57

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

AUG 17 1993

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM:

SUBJECT: ID # PP2F4105: *Metalaxyl (Ridomil 2E) in or on Non-grass Animal Feeds (as Clover). Evaluation of Analytical and Residue Data.*
CBTS #9625
HED #2-1840
EPA Reg. #100607
DP Barcode #D175974
MRID #422268-01

FROM: María Isabel Rodríguez, Chemist
Tolerance Petition Section III
Chemistry Branch I - Tolerance Support
Health Effects Division (H7509C)

María Isabel Rodríguez
August 16, 1993.

THROUGH: Debra Edwards, Ph.D., Chief
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Debra Edwards
8/16/93

TO: Susan Lewis/Benjamin Chambliss
Product Manager Team #21
Registration Division (H7505C)

Ciba-Geigy Corporation submitted an application requesting tolerances for the combined residues of the fungicide metalaxyl [*N*-(2,6-dimethylphenyl)-*N*-(methoxyacetyl)alanine methyl ester] and its metabolites containing the 2,6-dimethylaniline (known as DMA) moiety, and *N*-(2-hydroxymethyl-6-methylphenyl)-*N*-(methoxy-acetyl)alanine methyl ester, each expressed as metalaxyl equivalents, in or on all members of the non-grass animal feeds (forage and hay) crop grouping as defined under 40 CFR §180.34 (f) (9) (xviii) (A) and (B). The petitioner is proposing the following tolerances:

* Non-grass Animal Feeds - Forage - at 6.0 ppm

* Non-grass Animal Feeds - Hay - at 20.0 ppm

The non-grass animal feeds (forage, fodder, straw and hay) group is

defined under 40 CFR §180.34 (f)(9)(xviii)(A) and (B). The following commodities are included in this crop group: alfalfa; bean, velvet; clover; kudzu; lespedeza; lupine; sainfoin; trefoil; vetch; vetch, crown; and vetch, milk. Representative commodities are alfalfa and clover.

Previously, Ciba-Geigy submitted a petition (PP8F3695/8H5569, 8-3-1989, J. Garbus, MRID #408329-01) for the registration of Ridomil 2E on alfalfa. Tolerances were established for forage (6 ppm) and hay (20 ppm). The alfalfa label allows for one application of Ridomil 2E at 1.0 lb ai/A and a 60-day pre-harvest interval (PHI). Data for alfalfa and clover were generated using 1.0 lb ai/A of metalaxyl at planting (4 pts of Ridomil 2E). When originally accepted for use on alfalfa, the Ridomil 2E label recommended rates of up to 1.0 lb ai/A. Trials for clover were then placed at 1.0 lb ai/A. Then, the petitioner explains, it was determined that only 0.25-0.5 lb ai/A was needed to achieve the desired control. According to the petitioner, the Ridomil 2E in alfalfa was amended to lower the rate to 1-2 pts/A. No evidence of this change was found in our files. This same rate is being proposed for the non-grass animal feeds group. However, as will be seen below, the study (with clover) was carried out using 1.0 lb ai/Acre.

Ciba-Geigy Corporation is also requesting that when the above tolerances are established, tolerances in alfalfa forage at 6.0 ppm and alfalfa hay at 20 ppm be withdrawn because the crop tolerances for non-grass animal feeds will cover them.

According to 40 CFR §180.408 (a), tolerances are established for the combined residues of the fungicide metalaxyl [*N*-(2,6-dimethylphenyl)-*N*-(methoxyacetyl)alanine methyl ester] and its metabolites containing the 2,6-dimethylaniline moiety, and *N*-(2-hydroxy methyl-6-methyl)-*N*-(methoxyacetyl)-alanine methylester, each expressed as metalaxyl, in or on several raw agricultural commodities.

Tolerances are established for indirect or inadvertent residues of metalaxyl in or on the raw agricultural commodities when present therein as a result of the application of metalaxyl to the growing crops listed in 40 CFR §180.408 (a) and other non-food crops listed in 40 CFR §180.408 (b).

According to 40 CFR §180.408 (c), tolerances with regional registration are established for the combined residues of the fungicide and its metabolites, each expressed as metalaxyl, in or on the raw agricultural commodity papaya.

