

2004-04-15

European Commission
DG ENV,

Assessment report of the Swedish Competent Authority on the placing on the market according to notification C/SE/96/3501

1. Statement containing the conclusions according to Article 14.3.a and Annex VI.5

The Swedish Board of Agriculture concludes that the genetically modified potato clone EH92-527-1 should be placed on the market for the proposed use, on the following conditions:

- The Notifier shall comply with the commitments in the notification.
- If the Swedish Board of Agriculture considers it necessary, external experts, on the Notifiers expense, shall design, carry out or participate in those studies that may potentially be triggered by the results of the monitoring.
- The Notifier shall confirm the reliability of the detection method before EH92-527-1 is placed on the market. An additional external laboratory shall therefore test the parameters under points 5.1 and 5.2 in the Notifiers report on the detection method. The samples shall be deidentified and all steps in the analysis, including DNA-extraction, shall be performed in that laboratory.
- The consent is valid for 10 years from the day of the issuing of the permit.

Proposed use

Potato clone EH92-527-1 is proposed to be used for:

Cultivation and handling as any other starch potato.

This will include production and non-food, non-feed use of the starch, feed use of pulp from starch processing and use of by-products as fertilisers.

The Swedish Board of Agriculture concludes that the proposed use is safe but that it is important that EH92-527-1 and products derived from EH92-527-1 are kept separated from the food chain, since a full assessment for food use has not been performed. The commitments of Amylogen HB (hereafter called the Notifier) in the notification, for the purpose of quality assurance and monitoring,

are sufficient for The Swedish Board of Agriculture to conclude that these products will be kept out of the food chain.

Risk management

The Notifier suggests no risk management actions, but commitments of the Notifier will result in separation of EH92-527-1 from the food chain and the management of volunteer plants.

The Swedish Board of Agriculture is of the opinion that the result of the risk assessment does not call for risk management actions. The potential risks are very small and connected with certain unlikely changes of the potato and effects that have not been anticipated in the risk assessment. These are addressed by the Monitoring plan.

Monitoring plan

The case-specific part of the monitoring plan focuses on some unlikely changes of the potato that might lead to an altered risk-profile and which cannot be excluded.

The general surveillance part of the plan focuses on key parameters, which could signal later unanticipated negative effects on health and environment.

The Swedish Board of Agriculture considers that the monitoring plan fulfils the requirements to verify the assumptions from the risk assessment. The monitoring plan also constitutes a system fit to detect the potential occurrence of unanticipated events that might lead to adverse effects on human health, animal health and the environment.

The plan has enough details to make plausible that it will function.

The plan also contains commitments for follow-up studies if this would be needed as a consequence of initial monitoring results.

2. Introduction

The Swedish competent authority, The Swedish Board of Agriculture, has received a notification from the Notifier for consent to market the genetically modified potato, EH92-527-1. The dossier was first received on 5 August 1996 under directive 90/220/EC, but has since been updated on 17 January 2003 to follow the directive 2001/18/EC.

The Notifier claims no confidentiality of documents in the dossier.

EH92-527-1 has been cultivated for many years in field releases in Sweden and a study using the pulp as feed has been performed.

3. Genetic modification

The potato variety Prevalent has been modified by incorporating the gene granule bound starch synthase (*gbss*) in antisense orientation to reduce the expression of the potatoes endogenous *gbss*-gene. The purpose is to reduce the

level of amylose, and increase the level of amylopectin. The gene neomycin phosphotransferase (*nptII* also known as *aph (3')-II*) from the bacterium *Escherichia coli*, that gives resistance to the antibiotic Kanamycin, Neomycin and Geneticin, has also been introduced as a selective marker gene.

4. The result of the modifications

The genetic modification has caused a reduced expression of the potatoes endogenous *gbss* and as a result, the content of amylose in EH92-527-1 is 2% compared to approximately 15% for the parent variety Prevalent and the content of amylopectin is 98% compared to approximately 85% in Prevalent. The introduction of *nptII* has also resulted in that EH92-527-1 has received a resistance against Kanamycin and possibly also against Neomycin and Geneticin.

