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OFFICE OF
PESTICIDES AND
TOXIC SUBSTANCES

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MEMORANDUM

SUBJECT: Leaching Assessment for Myclobutanil (Rally)

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Background

Myclobutanil (a.k.a Systhane and Rally) is a fungicide used against many fungi classified as Ascomycetes, Deuteromycetes (Fungi Imperfecti) and Basidiomycetes. The fungicide's primary mode of action is the inhibition of ergosterol biosynthesis.

Myclobutanil is registered for use on perennial grasses (turf), apples, grapes and there is an EUP for use on stone fruits pending. The compound is spray applied to the canopy of the crop. Most application rates are very low.

Use /Crop	Application Rate	Maximum Application
Turf Grass	0.5 to 1.0 pint/ A	2 pints
Apple	2-8 oz./A	5 lb
Apple	6-12 oz./A	
Grapes	2-5 oz./A	1 lb
Grapes	2-5 oz./A	
Turf Grass	0.3-0.6 lb/A	1 pint

Application is made directly to the foliage and fruits. The intention during application is to apply as little of the a.i. to the ground as possible. The registrant is currently conducting two field dissipation studies on bare ground plots in California. One of the sites is located on the coast, the other is located in the Central Valley. Each site will have two plots. One plot will have a 1.5 lb/A application, the other a 5 lb/A application. The 5 lb/A application rate is the maximum total application used on any one crop. Because the pesticide is usually applied to the crop at full canopy, bare ground plots will be used to ensure adequate residues of myclobutanil for half-life determination of the parent and the pattern of formation and decline of the degradates. These studies should represent worst-case conditions regarding the maximum amount of myclobutanil reaching the soil surface.

Conclusion

Myclobutanil exhibits most of the characteristics of a leaching compound; however, the field dissipation data were inconclusive as to the movement of myclobutanil in the field. As a condition of registration, the EFGWB has recommended a field dissipation study in a review dated 9-27-88. In a second review dated 11-10-88, EFGWB concurred with granting an EUP for myclobutanil on stone fruits.

The Ground-Water Technology Section recommends waiting to receive the two field dissipation studies currently underway in California prior to recommending any ground-water monitoring studies. Discussions with the registrant (Mike Morelli) indicate the soils are being sampled to at least three feet in these two studies. These studies will be submitted in the Spring of 1989.

Because myclobutanil is registered for a limited number of uses, the field dissipation studies underway in California should address current field dissipation study needs, and may clarify myclobutanil's movement in the field under actual use conditions. Although the compound exhibits leaching characteristics in laboratory experiments, low application rates and light irrigation may inhibit leaching. However, depending on the results of these field studies, more monitoring may be required. Specifically, if the field studies show movement to the three feet, a field leaching study will be required.

At this time, because of inconclusive field evidence for leaching, limited uses, and the nature of myclobutanil use, i.e., it is spray-applied to full canopy and at very low use rates so that up to 60% of the application is intercepted before reaching the soil, the EFGWB does not think it appropriate to require ground-water monitoring studies.

The Toxicology Branch has made the following determinations about myclobutanil:

* From a chronic 2-year feeding study in rats, testicular atrophy was noted.

* An Rfd was calculated based on testicular atrophy of 2.49 mg/kg/day from a 50ppm diet.

* It is not a teratogen.

* It is not an oncogen up to the 800 ppm level, in a chronic feeding study with rats, and up to the 500 ppm level with mice. However, data from feeding studies at higher doses have been required.

Leaching Assessment

Myclobutanil is persistent and moderately mobile. However, possibly because of the type of application (foliar) and low use rates, it has not demonstrated mobility in the field. Its environmental fate profile is as follows:

Hydrolysis:	Myclobutanil is stable to hydrolysis at pHs, 5, 7, 9.
Photolysis/Water:	Myclobutanil was stable.
Photolysis/Soil:	Myclobutanil degraded with a half-life of 143 days.
Aerobic Soil Metabolism:	Myclobutanil degraded with a half-life of 61-71 days. The compound shows some persistence.

At the end of the experiment (240 days) 34% of the parent compound remained undegraded and labelled as the triazole moiety. Up to 44% of the triazole-labelled parent compound was unextractable and 15% of it was identified as the 1,2,4-triazole degradate. The chlorophenyl-labelled parent compound degraded to C02 (28%) and unextrable material (29%) with 37% if the parent remaining at the study's end. An unidentified compound was reported as reaching 12-15% of the original concentration of myclobutanil and then declining to 3% at the study's end. Myclobutanil appears then to degrade largely to some CO_2, and non-extractable or conjugated materials, the 1,2,4-triazole compound and an unidentified compound that dissipates. Therefore, approximately 34-37% of the parent remains undegraded.

The triazole compound was extracted in the aqueous fraction indicating an affinity for water versus organic solvents. The 1,2,4-triazole compound is expected to be very mobile. The 1,2,4-triazole compound is also persistent. Other than the triazole degradate, there are no other degradates that form and persist. 1,2,4-triazole is a compound found in nature; it is ubiquitous in soils. There are no toxicity concerns about 1,2,4-triazole nor are there any concerns regarding its impact on ground water, at this time.

Anaerobic Soil Metabolism: Myclobutanil did not degrade further once anaerobic conditions were established. The compound does not degrade under anaerobic conditions. Once it had migrated to a zone of reduced oxygen concentration, it would be expected to persist.

Leaching

Adsorption-desorption values for five soils ranged from 1.46-9.77.

Clay loam	4.44
sand	1.46
silt loam	7.08
sand loam	9.77
clay	2.39

Myclobutanil is mobile to moderately mobile.

Aged residues of myclobutanil were leached with 20 inches of water slowly. The leachate contained 1-6% of the triazole-labelled parent compound and 5-6% of the chlorophenyl-labelled parent compound. The majority of the labelled-parent material remained in the upper 10 cm of soil column. The compound in the leachate was most likely the parent compound, although this was not specifically stated. However, because the leachate was extracted with and quantitated by TLC in the same organic solvents used to quantitate the parent compound by TLC in the soil metabolism studies, the assumption has been made that the compound identified in the leachate was myclobutanil.

A second column study using aged residues containing the degradate 1,2,4-triazole was submitted. Sand loam and silt clay soils were used. The triazole compound was very mobile; 40% was detected in the leachate from the sand loam column, and 44% in the leachate from the silty clay loam soil. The conditions of this experiment were similar to those described above. Parent compound labelled on the triazole ring was aged for 30 days in soil aerobically and leached with 20 inches of water slowly.

Field Dissipation

The field studies submitted, one on a site in Pennsylvania on silt loam soils with an application rate of 0.25 lb/A on winter wheat, the other at a site in Mississippi on a loam soil also at 0.25 lb/A on winter wheat were inconclusive as to the depth of movement of myclobutanil in the soil profile. Soils sampled at 0-3,3-6, and 6-12 inches show residues of myclobutanil periodically at all depths at the Mississippi site and the Pennsylvania site. The control plots were entirely free of residues. However, because there were residues at the 6-12 inch depths even on day zero (immediate post- application) at both 3-6 and 6-12 inch depths, at both sites, this may be evidence of contamination resulting from poor sampling technique. However, there appears to have been adequate rainfall during the studies to move residues through the soil profile.

The field dissipation studies do not conclusively show leaching. Residues were detected at the deepest depths sampled (6-12 inches), but this appears to have been a result of contamination during sampling procedures. To clarify this, new field dissipation studies are being conducted in California.