Food and feed additive tolerances are established at 40 CFR §185.4000 (a), (b), (c) and (d) and 40 CFR §186.4000 (a), (b), (c), and (d) for combined residues of metalaxyl and its metabolites in processed commodities in the range of 1-20 ppm.

Clover can be utilized for several agricultural functions: (1) as a pasture crop, either plain or mixed with some other grass or legume; (2) for hay, plain or mixed; (3) for soil-enrichment; (4) as a cover crop, particularly desirable in some orchards; (5) for silage; and (6) for green manuring. Clover is also an excellent honey crop. There are about 400 to 500

species of true clover plants, of which only about 10 to 15% are native to North America. The majority of important clover species in the United States are of food production significance.

BACKGROUND:

Metalaxyl is a systemic fungicide for use on selected crops like alfalfa and other non-grass animal feeds. Metalaxyl is the common name for the active ingredient contained in Ridomil 2E Fungicide. It is used to control certain diseases caused by members of the Oomycete class of fungi.

Metalaxyl is a List "A" chemical for which a Registration Standard Guidance Document was issued in December, 1981. The Residue Chemistry Chapter for the Final Registration Standard and Tolerance Reassessment (FRSTR) was completed in June, 1987. An update to the Residue Chemistry Chapter was completed in April, 1992.

CONCLUSIONS:

1. Product Chemistry data for metalaxyl were submitted and have been previously reviewed. These are adequate for the purposes of the proposed tolerance in/on non-grass animal feeds (forage and hay).

2. a. For the purposes of this petition, the nature of the residue in plants is considered to be understood. The residues of concern are metalaxyl and its metabolites containing the 2,6-dimethylaniline moiety, and *N*-(2-hydroxymethyl-6-methyl)-*N*-(methoxyacetyl)-alanine methylester.

b. According to the FRSTR, the nature of the residue in animals is not understood. The residues currently regulated are the same as those in plants, metalaxyl and its metabolites containing the 2,6-dimethylaniline moiety, and *N*-(2-hydroxymethyl-6-methyl)-*N*-(methoxyacetyl)-alanine methylester. For the purposes of the tolerance petition in/on non-grass animal feeds (forage and hay), CBTS recommends regulating these same residues while the requirement is satisfied for the FRSTR.

c. Animal feed items are derived from clover (forage and hay) and from the non-grass animal feeds crop group (forage and hay). This is a 40 CFR §180.6 (a) 2 situation with respect to secondary residues in meat and milk for this proposed use. The established tolerances on meat, fat, and milk adequately cover residues expected from the proposed use of metalaxyl.

3. The proposed use of metalaxyl in/on non-grass animal feeds crop group (forage and hay) was adequately described in the submitted petition.

4. Methods AG-348, AG-349, and AG-395 are adequate for residue data collection and enforcement of the proposed tolerances in/on non-grass animal feeds (forage and hay).

5. Adequate storage stability data for several raw agricultural commodities which have been previously submitted and reviewed can be translated to clover (forage and hay) and non-grass animal feeds (forage and

hay).

6. a. Based on the systemic nature of metalaxyl and the greater than five-fold difference between the residues in alfalfa and clover hays (this submission), a crop group tolerance is not appropriate.

Alternatively, the petitioner could request individual tolerances for clover instead of a crop grouping expression. A tolerance of 1.0 ppm would be appropriate for clover, forage and a tolerance of 2.5 ppm would be appropriate for clover, hay with a PHI of 90 days.

b. Revised Sections B and F should be submitted for review. The revised Section B should limit use to clover (Alfalfa already has a registered use).

7. The petitioner has presented sufficient geographically representative residue data.

8. There is no Codex Proposal, nor Canadian or Mexican limits for residues of metalaxyl *per se* in non-grass animal feeds - forage and/or hay. Therefore, a compatibility issue is not relevant to the proposed tolerance. A copy of the International Residue Limit Status (IRLS) has been attached to this memorandum.

RECOMMENDATIONS:

The CBTS recommends against the proposed tolerance for the residues of the fungicide metalaxyl and its metabolites in or on the non-grass animal feeds group - forage - at 6.0 ppm - and hay - at 20.0 ppm. Alternatively, revised Sections B and F could be submitted for review. The petitioner could request individual tolerances instead of a crop grouping expression. A tolerance of 1.0 ppm would be appropriate for clover, forage and a tolerance of 2.5 ppm would be appropriate for clover, hay with a PHI of 90 days. (Refer to Conclusions #6a & #6b). The revised Section B should limit use to clover (Alfalfa already has a registered use).

