National Registration Authority
For Agricultural & Veterinary Chemicals

Evaluation of the new active constituent

FIPRONIL

in the products

REGENT 200SC INSECTICIDE

and

PRESTO MUSHROOM INSECTICIDE

This document is published by the National Registration Authority for Agricultural and Veterinary Chemicals.
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FOREWORD

The National Registration Authority for Agricultural and Veterinary Chemicals (NRA) is an independent Statutory Authority with responsibility for the assessment and approval of agricultural and veterinary chemical products prior to sale and use in Australia.

In undertaking this task, the NRA works in close cooperation with advisory agencies including the Department of Human Services and Health (Environmental Health and Safety Unit), the Environment Protection Agency (EPA), the National Occupational Health and Safety Commission (Worksafe Australia) and State Departments of Agriculture and Health.

The NRA has a policy of encouraging openness and transparency in its activities and seeking community involvement in decision making. The publication of Public Release Summaries for all products containing new active ingredients is a part of that process.

The information and technical data required by the NRA in order to assess the safety of new chemical products and the methods of assessment must be undertaken according to accepted scientific principles. Details are outlined in the document "Interim Requirements for the Registration of Agricultural and Veterinary Chemical Products" which can be obtained from the NRA.

This Public Release Summary is intended as a brief overview of the assessment that has been completed by the NRA and advisory agencies. The document has been deliberately presented in a manner that is likely to be informative to the widest possible audience thereby encouraging public comment. More detailed technical assessment reports on occupational health and safety aspects, environmental impact, and residues in food are available from the NRA on request.

The NRA welcomes comment both on the usefulness of this document and on suggestions for further improvement. Comments should be forwarded to the National Registration Manager, National Registration Authority for Agricultural and Veterinary Chemicals, PO Box E240, Queen Victoria Terrace, Parkes, ACT, 2600.

ABBREVIATIONS AND ACRONYMS WHICH MAY APPEAR IN THIS DOCUMENT

ac	Active constituent
ADI	Acceptable Daily Intake (for humans)
AHMAC	Australian Health Ministers Advisory Council
ai	Active ingredient
d	Day
EHSU	Environmental Health and Safety Unit (Department of Human Services and Health)
EC_{50}	Concentration at which 50% of the test population are immobilised
EUP	End Use Product
Fo	Original Parent Generation
h	Hour
HPLC	High Performance Liquid Chromatography
id	Intradermal
ip	Intraperitoneal
im	Intramuscular
iv	Intravenous
In Vitro	Outside the living body and in an artificial environment
In Vivo	Inside the living body of a plant or animal
kg	Kilogram
L	Litre
LC_{50}	Concentration that kills 50 %of the test population of organisms
LD_{50}	Dosage of chemical that kills 50% of the test population of organisms
mg	Milligram
mL	Millilitre
MRL	Maximum Residue Limit (a legal limit)
MSDS	Material Safety Data Sheet
NDPSC	National Drugs and Poisons Schedule Committee
ng	Nanogram
NHMRC	National Health and Medical Research Council
NOECINOEL	No Observable Effect Concentration/Level
po	Oral
ppb	parts per billion
PPE	Personal Protective Equipment
ppm	parts per million
s	Second
sc	Subcutaneous
SC	Suspension Concentrate
SUSDP	Standard for the Uniform Scheduling of Drugs and Poisons
T-Value	A value used to determine the First Aid Instructions for chemical products that contain two or more poisons
TGAC	Technical Grade Active Constituent
WDG	Water Dispersible Granule
WHP	Withholding Period

1. EXECUTIVE SUMMARY

INTRODUCTION

The National Registration Authority for Agricultural and Veterinary Chemicals (NRA) has before it applications for registration of the products REGENT 200SC INSECTICIDE and PRESTO MUSHROOM INSECTICIDE and now invites comment from any person on whether these products should be registered. This invitation is being made as the active constituent contained in Regent 200SC Insecticide and Presto Mushroom Insecticide *(fipronil)* is new to agricultural products in Australia.

The purpose of this document is to provide a summary of the data evaluated, and of the regulatory considerations reached, during the evaluation by the NRA of Regent 200SC Insecticide for the control of Banana weevil borers in bananas and Presto Mushroom Insecticide for the control of mushroom flies in mushrooms.

Having completed its evaluation of the proposed use *fipronil* in Regent 200SC Insecticide and Presto Mushroom Insecticide, the NRA provides the following description of that evaluation for public comment:

AGRICULTURAL ASPECTS

Regent 200SC Insecticide and Presto Mushroom Insecticide contain the active constituent fipronil, a new chemical not previously contained in agricultural chemical products in Australia. Fipronil belongs to a new chemical class, the phenyl pyrazole insecticides, which act on the central nervous system of insects by blocking the GABA-regulated chloride channel.

