(5/2/02)

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

**OFFICE OF PREVENTION, PESTICIDES AND TOXIC SUBSTANCES**

DP Barcode: D271623
Out Date: 04/30/02

**Review of New Uses**

SUBJECT: Cyromazine (121301): Dry Beans

FROM: Thuy L. Nguyen, Chemist
Environmental Risk Branch III/EFED

THRU: Kevin Costello, Acting Branch Chief
Environmental Risk Branch III/EFED

TO: Shaja Brothers
Registration Division (7505C)

The Environmental Risk Branch III has completed the review of the proposal to use cyromazine for leafminer control on dry beans at a rate of 0.125 lb ai/acre/application, 6 applications per year with a 7-day interval. Risk was assessed as if cyromazine was applied by aerial equipment. However, given the screening models used and the fact that risk to non-target organisms was limited to chronic effects to birds, risk conclusions would be similar if ground application was assumed.

A revised aquatic exposure assessment was also performed to comply with the current EFED guidelines for estimating pesticide residue concentrations in surface and ground water resources. Minimal change in the residue concentrations for both drinking water and ecological assessment was noted (see attached "Aquatic Exposure Assessment Memorandum, D271623.") Therefore, since the proposed application rate is identical to the previous uses (such as celery and potato), results from the celery and potato assessment are also applicable to this proposed use. A summary of the risk assessment based on that review is provided below. However, the detailed risk assessment and risk characterization of celery and potato uses can be found in the EFED Review of New Uses completed on August 9, 1999, under the barcodes D219201, D250731, D251321.

**Summary of Risk Assessment**

Cyromazine is persistent and mobile. Furthermore, its primary degradate, melamime, could be even more persistent and mobile than cyromazine. With multiple applications and usage year after year, cyromazine and melamime eventually lead to build up of this chemical in the environmental compartments. Both the parent and degradate are also expected to get into ground and surface water. In a small scale ground water monitoring study in Florida, no cyromazine was measured, but melamime was detected. Although the proposed application rate for cyromazine use on dry beans is relatively low, the persistence of cyromazine and the repeated applications as proposed by the new uses over the years could potentially pose chronic risk to birds, including endangered birds, as indicated by the chronic LOC exceedance for birds. No LOCs (chronic and acute) were exceeded for other organisms.

**Endangered Species Concerns**

There is a potential risk to endangered avian species that consume **vegetation and terrestrial invertebrates** containing maximum residues after 3 or more foliar applications of cyromazine. EFED has generated a very preliminary list describing states where dry beans are grown that also have endangered birds. No attempt was made to cull the list for predators such as the Northern spotted owl, aquatic feeders such as bald eagle or interior least turn, or seed eaters such as Florida scrub jay. The first two groups comprise the majority of the endangered species. Since there appears to be few insectivores or herbivores on the list there is limited potential for the need for mitigation . At this time EFED is not typically providing a comprehensive endangered species assessment for minor use Section 3 registrations. If a future assessment is conducted for which mitigation may be necessary Syngenta is a member of the FIFRA Endangered Species Task Force. Any risk that cannot be mitigated would be addressed by providing endangered species locality information via the Task Force.

Attachment: Revised Tier 1 Aquatic Exposure Assessment - TLN, 04/30/02

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DP Barcode: D271623
PC Code: 121301
Out Date: 04/30/02

**AQUATIC EXPOSURE ASSESSMENT**

SUBJECT: Revised Tier 1 Estimated Surface and Ground Water Assessment of Cyromazine
PC Code: 121301; CAS# 66215-27-8

TO: William Wassell
Registration Action Branch III
Health Effects Division (7509C)

FROM: Thuy L. Nguyen
Chemist
Environmental Risk Branch III (7507C)

THRU: Kevin Costello
Acting Branch Chief
Environmental Risk Branch III

The Environmental Fate and Effects Division (EFED) has been requested to generate a Drinking Water Assessment for cyromazine in support of an Interregional Research Project No. 4 (IR-4) tolerance petition for use of this chemical on dry bean and southern peas. A Tier 1 drinking water assessment was originally submitted by Dr. James Wolf on November 13, 1997. However, a revision is needed to comply with changes in EFED policies when performing surface and ground water exposure assessment (Memorandum "Addendum to Guidance on Use of FIRST and GENEEC2 Programs, WQTT/EFED, 05/01/2001).