If the petitioner wishes to propose a lower application rate, and presumably a lower tolerance, additional residue data should be submitted for review. These residue data should be generated using the maximum rate and minimum PHI. Revised Sections B and F should be submitted for review along with the field residue data.

DETAILED CONSIDERATIONS:

Product Chemistry:

No studies were submitted with this petition.

The manufacturing process of metalaxyl (technical product) as well as its physical/chemical characteristics have been adequately described

(PP1F2500/1H5299, 3-9-1982, P. Errico).

The chemical, with trade name Ridomil 2E (EPA Reg. No. 100-607), is an emulsifiable concentrate that contains 25.1% active ingredient and 74.9% inert ingredients (two pounds of active ingredient per gallon). Impurities are not likely to produce residue problems.

Metalaxyl is supplied in various formulations: as an emulsifiable liquid, Ridomil 2E, in a granular form, Ridomil 5G, and as a component in mixtures, Ridomil MZ58, Ridomil PC 11G, and Ridomil/Bravo 81W.

Proposed Use:

Metalaxyl applied to the soil at planting will provide control of damping-off and root rots.

Apply 0.25 to 0.5 lb ai/Acre (1 to 2 pts/Acre) as a broadcast surface spray at planting in a minimum of 20 gallons of water or following impregnation on fertilizer.

If seed was previously treated with metalaxyl as a seed dressing, an application of Ridomil 2E at 0.25 lb ai/Acre (1 pt/Acre) is recommended at planting. Use the higher rate [0.5 lb ai/Acre (2 pts/Acre)] in areas where disease pressure is expected to be heavy.

Do not feed green forage or cut for hay for 60 days following application.

Do not plant any crop which is not registered for use with metalaxyl in metalaxyl-treated soil for a period of 12 months, with the exception of wheat, barley and oats.

The use rate for the registered label for alfalfa is similar.

The proposed use of metalaxyl in/on non-grass animal feeds (forage, straw, and hay) was adequately described in the submitted petition.

Nature of the Residue in Plants:

No studies were submitted with this petition.

For this proposed use the residues of concern are those expressed in the current tolerances as the combined residues of metalaxyl [*N*-(2,6-dimethylphenyl)-*N*-(methoxy-acetyl)alanine methyl ester] ant its metabolites containing the 2,6-dimethyl-aniline moiety, and *N*-(2-hydroxymethyl-6-methyl)-*N*-(methoxyacetyl)-alanine methyl ester. Adequate enforcement exists as Methods I and II in the *Pesticide Analytical Manual, Volume II* (CBRS Review #9596, 6-22-1992, R.B. Perfetti).

Radiolabelled studies indicate that metalaxyl is metabolized along the same pathway in a variety of unrelated plants, such as lettuce, grapes, tobacco, and potatoes. Detailed data have been reviewed in previous

submissions (PP1F2500, 3-9-1982, P. Errico and PP2F2762, 1-6-1983, K. Arne).

In summary, metalaxyl is metabolized through one or more of the following processes: oxidation of the ring's methyl group to the alcohol and then the carboxylic acid, hydroxylation of the phenyl group, cleavage of the methyl ester and methyl ether, N-dealkylation, and/or subsequent conjugation of some breakdown products.

CBTS concludes that the nature of the residue in plants is adequately understood for this proposed use.

Nature of the Residue in Animals:

No studies were submitted with this petition. Radiolabelled metabolism studies in rats, goats, and cows have been previously submitted and reviewed.

In summary, degradation occurs via the same mechanisms as in plants.

Animal metabolism studies with rats have demonstrated that degradation occurs via one or more of the following processes: methyl ester hydrolysis, N-dealkylation, methyl ether cleavage, benzylic methyl oxidation, and/or subsequent formation of conjugates with glucuronic acid. The parent compound is rapidly excreted in both urine and feces (PP1F2500/H5299, 3-9-1982, P. Errico).