Fipronil products will therefore be useful in managing insecticide resistance as it has a different mode of action from other chemicals registered for Banana weevil borer control.

There is no currently registered insecticide which is effective against all four major dipterous mushroom pests. As the fipronil product shows this broad activity, it should simplify control measures and reduce the amount of pesticide used for this purpose.

Efficacy trials carried out in Australia show that the products give good control of Banana weevil borers in bananas, and sciarid, phorid and cecid flies in mushroom housing. The product is applied to the bottom 30 cm of banana trunks and to surrounding trash and soil. As would be expected, there has been no evidence of phytotoxicity to bananas. In mushroom production, it is to be applied to the peatmoss during preparation of casing. There have been no reports of adverse effects on mushrooms.

ENVIRONMENTAL ASPECTS

Environmental exposure to fipronil will primarily involve the soil, as water solubility and vapour pressure are low. Biodegradation of fipronil occurs at moderate rates in laboratory and field soils, with half-lives of a few months being typical. Significant accumulation, bioaccumulation or leaching are all considered unlikely.

The ecotoxicological profile of fipronil indicates high acute toxicity to fish and terrestrial and aquatic arthropods. Fipronil is also highly toxic to galliform birds, but repellent effects appear to limit mortality where uncontaminated feed is available. Phytotoxicity appears low, although chlorophyll production in green algae exposed to low concentrations of fipronil appears to be suppressed.

Fipronil is applied at a low rate and represents a low hazard to most nontarget organisms under proposed conditions of use. The possible exception is galliform birds such as Australian brush turkeys that forage in banana plantations. Given the high toxicity of fipronil to galliform birds and the possibility that such birds may be exposed in banana plantations, it would be appropriate for the company to assess the likely hazard to birds in banana plantations during the early phase of commercial use. Suggestions for how this may be done are outlined in the body of the summary, and in more detail in the full technical report.

PUBLIC HEALTH AND SAFETY ASPECTS

Fipronil, the active ingredient in the products, has moderate acute toxicity, and does not irritate the skin or eyes of rabbits or cause skin sensitisation in guinea pigs. The six fipronil formulations are less toxic than fipronil, but all except one caused slight skin or eye irritation or weak skin sensitisation.

Repeat-dose studies in rats, mice, dogs and rabbits indicated that the central nervous system (CNS) was stimulated due to the pharmacological action of fipronil at neurological receptors. Repeat-dose studies also led to effects on the liver and thyroid glands. When fed fipronil for 1 year or longer at the threshold level of thyroid stimulation, tumors were observed in rats. At lower dose levels and in other test species (mice and dogs), fipronil did not induce thyroid tumors or tumors in any other organs. Fipronil did not cause birth defects or damage genetic material, but in a two-generation study in rats there was a slight reduction in reproductive potential.

Based on an assessment of the toxicology and the potential dietary intake of residues, it was considered that there should be no adverse effects on human health from the proposed use of Regent Insecticides.

RESIDUES IN FOOD AND TRADE ASPECTS

Residues in Food

Appropriate residue and metabolism studies were provided, in accordance with the *Requirements for Clearance of Agricultural and Veterinary Chemical Products,* to support the use of fipronil in bananas and mushrooms in Australia.

In bananas, trials were conducted in Northern NSW and Queensland. Banana plants were treated with two applications at rates of 0.15 and 0.30 g ai/stool and 0.20 and 0.50 g ai/stool (up to 3.3 times the recommended rate). Fruits were tested for fipronil and four metabolites between 0 and 60 days after treatment, and in the same interval following re-treatment. No detectable residues were found in any of the five trials (< 0.002 mg/kg).

In mushrooms, two trials were conducted from which residue samples were taken. In both trials, fipronil was applied at twice and approximately four times the recommended rate to the casing material. Mushrooms harvested at the requested withholding period of 19 days, contained residues of 0.0026 - 0.0087 mg/kg of the parent compound, at twice the reco1ll1llended treatment rate. Residues of 0.0046 - 0.0102 mg/kg were found at four times the recommended application rate.

The residue trial data indicate that, in accordance with the recommended pattern of use, withholding periods of 19 days for mushrooms and nil for bananas are appropriate.

In metabolism studies conducted in the UK. on three crop types, sunflowers, sugarbeet and maize; in laboratory animals (mouse, rat and rabbit); and in the dairy goat and hen the parent and two C01ll1llon metabolites (the sulphonyl and sulphenyl derivatives) were found.