Nutrients and other substances important for human and animal health have been analysed in EH92-527-1, and no statistical differences are found for most substances when difference in yield is compensated for (counted as dry-weight). Even after compensation for difference in yield, EH92-527-1 contains more sugar and C-vitamin and less glycoalkaloids compared to the parent variety Prevalent.

In all other parameters studied no difference was found between the two potato clones.

5. Traceability and labelling

Bags and consignments containing the potato EH92-527-1 will be labelled or have enclosed documents according to the requirements in appendix IV of the directive 2001/18/EC. The information will include for example the unique identification code (BPS-25271-9), the name of the transformation event, that the potato has been genetically modified and that it is meant for starch production and not as food.

Demands on traceability and labelling of products at the time of placing on the market and demands on actors handling the genetically modified potato EH92-527-1 will be subjected to the requirements of Regulations (EC) No 1830/2003 and (EC) No 1829/2003. The demands on actors to forward and save information according to the requirements of Regulation (EC) No 1830/2003 will be evident on labels or on enclosed documents.

The Notifier has established a system for separation, control, and documentation, Identity Preservation System (IPS) in order to assure quality. IPS will also make it easier to fulfil the requirements of the above-mentioned regulations. All growing and handling will take place under the IPS setting.

Technical products produced from the starch, e.g. paper, will not be GMO-labelled. Such products are not encompassed by existing requirements for traceability and labelling.

The Swedish Board of Agriculture is of the opinion that the system of separation, control and documentation, (IPS), that the Notifier has established for quality

assurance, will facilitate the fulfilling of the demands of traceability and labelling in the Regulations (EG) No 1829/2003 and (EG) No 1830/2003.

6. Separation of the product line

The Swedish Board of Agriculture is of the opinion that keeping the product line EH92-527-1 separate is very important. Particularly, it is important to prevent EH92-527-1 from entering the food production chain, since EH92-527-1 is not approved for food-use.

The Notifier has created a system for separation, control and documentation, the Identity Preservation System (IPS), which gives detailed account for the tasks and responsibilities of the different actors. The cultivation and handling will be governed, controlled and supervised through manuals, instructions, checklists and report forms at all the levels of the production. The purpose of IPS is to assure the quality of EH92-527-1 by keeping other potato cultivars separated from EH92-527-1. The Swedish Board of Agriculture is of the opinion that IPS also will work the other way and effectively prevent EH92-527-1 to be mixed into other cultivars of potato and that the tracking of potential mix-ups will be facilitated by the IPS. In addition, the Notifier has committed itself, as a part of the general surveillance, to make efforts to detect and track down potatoes of the line EH92-527-1 if there is any suspicion that such potatoes have entered the food production chain.

7. Detection methods

GeneScan Analytics has developed a detection system based on TaqMan-real time-PCR. The sensitivity of the method has been declared to be one gene copy. The detection method appears to have satisfying sensitivity, robustness and specificity to fulfil the basic acceptance criteria for a qualitative detection method. The method is not quantitative. This is not needed, as there is no threshold value for presence of EH92-527-1 in lots of other potatoes. There is null acceptance for admixture.

Since the method of detection of EH92-527-1 suggested by the Notifier fulfils the fundamental acceptance criteria for a qualitative detection method, the Swedish Board of Agriculture considers that the notification can be submitted to the EU-commission and the other member states. The Swedish Board of Agriculture has after discussions with the Swedish National Food Administration come to the conclusion that validation of the specificity and selectivity parameters by one additional, external laboratory will be sufficient to determine the reliability of the method and to fulfil the minimum demands that would be put on the robustness of the method for inter-laboratory transferability according to Annex 1 point 3.B. in Commission Regulation (EC) No 641/2004 (on detailed rules for the implementation of Regulation (EC) No 1829/2003 of the European Parliament and of the Council as regards the application for the authorisation of new genetically modified food and feed, the notification of existing products and adventitious or technically unavoidable presence of genetically modified material which has benefited from a favourable risk evaluation). The Swedish

Board of Agriculture therefore adds a condition to the suggested approval that the Notifier shall confirm the reliability of the detection method before the market release. One, additional external laboratory shall therefore test the parameters mentioned under points 5.1 and 5.2 in the Notifiers report of the detection method. The samples shall be deidentified and the external laboratory shall perform all steps in the analysis, including the DNA-extraction.