Radiolabelled studies with lactating goats have shown that small amounts (0.003-0.008 ppm) were recovered from milk, blood, and tissues. Less than 0.004 ppm had been recovered from the heart, skeletal muscle, and tenderloin. In fat <0.008-0.023 ppm was obtained while 0.19 ppm and 0.057 ppm were observed in the kidney and the liver, respectively (PP0E3826/H5591, DEB Review #'s 6232, 6233, 5-9-1990, S. Inasi, and PP6F3387/6H5499, 9-26-1986, F.D. Griffith).

According to the FRSTR, the nature of the residue in animals is not understood. The residues currently regulated are metalaxyl and its metabolites containing the 2,6-dimethylaniline moiety, and *N*-(2-hydroxymethyl-6-methyl)-*N*-(methoxyacetyl)-alanine methylester. For the purposes of this tolerance petition in/on non-grass animal feeds (forage and hay), CBTS recommends regulating these same residues while the requirement is satisfied for the reregistration process.

Analytical Methodology for Plants:

Analytical Methods AG-348 and AG-349 correspond to Methods I and II of *PAM, Vol. II*. Method AG-395 is an improved modification of Method AG-348, exhibiting increased sensitivity for measurement of a metabolite and reduced time required for analysis. Method AG-395 has undergone successful Agency validation trial with plant samples. All these are adequate analytical methods for enforcement purposes. (DEB Review #8704, 10-23-1991, J. Abbotts).

Method AG-395 was discussed in detail in the 1987 FRSTR Residue Chemistry Chapter. In Method AG-395, residues are extracted in methanol:water

and refluxed with methanesulfonic acid and then basified, converting the residues of concern to DMA. After cleanup, the DMA residues are analyzed using GLC with a nitrogen/phosphorus detector in the nitrogen mode. The stated detection limit is 0.05 ppm. (PP1F3993, CBTS Review #9011, 6-19-1991, J. Morales).

In this method, crop samples (10 g) are extracted by refluxing with 80% (v/v) methanol/water for two hours. A 2 g aliquot of the extract is evaporated to dryness with a rotary evaporator. Depending on the substrate, 1.0 or 1.5 Ml of water is added to dissolve the residue. Ten milliliters of methanesulfonic acid is added and the sample is refluxed for approximately 15 minutes. The extract is basified after cooling and addition of water. DMA formed in the reaction is steam distilled. The steam-distilled product is cleaned-up prior to gas chromatographic analysis. After separation, DMA is detected with a nitrogen-phosphorus detector operating in the nitrogen-specific mode. Chromatographic conditions, as well as other modifications to the method were utilized. These were listed in the study and are as follows.

* Section 5.3: wet crop extraction section is omitted. The dry crop extraction section (5.4) is used for all samples.

* Section 5.5.4: water and 25% sodium hydroxide/water are doubled in volume to facilitate a more efficient steam distillation process.

* Section 5.6.1: glass wool plugs will not be installed in condensers.

* Section 5.7.5: DMA residues in dichloromethane are concentrated for GC detection. Sections 5.7.6 and 5.7.7 are omitted.

* Section 6.1.1: GC injection standards are prepared by serial dilution of a 1.0 $\mu g/\mu L$ stock solution of 2,6-dimethylaniline in dichloromethane.

* Section 6.2.2: The conversion factor to convert residues of DMA into metalaxyl equivalents in 2.308.

DMA results, expressed as (ng DMA found/mg crop injected) are converted to metalaxyl equivalents using the factor 2.308.

The average recovery and standard deviation for fortified substrate samples were 88.2 ± 13.4% (n = 38).

Analytical Methodology for Animals:

A suitable enforcement procedure exists for total metalaxyl residues in liver and milk. Metalaxyl and regulated metabolites were successfully recovered from beef liver in an Agency validation trial of Method II in *PAM, Vol. II*, Pesticide Reg. Sec. 180.408; it is coded AG-349. (CBRS Review #9596,

6-22-1992, R.B. Perfetti). This method is a modification of Method AG-348. It uses acetonitrile as an extraction solvent for milk and tissues and hexane for eggs. The limits of detection are 0.01 ppm in milk, 0.1 ppm in liver and kidney, and 0.05 ppm in eggs. (PP6F3387/6H5499, RCB #768-769, 9-26-1986, F.D. Griffith).

