

US EPA ARCHIVE DOCUMENT



5-8-96  
Vickie Walters  
PM 25

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

May 8, 1996

OFFICE OF  
PREVENTION, PESTICIDES AND  
TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: PP No. 6E04645. Glyphosate (103601) in or on Imported Oats. Review of Residue Data and Analytical Methodology. D223639. Case No. 287213. CB No. 16948. MRID Nos. 43870200, 43870201, 43870202, 43870203, 43870204, 43927401, 43927402.

FROM: Stephanie H. Willett, Chemist *SHW*  
Tolerance Petition Section II  
Chemistry Branch I-Tolerance Support  
Health Effects Division (7509C)

THRU: Edward Zager, Acting Branch Chief  
Chemistry Branch I-Tolerance Support  
Health Effects Division (7509C) *Edward Zager*

TO: Debbie McCall, Acting Section Head  
Registration Section, RCAB/HED (7509C)

Background

Monsanto is requesting a 20 ppm tolerance for residues of the herbicide glyphosate (N-(phosphonomethyl)-glycine) in/on imported oats. According to the petitioner, preharvest uses of glyphosate on oats, similar to the use requested in this petition, have been registered in a number of European countries over the past decade. Canadian regulatory authorities are in the final stages of granting this use on oats in Canada. The petitioner states that according to the American Oat Association, the majority of oats imported into the U.S. are produced in Canada. Some oats are also imported from Sweden and Finland, but the preharvest use of glyphosate is not registered in either of these latter two European countries.

Tolerances for glyphosate and its major metabolite AMPA (aminomethyl phosphonic acid), are currently established for numerous raw agricultural commodities, processed foods and feeds under 40 CFR § 180.364, 185.3500 and 186.3500, respectively. The Glyphosate Reregistration Eligibility Decision (RED) document was issued in September 1993. In that document, it was concluded that dietary risk resulting from the (then) established tolerances ( $\geq 85$ ) and registered uses of pesticide products containing the isopropylamine and sodium salts of glyphosate was minimal.

Conclusions Resulting From Review of This Submission

- 1) The registrant must verify that inert ingredients used in foreign Roundup end use products that are likely to be used on oats exported to the U.S. are safe for food use.
- 2) For the purposes of this import tolerance, the foreign uses have been adequately described.
- 3) The nature of the residue in plants and animals is adequately understood. The residue to be regulated is parent glyphosate. The HED Metabolism Committee has decided that only glyphosate parent is to be regulated in plant and animal commodities, and that AMPA is not of toxicological concern regardless of its level in food (Memo, R. Perfetti 3/17/94).
- 4) Adequate enforcement methods are available for analysis of residues of glyphosate in or on plant commodities.
- 5) The referenced residue data adequately support the requested tolerance of 20 ppm for residues of glyphosate on imported oats. Additional residue data may be required in the event that a U.S. registration for use of glyphosate on oats is sought.
- 6) CBTS can tentatively conclude that the processing study data are adequate. However, supporting information concerning the oat processing study (RD NO. 1326/MRID No. 43870204) should be submitted. The petitioner should provide details on the conduct of the study (i.e. scale size, amount of grain processed), provide some details on the analytical methodology, and sample chromatograms.
- 7) Monsanto has not requested import tolerances for oat forage, oat hay or oat straw since these commodities are used typically as on-farm animal feed items, and it is extremely unlikely that these commodities would enter channels of trade in the U.S..

CBTS concurs with Monsanto's position that tolerances are not needed for oat forage, oat hay or oat straw. Additionally, it can be reasonably concluded that imported meat, milk, poultry or eggs adulterated as a result of the glyphosate uses on oats described herein would not contain unacceptable residue levels.<sup>1</sup>

- 8) Maximum residue limits (MRLs) of 20 ppm, 10 ppm and 0.1 ppm on oats are established/pending for CODEX, Canada and Mexico,

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<sup>1</sup>It is assumed that animal feeding practices are similar to those in the U.S..

respectively (see attachments 1 and 2). The petitioner states that a 20 ppm import tolerance is being proposed in order to harmonize with other international MRLs, and that the establishment of the requested tolerance will protect public health and prevent possible barriers to trade between countries.