Detailed descriptions of the analytical method were provided. The residues were detected and analysed using GC or HPLC. With both methods, the parent plus four or more metabolites can be observed on a single trace. The limits of determination varied, with improvement of the analytical method, from 0.01 - 0.002 mg/kg.

MRL's of *0.01 mg/kg for bananas and 0.05 mg/kg for mushrooms have been recommended to the *MRL Standard:*

Trade

Very few overseas MRLs are set for fipronil, especially for bananas or mushrooms. There are no CODEXMRLs.

However, only very small amounts of mushrooms (less than 0.1 % of total Australian production) and bananas (0.2%) are exported. Mushrooms, bananas or their products or waste materials from these crops would not be expected to be fed to livestock.

In view of this, it is considered that use of the products does not pose a threat to Australia's overseas trade.

OCCUPATIONAL HEALTH AND SAFETY ASPECTS

Worksafe Australia has conducted a risk assessment on REGENT 200 SC INSECTICIDE and REGENT 800 WDG INSECTICIDE containing fipronil 200 g/L and 800 g/kg respectively, for use on bananas and mushrooms, and concludes that they can be safely used by workers.

Fipronil, REGENT 200 SC INSECTICIDE and REGENT 800 WDG INSECTICIDE are hazardous substances.

Technical fipronil and both end use products are Class 6.1 (a) dangerous goods, under the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code).

Chemical industry workers involved in formulating, testing and packaging the products should be protected by engineering controls arid personal protective equipment and receive adequate training.

The risk of accidental contact with the technical material or products during routine transport, storage and retailing is expected to be negligible.

End users may become contaminated with REGENT 200 SC INSECTICIDE and REGENT 800 WDG INSECTICIDE during routine use. The probability of workers developing adverse health effects following short-term or long-term use of either product is minimised by appropriate safety directions on the product labels and good personal hygiene. Workers using REGENT 200 SC INSECTICIDE should wear overalls (or equivalent clothing), and elbow-length gloves, when opening containers and preparing spray. Workers using REGENT 800 WDG INSECTICIDE should wear overalls (or equivalent clothing), elbow-length gloves and face shield or goggles, when handling the concentrated product. No specific protective equipment is required when applying the spray, for either product.

A re-entry or re-handling restriction is not required for either product.

Fipronil, REGENT 200 SC INSECTICIDE and REGENT 800 WDG INSECTICIDE can be handled safely by workers, when they are used in accordance with the control measures indicated on the respective labels and material safety data sheets.

2. INTRODUCTION

The purpose of this document is to provide the public with a summary of the data evaluated, and of the regulatory considerations reached, in the evaluation by the NRA of REGENT 200SC INSECTICIDE and PRESTO MUSHROOM INSECTICIDE.

The use of Regent 200SC Insecticide is proposed as a control of Banana weevil borer in bananas in NSW, Queensland, WA and Northern Territory only and Presto Mushroom Insecticide is proposed for control of sciarid, phorid and cecid flies in mushroom housing in all States. The NRA now invites comment from any person on whether Regent 200SC Insecticide and Presto Mushroom Insecticide should be registered

Comments should be sent by 5 March 1996 to:

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APPLICANT

The applicant, Rhone-Poulenc Rural Australia Pty Ltd, has applied for the registration of Regent 200SC Insecticide and Presto Mushroom Insecticide, which contain a new active constituent, fipronil.

PRODUCT DETAILS

Regent 200SC Insecticide and Presto Mushroom Insecticide are formulated as suspension concentrates and contain 200 g/L fipronil. The products will be formulated in Australia using active constituent imported from France.

Rhone-Poulenc has also sought consideration of other formulations, including a water dispersible granule (WDG), which are mentioned in some of the following reports. The company will not be commercialising these other formulations at this time (apart from a veterinary preparation for use on dogs and cats which the NRA has already registered under the name Frontline Spray).

Presto Mushroom Insecticide has the same formulation as Regent 200SC Insecticide. Comments made in the following assessment reports about properties of Regent 200SC apply equally therefore to Presto.