Storage Stability Data:

Results of freezer storage stability experiments for several raw agricultural commodities have been previously reported and reviewed. Metalaxyl residues have shown to be stable for 18 months when stored in a freezer at -15 °C. In the submitted study, clover forage and hay samples were stored between 1 and 16 months prior to analysis. Therefore, translating the results from the 18-month storage stability studies, metalaxyl residue results for these samples were not affected by freezer storage. (CBRS Review #8166, 4-16-1992, J. Abbotts).

Residue Data:

A. Magnitude of the Residue in Plants:

Eudy, L. W. January 10, 1992. Metalaxyl - Magnitude of Residues in Clover Forage and Hay Following Application of Ridomil 2E. Study performed and submitted by Ciba-Geigy Corporation, NC. Laboratory Project ID ABR-91030. EPA Guideline #171-4 (K). MRID #422268-01

The objective of this study was to provide additional residue data for metalaxyl in clover (forage and hay) following application of Ridomil 2E for use on the non-grass animal feed group (forage and hay).

Twelve clover field trials were conducted in California, Georgia, Illinois, Missouri, Nebraska, New York, North Dakota, Ohio, Oklahoma, Pennsylvania, South Dakota, and Texas.

Field trials were generated using 1 lb ai/A and 2 lb ai/A. This is 2X and 4X, respectively, the highest proposed use rate as described in Section B. The actual residue test results submitted by the registrant label those rates as 1X (1 lb ai/A) and 2X.

Clover was grown to maturity under normal agricultural practices. Clover forage and hay samples were collected at random. Samples were not cleaned or washed. Any surface soil that was removed was done by shaking the clover. After collection, samples were frozen and shipped with dry ice. Upon arrival, samples were stored in a freezer at approximately -20 °C. After preparation, the samples were placed in polyethylene bags or bottles, labeled, and returned to the freezer until residue analysis.

Analytical Method AG-395 was used to determine residues in clover forage and hay. Results are expressed as metalaxyl equivalents and the limit of determination is 0.05 ppm.

Residue results expressed as metalaxyl equivalents are reported in Table I (next pages).

Table I: Metalaxyl Residues Determined as DMA in Clover Forage and Hay Following Application of Ridomil 2E.

Field Test Location	Application Rate	PHI (*)	Substrate	Metalaxyl (**) Residue, ppm
IL	Control	--	Forage	<0.05
	2X	62	Forage	0.53
	2X	62	Forage	0.45
	Reagent Blank	--	------	<0.05
	Control	--	Forage	<0.05
	2X	79	Forage	0.37
	2X	79	Forage	0.51
	Reagent Blank	--	------	<0.05
	Control	--	Hay	0.06
	2X	79	Hay	0.87
	2X	79	Hay	0.73
	Reagent Blank	--	---	<0.05
NY	Control	--	Forage	<0.05
	2X	61	Forage	0.72
	2X	61	Forage	0.53
	4X	61	Forage	2.1
	Reagent Blank	--	------	<0.05
	Control	---	Forage	<0.05
	2X	288	Forage	0.06
	2X	288	Forage	<0.05
	4X	288	Forage	0.16
	Reagent Blank	---	------	<0.05
	Control	---	Hay	0.06
	2X	288	Hay	0.12
	2X	288	Hay	0.10
	4X	288	Hay	0.41
	Reagent Blank	---	---	<0.05
TX	Control	---	Forage	<0.05
	2X	179	Forage	0.56
	2X	179	Forage	0.57
	Reagent Blank	---	------	<0.05
	Control	---	Hay	<0.05
	2X	179	Hay	1.2
	2X	179	Hay	1.4
	Reagent Blank	---	---	<0.05
OK	Control	---	Forage	<0.05
	2X	210	Forage	0.07
	2X	210	Forage	0.12
	Reagent Blank	---	------	<0.05
	Control	---	Hay	<0.05
	2X	210	Hay	0.14
	2X	210	Hay	0.17
	Reagent Blank	---	---	<0.05
GA	Control	--	Forage	<0.05
	2X	60	Forage	0.53
	2X	60	Forage	0.63
	4X	60	Forage	1.5
	Reagent Blank	--	------	<0.05
	Control	---	Forage	<0.05
	2X	209	Forage	0.06
	2X	209	Forage	0.07
	4X	209	Forage	0.20
	Reagent Blank	---	------	<0.05