### Recommendations

With the submission of the additional information specified in conclusions 1 and 6 above, CBTS can recommend for the establishment of the requested 20 ppm tolerance to allow the import of oats treated with glyphosate outside of the U.S.. Additional data may be required if and when a domestic registration for use of glyphosate on oats is sought.

**NOTE TO RCAB: A DRES run may be initiated at this time using a tolerance level of 20 ppm for oats. So that exposure resulting from this use is not unnecessarily overestimated, reliable data concerning the amount of oats imported into the U.S. should be used in the dietary exposure/risk analysis.**

### Detailed Considerations

#### Product Chemistry

CBTS assumes that since Monsanto is the registrant for both domestic and exported glyphosate products, the manufacturing process of the technical grade active ingredient is essentially the same, and therefore has been adequately described (see Glyphosate RED).

Several Roundup end use products are worldwide. Since foreign Roundup end use products may possibly contain different inert ingredients than those cleared for use in domestic products, the registrant must verify that inert ingredients used in the end use products that are likely to be used on oats exported to the U.S. are safe for food use (see also pending import tolerance on barley, rape, peas and lentils, PP No. 2E4118).

#### Proposed Use

The glyphosate uses in countries which are likely to export to the U.S. vary somewhat according to location. A summary of the use rates and conditions follow.

TABLE 1: SUMMARY OF INTERNATIONAL PREHARVEST USES OF GLYPHOSATE ON OATS

COUNTRY	APPLICATION RATE (L Roundup*/ha)	PREHARVEST INTERVAL (days)	SEED MOISTURE CONTENT
United Kingdom	4	7	<30%
Ireland	2-4	7	<30%
Germany	3-5	14	Lodged <25%
Denmark	2-3	10	<30%
The Netherlands	3-6	7	<30%
Belgium	3-4	7	<30%
Canada	2.5	7-14	<30%

\* In these end use products, 1 Liter Roundup typically contains 360 g/L glyphosate acid equivalents (ae)

Application is by ground equipment, in 40 to 250 L water/ha. Representative labels with their applicable English translations from the U.K., Ireland, Germany, Denmark, the Netherlands, Belgium and Canada were contained in the submission.

CBTS concludes that for the purposes of this import tolerance, the foreign uses have been adequately described.

#### Plant and Animal Metabolism

The HED Metabolism Committee has decided that only glyphosate parent is to be regulated in plant and animal commodities, and that AMPA is not of toxicological concern regardless of its level in food (Memo, R. Perfetti 3/17/94).

#### Analytical Methodology

Adequate enforcement methods are available for analysis of residues of glyphosate in or on plant commodities. These methods include GLC (PAM II; the limit of detection is 0.05 ppm), and HPLC with fluorometric detection. Use of the GLC method is being discouraged due to lengthiness of the procedure. The HPLC method has undergone successful Agency validation and was recommended for inclusion in PAM II; the limit of detection is 0.0005 ppm. A GC/MS method for glyphosate in crops has also been validated by ACL (Memo, G. Kramer 3/21/95). This method has not yet been submitted for publication in PAM-II.

Residue Data

Monsanto submitted residue data from trials conducted from 1993 to 1994 in Canada (MRID Nos. 43927401, 43927402), and from 1978 to 1986 in Europe (43870201, 43870202 and 43870203). All of the data have been previously reviewed by the Pest Management Regulatory Agency of Canada in support of Canadian or Codex MRL's and determined to be acceptable (see attachment 1). Table 1 summarizes the residue data as reviewed by PMRA.<sup>2</sup>

TABLE 2. SUMMARY OF GLYPHOSATE RESIDUES IN OATS (INTERNATIONAL TRIALS)

Country	Rate (kg ae/ha)	# of Sites	PHI (days)	Glyphosate Residues (ppm)	Median Glyphosate (ppm)
Canada	0.9	7	7-14	0.9-6.2	3.6
Canada <sup>3</sup>	1.8 (2X)	1		13-16	15
Norway	1.0	4	7-15	1.0-3.1	2.2
Finland	1.08	4	7-14	2.8-13	10
Europe <sup>4</sup>	1.44	20	5-15	1.0-10	4.7
Germany	1.8	7	5-14	4.3-17	8.3

CBTS concludes that the residue data adequately support the requested tolerance of 20 ppm for residues of glyphosate on imported oats.<sup>5</sup> Additional residue data may be required in the event that a U.S. registration for use of glyphosate on oats is sought.