OVERSEAS REGISTRATION STATUS

Countries having registrations of products containing fipronil are shown below –

Country	Crop	Registration Date
Brazil	Sugarcane, cotton, potatoes, rice	December 1994
China	Rice, brassicas	December 1994
Colombia	Cotton	June 1993
Cote d'Ivorie	Bananas	June 1994
Ecuador	Cotton, rice, bananas, coffee, citrus, brassicas, potatoes, soybeans, balsa, lucerne	September 1995
France	Maize, sunflower, sugarbeet	Provisional July 1993
France	Bananas	Provisional June 1995
Guatemala	Cotton	August 1994
Honduras	All uses	May 1995
Indonesia	Rice	October 1993
Indonesia	Brassicas	January 1995
Mexico	Maize	March 1995
Paraguay	Cotton, soybeans	October 1994
Peru	Cotton, potatoes, brassicas	July 1994
Philippines	Rice	Provisional May 1994
Philippines	Brassicas	Provisional May 1995

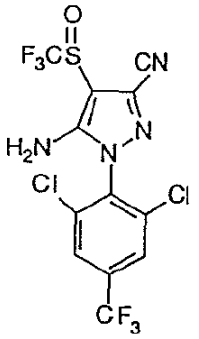
Country	Crop	Registration Date
Romania	Maize, potatoes	Provisional March 1'995
South Africa	Citrus	August 1994
Thailand	Rice	May 1995
Thailand	Citrus, brassicas	August 1994
Thailand	Watermelon	March 1995
Trinadad	Sugarcane	December 1994
US	Maize, turf, cotton, rice, potatoes, sweet potatoes, ticks/fleas, PCO cockroach & termites	Pending
Venezuela	Cotton	September 1995
Vietnam	Rice	August 1994
Zimbabwe	Maize, sugarcane	November 1994

PROPERTIES OF THE CHEMICAL ACTIVE CONSTITUENT

The chemical active constituent fipronil is manufactured in France and has the following properties:

Common name:	fipronil
Chemical name (IUPAC):	(±)-5-Amino-1-9-(2, 6-dichloro-α,α,α-trifluoro-p-tolyl)-4-trifluoromethylsulfinylpyrazole-3-carbonitrile
Product names	Regent 200SC Insecticide and Presto Mushroom Insecticide
CAS Registry Number	120068-37-3
Molecular formula:	C12H4C12F6N4O4S
Molecular weight:	437.15
Appearance (colour):	white powder
Odour:	mouldy
Physical state:	powder
Melting point:	195.5 -203°C
Relative density:	1.471-1.626 g/mL @ 20°C
Vapour pressure:	3.7 X 10-9 hPa at 25°C
Water solubility (20°C):	1.9 (distilled water), 2.4 (PH 5), 2.2 (PH 9) mg/L
Fat solubility:	10.2 g/kg
Partition co-efficient:	1ogPow = 4.0 at 20°C

Structural formula:



3. AGRICULTURAL ASSESSMENT

JUSTIFICATION FOR USE

Banana weevil borer *(Cosmopolities sordidus)* is a significant pest of bananas, causing localised rotting at the base of stems, which may break off in the wind. A number of pesticides are registered for control of the pest, but resistance may reduce their effectiveness.

Because fipronil has a different mode of action on the pest it would be useful in managing pest resistance.

No single insecticide is currently available in Australia that controls all the major dipterous pests (sciarid, phorid and cecid flies) of mushrooms. The product should therefore simplify control measures for these pests and reduce the amount of pesticide used for this purpose.

PROPOSED USE PATTERN

On Bananas

Regent 200SC Insecticide: For use in Qld, NSW, WA and NT only. Apply at the rate of 150 mL of product per 100L water. Apply as a fine spray covering the stem to a height of 30cm and the soil in a 30cm radius from the stem base. Apply a total volume of 500mL per stool.

Ensure thorough coverage of butt, suckers, trash and exposed soil. Applications should be made in spring and autumn when weevil numbers reach 4 per bait (NSW and NQ) or 2 per bait (SE Qld) or where commercial damage is likely. For full details see product label.

On Mushrooms

Presto Mushroom Insecticide. For use in all States. Apply at the rate of 16mL of product per 300L bale of peatmoss. Prepare solution by mixing product with a small volume of water. Apply mixture to peatrnoss during preparation of casing. Ensure thorough mixing with peatmoss. Do not apply later than 19 days before harvest. For full details see product label.

EVALUATION OF EFFICACY

The applicant, Rhone-Poulenc Rural Australia Pty Ltd, provided efficacy data to support the claims of Regent 200SC Insecticide and Presto Mushroom Insecticide. The reviewer of this data was satisfied that the claims for Regent 200SC Insecticide and Presto Mushroom Insecticide were supported by the data presented. Details of the efficacy data are:

On Bananas:

A total of 11 trials were conducted over 5 years by the company under field conditions in NSW and Qld, and the product was also tested by the Queensland Department of Primary Industries. Also a bioassay compared the relative potency against Banana weevil borer with that of prothiofos and chlorpyrifos.