Field Test Location	Application Rate	PHI (*)	Substrate	Metalaxyl (**) Residue, ppm
	Control	---	Hay	<0.05
	2X	209	Hay	0.07
	2X	209	Hay	0.15
	4X	209	Hay	0.25
	Reagent Blank	---	---	<0.05
CA	Control	--	Forage	<0.05
	2X	59	Forage	0.29
	2X	59	Forage	0.23
	Reagent Blank	--	------	<0.05
	Control	---	Forage	<0.05
	2X	172	Forage	0.10
	2X	172	Forage	0.10
	Reagent Blank	---	------	<0.05
	Control	---	Hay	<0.05
	2X	172	Hay	0.37
	2X	171	Hay	0.34
	Reagent Blank	---	---	<0.05
MO	Control	--	Forage	<0.05
	2X	61	Forage	0.30
	2X	61	Forage	0.27
	Reagent Blank	--	------	<0.05
	Control	---	Forage	<0.05
	2X	279	Forage	0.06
	2X	279	Forage	0.08
	Reagent Blank	---	------	<0.05
	Control	---	Hay	0.07
	2X	279	Hay	0.14
	2X	279	Hay	0.16
	Reagent Blank	---	---	<0.05
ND	Control	--	Forage	<0.05
	2X	58	Forage	<0.05
	2X	58	Forage	0.20
	Reagent Blank	--	------	<0.05
	Control	--	Forage	<0.05
	2X	76	Forage	0.15
	2X	76	Forage	0.32
	Reagent Blank	--	------	<0.05
	Control	--	Hay	0.18
	2X	76	Hay	0.48
	2X	76	Hay	0.86
	Reagent Blank	--	---	<0.05
NE	Control	--	Forage	<0.05 (a)
	2X	60	Forage	0.99
	2X	60	Forage	0.79
	4X	60	Forage	2.6 (a)
	Reagent Blank	--	------	<0.05
	Control	--	Forage	<0.05
	2X	90	Forage	0.56
	2X	90	Forage	0.55
	4X	90	Forage	1.5
	Reagent Blank	--	------	<0.05

Field Test Location	Application Rate	PHI (*)	Substrate	Metalaxyl (**) Residue, ppm
	Control	--	Hay	0.17
	2X	90	Hay	1.6
	2X	90	Hay	1.4
	4X	90	Hay	3.0
	Reagent Blank	--	---	<0.05
SD	Control	--	Forage	0.06
	2X	60	Forage	0.14
	2X	60	Forage	0.14
	4X	60	Forage	0.21
	Reagent Blank	--	------	<0.05
	Control	--	Forage	0.05
	2X	91	Forage	0.15
	2X	91	Forage	0.16
	4X	91	Forage	0.25
	Reagent Blank	--	------	<0.05
	Control	--	Hay	0.08
	2X	91	Hay	0.24
	2X	91	Hay	0.24
	4X	91	Hay	0.42
	Reagent Blank	--	---	<0.05
OH	Control	--	Forage	<0.05
	2X	59	Forage	0.39
	2X	59	Forage	0.29
	Reagent Blank	--	------	<0.05
	Control	---	Forage	0.05
	2X	119	Forage	0.09
	2X	119	Forage	0.09
	Reagent Blank	---	------	<0.05
	Control	---	Hay	0.06
	2X	119	Hay	0.12
	2X	119	Hay	0.14
	Reagent Blank	---	---	<0.05
PA	Control	--	Forage	<0.05
	2X	60	Forage	0.35
	2X	60	Forage	0.53
	Reagent Blank	--	------	<0.05
	Control	---	Forage	<0.05
	2X	120	Forage	0.06
	2X	120	Forage	<0.05
	Reagent Blank	---	------	<0.05
	Control	---	Hay	0.07
	2X	120	Hay	0.27
	2X	120	Hay	0.24
	Reagent Blank	---	---	<0.05

* PHI is based on time between last application and sample collecting.

** Determined as 2,6-dimethylaniline and converted to metalaxyl equivalents by the factor 2.308.

(a) Sample was apparently switched with the replicate.

