CALIFORNIA DEPARTMENT OF PESTICIDE REGULATION
PUBLIC REPORT 2007-5

Triallate

Tracking ID Number 215144

DESCRIPTION OF ACTION

Gowan Company submitted an application seeking California registration of Far-Go Herbicide, EPA Reg. No. 10163-286, containing the new active ingredient triallate. It is a selective pre-emergence herbicide for control of wild oats and brome grasses in winter wheat and spring and durum wheat.

Gowan Company applied for an interim registration as established by Article 16, of Chapter 2, Division 7, sections 13161-13170 of the Food and Agricultural Code (FAC). Under the interim registration process, the submission of certain data may be deferred for up to three years. An interim registration may be issued for an agricultural use product which contains an active ingredient subject to the Pesticide Contamination Prevention Act (PCPA, FAC sections 13145-13152). The submission must meet the following criteria:

1. DPR defers submission of no more than three of the listed data types:

- Field dissipation study
- Octanol water partition coefficient (Kow)
- Efficacy data
- Soil photolysis
- A re-done environmental fate study to correct errors or a study conducted under California conditions, if all other data support a decision for interim registration

2. All other required data have been submitted and found acceptable

3. The applicant must provide all of the following:

- Information that the product is a useful part of a pest management system
- A commitment to submit the deferred data, including a schedule of quarterly progress reports
- A $5000 application fee per registration action in addition to the required $200 product
- application fee

The precautionary and first aid statements on the product label, as well as label directions requiring personal protective equipment (PPE) and other protective measures adequately mitigate potential health risks to persons who may come in contact with the pesticide during application.

DPR does not expect significant adverse environmental impacts to result from registration of Far-Go Herbicide.

The U.S. Environmental Protection Agency (U.S. EPA) registered Far-Go Herbicide, U.S. EPA Reg. No. 524-145, to Monsanto Company on August 20, 1963. DPR initially registered Far-Go Herbicide, in California, on April 12, 1977, and Monsanto Company withdrew the California registration December 31, 1991. Subsequently, Far-Go Herbicide, EPA Reg. No. 524-145 was transferred to Gowan Company by U.S. EPA on November 9, 2004.

BACKGROUND

Registrant:	Gowan Company
Common name:	Triallate
Chemical name:	S-(2,3,3-trichloroally)-diisopropylthiocarbamate
Brand name:	Far-Go Herbicide
Uses:	For selective pre-emergence weed control of annual grasses
Pests controlled:	Weeds such as wild oats and brome grasses
Type of registration:	Interim Registration

Far-Go Herbicide is a emulsifiable concentrate containing 46.3% triallate, which is in the thiocarbamate chemical family. The product is a systemic herbicide inhibiting cell division and elongation in the seedling shoots before emergence from the ground. Far-Go Herbicide provides effective weed control when sprayed on the soil and incorporated before weeds germinate.

SCIENTIFIC REVIEW

A. Chemistry

1. Product Chemistry**:** DPR evaluated the submitted chemistry studies for Far-Go Herbicide. The results are summarized in Table 1.

Table 1. Physical and Chemical Properties of Far-Go Herbicide

Properties	Values
Physical state	Liquid
Specific gravity	1.03 @ 20^{o}C
pH (1% solution)	5.21
Flammability	Flash Point of 47.8 ^{o}C
Viscosity (25 °C)	2.93 cPs
Emission potential	19.83%
Storage stability	Stable for 2 years @ 20^{o}C
Corrosion characteristics	Non-corrosive for 2 years @ 20^{o}C

Submitted product chemistry data support registration of Far-Go Herbicide.

2. Residues in Food and Animal Feed**:** Monsanto Company submitted an adequate residue analytical method when originally applying for California registration of Far-Go Herbicide. The U.S. EPA established tolerances in the Code of Federal Regulations (CFR), Title 40, section 180.314 for residues of triallate, in or on the following food commodities: barley (grain and straw), wheat (grain and straw) at 0.05 ppm. When applied in accordance with the label directions, triallate residues should not exceed the established 0.05 ppm tolerance for the listed commodities.