This memorandum provides a revised Tier 1 aquatic exposure assessment for cyromazine in accordance to the current EFED guidelines. Under these new guidelines, the surface drinking water concentrations for human health assessment are generated based on the FIRST (FQPA Index Reservoir Screening Tool) model, while the surface water concentrations for ecological risk assessment are based on the GENEEC2 version 2.0 model. Previously, GENEEC version 1.2 was used to estimate water concentrations for both human health and ecological exposure assessment. Ground water estimation is still based on SCI-GROW, however this model is now revised to SCI-GROW2.

**Table I** listed the cyromazine surface water concentrations from the original and the current risk assessments (RA). **Table II** listed the cyromazine ground water concentrations from both assessments.

**Table I -** Cyromazine Concentration in Surface Water (ug/L)*

| | Nov 1997 Assessment **GENEEC** | Apr 2002 Assessment (Human Health RA) **FIRST** | Apr 2002 Assessment (Ecological R A) **GENEEC2** |
|---|---|---|---|
| Peak | 30.1 | 43.3 | 30.0 |
| 4-Day Mean | 30.0 | | 30.0 |
| 21-Day Mean | 29.6 | | 29.6 |
| 56/60-Day Mean | 28.9 | | 28.7 |
| 90-Day Mean | | | 28.0 |
| Annual Average | | 15.5 | |

* based on 6 applications of 0.125 lb ai/A and 7-day interval between application.

**Table II -** Cyromazine Concentration in Ground Water (ug/L)

| | Nov 1997 Assessment **SCI-GROW** | Apr 2002 Assessment **SCI-GROW2** |
|---|---|---|
| 0.125 lb ai/A, 6 appl/year, 7-day interval | 1.63 | 5.33 |

Environmental Fate:

Based on previously submitted data, cyromazine is stable to hydrolysis and photolysis, and is quite persistent in aerobic soil (t ½ ≈ 150 days). This was confirmed in the field studies, where dissipation half-lives averaged between 75 days to more than 250 days. Soil adsorption coefficients are generally low, with soil adsorption coefficients ($K_{ads}$) less than 5 for three of the tested mineral soils (sand and silt loam), and 17 for clay loam. This would indicate that cyromazine has the potential to leach through soils, especially sand and silt loam soils. Melamine was identified as the primary degradate of cyromazine. The persistence, adsorption, and dissipation rate of melamine have not been specified, but in terrestrial field studies, melamine is shown to be more persistent and mobile than the parent, and may accumulate in soil with repeated uses. Two other degradates were also noted, but not identified.

Ground-Water Monitoring:

The registrant previously conducted a small-scale prospective ground-water monitoring study in Florida on tomatoes under conditions where pesticide contamination and leaching are very likely, based on the following reasons:

1. Florida has the largest area for the production of tomatoes in the US.
2. The site chosen has high vulnerability to pesticide contamination
3. The depth to ground water at the site is only three to four feet.
4. The surface soil is a Myakka fine sand.

Results showed no detection of cyromazine residues in ground water during this study. However, low levels of melamine were found in shallow ground water. The agronomic practices used at this study site resulted in irrigation water running off the treated field; the water running off the treated field was not assessed for cyromazine residues.

Drinking Water Assessment:

*Surface Water Estimation*:

Estimates of cyromazine concentrations in surface water using FIRST for human health and GENEEC2 for ecological risk assessment are summarized in Table I. Detailed outputs of the model are listed in Appendix I for FIRST and Appendix II for GENEEC2. These results were based on the environmental fate parameters listed in Table III and at a rate of 6 applications, 0.125 lb ai/acre per application, and 7-day intervals. Aerial application method was used to simulate a maximum drift capacity. EFED's Input Parameter Guidance suggests the use of the 90$^{th}$ percentile confidence bound on the mean half-life of aerobic soil metabolism to account for variability and uncertainty in the studies; however if only value was provided, three times that value would be used. Note that, FIRST also takes into account the percent cropped factor (PCA) which is a generic adjustment that represents the maximum percent of any watershed that is planted to the crop being modeled and, thus, may potentially be treated with the pesticide in question. PCA factors are generated from Geographic Information System (GIS) overlays of cropping area and watershed delineations. For dry beans, EFED does not have enough data for a PCA value and a default of 87% cropped factor was assumed. No PCA adjustment is required for GENEEC2.

