Extended Determination of Nonregulated Status for Syngenta MZHG0JG Corn (*Zea mays*)

In response to a request from Syngenta Seeds, Inc. (hereinafter Syngenta) to extend a determination of nonregulated status to glyphosate and glufosinate resistant corn event MZHG0JG (15-124-01p), the Animal and Plant Health Inspection Service (APHIS) of the United States Department of Agriculture (USDA) has determined, based on similarity to two antecedent organisms, that MZHG0JG corn and progeny derived from it are unlikely to pose plant pest risks and are no longer to be considered regulated articles under APHIS' Biotechnology Regulations (Title 7 of Code of Federal Regulations (CFR), part 340). This extension request is based upon APHIS' determinations of nonregulated status of two antecedent organisms: Bayer/Genective S.A. VCO-Ø1981-5 glyphosate resistant corn (herineafter Genective VCO-Ø1981-5 corn) and Pioneer Hi-Breed International Inc. DP-ØØ4114-3 glufosinate resistant corn (hereinafter Pioneer 4114 corn). Genective VCO-Ø1981-5 corn (petition number 11-342-01p) was deregulated on September 25, 2013 and Pioneer 4114 corn (petition number 11-244-01p) was deregulated on June 20, 2013. APHIS authorizations that were previously required for environmental release, interstate movement, or importation under those regulations will no longer be required for MZHG0JG corn and its progeny. Importation of MZHG0JG corn seeds, other propagative material, and grain for consumption would still be subject to APHIS foreign quarantine notices at 7 CFR part 319 and the Federal Seed Act regulations at 7 CFR parts 201 and 361.

MZHG0JG has been engineered to express two proteins which confer resistance to the herbicides glyphosate and glufosinate. APHIS evaluated the plant pest risk of MZHG0JG by assessing its similarity to the deregulated antecedents, Genective VCO-Ø1981-5 corn and Pioneer 4114 corn. These two corn lines produce proteins which catalyze the same reactions as do the proteins produced in MZHG0JG corn.

APHIS previously conducted Plant Pest Risk Assessments on the antecedent organisms and found them unlikely to pose risks as plant pests. Based on a the plant pest similarity assessment (see Appendix A) of MZHG0JG to the antecedents, APHIS concludes that MZHG0JG corn is unlikely to pose a plant pest risk and should no longer be regulated under 7 CFR part 340. From the similarity assessment APHIS concludes the following with respect to MZHGOJG corn and its progeny:

(1) No plant pest risk was identified from the transformation process, the insertion and/or expression of new genetic material, or from changes in metabolism in MZHG0JG corn.

(2) Disease and pest incidence and/or damage is not expected to be increased or atypical for MZHG0JG corn. No plant pest effects are expected on these or other agricultural products and no impacts are expected to APHIS pest control programs.

(3) Based on the proteins introduced, and their similarity to the antecedents, MZHG0JG corn is unlikely to adversely impact nontarget organisms beneficial to agriculture.

(4) MZHG0JG corn is no more likely to become weedier or more difficult to control as a

weed than the antecedents, which are not weedy.

(5) Gene introgression from MZHG0JG corn into wild relatives in the United States and its territories is extremely unlikely and is not likely to increase the weediness potential of any resulting progeny nor adversely affect the genetic diversity of related plants any more than would cultivation of traditional or other specialty corn varieties.

(6) Significant changes to agricultural or cultivation practices (e.g. pesticide applications, tillage, irrigation, harvesting, etc.) from adoption of MZHG0JG corn are not expected.

(7) Horizontal gene transfer of the new genetic material inserted into the GE plant to other organisms is highly unlikely, and is not expected to lead directly or indirectly to disease, damage, injury or harm to plants, including the creation of new or more virulent pests, pathogens, or parasitic plants.

In addition to our finding that MZHG0JG corn is unlikely to pose a plant pest risk, APHIS prepared an Environmental Assessment and reached a Finding of No Significant Impact (FONSI) for this action. Deregulation of MZHG0JG corn will have no significant impacts, individually or collectively, on the quality of the human environment and will have no effect on federally listed threatened or endangered species, species proposed for listing, or their designated or proposed critical habitats (http://www.aphis.usda.gov/biotechnology/not_reg.html).