3. Environmental Fate**:** The triallate environmental fate data includes studies on soil hydrolysis and aqueous soil photolysis, aerobic and anaerobic soil metabolism, anaerobic aquatic metabolism, batch equilibrium, and field dissipation. All studies, with the exception of the field dissipation studies, were found to be satisfactory. The field dissipation studies were not conducted in California, nor under California conditions. When the results of the acceptable studies are compared with the U.S. EPA and California EPA criteria for predicting the potential of a chemical to reach ground water, the studies indicated that triallate does have the potential to leach, as summarized in Table 2:

Table 2. Comparison of U.S. EPA and California EPA Ground Water Leaching Criteria with Environmental Fate Study Results for Triallate

Parameter	**Potential to Leach Value** (U.S. EPA)	**Potential to Leach Value** (California EPA)	**Experimental Value**	**Criteria Exceeded**
Water solubility	> 30 ppm	> 3 ppm	4 ppm	No
Soil adsorption coefficient (K_d)	< 5 ml/g		5.3-35 ml/g	No
K_{oc}		<1,900 ml/g	2400 ml/g	No
Hydrolytic half-life	> 30 days	> 14 days	168 days	Yes
Aerobic soil metabolic half-life	> 21 days	> 610 days	20 days	No
Anaerobic soil metabolic half-life	> 21 days	> 9 days	184 days	Yes
Field dissipation half-life	> 21 days		Not Reported	N/A

As seen in Table 2, the hydrolytic half-life and the anaerobic soil metabolic half-life values exceed the potential leach values established by U.S. EPA and CA EPA. Triallate is stable to both hydrolysis and photolysis. However, water solubility is low and the aerobic soil

metabolism is relatively rapid. These factors minimize the possibility that triallate will leach to ground water. Also, the Koc value is indicative of slight to low mobility in soil. In addition, the Environmental Hazards section on the product label contains extensive warnings directed at the prevention of ground water contamination. The product label also bears specific directions for the mitigation of point source contamination.

The recommendation was originally made against registration of Far-Go Herbicide because the submitted field dissipation studies were conducted in Kansas, and it was determined that the test location did not represent California conditions. Consequently, Gowan Company requested an interim registration for Far-Go Herbicide, allowing them time to complete the required field dissipation studies in California. The Gowan Company request was routed to the Pest Management and Licensing Branch for consideration. The Pest Management and Licensing Branch recommended interim registration of Far-Go Herbicide based on available information and discussion with UC Farm Advisors. DPR staff determined that Far-Go Herbicide meets the following criteria for interim registration:

- The product will be a significant component in a pest management system.
- The product will reduce risks of pest resistance problems such as loss of economic efficacy and increased amounts of frequency of chemical applications by providing better integrated management of a pest or pest complex.

The submitted product chemistry, residue chemistry, and environmental fate data support interim registration of Far-Go Herbicide.

B. Toxicology

Monsanto Company submitted toxicity data when originally applying for California registration of Far-Go Herbicide. The previously submitted toxicology studies are adequate to conduct a complete toxicological evaluation of Far-Go Herbicide. DPR evaluated the submitted data to determine the potential for adverse health effects. The acute toxicity parameters for Far-Go Herbicide are summarized in Table 3 on page 5.

DPR's evaluation of the acute toxicity studies indicates that the studies are adequate for a complete toxicological evaluation. The product label adequately identifies the potential acute toxicity hazards indicated by the data reviewed. The first aid statements and PPE are adequate for the indicated acute toxicity hazards.

DPR found the submitted toxicology studies for triallate sufficient to satisfy the data requirements of the Birth Defects Prevention Act (Food and Agricultural Code section 13121 et al.). Neurotoxicity (though not delayed neurotoxicity) was observed in a number of studies. A possible increase in liver tumors was noted in the mouse oncogenicity study. Also, two hemotoxicity studies indicated positive effects. DPR prioritizes pesticide active ingredients for risk assessment based on of the nature the potential adverse health effects, the number of potential adverse effects, the number of species affected, no observable effect levels (NOELs), the potential for human exposure, use patterns, and other similar factors. Based on these criteria, pesticides with the greatest potential for health problems are placed in high priority, with other

chemicals being in moderate or low priority. At this time, DPR gives triallate a high priority for risk assessment. The purpose of the risk assessment would be to appraise the potential for triallate to cause adverse health effects in humans if exposed to the pesticide through legal use. A summary of toxicology data with additional triallate toxicity information is available on the DPR public website at: http://www.cdpr.ca.gov/docs/toxsums/pdfs/49.pdf.

Table 3. Acute Toxicity of Far-Go Herbicide*

Type of Study	Acute Toxicity Values	Acute Toxicity Category
Acute oral	LD_{50} 2193 mg/kg	III
Acute dermal	LD_{50} >5000 mg/kg	IV
Acute inhalation	LC_{50} >5.3 mg/l	IV
Primary eye irritation	N/A*	III
Primary dermal irritation	N/A	IV
Dermal sensitization	N/A	Possible dermal sensitizer
Signal word	N/A	CAUTION

*Acute Toxicity Values expressed as:
LD_{50} = Lethal dose that kills 50% of the test population
LC_{50} = Lethal environmental concentration that kills 50% of the test population
N/A = Not applicable