Maximum 2X total residues in clover forage (60-day PHI) and hay (90-day PHI) were 0.99 ppm and 1.6 ppm, respectively. For the 4X treatment rate, maximum total metalaxyl residues, were 2.6 ppm and 3.0 ppm for forage (60-hay PHI) and hay (90-day PHI), respectively. Hay samples were not collected at the first cutting. However, metalaxyl residues in hay at a 60-day PHI were predicted by calculating a forage-to-hay concentration factor from the second cutting data, then multiplying the first-cutting forage residues by this factor. These data are summarized in Table II (next page).

The range of the calculated concentration factors is 1.2-4.5. The average concentration factor for all the forage-to-hay data is 2.3 (n=22).

Representative chromatograms and calibration curves were included in the study.

Based on the systemic nature of metalaxyl and the greater than five-fold difference between the tolerances in alfalfa and clover (this submission), the proposed tolerance is not appropriate. Alternatively, the petitioner could request individual tolerances for clover instead of a crop grouping expression. A tolerance of 1.0 ppm would be appropriate for clover, forage and a tolerance of 2.5 ppm would be appropriate for clover, hay with a PHI of 90 days. Revised Sections B and F should be submitted for review. The revised Section B should limit use to clover (Alfalfa already has a registered use).

B. Magnitude of the Residue in Animals (Meat, Milk, Poultry, and Eggs):

No feeding studies were submitted with this petition.

Livestock feeding studies have been previously submitted and adequately reviewed. Lactating dairy cows were fed metalaxyl at 0, 1.5, 7.5, and 15.0 ppm for up to 40 days. Milk samples were collected and analyzed 7, 14, 21, 28 and 40 days after feeding. No residues within the limit of detection (<0.01 ppm) were found in any of the milk samples reflecting the 7.5 and 15.0 ppm feeding levels.

Meat samples were collected and analyzed 14, 21, 28 and 40 days after treatment. Meat and fat samples showed no reported residues within the limit of detection (0.05 ppm). At the 1.5, 7.5, and 15.0 ppm feeding levels, residues ranged from 0.11 ppm to 0.22 ppm in liver, and 0.16 to 0.70 ppm in kidney. In other studies, lactating dairy cows were fed 75 ppm metalaxyl for 14 to 28 days. Liver and kidney samples were analyzed 14, 21, and 28 days after treatment. Residues ranged from <0.10 to 0.82 ppm in the liver, and from 0.11 to 5.5 ppm in the kidney. (DEB #7431, 6-27-1991, J. Abbotts)

Poultry feeding studies have been previously submitted and adequately reviewed. Hens were fed metalaxyl at 0.05 ppm, 1.5 ppm and 5.0 ppm for four weeks. Analysis of eggs, skin, fat, breast, and thigh muscle showed no metalaxyl residues within the limit of detection (0.01 ppm) and the feeding level (5.0 ppm). (PP6F3387/6H5499, 9-26-1986, F.D. Griffith).

Table II: Forage-to-hay Concentration Factors and Predicted Metalaxyl Residues in 60-day Hay Using Mean Concentration Factor of 2.3:

Field Test Location	Metalaxyl Residue (ppm) Second-cutting Forage	Metalaxyl Residue (ppm) Second-cutting Hay	Concentration Factor	Metalaxyl Residue (ppm) First-cutting Forage	Predicted Metalaxyl Residue (ppm) First-cutting Hay
IL	0.37 0.51	0.87 0.73	2.351 1.431	0.53 0.45	1.2 1.0
NY	0.06 <0.05	0.12 0.10	2.000 -----	0.72 0.53	1.7 1.2
TX	0.56 0.57	1.2 1.4	2.143 2.456	---- ----	----- -----
OK	0.07 0.12	0.14 0.17	2.000 1.417	---- ----	----- -----
GA	0.06 0.07	0.07 0.15	1.167 2.143	0.53 0.63	1.2 1.4
CA	0.10 0.10	0.37 0.34	3.700 3.400	0.29 0.23	1.7 0.5
MO	0.06 0.08	0.14 0.16	2.333 2.000	0.30 0.27	0.7 0.6
ND	0.15 0.32	0.48 0.86	3.200 2.688	<0.05 0.20	----- 0.5
NE	0.56 0.55	1.6 1.4	2.857 2.546	0.99 0.79	2.3 1.8
SD	0.15 0.16	0.24 0.24	1.600 1.500	0.14 0.14	0.3 0.3
OH	0.09 0.09	0.12 0.14	1.333 1.556	0.39 0.29	0.9 0.7
PA	0.06 <0.05	0.27 0.24	4.500 -----	0.35 0.53	0.8 1.2

A plausible livestock exposure analysis for dairy and beef animals, assuming the requested tolerances were performed and is as follows.