**Processing Study Data**

Oats may be processed to produce flour and groats/rolled oats. Therefore the petitioner has submitted processing study data.

Oat grain from a field trial conducted in 1981 in the U.K. (MRID No. 43870204) was processed to groats and hulls. Glyphosate residue levels in oat grain from 0.5X, 1X and 2X the European label rate [4L Roundup (1.44 kg ae)/ha] and harvested 7 days after treatment

<sup>2</sup>EPA/OPP and the Pest Management Regulatory Agency of Canada (PMRA) recently announced that it would share pesticide data reviews. See EPA Press Advisory dated Monday April 22, 1996.

<sup>3</sup>These residue data were generated at a site in Oakville Manitoba. The plot was shorter and wider than the other sites, and required two passes with the sprayer. This possibly resulted in considerable overlap resulting in a 2X rate and higher residue values. The Canadian MRL is 10 ppm (see attachment 1).

<sup>4</sup>See also PP No. 2E4118, MRID No. 43827802.

<sup>5</sup>Draft internal guidance on data requirements for import tolerances suggests that data review of pesticides with existing U.S. tolerances and adequate toxicity studies should be minimal, and that CODEX tolerances should be adopted if possible. See 11/95 CBTS working paper.

ranged from 0.8 to 11.3 ppm. Analyses of the corresponding groat samples indicated no concentration as a result of processing. Residues concentrated an average of 2.6X in oat hulls. However oat hulls are not considered to be a separate human food or animal feed item (see Residue Chemistry Guidelines, Table II September 1995), and so no tolerance is needed for oat hulls. Glyphosate residue levels were not reported for oat flour in this study. However, the petitioner has referenced a wheat milling study to be used as a surrogate which has been previously reviewed by CBTS. That study indicates that glyphosate residues do not concentrate as a result of processing to flour (see 1/29/91 memo of R. Cook, PP No. OF3865).

CBTS can tentatively conclude that the processing study data are adequate. However, supporting information concerning the processing study should be submitted. The petitioner should provide details on the conduct of the European study (i.e. scale size, amount of grain processed), provide some details on the analytical methodology, and sample chromatograms.

#### Secondary Residues in Meat, Milk, Poultry and Eggs

Monsanto has not requested import tolerances for oat forage, oat hay or oat straw since these commodities are used typically as on-farm animal feed items, and it is extremely unlikely that these commodities would enter channels of trade in the U.S..

CBTS concurs with Monsanto's position that tolerances are not needed for oat forage, oat hay or oat straw. Additionally, it can be reasonably concluded that imported meat, milk, poultry or eggs adulterated as a result of the glyphosate uses on oats described herein would not contain unacceptable residue levels.<sup>6</sup> This is based on the fact that glyphosate residues are expected to be nondetectable in milk, meat, fat and eggs at animal exposure levels of up to 400 ppm (see 3/16/96 memo of W. Cutchin, PP No. 8F3673). Glyphosate tolerances for kidney of cattle, goats, hogs, horses, poultry, and sheep are in the process of being raised to 4 ppm as a result of a preharvest use of glyphosate on alfalfa where exposure could be up to 157 ppm (PP No. 4F4312, M. Rodriguez, 1/11/95).

#### Other Considerations

Maximum residue limits of 20 ppm, 10 ppm and 0.1 ppm are established on oats for CODEX, Canada and Mexico, respectively (see attachments 1 and 2). The petitioner states that a 20 ppm import tolerance is being proposed in order to harmonize with other

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<sup>6</sup>It is assumed that animal feeding practices are similar to those in the U.S..

glyphosate, page 7

international MRLs, and that the establishment of the requested tolerance will protect public health and prevent possible barriers to trade between countries.