8. Co-existence

Today there are no EU regulations that regulate coexistence on the EU-level in a harmonised fashion. According to article 26a in directive 2001/18/EG member states may take appropriate measures to prevent unintentional presence of genetically modified organisms in other products. The Swedish Board of Agriculture makes the assessment that any resulting demands posed in different member states will be valid also for the actors cultivating and handling EH92-527-1.

The probability of dispersal of potatoes to adjacent fields is generally small. The pollen production of the flowers of EH92-527-1 is low and most of the flowers are shed before the pollen is ready, which makes the probability of dispersal through pollen very low.

Cultivation and handling of EH92-527-1 will take place within the frames of the quality assurance system IPS, which will secure separation, control and documentation. The Swedish Board of Agriculture is of the opinion that this system together with the inherent traits of the potato will make the probability very unlikely of EH92-527-1 involuntarily entering the food production chain.

9. Evaluation of molecular data

From the studies provided by the Notifier it can be concluded that most parts of the T-DNA have been inserted during transformation. A rearrangement at the T-DNAs left boarder sequence has taken place so that the nopalin syntethase terminator sequence and a smaller part of the *gbss*-gene have been deleted, whereas a larger part of the *gbss*-gene has been inserted in reversed orientation. Such rearrangements are commonly found after transformations with *Agrobacterium tumefaciens*.

The studies also show that no parts of the DNA-sequence of the vector apart from the T-DNA have been introduced into the plant genome. No other unknown DNA-sequences have been recombined in to the inserted T-DNA. Some bases from the DNA flanking the T-DNA have been sequenced on both sides. The DNA-sequences are not long enough to determine their origin. Most likely, the flanking regions are made up of chromosomal potato-DNA (those DNA-sequences in the potato chromosome where T-DNA has been integrated). Foreign DNA could possibly be integrated together with the T-DNA. However, there should only be two sources for this DNA, DNA from *Agrobacterium tumefaciens* and DNA from the potato itself from another part of the genome. The Swedish Board of Agriculture argues, based on the result of a data base

search on the immediately flanking sequences, that the DNA is most probably of eucaryote origin, and not from *Agrobacterium tumefaciens*.

The Notifier has sequenced the whole inserted DNA-sequence after amplification with PCR. Three bases that differed from the vector sequence were found. This is within the expected error for the used polymerase. Only one of these bases is placed within a sequence that may give rise to a protein, NptII. Theoretically a mutation of an antibiotic resistance gene could result in altered specificity or activity of the protein. The Swedish Board of Agriculture is of the opinion that even if the base changes in the sequence reaction would correspond to real mutations in the inserted DNA, the likelihood would be very small for those mutations to cause altered qualities to the protein which would affect the risk assessment. The gene comes from the bacteria *Echerishia coli* and is found in natural bacterial populations and should be well adapted to natural conditions of its environment. If the current discussed base exchange would give the bacteria an advantage under natural conditions this would already have been taken place as base exchange is a natural process that frequently occurs in natural situations. Furthermore, single random alterations of NptII are likely to, in most situations, result in unchanged or reduced functions rather than enhanced or new functions.