Based on my review and consideration of all of the scientific and environmental data, analyses, information, and previous conclusions regarding the plant pest risk assessments for the two antecedent organisms, the plant pest risk similarity assessment, the EA and FONSI, and my knowledge and experience as the APHIS Deputy Administrator for Biotechnology Regulatory Services, I have determined and decided that this determination of nonregulated status of MZHG0JG corn is the most scientifically sound and appropriate regulatory decision.

M. J. Firko

11/30/2015

Michael J. Firko, Ph.D.
APHIS Deputy Administrator
Biotechnology Regulatory Services
Animal and Plant Health Inspection Service
U.S. Department of Agriculture

Date

Appendix A

Syngenta Seeds Inc. Request (15-124-01p) for Extension of Determination of Non-regulated Status of MZHG0JG corn

OECD Unique Identifier: SYN-ØØØJG-2

Plant Pest Risk Similarity Assessment

July 2015

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Introduction

The Animal and Plant Health Inspection Service (APHIS) of the United States Department of Agriculture (USDA) has received an extension request (15-124-01p) from Syngenta Seeds, Inc. (hereafter referred to as Syngenta). In accordance with §340.6(e)(2), Syngenta requests APHIS' determination of nonregulated status for Bayer/Genective S.A. VCO-Ø1981-5 glyphosate resistant corn (hereafter Genective VCO-Ø1981-5 corn) and Pioneer Hi-Breed International Inc. DP-ØØ4114-3 glufosinate resistant corn (hereinafter Pioneer 4114 corn) be extended to Syngenta's event MZHG0JG corn which is resistant to both glyphosate and glufosinate. Nonregulated status would also be extended to crosses of MZHG0JG corn with conventional corn or other nonregulated corn varieties. USDA announced its determination of nonregulated status for Genective VCO-Ø1981-5 corn (11-342-01p) on September 25, 2013 and Pioneer 4114 corn (11-244-01p) on June 20, 2013.

APHIS regulations in 7 CFR part 340 regulate the introduction (importation, interstate movement, or release into the environment) of certain GE organisms and products. A GE organism is no longer subject to the regulatory requirements of Part 340 when APHIS determines that it is unlikely to pose a plant pest risk. A GE organism is considered a regulated article under Part 340 if the donor organism, recipient organism, or vector, or vector agent used in engineering the organism belongs to any genera or taxa designated in 7 CFR 340.2 and meets the definition of plant pest, or is an unclassified organism and/or an organism whose classification is unknown, or any product which contains such an organism, or any other organism or product altered or produced through genetic engineering which the Administrator determines is a plant pest or has reason to believe is a plant pest. MZHG0JG corn was produced by the *Agrobacterium tumefaciens* mediated transformation of immature embryos , and some of the introduced regulatory sequences come from plant pest organisms listed in 7 CFR 340.2 (Syngenta, 2015). Therefore, the MZHG0JG corn is considered a regulated article under APHIS regulations at 7 CFR part 340.

Potential impacts in this Plant Pest Risk Similarity Assessment are those that pertain to plant pest risk associated with MZHG0JG corn and its progeny and their use in the absence of confinement relative to the antecedent organisms Genective VCO-Ø1981-5 corn and Pioneer 4114 corn. APHIS utilizes data and information submitted by the applicant, in addition to current literature, to determine if MZHG0JG corn is any more likely than the Genective VCO-Ø1981-5 corn and Pioneer 4114 corn to pose a plant pest risk. APHIS specifies in 7 CFR 340.6(e) that an extension request for nonregulated status shall include information to establish the similarity of the antecedent organism to the regulated article in question. As of May 2015, APHIS has deregulated seven GE corn varieties to resist glyphosate and eight corn varieties GE to resist glufosinate. One of these de-regulated lines, GA 21, has the same amino acid sequence for the EPSPS protein as MZHG0JG, however, mechanism of action is the primary consideration for similarity with respect to plant pest risks and APHIS finds the Genective VCO-Ø1981-5 corn and Pioneer 4114 corn to be suitable antecedents. These are the most recent deregulations reflecting the latest literature and analysis reviews.