Attachment 1: 4/19/96 PMRA Canada Review of Preharvest Application of Glyphosate to Oats

Attachment 2: International Residue Limit Status Sheet

cc: Vickie Walters/Robert Taylor (PM 25/RD/7505C), RF, Circ,  
S. Willett, E. Haeberer; PP No. 6E4645

7509C:CM2:RM804C:305-6380:SHWillett:shw-5/2/96

RDI: E. Haeberer, 5/3/96; R. Loranger, 5/6/96; E. Zager, 5/7/96

Attachment 1

PEST MANAGEMENT REGULATORY AGENCY

AGENCE DE RÉGLEMENTATION DE LA LUTTE ANTIPARASITAIRE

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TO/À : Stephanie Willett  
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FROM / DE: Charles Williams  
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DATE: 19/04/96  
PAGES: 7

REMARKS / COMMENTAIRES :

Review of Glyphosate  
pre-harvest Appl on Oats -  
Any questions please call.

- Please call if you have any trouble receiving this fax and let us know if your fax number or telephone number changes.
- Veuillez nous avvertir si vous avez de la difficulté à recevoir cette télécopie et nous avvertir si votre numéro de téléphone ou de télécopieur est change.

December 18, 1995

**GLYPHOSATE**

RE: Review of label, residue data submitted on July 25, 1994, September 14, 1994, May 8, 1995 and May 10, 1995.

Petitioner: Monsanto Canada Inc.

Submission Nos.: S94093900, S94093902, S94093903 and S94093904

Purpose: Monsanto Canada Inc. has requested the review of data submitted in support of oats to the list of crops treated in the preharvest section of the Roundup<sup>®</sup> herbicide label. Monsanto Canada is requesting the establishment of a maximum residue limit (MRL) for glyphosate in oats that is harmonized with current national or CODEX values (i.e., 5-20 ppm).

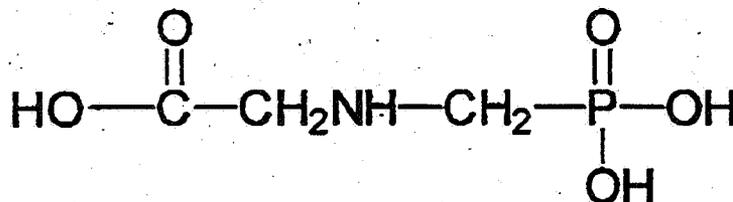
Common Name: Glyphosate

Chemical Name:

IUPAC & CAS Name: N-(phosphonomethyl) glycine

Other Names: Roundup<sup>®</sup>

Chemical Structure:



Chemical Description:

Glyphosate is a systemic, nonselective, postemergent herbicide. The formulation Roundup<sup>®</sup>, contains 356 grams of glyphosate as acid equivalent (ae) per litre of formulation.

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## Residue Data

Document: Part - 5.3, Crop Residue data, Monsanto Canada Inc.,  
July 22, 1994.

Title: Residue data to support the registration of preharvest applications of Roundup<sup>®</sup> herbicide in oats, R.D. 137 C, by P.R. Marshall, July 22, 1994.

## Introduction

Over the last 15 years, Monsanto has conducted trials investigating the residues resulting from preharvest applications of Roundup<sup>®</sup> herbicide in oats. Trials have been conducted in Canada and five European countries. Treatment rates have ranged from 0.9 to 1.8 kg glyphosate ae (2.5 to 5.0 L)/ha. The current glyphosate MRL in oats are 5 ppm (Belgium) and 10 ppm (Germany/Netherlands) based on rates of 1.08 to 1.80 kg glyphosate ae/ha. The current CODEX glyphosate MRL for oats is 20 ppm.

Note: European residue data included in this report were already reviewed in 1989 (rev. October 2, 1989).

## Description of the Study

Four residue trials were conducted at three sites, Dalmeny, Saskatchewan (1); Legal, Alberta (1); and Oakville, Manitoba (2); in 1993. Roundup was applied 7 to 14 days before harvest of the crop when moisture content of the grain was <30%, at the rate of 0.9 kg glyphosate ae/ha at all four sites.

## Analytical Methodology

Glyphosate and its major metabolite aminomethylphosphonic acid (AMPA) were analysed using Monsanto "Analytical Method for Glyphosate and AMPA in Raw Agricultural Commodities", reviewed October 25, 1993. The limit of detection (LOD) for the method of analysis for oats reported was 0.02 ppm for both glyphosate and AMPA (this appears to be LOQ).