No Open Reading Frame (ORF, potentially active gene) coding for a complete protein has been found except for *nptII*. However, there is a sequence with homology to the first part of a gene that gives resistance against the antibiotic Bleomycin (50 of 126 amino acids) in ORF4. The DNA-sequence comes from *Echerishia coli*. ORF4 contains also a sequence with homology to a part of the ornitincyklodeaminase that comes from *Agrobacterium tumefaciens* (68 of 354 amino acids). The Notifier has shown that ORF 4 is expressed on RNA-level on the same transcript as ORF 1. A translation start in the correct reading frame is missing and a stop codon is present before ORF 4. No protein can be detected and when the fragment has been cloned in to *Echerishia coli* under a prokaryotic promoter it does not provide resistance against the antibiotic Bleomycin. No homology is found to known allergens.

Therefore, the Swedish Board of Agriculture considers it to be highly unlikely that the presence of ORF 4 in EH92-527-1 would imply a risk.

The integration itself could theoretically lead to changes that could influence the estimation of health and environmental risks. The risks that are connected with changes in the T-DNA at the introduction into the plant and a potential introduction of DNA from the vector outside the T-DNA can be dismissed after a complete sequencing of the introduced DNA and analyses of potential presence of DNA from the vector outside T-DNA. Endogenous genes may also have been knocked out, have changed expression level, or been fused with other endogenous genes, as a consequence of the introduction of the T-DNA. This could happen as a consequence of T-DNA introduction in an already present gene or by rearrangements in connection with the introduction itself. Such effects may also arise as a consequence of normal mutations and are thus nothing

that especially distinguishes EH92-527-1 from conventional potatoes. Such an activation of endogenous genes is also improbable because at the right border sequence, the promoter does not read towards the plantgenome and at the left border sequence is the gbss-sequence whose transcript is broken down as a consequence of the antisense/sense inhibition. The only remaining scenario that would be specific to EH92-527-1 would be formation of potential fusion-proteins between products of endogenous genes and the introduced genes. However, there are stop-codons between the genes in the T-DNA and the genome of the plant, that will make the formation of fusion-proteins very unlikely. The conclusion of the reasoning above is that the Swedish Board of Agriculture sees no need for the risk assessment of further analysing the sequences of the plant genome flanking the introduced DNA.

10. Environmental risk assessment

Vertical gene flow

Potato is mostly propagated vegetatively with tubers, but certain varieties can also form seeds. Pollen can only spread a short distance. Crosses between potato and wild relatives in Europe cannot under natural conditions result in vital hybrids. The genetically modified potato can therefore only spread its genes to cultivated potatoes. EH92-527-1 and the mother clone Prevalent abort most flowers prematurely, and the stamens produce almost no pollen. Seed plants and plants from tubers that have been left behind during cultivation are usually destroyed by tilling or chemical weed management, and are out-competed by the next crop in the rotation. Outside arable land, potato has a very low competitiveness, particularly in northern Europe, where the potato in question is meant to be cultivated.

Horizontal gene flow

In Article 4 (2) of Directive 2001/18/EC, it is stated that genetically modified organisms which contain genes expressing resistance to antibiotics shall be taken into particular consideration when carrying out an environmental risk assessment.

If genes expressing resistance to antibiotics are spread to pathogenic strains of bacteria, infections caused by such bacteria would not be treatable by the antibiotics in question. In order for the use in question of the antibiotic resistance gene, *nptII*, in the potato EH92-527-1 to result in such a scenario, horizontal gene transfer must take place from the potato to the genome of pathogenic bacteria. Theoretically, this could happen in the gastro-intestinal tract of animals fed by-products of EH92-527-1, or indirectly via DNA uptake of soil bacteria from decomposing plant parts followed by horizontal gene transfer from soil bacteria to pathogenic bacteria.

Studies show that a very large degree of homology is required between the plant's and the bacteria's DNA in order for horizontal gene transfer to take place at all in targeted studies. Under natural conditions, several other factors become

important, which further limit the possibility of horizontal gene transfer resulting in a population of resistant bacteria, such as the absence of prokaryote regulation sequences linked to *nptII* in the genetic construct in question, DNA fragmentation and the need for selection pressure at the time of the gene transfer. The Swedish Board of Agriculture believes that it is very unlikely that such a horizontal gene transfer would take place and result in a population of resistant bacteria as a consequence of the use in question, unless the same DNA sequence already exists in the receiving bacteria. The sequences that may be relevant are the *nptII* gene and, less likely, the promoter Pnos. The former exists in gram-negative bacteria that already are resistant to kanamycin, and the latter in *Agrobacterium tumefaciens* T-DNA, which is designed to be inserted into plants and expressed there, not in the bacteria.