APHIS may also consider information relevant to reviews conducted by other agencies that are part of the 'Coordinated Framework for the Regulation of Biotechnology'(51 FR 23302, 1986; 57 FR 22984, 1992). Under the Coordinated Framework, the oversight of biotechnology-derived plants rests with APHIS, the Food and Drug Administration (FDA), and the Office of Pesticide Programs of the U.S. Environmental Protection Agency (EPA). Depending on its characteristics, certain biotechnology-derived products are subjected to review by one or more of these agencies.

Development of MZHG0JG Corn

Syngenta genetically engineered corn with two genes, *epsps* and *pat* to develop MZHG0JG corn that is resistant to both glyphosate and glufosinate derived herbicides. Rather than traditionally breeding separate deregulated cultivars to achieve the dual herbicide resistance, Syngenta has genetically engineered the two traits into one variety. The *epsps* gene in MZHG0JG corn is derived from corn and the *epsps* gene from Genective VCO-Ø1981-5 corn is derived from the bacterium *Arthrobacter globiformis*; however the enzymatic activity of both proteins catalyze the same reaction, the synthesis of 5-enolpyruvylshikimate-3-phosphate from phosphoenolpyruvate and 3-phosphoshikimate. MZHG0JG corn expresses phosphinothricin acetyltransferase (PAT) protein which is identical to the PAT protein expressed in Pioneer 4114 corn.

APHIS BRS completed plant pest risk assessments and environmental assessments (EAs) for Genective VCO-Ø1981-5 corn and Pioneer 4114 corn (http://www.aphis.usda.gov/biotechnology/not_reg.html). The EAs fully addressed all resource areas of potential concern. In both petitions, APHIS concluded on the basis of the EA that the impacts would not be significant. The agency issued Findings of No Significant Impacts (FONSI) and made determinations of nonregulated status for each. The EPSPS and PAT proteins have a history of safe use in agricultural crop commodities.

Description of Inserted Genetic Material, Its Inheritance and Expression, Gene Products, and Changes to Plant Metabolism

To inform APHIS of the potential hazards resulting from the genetic modification and potential routes of exposure related to the inserted DNA and its expression products, APHIS assessed data and information presented in the extension request related to the similarity of MZHG0JG corn to Genective VCO-Ø1981-5 corn and Pioneer 4114 corn: the transformation process; the source of the inserted genetic material and its function in both the donor organism and the GE crop event; and the integrity, stability and mode of inheritance of the inserted genetic material through sexual or asexual reproduction and the number of loci inserted.

APHIS also assessed data presented in the extension request on whether the genetic modification results in expression of new genes, proteins, or enzymes or changes in plant metabolism or composition in the MZHG0JG corn. The assessment encompasses a consideration of the expressed EPSPS and PAT proteins and any observed or anticipated effects on plant metabolism including, e.g. any relevant changes in levels of metabolites, antinutrients, or nutrients in forage and grain derived from the MZHG0JG corn compared to Genective VCO-Ø1981-5 corn, Pioneer 4114 corn or unmodified corn.

Description of the genetic modification and inheritance of inserted DNA

Syngenta used the transformation plasmid pSYN18857 to produce MZHG0JG corn through *Agrobacterium tumefaciens* mediated transformation as described in Syngenta's extension request (Syngenta, 2015, p. 21). Syngenta engineered the pSYN18857 plasmid to contain expression cassettes for *mepsps-02* and *pat-09* which confer glyphosate and glufosinate resistance respectively.

Expression cassette *mepsps-02*:

- FMV-05 enhancer from figwort mosaic virus (FMV) enhancer region (similar to National Center for Biotechnology Information [NCBI] accession number X06166.1)
- 35S-05 enhancer from cauliflower mosaic virus (CMV) 35S enhancer region (Ow *et al.*, 1987).
- Ubi158-02 promoter from corn, based on the Ubiquitin ZmU29158-3 gene NCBI accession number S94466.1; Christensen *et al.*, 1992).
- TMV-03 enhancer from tobacco mosaic virus (TMV); the reverse orientation of the 5' non-coding leader sequence (called omega) (Gallie *et al.*, 1987)
- Optimized transit peptide (OTP-02) based on N-terminal chloroplast transit peptide sequences from *Helianthus annuus* (sunflower) and corn (Lebrun *et al.*, 1996).
- *mepsps-02* modified gene from corn *mepsps* (*Zea mays*); confers tolerance to glyphosate (Lebrun *et al.*, 2003).
- Ubi158-02 terminator from corn, based on the Ubiquitin ZmU29158-3 gene. It is similar to the corn polyubiquitin terminator (NCBI accession number S94466.1; Christensen *et al.*, 1992). The original Ubi158 terminator was altered by 1 bp to eliminate an unintended open reading frame.