## Method Validation

Control samples of oats were spiked with glyphosate and AMPA from 0.010 to 0.33 ppm. Each spiking was equilibrated for 20 minutes prior to extraction. Recoveries of glyphosate and AMPA ranged from 54% to 109% (SD = ± 23) and 52% to 110% (SD = ± 25), with an average of 84% and 88%, respectively.

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## Residues of Glyphosate and AMPA in oats, 1993

Site	Application Rate kg ae/ha	Glyphosate (ppm)	AMPA (ppm)
Dalmeny Saskatchewan			
Control	-	<0.020	<0.020
Oats	0.9	3.9	0.110
Oats	0.9	2.7	0.073
Oats	0.9	2.8	0.077
Legal Alberta			
Control	-	<0.020	<0.020
Oats	0.9	5.5	0.180
Oats	0.9	4.8	0.100
Oats	0.9	4.1	0.081
Oats	0.9	6.2	0.250
Oakville Manitoba			
Control	-	0.21	<0.020
Oats	0.9	4.1	0.110
Oats	0.9	3.5	0.094
Oats	0.9	4.0	0.100
Oats	0.9	3.8	0.090
Oakville* Manitoba			
Control	-	<0.020	<0.020
Oats	0.9	16	0.25
Oats	0.9	13	0.24
Oats	0.9	15	0.22
Oats	0.9	14	0.22

\* This Oakville site was shorter and wider than the other sites, and required two passes with the sprayer. This possibly resulted in considerable overlap resulting in a 2X rate and higher residue values.

All bolded are GAP data.

### Conclusions

Oats were treated preharvest with Roundup at the proposed label rate of 0.9 kg glyphosate ae/ha at four sites, one each in Alberta, Saskatchewan, and two in Manitoba, in 1993. The residues of glyphosate ranged from 2.8 ppm to 6.2 ppm (Median = 4.0 ppm). The residues of AMPA ranged from 0.073 ppm to 0.18 ppm (Median = 0.10 ppm).

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Document: Part - 5.3, Crop Residue data, Monsanto Canada Inc.,  
May 5, 1995.

Title: Additional residue data to support the registration of  
preharvest applications of Roundup<sup>®</sup> herbicide in oats,  
R.D. 143 C by P.R. Marshall, May 5, 1995.

#### Description of the study

Four additional residue trials were conducted at four sites in  
Saskatoon, Saskatchewan; Edmonton, Alberta; Oakville, Manitoba; and  
Ayr, Ontario, in 1994. Roundup was applied 7 to 14 days before  
harvest of the crop when moisture content of the grain was <30%, at  
a rate of 0.9 kg glyphosate ae/ha at all four sites.

#### Residues of Glyphosate and AMPA in oats, 1994

Site	Application Rate kg ae/ha	Glyphosate (ppm)	AMPA (ppm)
Saskatoon Saskatchewan			
Control	-	0.036	<0.010
Oats	0.9	3.2	0.200
Oats	0.9	1.4	0.031
Oats	0.9	5.4	0.190
Oats	0.9	4.0	0.160
Oats	0.9	3.0	0.063
Edmonton Alberta			
Control	-	<0.010	<0.010
Oats	0.9	2.2	0.025
Oats	0.9	1.1	<0.010
Oats	0.9	1.0	<0.010
Oats	0.9	2.0	<0.010
Oakville Manitoba			
Control	-	<0.010	<0.010
Oats	0.9	3.5	0.058
Oats	0.9	2.2	0.028
Oats	0.9	2.2	0.029
Oats	0.9	2.8	0.024
Ayr Ontario			
Control	-	<0.010	<0.010
Oats	0.9	1.9	0.019
Oats	0.9	1.4	<0.010
Oats	0.9	0.9	<0.010
Oats	0.9	1.2	<0.010

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All bolded are GAP data

### Conclusions

Oats were treated preharvest with Roundup at the proposed label rate of 0.9 kg glyphosate ae/ha at four sites, one each in Alberta, Saskatchewan, Manitoba, and Ontario, in 1994. Residues of glyphosate ranged from 0.9 ppm to 5.4 ppm (Median = 2.2 ppm). Residues of AMPA ranged from <0.010 ppm to 0.20 ppm (Median = 0.028 ppm).