Kanamycin-resistant bacteria are common. *nptII* can be isolated from human faeces, manure, river water and soils. In the unlikely event that a horizontal gene transfer takes place to a bacterium that does not already have a functional kanamycin resistance, the contribution to the pool of kanamycin-resistant bacteria will anyway be negligible and much less than for instance as a result of the use of manure.

Kanamycin, neomycin and geneticin are of little importance for human and veterinary medicine (neither antibiotic is for internal use in Sweden), which has an effect on both the selection pressure and thereby the likelihood of horizontal gene transfer, and on possible consequences of the unlikely scenario that use of EH92-527-1 would significantly contribute to the pool of kanamycin-resistant bacteria.

Taking the facts above into account, the Swedish Board of Agriculture considers that the risk posed by the presence of the antibiotic resistance gene *nptII* in the relevant potato clone is negligible for the use in question.

Competitive ability

Potato has a very low competitiveness outside arable land. This is particularly true in northern Europe, where the potato in question is to be grown. EH92-527-1 and the mother clone Prevalent can be assumed to have even less long-term competitive ability, since they shed most flowers prematurely and produce very little pollen. In order for the potato to establish itself in spite of these characteristics and spread outside the field in northern Europe, its competitive ability would have to increase considerably.

The genetic construct that has been introduced alters the content of two forms of starch in relation to each other, and makes the potato resistant to kanamycin. The Swedish Board of Agriculture rules out the possibility that kanamycin resistance could influence the potato's competitive ability. The increased level of amylopectin and the reduced level of amylose are also not believed to result in increased competitive ability. On the other hand, increased sugar content could theoretically result in greater freezing resistance. Increased freezing resistance might give the tubers improved ability to survive during the winter, which could

have an effect on the number of volunteers and the potato's ability to compete outside the field. The Notifier has performed studies of frost tolerance in the field, showing that EH92-527-1 and Prevalent behave in the same way. The Notifier has also carried out a freezing test where tubers of both EH92-527-1 and Prevalent lost their germination capacity because of the treatment. There is also no difference in the number of volunteers or spreading outside the field between Prevalent and EH92-527-1. The field trials carried out show that EH92-527-1 behaves in a similar way to the mother clone Prevalent under production conditions also as regards i.a. morphology, sensitivity to chemical treatment and receptiveness to diseases and pests.

The differences measured as regards levels of vitamin C and glycoalkaloids are within the variation for other potatoes. EH92-527-1 is not expected to obtain increased competitive ability compared to conventional potatoes as a result of the observed changes of these substances.

Effect on target organisms

EH92-527-1 has no target organisms.

Effect on non-target organisms

No studies have indicated any significant difference as regards the effect of Prevalent and EH92-527-1 on non-target organisms. However, the Swedish Board of Agriculture believes that it is not unreasonable to expect that altered starch composition may have an effect on certain micro-organisms (see Biogeochemical processes). Increased content of sugar and reduced content of glycoalkaloids might possibly result in pests (e.g. insects) attacking the potato to a larger extent. However, several years of field trials on large areas under production conditions have not indicated any such differences. In addition, the levels of these substances are within the variation for conventional potatoes. Also, the antibiotics resistance and the increased vitamin C content should not be able to affect non-target organisms. The levels of vitamin C are also within the variation for conventional potatoes.