Expression cassette *pat-09*:

- 35S-19 promoter region of CMV (Odell *et al.*, 1985).
- *pat-09* gene from *S. viridochromogenes* strain Tü494; confers resistance to phosphinothricin.
- NOS-05-01 terminator from *Agrobacterium tumefaciens*.

In addition to the above genetic elements, the inserted T-DNA contains short non-coding intervening DNA sequences. These intervening sequences contain restriction enzyme recognition sites used for cloning purposes. The T-DNA also contains the left and right border sequences (approximately 25 bps each) from the *Agrobacterium tumefaciens* Ti plasmid.

APHIS reviewed the information provided by Syngenta in the extension request and determined the following:

- The T-DNA inserted into the corn genome is present at a single locus and contains a single copy of the transgene.
- The T-DNA is stably inherited from generation to generation.
- MZHG0JG corn does not contain any back bone sequence of extraneous DNA fragments from the transformation plasmid pSYN18857.
- During the transformation process, 21 base pairs of the left border sequence and 22 base pairs of the right border sequence of the T-DNA were truncated. These sequences are outside of the functional DNA elements and are not expected to impact expression of the transgenes.

Expression of inserted DNA and changes in gene expression, new proteins or metabolism

The safety of the EPSPS and PAT proteins has been previously established (Herouet *et al.*, 2005; ILSI, 2011a; ILSI, 2011b; OECD 1999a; OECD 1999b). Furthermore, EPA has provided a permanent exemption for EPSPS and PAT proteins from food and feed tolerances in all crops in the United States (U.S. EPA, 2007). The mEPSPS protein expressed in MZHG0JG corn has the identical amino acid sequence as the mEPSPS protein expressed in a previously deregulated, commercially available GE corn, GA21 corn (USDA, 1997). The PAT protein expressed in MZHG0JG corn has the identical amino acid sequence as the PAT protein expressed in a previously deregulated, commercially available GE corn, Bt11 corn (USDA, 1996).

D. Potential Plant Pest and Disease Impacts

APHIS assessed data and information presented in the extension request related to the similarity of MZHG0JG corn to Genective VCO-Ø1981-5 corn and Pioneer 4114 corn to determine whether potential plant pest or disease impacts are likely to result from the transformation process, from DNA sequences from plant pests, or from any other expression products, new enzymes, proteins or changes in plant metabolism or composition in MZHG0JG corn that are known or anticipated to cause disease symptoms, or to affect plant pests or diseases or plant defense responses. APHIS also assessed whether MZHG0JG corn is more likely to have significantly increased disease and pest susceptibility as compared to Genective VCO-Ø1981-5 corn and Pioneer 4114 corn. Impacts or changes in similarity to the two antecedents was assessed to determine if they would (1) affect MZHG0JG corn and/or result in significant introduction or spread of a damaging pest or disease to other plants; (2) result in the introduction, spread, and/or creation of a new disease; and/or (3) result in a significant exacerbation of a pest or disease for which APHIS has a control program.

Plant Protection and Quarantine (PPQ) is an APHIS program that safeguards agriculture and natural resources from the entry, establishment, and spread of animal and plant pests and noxious weeds into the United States; and supports trade and exports of U.S. agricultural products. PPQ responds to new introductions of plant pests to eradicate, suppress, or contain them through various programs in cooperation with state departments of agriculture and other government agencies. These may be an emergency or longer term domestic programs that target a specific pest. A variety of insect, plant disease, mollusk, nematode or weed programs exist (USDA-APHIS-BRS, 2014a), however, none specifically target pests of MZHG0JG corn.