### Summary Glyphosate Residues in Oats

Country	Rate (kg ae/ha)	# Sites	PHI (days)	Range (ppm)	Median Glyphosate (ppm)
Canada	0.9	7	7-14	0.9 - 6.2	3.6
Norway	1.0	4	7-15	1.0 - 3.1	2.2
Finland	1.08	4	7-14	2.8 - 13	10
Europe	1.44	20	5-15	1.0 - 10	4.7
Germany	1.8	7	5-14	4.3 - 17	8.3

GAP residue data, provided for treatment of oats with glyphosate, support an MRL of 10 ppm. This value is arrived at by taking into consideration the residue profile from the Europe, Finland, Norway, Germany and Canada. The residue value at close to GAP in Finland and at 2X from Germany (extrapolated to GAP) ranged from 1.0 to 8.5 ppm; these residue values supports the proposed MRL of 10 ppm.

### Dietary Risk Assessment

The addition of oats to the label at a maximum residue limit (MRL) of 10 ppm will increase the potential daily intake (PDI) of 0.02005 mg/kg bw/day or 2.67% by 0.0009 mg/kg bw/day or 0.12% of the acceptable daily intake (ADI), increasing the PDI to 0.02055 mg/kg bw/day or 2.79% of the ADI. Therefore, the addition of oat crop to the Roundup label will not pose any health risk to humans.

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**Overall Summary and Comments**

\* Residues of glyphosate and AMPA in oats treated at the proposed label rate of 0.9 kg glyphosate ae/ha, 7-14 days after treatment, for the trials conducted in 1993 and 1994 ranged from 0.9 ppm to 6.2 ppm (Median = 3.6 ppm) and from <0.010 ppm to 0.20 ppm (Median = 0.10 ppm), respectively.

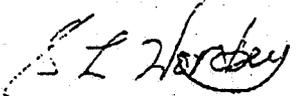
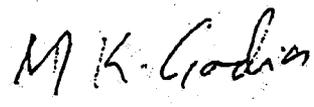
\* An MRL of 10 ppm on barley and 5 ppm on wheat has already been established in Table II.

\* It is proposed that an MRL of 10 ppm (glyphosate + its metabolite AMPA) be established for oats. This would be covered under the existing MRLs on barley. Regulatory Affairs should be advised to list oats with barley in Division 15, Table II.

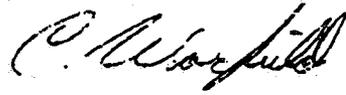
\* The addition of oats will not pose risk to human health.

Peer Reviewed by

Reviewed by

  
B.L. Worobey12/12/95  
Date  
Mahendra K. Gadia12/12/95  
Date

Section Head

  
C. Warfield20/12/95  
Date

*Fred Hess*  
4/23/96

Attachment: 2

Page 1 of 1

INTERNATIONAL RESIDUE LIMIT STATUS

CHEMICAL Glyphosate

CODEX NO. 158

CODEX STATUS:

No Codex Proposal  
Step 6 or Above

Residue (if Step 8): \_\_\_\_\_  
Glyphosate

PROPOSED U.S. TOLERANCES:

Petition No. 6E4645

DEB Reviewer S. Willett 4/17/96

Residue: glyphosate

<u>Crop(s)</u>	<u>Limit (mg/kg)</u>
<u>Oats</u>	<u>20</u>

<u>Crop(s)</u>	<u>Limit (mg/kg)</u>
<u>imported Oats</u>	<u>20</u>

CANADIAN LIMITS:

No Canadian Limit (on Oats)

Residue: \_\_\_\_\_  
glyphosate + aminomethyl-phosphonic acid

<u>Crop(s)</u>	<u>Limit (mg/kg)</u>
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MEXICAN LIMITS:

No Mexican Limit

Residue: \_\_\_\_\_  
glyphosate assumed

<u>Crop(s)</u>	<u>Limit (mg/kg)</u>
<u>Oats</u>	<u>0.1</u>

NOTES

Form Revised 1989

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