Theoretically, EH92-527-1 could have an effect on other organisms if it would be establishing itself in natural plant populations, for instance by competing or changing interactions between other organisms, so called apparent competition. In Sweden, where the potato is to be grown first, the mother variety Prevalent – which is not significantly different in spreading ability from EH92-527-1 – has not been able to establish itself outside arable land. A factor that provides low competitive ability in the long term is that both Prevalent and EH92-527-1 shed most flowers prematurely, and produce almost no pollen.

Biogeochemical processes

Biogeochemical processes could potentially be influenced through effects on various decomposition organisms like worms, collembols, fungi and bacteria. Such an effect could occur during cultivation or when residue products like

manure are spread on fields. One important precondition for such an influence is lacking, since EH92-527-1's composition is no different from that of the conventional potato variety Prevalent, with the exception of the small differences observed for sugars, C-vitamin and glycoalkaloids. The Swedish Board of Agriculture sees no reason to believe that animal decomposers would be significantly affected by the difference in starch composition or the small differences in other substances that have been observed.

On the other hand, micro-flora might be affected to some extent by certain of these substances, mainly as a consequence of the substances' ability to function as substrates for various microorganisms, and the fact that different microorganisms prefer different substrates.

There are results that indicate that starch of different composition may result in small differences in the soil micro-flora composition. The Swedish Board of Agriculture finds it likely that the differences depend on the starch offering slightly different substrates. The differences in available substrates and in substances that can affect other organisms are however larger between two different crops than between two potato clones with slightly different starch composition.

The micro-flora is constantly exposed to shifting effects of climate factors, different cropping methods and cultivation of different crops and varieties. Differences that might be measured during cultivation of EH92-527-1 in comparison with conventional potatoes would be small and of short duration, since micro-flora composition would change radically the next cropping season as a result of switching to other crops and different weather. Such possible differences would probably be of no significance. A detailed investigation of effects on the micro-flora before placing on the market or in a monitoring program would not be proportional to the possible risk from the putative detection of a minor difference in micro-flora composition.

Handling and methods

EH92-527-1 will in the field be handled like conventional starch potatoes, and the cropping methods will be the same as for such potatoes. EH92-527-1 has not been found to be more susceptible to pests or diseases.

Summary of environmental risks

On the whole, the Swedish Board of Agriculture believes that there is a very small possibility that the use of EH92-527-1 applied for could result in negative environmental effects. For reasons of caution, however, the Swedish Board of Agriculture believes that the monitoring programme included in the application is justified, in order to confirm assumptions made in the risk analysis, and in order to detect any risks that have been overlooked.

11. Health risk assessment

Animal health

The by-product pulp, that is the material that remains after the starch has been extracted, will be used as bovine feed. Documentation shows variations in several compositional parameters between years and place of production. Statistically significant changes in nutrient composition in the relevant clone and in the mother variety Prevalent exist as regards

higher level of mono- and disaccharides,

higher level of vitamin C,

lower level of glycoalkaloids (i.a. solanine).

The Swedish Board of Agriculture shares the company's view that the risk that might result as a consequence of the changes presented is that of increased level of glycoalkaloids. However, the clone in question has been shown to contain lower levels than the mother variety Prevalent.

The measured differences fall within the natural variation interval for potatoes, and the Swedish Board of Agriculture finds it of little significance. The feed product is deemed to be substantially equivalent to the corresponding non-GM products, and no health risk is believed to exist. The documented change is within the normal variation interval for potatoes, and the documented change should rather result in a positive health effect on the animals rather than the reverse.

From a nutrition and health point of view the differences cannot be seen as significant, a view that is emphasised by feed trials. Given the data provided in the application and the long experience gained from feed trials of such by-products of starch production, the Swedish Board of Agriculture believes that no additional feed trials are required at this stage. However, the Notifier may have an interest in documenting the variation in the post-market monitoring plan, in order to obtain data for several seasons.

The Swedish Board of Agriculture is of the opinion that the monitoring plan should also include the use of the by-product as feed. Significant deviations and any negative effects associated with the use of by-products as feed should be reported immediately to the Swedish Board of Agriculture.