Corn itself is not considered a plant pest in the United States (7CFR 340.2). MZHG0JG corn EPSPS protein has an identical amino acid sequence as the corn EPSPS protein produced in GA21 corn (USDA, 1997) and the enzymatic activity of the expressed protein is functionally equivalent to the EPSPS protein from Genective VCO-Ø1981-5 corn. Additionally, MZHG0JG expresses the protein phosphinothricin acetyltransferase (PAT) which is identical to the PAT protein expressed in Pioneer 4114 corn.

Because the EPSPS protein in MZHG0JG is identical to previously deregulated GA21 in corn and functionally equivalent to the EPSPS protein from Genective VCO-Ø1981-5 corn and the PAT protein is identical to the PAT protein in Pioneer 4414 in corn, no significant changes in composition are expected from the expression of both genes in MZHG0JG. Similarly, MZHG0JG is not expected to differ from the antecedents in its ability to harbor or transmit plant pathogens or pests and cause indirect plant pest effects on other agricultural products.

E. Potential Impacts on Nontarget Organisms Beneficial to Agriculture

APHIS has previously evaluated the potential impacts on nontarget organisms beneficial to agriculture that could result from the deregulation of Genective VCO-Ø1981-5 corn expressing the EPSPS ACE5 protein from *Arthrobacter globiformis* and of Pioneer 4114 corn expressing the PAT protein from *Streptomyces viridochromogenes*. These antecedents were both found to be unlikely to have an adverse effect on nontarget organisms in the environment. The EPSPS protein expressed in MZHG0JG corn is a variant of the EPSPS protein expressed in Genective VCO-Ø1981-5 corn. These proteins catalyze the same reaction and confer the phenotype. In addition to the EPSPS protein in MZHG0JG corn being similar to the antecedent, it is exactly the same protein as in GA21 corn de-regulated in 1997

(USDA-APHIS 1997). This family of proteins is one of the most commonly used features of genetically engineered crops and has a long history of safe use.

In addition, the PAT protein expressed in MZHG0JG corn and the gene that encodes it are the same as is found in the antecedent, Pioneer 4114 corn, as well as other GE crops with de-regulations dating back to 1997. The PAT protein also has a long history of safe use.

Based on the high similarity of MZHG0JG corn to the antecedents expressing similar proteins, and on the finding that the antecedent organisms were unlikely to harm nontarget organisms, APHIS concludes that it is unlikely that MZHG0JG corn will have an adverse effect on nontarget organisms, including those beneficial to agriculture.

F. Potential for Enhanced Weediness of MZHG0JGCorn

APHIS has previously assessed the potential of the two antecedent corn events, Genective VCO-Ø1981-5 corn and Pioneer 4114 corn, to become weeds. In addition, APHIS has also assessed the potential weediness of many other genetically engineered corn events representing a variety or traits. For both the antecedents and other GE corn, it was concluded that the new traits would not make the corn any more likely to become a weed. And therefore, because of the similarity of MZHG0JG to these antecedents, MZHG0JG is no more likely to be a weed either.

The biology of corn is well studied and understood. As documented in the PPRAs of the antecedent organisms, corn is not listed as a weed (Crockett, 1977; Muenscher, 1980), nor is it present on the Federal Noxious Weed List (7 CFR part 360.200). Corn possesses few of the characteristics of those plants that are notably successful as weeds (Baker, 1965; Keeler, 1989).

In addition to considerations of the known biology of corn, APHIS analyzed information submitted in the petitions on the antecedent organisms on a suite of agronomic phenotypic characteristics and plant-disease and plant-insect interactions. This agronomic data from the field showed that the antecedents were not different than their non-transgenic comparator. The assessments concluded that the antecedents were unlikely to become weeds. Based on the high similarity of MZHG0JG corn to the antecedents expressing similar proteins, and on the finding that the antecedent organisms were unlikely to become weeds, APHIS concludes that it is unlikely that MZHG0JG corn will become a weed.