*Ground Water Estimation:*

Using the fate properties listed in Table III and assuming 6 applications at 0.125 lbs ai./ac per application, the estimated ground water concentration from cyromazine using SCI-GROW2 is now 5.33 µg/L vs. 1.62 µg/L as reported previously (see Table II). The difference is largely due to the fact that preciously, EFED chooses the average $K_{oc}$ value (106) for ground water modeling. However in the current assessment, the lowest value (40) was used since there was more than a three-fold variation between the $K_{oc}$ values reported. The SCI-GROW program output is listed in Appendix III.

**Table III.** Summary of Selected Environmental Fate Properties for Cyromazine.

| Property | Range | Value used in assessment | Model |
|---|---|---|---|
| Solubility | 1.36 x $10^5$ ppm | 1.36 x $10^5$ ppm | GENEEC2/FIRST |
| Hydrolysis | stable @ pH 5, 7, 9 | 0 (stable) | GENEEC2/FIRST |
| Photolysis | stable in water @ pH 7 | 0 (stable) | GENEEC2/FIRST |
| Aerobic Soil Metabolism $T_{1/2}$ | 150 days | 150 x 3 = 450 days<br>150 days | GENEEC2/FIRST<br>SCI-GROW |
| Anaerobic Soil Metabolism $T_{1/2}$ | no data | 450 x 2 = 900 days | GENEEC2/FIRST |
| Aerobic Aquatic Metabolism $T_{1/2}$ | no data | not considered | |
| $K_{ads}$ | 0.52(sand), 2.37(sand), 3.87(silt loam), 17.00 (clay loam) | 3.87 (lowest non sand) | GENEEC2/FIRST |
| $K_{oc}$ | 40, 73, 185, and 127 | 40 | SCI-GROW |



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Appendix I - **FQPA Index Reservoir Screening Tool - FIRST (Version August 1, 2001)**

***Model Background***

For human health exposure assessments undertaken for FQPA, EFED has attempted to develop a consistent, parallel modeling system to replace that developed for ecological risk assessment. In recognition of the fact that very few people drink water derived from small farm ponds or from small, upland streams, EFED has developed an "index agricultural watershed-drinking water reservoir" or "index reservoir" scenario to replace the "standard field-pond" scenario used in GENEEC. In addition, it is recognized that most watersheds large enough to support a community drinking water system (CWS) are not entirely planted in one crop. The modeling system, therefore, has developed a method to consider a maximum percent cropped area (PCA) factor to account for this fact. The 'FIRST' program is designed to mimic a more complex simulation using the linked PRZM 3.12 and EXAMS 2.97.5 models but requires less time and effort to complete. The program produces both a peak value and an annual average pesticide concentration, or Estimated Environmental Concentration (EEC), and is intended to replace the GENEEC program for drinking water estimates. If the FIRST EECs are within 10% of a DWLOC, EFED will move to the next tier and perform a PRZM/EXAMS assessment.

***FIRST Output Cyromazine on Dry Bean***

* INPUT VALUES *

| RATE (#/AC) ONE(MULT) | No.APPS & INTERVAL | SOIL Kd | SOLUBIL (PPM ) | APPL TYPE (%DRIFT) | %CROPPED AREA | INCORP (IN) |
|---|---|---|---|---|---|---|
| .125( .730) | 6 7 | 3.9 | $1.36 \times 10^5$ | AERIAL(16.0) | 87.0 | .0 |

FIELD AND RESERVOIR HALFLIFE VALUES (DAYS)

| METABOLIC (FIELD) | DAYS UNTIL RAIN/RUNOFF | HYDROLYSIS (RESERVOIR) | PHOTOLYSIS (RES.-EFF) | METABOLIC (RESER.) | COMBINED (RESER.) |
|---|---|---|---|---|---|
| 450. | 2 | N/A | .00- .00 | 900. | 900. |