Human health

EH92-527-1 is not intended for food. The application and approval under Directive 2001/18/EC does not comprise food use. Therefore, no complete food evaluation has been performed. The Swedish Board of Agriculture therefore finds it very important that the potato is kept out of the food chain. The Notifier has established a far-reaching quality assurance system for keeping EH92-527-1 separate from other potatoes (see under the heading Separation). The Swedish Board of Agriculture believes that this system in combination with the innate

characteristics of the potato makes it very unlikely that EH92-527-1 would get into the food chain. However, it cannot be completely ruled out. Therefore, we describe below the Board's estimation – based on the comments from the Swedish National Food Administration – of health effects of a small or temporary intake.

Starch rich in amylopectin does not constitute a health risk to a healthy normal consumer. However, the branched starch molecule (amylopectin) is digested quicker than the corresponding non-branched starch molecule (amylose). This could result in undesirable effects for i.a. diabetics, who could experience a swifter increase in blood glucose levels than intake of other potatoes would result in. Effects on insulin have been noted in studies where animals or people for a long time ate feed or food of conventional origin with different starch composition. It is therefore important that EH92-527-1 is kept well separated from other potatoes, in order to avoid confusion with food potatoes. The obtained difference in starch composition, from ca 85 % amylopectin and ca 15 % amylose to 98 % amylopectin and 2 % amylose, is believed to be of no importance in cases of low or temporary intake. Starch rich in amylopectin is already today used in the food industry.

Significant differences in levels of sugar, glycoalkaloids and vitamin C exist in a comparison between EH92-527-1 and the mother clone Prevalent. However, these levels are within the normal variation for food potatoes. The lower level of glycoalkaloids and higher level of vitamin C in EH92-527-1 is an advantage rather than a drawback.

EH92-527-1 produces only one new protein, NptII, which has not been shown to be neither toxic nor allergenic.

12. Post-Market Monitoring

Case-specific monitoring

The case-specific monitoring will comprise verification of the following assumptions of the risk assessment:

- the genes of interest remain stably inserted,
- the ORF 4 is not expressed at the protein level, and
- the starch composition and the glycoalkaloid content are stable.

The Notifier has developed methods and accounted for sampling and analysis. The suggested case-specific monitoring will continue for five years. After that period the monitoring plan will be evaluated and there will be a possibility for the Swedish Board of Agriculture to revise the monitoring which may result in extension and alterations to the monitoring plan.

The base-line for the parent variety Prevalent and the genetically modified EH92-527-1 are the data the Notifier gathered during previous years cultivation and analysis.

In the Swedish Board of Agriculture's opinion, there is little probability of these assumptions being wrong, but it is still important to monitor these components. In particular, it is important to study how the glycoalkaloid content may turn out to vary depending on the place of cultivation or the weather, since previous studies have indicated a lower level in EH92-527-1 compared to the mother clone Prevalent under stress.

Genetic and epigenetic stability is lower for *in vitro* culture than in later cultivation in the field. Deviating individuals are sorted out at an early stage. The clone EH92-527-1 has been grown for several years in the field and on large areas. It has shown large stability. The Swedish Board of Agriculture sees no reason why this stability should change now. In addition, the Swedish Board of Agriculture predicts that it is very unlikely that a possible rearranging of the DNA sequence or a silencing of the only active gene, *ntpII*, could lead to changes of importance for health or environmental risks.

The Swedish Board of Agriculture considers it very unlikely that translation of ORF4 could happen in the potato, considering i.a. that a translational start in the right reading frame is missing. Furthermore, there is very little reason to expect that the possible expression of a protein from ORF4 would result in negative health effects in animals that will eat the by-products of the potato, considering i.a. that ORF 4 only contains a part of two genes, and that the sequence does not show significant homology to any known allergen. It is therefore reasonable that monitoring is designed to fulfil the most important criterion in this context, that is to detect and avoid the unlikely scenario that ORF 4 causes a protein to occur in a significant share of the potatoes.

General surveillance

General surveillance shall enable detection of effects unanticipated in the risk assessment.