G. Potential Impacts on the Weediness of Any Other Plants with which MZHG0JG Corn Can Interbreed

APHIS evaluated the potential for gene introgression to occur from the two antecedent corn events, Genective VCO-Ø1981-5 and Pioneer 4114 corn, to sexually compatible wild relatives and considered whether such introgression would result in increased weediness. Those assessments found that while first generation hybrids can be formed with corn's closest relative, teosinte, the hybrids are weak and do not contribute to gene flow in subsequent generations. Also, the geographic distribution of teosinte is highly limited in the United States to fairly rare, sparsely dispersed feral populations in Florida. *Tripsacum* is not as closely related to corn as teosinte, but can be successfully hand crossed with corn to form hybrids. However, the many biological and geographic constraints such as distribution, genetic incompatibility, and temporal separation of flowering time make gene flow nearly impossible. Thus introgression from cultivated corn to either of these wild relatives is highly unlikely.

These sexually compatible relatives of corn are not considered to be weeds in the United States (Holm *et al.*, 1979) and the PPRAs of the antecedents conclude that in the highly unlikely event that they acquire the new traits through gene flow; the traits would not be expected to transform them into weeds. Based on the high similarity of MZHG0JG corn to the antecedents expressing similar proteins, and on the finding that the antecedent organisms were unlikely to cause wild relatives to become weeds, APHIS concludes that it is unlikely that MZHG0JG corn will cause the wild relatives of corn to become weeds.

H. Potential Changes to Agriculture or Cultivation Practices

APHIS assessed whether significant changes to agricultural or cultivation practices from the two antecedent corn events, Genective VCO-Ø1981-5 and Pioneer 4114 corn is likely to impact plant diseases or pests or their management, including any APHIS control programs. This includes consideration of any changes in pesticide applications, tillage, irrigation, harvesting, etc. as they relate to plant pests and diseases.

APHIS did not identify any significant changes to agricultural or cultivation practices (e.g. pesticide applications, tillage, irrigation, harvesting, rotations, management of volunteers, etc.) from the two antecedent corn events, Genective VCO-Ø1981-5 and Pioneer 4114 corn and concluded that, no impact on plant diseases or pests or their management is likely to occur. Based on the similarity of MZHG0JG to the antecedents expressing similar proteins, APHIS concludes that it is unlikely that any significant changes to agriculture or cultivation practices would be associated with MZHG0JG corn and therefore no impact on plant diseases or pests of their management is likely to occur.

I. Potential Impacts from Transfer of Genetic Information to Organisms with which MZHG0JG Cannot Interbreed

APHIS has previously examined the potential for the antecedent corn events Genective VCO-Ø1981-5 corn expressing the EPSPS ACE5 protein and of Pioneer 4114 corn expressing the PAT protein to be horizontally transferred without sexual reproduction to other organisms and whether such an event could lead directly or indirectly to disease, damage, injury or harm to plants, including the creation of new or more virulent pests, pathogens, or parasitic plants. The horizontal gene transfer between unrelated organisms is one of the most intensively studied fields in the biosciences since 1940, and the issue gained extra attention with the release of transgenic plants into the environment (Dröge *et al.*, 1998). Potential risks from stable horizontal gene transfer (HGT) from GE organisms to another organism without reproduction or human intervention were recently reviewed (Keese, 2008). Mechanisms of HGT include conjugation, transformation and transduction, and other diverse mechanisms of DNA and RNA uptake and recombination and rearrangement, most notably through viruses and mobile genetic elements. APHIS has previously reviewed the potential for horizontal gene transfer from GE corn to bacteria, fungi, invertebrates, viruses, and parasitic plants (USDA, 2013a; 2013b)

APHIS previously concluded that HGT of the inserted genetic material from the two antecedent corn events Genective VCO-Ø1981-5 corn expressing the EPSPS ACE5 protein and of Pioneer 4114 corn expressing PAT protein to other organisms is highly unlikely, and is not expected to lead directly or indirectly to disease, damage, injury or harm to plants, including the creation of new or more virulent pests, pathogens, or parasitic plants. Therefore, APHIS concludes that HGT from MZHG0JG corn to other organisms is also highly unlikely.

