

(e) Duration of the release

Varied depending on the aim of the trial.

(f) Aim of post-releases monitoring

Control of volunteers.

(g) Duration of post-releases monitoring

Varied depending on the aim of the trial, typically one year.

(h) Conclusions of post-release monitoring

The occurrence of volunteers after planting SYHT0H2 soybean field trials was no different to other soybean.

(i) Results of the release in respect to any risk to human health and the environment

No evidence of adverse effects to human health or the environment has been found.

(a) Release country

Argentina

(b) Authority overseeing the release

SENASA

(c) Release site

Various sites across Argentina.

(d) Aim of the release

Research and development.

(e) Duration of the release

Varied depending on the aim of the trial.

(f) Aim of post-releases monitoring

Control of volunteers.

(g) Duration of post-releases monitoring

Varied depending on the aim of the trial, typically one year.

(h) Conclusions of post-release monitoring

The occurrence of volunteers after planting SYHT0H2 soybean field trials was no different to other soybean.

(i) Results of the release in respect to any risk to human health and the environment

No evidence of adverse effects to human health or the environment has been found.