In the Post-market monitoring plan under the heading 2.2. General surveillance it is stated the following: General surveillance is largely based on routine observation and implies the collection, scientific evaluation and reporting of reliable scientific evidence, in order to be able to identify whether unanticipated, direct or indirect, immediate or delayed adverse effects have been caused by the placing on the market of a genetically modified crop in its receiving agronomic or non-agronomic environment.

Farmers that cultivate EH92-527-1 and farmers that use by-products of EH92-527-1 in feed will receive forms where they are told to note all possible unexpected effects. The other part of the Notifier's general monitoring plan focuses on a number of key parameters that could signal the existence of an unforeseen risk. Changes in some of these parameters should also be a precondition for certain kinds of environmental effects to arise. The following focus areas apply at the beginning of the general monitoring:

- General characteristics of the plant, as to colour of the foliage, size and shape of the plant, time to flowering, abortion of flowers, and time to maturity.
- Susceptibility to diseases and pests.
- Management of volunteer potatoes by standard practices.
- The presence of potatoes outside the field – spread.

The general surveillance plan will run throughout the whole consent period, 10 years.

The base-line is the data that the Notifier has gathered during previous years of cultivation and analysis.

The Swedish Board of Agriculture believes that the monitoring of the chosen focus areas and the preparedness to detect all possible unexpected effects during cultivation and feed use are good tools for detecting and counteracting any unexpected adverse effects.

The relevant studies comprise key parameters. In order for an environmental effect to arise as a result of the use of EH92-527-1, a change in one or several of these parameters would probably be necessary.

The Swedish Board of Agriculture does not find it necessary to monitor the use of by-products as fertilizer, for the reasons mentioned under Biogeochemical effects. The monitoring measures required must have a reasonable chance of producing a useful result, and be reasonably cost-efficient.

Analysis, reporting, review and supervision

Data analysis and reporting will be carried out by the Notifier. The competent authorities, especially the Swedish Board of Agriculture, will receive the reports, perform their own analyses and be involved in the review of the monitoring. All data will be made available to the competent authorities.

The case-specific monitoring will generate figures in accordance with established methods. This facilitates the authorities' objective analysis. On the other hand, the general monitoring will be about detecting possible unforeseen effects. To a certain extent, this monitoring will not result in figures. This means that there is more need for an external actor in this part of the general monitoring. To some extent, detection and primary reporting of the unexpected effects will be done by farmers during cultivation, handling and feed use. For many reasons, the farmers are a useful group of monitoring actors. They are more independent than the Notifier's employees, and they have experience from their cultivation conditions.

Supervision of that the monitoring system is functioning satisfactory as regards reporting and analysis of unexpected effects can be done by the relevant inspection authorities. The Swedish Board of Agriculture will carry out such supervision in Sweden via spot checks.

The Notifier has committed itself to establish studies on quantifying a detected effect, or other targeted studies motivated by the outcome of the monitoring. Decisions on such studies shall be taken in consultation with the competent authorities. The Swedish Board of Agriculture has also added a condition to the approval: if The Swedish Board of Agriculture considers it necessary, external experts, on the Notifiers expense, shall design, carry out or participate in those studies that may potentially be triggered by the results of the monitoring.

The Swedish Board of Agriculture finds that the Notifier's monitoring plan, together with the Swedish Board of Agriculture's condition constitute an appropriate and sufficient monitoring system.

Director General Mats Persson has decided in this matter. Administrative Officer Staffan Eklöf has presented the matter. In the final handling have also participated Chief Lawyer Ellinor Persson, Head of Department Carl Johan Lidén, Heads of Divisions Gabriella Cahlin and Stig Widell, Administrative Officers Jenny Andersson, Malin Carlsson, Kjell Wejdemar and Anders Wennström and the Lawyer Conny Öhman.

Mats Persson

Staffan Eklöf

Copy to: Amylogen HB, c/o Plant Science Sweden AB and BASF Plant Science Holding GmbH