C. Health & Safety

DPR's evaluation of the medical management information on the Far-Go Herbicide label and the acute toxicity study results indicate that the product label bears all of the required statements and warnings regarding safety to handlers and other persons who may be exposed to the pesticide. The product label bears an adequate First Aid statement. In addition, the product label requires applicators and other handlers to wear long sleeved shirt and long pants, shoes plus socks, and chemical-resistant gloves (such as barrier laminate or viton). The User Safety Recommendations direct users to:

1. Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
2. Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
3. Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

D. Fish & Wildlife

Monsanto Company submitted fish and wildlife toxicity studies to support the original registration of Far-Go Herbicide. The studies included testing on rats, bobwhite quail, mallard ducks, bluegill sunfish, rainbow trout, *Daphnia magna*, and the honey bee. The submitted data are adequate to characterize the toxicity to wildlife and aquatic animals from an environmental exposure. Table 4 summarizes the results of these studies.

Table 4. Summary of Fish & Wildlife Toxicity Values

Test Animal	Acute Toxicity Value	Relative Toxicity
Rat	LD_{50} 2193 mg/kg	Practically non-toxic
Bobwhite quail	LD_{50} 1560 mg/kg	Practically non-toxic
Bobwhite quail	LC_{50} >5000	Relatively non-toxic
Mallard duck	LC_{50} >5000	Relatively non-toxic
Bluegill sunfish	LC_{50} 1.3 ppm	Moderately toxic
Rainbow trout	LC_{50} 1.2 ppm	Moderately toxic
Daphnia magna	LC_{50} 0.43 ppm	Highly toxic
Honeybee	LD_{50} 36.26 µg/bee	Slightly toxic

The data indicate that triallate is practically non-toxic to rats, relatively non-toxic to birds, moderately toxic to bluegill sunfish and rainbow trout, highly toxic to *Dapnia magna*, and slightly toxic to honeybees. To mitigate the hazards to aquatic organisms the Far-Go Herbicide label contains the Environmental Hazards warning, “Do not apply directly to water, or to areas where water is present, or to inter-tidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwater or rinsate.”

E. Efficacy & Phytotoxicity

Triallate belongs to the thiocarbamate chemical class. The mode of action is by inhibition of cell division and elongation in the seedling shoots before emergence from the ground. It is a pre-emergence selective herbicide used to control wild oats and brome grasses in winter wheat and spring and durum wheat.

Monsanto Company submitted efficacy and phytotoxicity studies to support the original registration of Far-Go Herbicide. Submitted efficacy and phytotoxicity studies indicate that Far-Go Herbicide provides effective pre-emergence control of wild oats and brome grasses when used according to the label use directions. Application is limited to one per growing season and must not exceed 1.5 quarts per acre. It can be applied by ground broadcast treatment or band treatment. Depending on the crop that is treated, Far-Go Herbicide must be incorporated into the soil before or after planting for best results. Far-Go is not recommended for tank mix with other pesticides, but is recommended as a mix with standard sprayable fluid fertilizers. The product label contains directions for jar testing to determine compatibility of Far-Go with fertilizers.

Submitted product efficacy and phytotoxicity data are adequate to support registration of Far-Go Herbicide.

ALTERNATIVES

Far-Go Herbicide is a liquid emulsion herbicide providing pre-emergence selective control of a broad range of weedy annual grasses, especially wild oats. California wheat growers rely on two herbicides for wild oat control: fenoxaprop (Puma®) and mesosulfuron (Osprey®). Wild oats is a significant pest in all wheat areas and must be treated annually. University and independent researchers and scientists suggest that the best way to prevent or delay resistance is to rotate modes of action. Therefore it is very important to have another material with a different mode of action to prevent development of resistance to these two herbicides. Since triallate (Far-Go Herbicide) has a different mode of action, growers can use it in rotation in their integrated pest management programs to reduce or prevent the development of resistance. An effective integrated pest management strategy requires the flexibility of a number of comparable, but not exactly equivalent, pesticides.

CONCLUSION

DPR evaluated the product label and scientific data submitted to support the registration of Far-Go Herbicide. The label and data were found acceptable to support interim registration. The acute health risks to human from exposure to triallate are minimal due to its low mammalian toxicity. The precautionary and first aid statements on the product label and the recommended protective measures mitigate potential health risks to persons who may be exposed to these pesticides. If a risk assessment conducted by DPR determines that exposure to triallate may result in unacceptable margins of exposure, DPR will place further restrictions on the use of triallate at that time. No significant adverse environmental impacts are expected to occur from the use of Far-Go Herbicide, and when used in accordance with label directions, it will be effective for the intended use.

After review of Far-Go Herbicide data and labeling, including the use directions and the environmental warnings, DPR is proposing interim registration of Far-Go Herbicide. Gowan Company has agreed to complete the field dissipation testing, and to submit the final report by November, 2008. They will also submit the required quarterly progress reports.