UNTREATED WATER CONC (MICROGRAMS/LITER (PPB)) Ver 1.0 AUG 1, 2001

| PEAK DAY (ACUTE) CONCENTRATION | ANNUAL AVERAGE (CHRONIC) CONCENTRATION |
|---|---|
| 43.322 | 15.530 |

Appendix II - **GENeric Estimated Environmental Concentration - GENEEC2 (version 2, August 01, 2001)**

***Model Background***

GENEEC2 (version 2.0) was developed in response to suggestions for improvements by (1) model users; (2) by the desire to stay current with the newer versions of the PRZM 3.12 (Carsel, 1997) and EXAMS 2.97.5 (Burns, 1997) programs upon which GENEEC (version 1.0) is based; and (3) by availability of much improved data on spray drift and quantitative methods of estimation of offsite drift developed by the Spray Drift Task Force (SDTF). The main differences between versions 1.0 and 2.0 include: (a) an entirely new binding curve to represent dissolved concentration as a function of $K_d$; (b) the use of the binding parameter, $K_d$ in preference to $K_{oc}$ to represent pesticide attachment to soil, to organic matter or to water-body bottom and suspended sediments; (c) a change in the recommendation for depth of incorporation; (d) a change in the timing of the single event rainstorm for chemicals which receive multiple applications; (e) addition of a subroutine from the SDTF to estimate spray drift; and (f) a change in the time durations of the output values to better match the durations of relevant toxicity tests. GENEEC2 produces estimates of peak as well as 4-day, 21-day, 60-day, and 90-day maximum running average concentration values for the standard agricultural field/farm pond scenario and will be used for ecological exposure assessment only. GENEEC2 exposure values are compared to the appropriate duration toxicological endpoints and if they exceed any of the end points, PRZM/EXAMS simulation will be performed.

***GENEEC2 Run for Cyromazine on Dry Bean***

* INPUT VALUES *

| RATE (#/AC) ONE(MULT) | No.APPS & INTERVAL | SOIL Kd | SOLUBIL (PPM ) | APPL TYPE (%DRIFT) | NO-SPRAY ZONE(FT) | INCORP (IN) |
|---|---|---|---|---|---|---|
| .125( .730) | 6 7 | 3.9 | $1.36 \times 10^5$ | AERL_B( 13.0) | .0 | .0 |

FIELD AND STANDARD POND HALFLIFE VALUES (DAYS)

| METABOLIC (FIELD) | DAYS UNTIL RAIN/RUNOFF | | HYDROLYSIS (POND) | PHOTOLYSIS (POND-EFF) | METABOLIC (POND) | COMBINED (POND) |
|---|---|---|---|---|---|---|
| 450. | 2 | N/A | .00- | .00 | 900. | 900. |

GENERIC EECs (IN MICROGRAMS/LITER (PPB)) Version 2.0 Aug 1, 2001

| PEAK GEEC | MAX 4 DAY AVG GEEC | MAX 21 DAY AVG GEEC | MAX 60 DAY AVG GEEC | MAX 90 DAY AVG GEEC |
|---|---|---|---|---|
| 30.04 | 29.97 | 29.57 | 28.68 | 28.04 |

Appendix III - **Screening Concentration In GROund Water - SCI-GROW (version 2.1, May 1, 2001)**

***Model Background***

SCI-GROW screening model was developed in EFED and is a regression model based upon actual groundwater monitoring data collected for the registration of a number of pesticides. The current version of SCI-GROW appears to provide realistic estimates of pesticide concentrations in shallow, highly vulnerable ground water sites (i.e., sites with sandy soils and depth to ground water of 10 to 20 feet).

***SCI-GROW Run Cyromazine***

** INPUT VALUES **

| APP RATE (LBS/AC) | APPS/ YEAR | TOTAL/ SEASON | SOIL KOC | AEROBIC SOIL METAB HALFLIFE (DAYS) |
|---|---|---|---|---|
| .125 | 6 | .750 | 40.0 | 150. |

GROUND-WATER SCREENING CONCENTRATION (IN PPB) VERSION 2.1 MAY 1, 2001

5.3288