The bioassay indicated that fipronil has a relative potency 2.5 times that of prothiofos and 1.9 times that of chlorpyrifos.

The field trials showed that a rate of 0.067g ai/stool was inadequate, but that 0.125 to 0.175g ai/stool gave at least equivalent performance to the standard treatments (prothiofos and chlorpyrifos).

The rate of 0.150g ai/stool was selected to give an additional margin of performance and consistency over the 0.125g rate, and to provide longer residual control.

Residual activity at the proposed label rate varied in the trials from 69 days up to 8 months. Trials showed that the product is effective when applied in either spring or autumn, and that a butt spray technique gives most consistent results.

On Mushrooms

Eight trials over two years were conducted by the NSW Agriculture Mushroom Research and Development Unit at Rydalmere.

In two trials on sciarids, a rate of 10mg ai/kg proved effective but in one trial was less that the currently used product. A rate of 20mg ai/kg was shown in a third trial to give at least equivalent control and a slightly higher yield than the standard treatment.

Fipronil at 20 mg ai/ha gave excellent control of both species of cecid, resulting in better yield than from the treatments with either of the two currently registered products. Fipronil also controlled cecid infestations initiated at mushroom spawning, which has not been achieved with any other chemical.

In two trials on phorids at 20 mg ai/ha , fipronil reduced the population by 89 % compared with the standard treatment.

PHYTOTOXICITY

On Bananas

Fipronil is applied to the base of the trunk and surrounding trash and soil. It is relatively non-systemic and has a low water solubility, so little active ingredient would be taken up by the roots or directly through the epidermis of the lower stem. Phytotoxicity would therefore not be expected, and none has been reported in any of the trials.

On Mushrooms

No adverse effects were reported in the trials. In a residue trial, in the absence of pest pressure, there was no significant difference in yield between any of the treatments and the control, indicating no significant crop effect.

CONCLUSION

Regent 200SC Insecticide and Presto Mushroom Insecticide have been shown in trials to be effective for control of Banana weevil borers and mushroom files, respectively, with no observed adverse effects on crop yield.

4. ENVIRONMENTAL ASSESSMENT

ENVIRONMENTAL FATE

Environmental exposure from the proposed uses of fipronil will primarily involve the soil, either directly when applied as a fine spray to and around banana palms, or when mushroom casings are recycled as compost.

The following test results indicate that fipronil is expected to remain associated with the soil, where it is strongly bound and subject to microbial degradation.

Hydrolysis

Fipronil proved stable to hydrolysis at pH 5 and 7. At pH 9, the calculated half-life was about 28 days. A single hydrolysis product, the amide arising from nitrile hydrolysis, was detected.

Photolysis

Fipronil degraded rapidly under xenon lamp irradiation (half-life equivalent to 0.33 days of summer sunlight in Florida) to form the corresponding trifluoromethyl pyrazole (lacking the sulfoxide link) and sulfonate, in roughly 5: 1 ratio and found in organic extracts and aqueous phases, respectively. The structure of a third minor photoproduct, also recovered from the organic extracts, could not be determined.

Photodegradation was also observed when radiolabelled fipronil was applied as acetone solution to the surface of a clay loam soil and subjected to 30 days of xenon lamp irradiation, said to be equivalent in intensity to bright natural sunlight. Estimated half-lives were 49 days in controls and 34 days under irradiation, indicating a contribution from photolysis. The trifluoromethyl pyrazole and sulfonate, each amounting to about 7% of applied after 30 days, were observed as photoproducts. Similar results were obtained when a granular formulation (2 % on Sepiolite) was exposed to artificial sunlight for 14 days.

Degradation in Soil

Fipronil proved slightly to moderately persistent (half-lives between 18 and 128 days at 22°C) in five soils and persistent (half-life 308 days) in a sixth, a sand with low microbial activity. Persistence increased markedly at 10^0C (half-lives in five soils between 61 and 246 days). The main metabolites were amide and sulfone analogues of fipronil, together with small amounts of the sulfide. Carboxylate derivatives arising from hydrolysis of the nitrile substituent were also observed, but only the carboxylate analogue of fipronil was seen at more than 10% of applied. Very little radiolabelled carbon dioxide was evolved, indicating stability of the radiolabelled phenyl ring.

Anaerobic metabolism appears to proceed at similar rates to the aerobic, but with the sulfide analogue of fipronil the main metabolite.

Mobility in Soils

Standard batch adsorption/desorption studies on five soils indicated fipronil to be strongly bound and immobile in soils (soil organic carbon partition coefficients between 2500 and 8000).