For clover hay and clover forage,

Beef			
Feed	Tolerance, ppm	% in Diet	Exposure, ppm
Clover, hay	2.5	35	0.88
Tomato Pomace, Dry	20.0	30	6.00
Cottonseed	0.1	20	0.02
Soybean, meal	2.0	15	0.30
Total		100	7.20

Dairy			
Feed	Tolerance, ppm	% in Diet	Exposure, ppm
Clover, hay	2.5	45	1.13
Tomato Pomace, Dry	20.0	20	4.00
Cottonseed	0.1	20	0.02
Soybean, meal	2.0	15	0.30
Total		100	5.45

Alfalfa is a poultry feed item and has been previously evaluated in poultry feed. There may be some minor feeding of lupine seed (10-15% in diet maximum), but clover and the other members of the non-grass animal feeds group are not poultry feed items.

This is a 40 CFR §180.6 (a) 2 situation with respect to secondary residues in meat and milk for this proposed use. The existing metalaxyl tolerances for poultry, fat, kidney, liver (0.4), meat, eggs, mbyp (excluding kidney and liver) (0.05 ppm), cattle, horse, goat, hog, and sheep, fat, kidney, liver (0.4 ppm), meat, mbyp (except kidney and liver) (0.05 ppm) adequately cover the uses in this petition.

If the animal metabolism study required in the FRSTR identifies additional metabolites requiring regulation, tolerances established for the use of metalaxyl in/on clover, forage and hay may need revision.

OTHER CONSIDERATIONS:

Codex Proposal:

There is no Codex Proposal, nor Canadian or Mexican limits for residues of metalaxyl *per se* in non-grass animal feeds - forage and/or hay. Therefore, a compatibility issue is not relevant to the proposed tolerance. A copy of the International Residue Limit Status (IRLS - Codex #138) has been attached to this memorandum.

Attachments: IRLS
cc: MIRodríguez, PP2F4105, Circulation, Metalaxyl, Subject File & Reading File.
RDI: D. Edwards (8-12-1993), P.V. Errico (8-11-1993), R.A. Loranger (8-12-1993)
M.I. Rodríguez: Draft (11-5-1992), Edited (8-16-1993): H7509C/CBTS/CM#2, Room 804-T/703-305-6710

Branch File: F:\USER\CB\METLAXYL.001

F. Kuwa 10/21/92

Attachment: Page 1 of 1

INTERNATIONAL RESIDUE LIMIT STATUS

CHEMICAL Metalaxyl

CODEX NO. 138

CODEX STATUS:

[✓] No Codex Proposal Step 6 or Above (on commodities specified)

Residue (if Step 8): metalaxyl per se

Crop(s)	Limit (mg/kg)

PROPOSED U.S. TOLERANCES:

Petition No. 2F4105

DEB Reviewer M.I. Rodriguez

Residue: Metalaxyl equivalents*

Crop(s)	Limit (mg/kg)
① Non-grass Animal Feeds forage	6.0
② Non-grass Animal Feeds Hay	20.0

CANADIAN LIMITS:

[✓] No Canadian Limit (on commodities specified)

Residue: Metalaxyl per se

Crop(s)	Limit (mg/kg)

MEXICAN LIMITS:

[✓] No Mexican Limit

Residue:

Crop(s)	Limit (mg/kg)

NOTES

Form Revised 1989

*Metalaxyl ≡ N-(2,6-dimethylphenyl)-N-(methoxyacetyl)alanine methyl ester

Tolerance expressed as metalaxyl and its metabolites containing the 2,6-dimethylaniline moiety, and N-(2-hydroxymethyl-6-methylphenyl)-N-(methoxyacetyl)alanine methyl ester, each expressed as metalaxyl equivalents.