J. Conclusion

APHIS has reviewed the information submitted in the extension request, supporting documents, and other relevant information to assess the similarity of plant pest risk of the MZHG0JG corn compared to the two antecedent corn events Genective VCO-Ø1981-5 corn expressing the EPSPS ACE5 protein and of Pioneer 4114 corn expressing the PAT protein. APHIS concludes that the MZHG0JG corn is **no more likely** to pose a plant pest risk than the previously deregulated antecedent events Genective VCO-Ø1981-5 corn and Pioneer 4114 corn.

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Appendix B - Similarity Table

Extension Request and Petitions of Antecedents		**Extension Request MZHG0JG Petition 15-124-01p**	**Antecedent 1 VCO-Ø1981-5 Petition 11-342-01p**	**Antecedent 2 Pioneer 4114 Petition 11-244-01p**	**Comments**
Organism		**corn**	**corn**	**corn**	
Phenotype		Glyphosate and glufosinate resistant	Glyphosate resistant	Glufosinate resistant and lepidopteran and coleopteran resistant	Numerous deregulations with glyphosate and glufosinate phenotypes Insect resistant phenotypes in the antecedent are not relevant to the extension.
Genotype	**epsps**	*epsps* from maize promoter and terminator from the maize ubiquitin gene enhancers from 35S CaMV and FMV	*epsps* from *Arthrobacter globiformis* Promoter from ubiquitin-4 gene from *Saccharum officinarum;* Terminator from *35S CaMV*		*epsps* genes are from different sources, but catalyze the same reactions Utilize different promoters, but both are constitutive.
	pat	*pat* from *Streptomyces viridochromogenes*		*pat* from *Streptomyces viridochromogenes*	Same genes

		Promoter from *35S CaMV and nos* terminator from *Agrobacterium*		Promoter and terminator from *35S CaMV*	Same promoters
Extension Request and Petitions of Antecedents		**Extension Request MZHG0JG Petition 15-124-01p**	**Antecedent 1 VCO-Ø1981-5 Petition 11-342-01p**	**Antecedent 2 Pioneer 4114 Petition 11-244-01p**	**Comments**
Organism		**corn**	**corn**	**corn**	
Transformation Method		*Agrobacterium tumefaciens*–mediated	*Agrobacterium tumefaciens*–mediated	*Agrobacterium tumefaciens*–mediated	Same
Insert and Copy Number		Single intact insertion	Single intact insertion	Single intact insertion	Same
Backbone Absent		Yes	Yes	Yes	Same
Compositional analysis		Compositionally equivalent to conventional corn	Compositionally equivalent to conventional corn	Compositionally equivalent to conventional corn	Same
Mechanism of Action		EPSPS Same as **Genective VCO-Ø1981-5)**	Same	N/A	Same as Antecedent 1 (VCO-Ø1981-5)
		PAT	N/A	Same	Same as Antecedent 2

	Same as **Pioneer 4114**			(Pioneer 4114)
Date of antecedent EA/ EIS	N/A	April 2013	May 2013	
Extension Request and Petitions of Antecedents	**Extension Request MZHG0JG Petition 15-124-01p**	**Antecedent 1 VCO-Ø1981-5 Petition 11-342-01p**	**Antecedent 2 Pioneer 4114 Petition 11-244-01p**	**Comments**
Organism	**corn**	**corn**	**corn**	
Disease and pest susceptibilities	Similar as antecedents	Unlikely to change disease and pest susceptibilities	Unlikely to change disease and pest susceptibilities	
Impacts on beneficial non-targets	Similar as antecedents	Unlikely to impact beneficial non-target organisms	Unlikely to impact beneficial non-target organisms	
Enhanced weediness	Similar as antecedents	Unlikely to enhance weediness	Unlikely to enhance weediness	
Enhanced weediness of relatives	Similar as antecedents	Unlikely to enhance weediness of relatives	Unlikely to enhance weediness of relatives	
Changes to agriculture or cultivation practices	Similar as antecedents	Unlikely to change agriculture or cultivation practices	Unlikely to change agriculture or cultivation practices	

Horizontal Gene Transfer	Similar as antecedents	Unlikely to affect the probability of horizontal gene transfer	Unlikely to affect the probability of horizontal gene transfer	
Plant Pest Risk	Similar as antecedents	Unlikely to pose a plant pest risk	Unlikely to pose a plant pest risk	