Leaching studies on packed columns of the same five soils indicated that both fresh and aged samples of fipronil on soil have low mobility. Amide, sulfone and sulfide metabolites of fipronil were observed, together with traces of the sulfonate in one soil.

Consideration of metabolism and sorption data allows the conclusion that leaching of fipronil is unlikely to occur. The same conclusion applies to fipronil's sulfide and sulfone metabolites. The amide, is less lipophilic than fipronil and correspondingly more mobile, but did not leach in significant amounts in field studies. Sulfonate and carboxylate metabolites are hydrophilic and mobile, but were only found in low concentrations (1-2 % of applied fipronil) in field studies.

Field Dissipation

Half-lives in a range of North American and European soils were generally between 3 and 5 months, indicating fipronil to be moderately persistent in the field, but increased to 7.3 months at one site in Washington. No significant leaching was observed, although the amide metabolite was detected to 60 cm (and to 90 cm at Washington, where soils became saturated with the spring thaw). Sulfonate and carboxylate metabolites, which would be expected to leach by virtue of their hydrophilicity, were detected at low levels in some soils.

Accumulation and bioaccumulation

Computer modelling studies found no accumulation of fipronil residues in soil following five annual applications.

Bioaccumulation factors in bluegill sunfish were 321, 164 and 575 in whole fish, muscle and viscera, respectively, indicating a moderate bioaccumulation potential. Accumulated residues were rapidly depurated, with almost complete elimination (>96%) after 14 days in clean water.

ENVIRONMENTAL EFFECTS

Tests summarised below indicate fipronil to be very highly toxic to bees, highly toxic to Galliform birds, aquatic fauna and algae, moderately toxic to mammals and practically nontoxic to earthworms. Fipronil does not appear to be phytotoxic or to exert adverse impacts on soil microflora at proposed application rates.

Avian Toxicity

Fipronil appears to have low acute toxicity to most birds but is highly toxic (LD50 11-34 $mg.kg^{-1}$) following acute oral administration to galliform birds (quail, pheasant, partridge). Dietary toxicity to quail is also high (LC50 48 ppm) with clinical symptoms of lethargy, diarrhoea and anorexia but complete remission in survivors within 24 hours following treatment.

Choice studies on quail, pheasant and partridge indicate that the presence of fipronil in food has an aversive effect on birds, which feed preferentially on uncontaminated food sources when available and do not suffer significant levels of mortality.

Aquatic Toxicity

Fipronil has high acute toxicity to fish (96 h LC50s in three species between 0.085 and 0.43 $mg.L^{-1}$) and aquatic invertebrates (EC50 0.19 $mg.L^{-1}$ for *Daphnia magna).* No effect concentrations in 90 day early life stage testing on rainbow trout fingerlings and 21 day reproductive testing on daphnids are in the order of 0.01 $mg.L^{-1}$.

Fipronil does not adversely affect the growth of algae and higher aquatic plants at concentrations in the order of 0.15 $mg.L^{-1}$ but appears to depress chlorophyll production in green algae.

Non-target Invertebrates

Fipronil was found to be very highly toxic to bees exposed via oral or contact routes, with respective 48 hour LD50s of 0.00417 μg and 0.00593 μg per bee.

Fipronil was found to be practically non-toxic to earthworms, with no adverse effects apparent at 1000 ppm fipronil in a 14 day artificial soil test. No significant impacts on carbon mineralisation and nitrogen turnover were observed in glucose amended clay loam and sandy loam soils 28 days after application at 1 $kg.ha^{-1}$ fipronil, indicating low toxicity to soil microbes.

Phytotoxicity

No laboratory tests were submitted for non-target plants, but field trials are said to have shown no phytotoxic properties to a wide range of crops, with no adverse effects recorded for native vegetation.

ENVIRONMENTAL HAZARD

Fipronil has low water solubility and low vapour pressure, and will mainly become associated with the soil compartment following application around banana palms or when mushroom casings are recycled as compost.

Terrestrial organisms

The application rate of 0.15 g fipronil across a 30 cm radius approximates a rate of 5 kg.ha^{-1} within treated areas, where residues in the order of 600 ppm may be expected in the trash layer, and about 70 ppm on any fruits and seed pods that may be present. Residues may also be expected in contaminated invertebrates, although these should not significantly exceed 1. 9 μg per beetle based on laboratory bioassays on the target pest.

The predicted residues on fruits and seeds exceed dietary end-points for galliform birds, and may therefore present a risk to Australian brush-turkeys foraging around bananas. Given the strong repellent effects evident in palatability studies, avian impacts should not occur. Furthermore, avian food items such as seeds and fruits are unlikely to be present around banana palms as growers routinely remove competing plants.

Concerning possible exposure through consumption of contaminated invertebrates, the company reports that banana weevil borers hide in and under dead corms during the day when birds are feeding, and dead beetles were generally found in and under dead corms and heavy trash during field trials. A single Australian brush-turkey would need to consume nearly 10 000 beetles before reaching the LD50 reported for quail.

Given the high toxicity of fipronil to galliform birds and the possibility that such birds may be exposed in banana plantations, it would be appropriate for the company to further explore the possibility of avian impact. Reports of avian responses to the use of fipronil in banana plantations represent one option for determining whether a risk exists for Australian birds. The company could liaise with selected users, ideally located within rainforest areas where birds are abundant, to obtain such reports.

The company has indicated that it is prepared to initiate a grower observation type study to confirm the low risk to Australian birds. Any overseas monitoring work on this aspect will be made available for assessment upon completion.

Fipronil is essentially nontoxic to earthworms and will not present a hazard to these organisms.

Fipronil is toxic to bees, but bees would not be expected to be foraging in treated areas as floral resources are scarce. The impact on bee populations should be minimal.

Fipronil, is likely to be toxic to some soil dwelling insects. However, given that fipronil is not mobile in soil and will be applied to a minor proportion (4-5 %) of the plantation, recolonisation from surrounding untreated areas will be possible, and no significant impacts on soil invertebrate populations are to be expected.

Impacts on terrestrial plants are not expected as exposure will be low in the proposed situations of use, and field trials have not revealed any evidence of terrestrial phytotoxicity.

Aquatic organisms

Aquatic systems will not be contaminated directly by fipronil as a result of the proposed uses on mushrooms and bananas. Significant contamination through spray drift is unlikely from hand application around bananas, and fipronil's strong sorptive tendencies will minimise contamination through runoff.

Assuming as a worst case that 10 % of applied reaches 15 cm standing water, the estimated environmental concentration of fipronil from application to bananas at 225 $g.ha^{-1}$ would be 15 $\mu g.L^{-1}$, at least an order of magnitude, below levels of concern for aquatic fauna and flora. Chronic effects are not expected given the infrequency of application and very low mobility of fipronil. Aquatic hazard is low.

CONCLUSION

Data submitted demonstrate that the use of Regent to control insect pests in bananas and mushrooms as proposed and according to good agricultural practice should not lead to significant environmental contamination or impact on most non-target species. The possible exception is galliform birds such as Australian brush turkeys that forage in banana plantations. Given the high toxicity of fipronil to galliform birds and the possibility that such birds may be exposed in banana plantations, it would be appropriate for the company to actively explore the possibility of avian impact following the registration of Regent.

The company has indicated that it is prepared to initiate a grower observation type study to confirm the low risk to Australian bird. Any overseas monitoring work on this aspect will be made available for assessment upon completion.

5. PUBLIC HEALTH AND SAFETY ASSESSMENT

EVALUATION OF TOXICOLOGY

The toxicology database for fipronil is extensive. In interpreting the data, it should be noted that toxicity tests generally use doses that are high compared to possible human exposures. The use of high doses increases the likelihood that potentially significant toxic effects will be identified.

Toxicity tests should also indicate those dose levels at- which specific toxic effects are likely to occur. Dose levels such as the No-Observable-Effect-Level (NOEL) are used to develop acceptable limits for dietary or other intakes at which no adverse health effects in humans would be expected.

Toxicokinetics and Metabolism

The amount of fipronil absorbed depends on the size of the dose. In rats, there was at least 25 % absorption of a single high dose (150 mg/kg), compared with at least 50 % absorption of a low dose (4 mg/kg). Fipronil was metabolised rapidly, mainly in the liver. Most metabolites were excreted rapidly, but one metabolite (the sulphone) was taken up by tissues, particularly fat, and eliminated more slowly.

Acute Studies

Fipronil was moderately toxic in rats following a single oral dose (LD50 97 mg/kg). Dermal toxicity was low in rats (LD50 > 2000 mg/kg) and moderate in rabbits (LD50 354 mg/kg), and inhalation toxicity was moderate (LC50 682 mg/m^3) in rats. The compound was not a skin or eye irritant in rabbits or a skin sensitiser in guinea pigs.

Fipronil acts on the central nervous system, binding at certain neurotransmitter (GABA) receptors, which leads to disruption of CNS activity. Signs of toxicity were as expected for a chemical acting in this way (ie. abnormal gait and posture, lethargy, tremors and convulsions).

Each fipronil formulation showed lower oral, dermal and inhalation toxicity in rats than fipronil. In addition, Regent 200SC and 500FS Seed Dressing Insecticides caused slight skin irritation in rabbits, Regent 50SC Insecticide caused weak skin sensitisation in guinea pigs, and Regent 3GR Insecticide caused slight, and Frontline Spray moderate, eye irritation in rabbits.

Short-term Studies

In short-term (up to 90 days) dietary administration in rats at doses of up to 30 mg/kg bw/day there were no deaths, and the appearance and behaviour of the rats were unaffected. However, appetite and bodyweight gain were depressed, there was slight anaemia, and liver and thyroid weights were slightly greater than those of untreated rats at the highest dose.

When fipronil was administered orally to dogs for 13 weeks, those on the highest dose (10 mg/kg/day) exhibited weight loss and convulsions, tremors and other neurological signs. Blood biochemistry was slightly altered, indicating a mild liver disturbance, but haematology, urine analysis and pathology gave no evidence of treatment-related effects. In dogs receiving 2 mg/kg/ day, a reduction in appetite was the only effect noted.

Long-term Studies

Long-term dietary administration of fipronil to rats, the most sensitive species to the chemical, at doses of up to 15 mg/kg/day confirmed that, in addition to effects on the nervous system, the liver and thyroid glands were enlarged. The microscopic changes in the liver were characteristic of an adaptive response, which could be expected because the liver is the major site of metabolism of fipronil. Under the influence of fipronil, there is also increased binding and clearance of thyroxine by the liver, resulting in reduced blood thyroxine levels. In tum, this leads to increased hormonal stimulation of the thyroids, thyroid enlargement and, at a threshold level of stimulation (15 mg/kg/day) in rats receiving dietary fipronil for 1 year or more, thyroid tumours.

In mice fed fipronil in the diet for up to 78 weeks at levels below those necessary to produce neurological disturbances (up to 3 mg/kg/day), the liver was the target organ for toxicity and the chemical did not cause tumours. Dogs, treated orally with fipronil for 52 weeks at doses of up to 5 mg/kg/day, showed intermittent signs of neurological disturbance. No pathological changes were observed.

Reproduction and Developmental Studies

Fipronil caused slightly reduced reproductive performance in a two-generation dietary study in rats. In the highest dose group (15 mg/kg/day), bodyweight gain of first-generation offspring was reduced and mating performance was slightly reduced; and second-generation offspring had slightly lower survival rates than controls. In pregnant rats and rabbits that were given fipronil orally, there was no evidence for potential to cause birth defects.

Genotoxicity

A number of tests established that fipronil does not damage genetic material (DNA). Studies submitted consisted of tests for mutagenicity in Salmonella typhimurium strains and Chinese hamster lung cells, and chromosomal effects in human lymphocytes and mouse bone marrow cells.

Other Studies

Numerous other studies were carried out to further investigate the pharmacological, physiological and toxicological effects of fipronil. The main studies involved liver biochemistry, the thyroid glands, the CNS and the cardiovascular system. Results confirmed the key role of the liver in the metabolism of fipronil, and in reducing levels of circulating thyroxine under the influence of fipronil. While electroencephalogram studies demonstrated early signs of fipronil toxicity before behavioural changes became evident, blood pressure, heart rate and electrocardiogram parameters were not affected. Fipronil was found to penetrate the skin slowly in a comparative skin-permeability study.

A number of studies were also carried out on the acute toxicity and genotoxicity of the main fipronil metabolites. Both were found to be less toxic than the parent compound and not genotoxic.

PUBLIC HEALTH STANDARDS

Poisons Scheduling

The National Drugs and Poisons Schedule Committee (NDPSC) considered the toxicity of the products and their active ingredients and assessed the necessary controls to be implemented under States' poisons regulations to prevent the occurrence of poisoning.

NDPSC recommended that fipronil be listed in Schedule 6 of the Standard for Uniform Scheduling of Drugs and Poisons (SUSDP), with preparations containing 2% or less being classified in Schedule 5. There are provisions for appropriate warning statements and first-aid directions on the product label.

NOEL/ADI

The most sensitive species was the rat, with a NOEL of 0.02 mg/kg/day. In order to calculate the acceptable daily intake (ADI) for humans, a safety factor is applied to the NOEL in the most sensitive species. The magnitude of the safety factor ill selected to account for uncertainties in extrapolation of animal data to humans; variation within the human population; the quality of the experimental data; and the nature of the potential hazards. Using a safety factor of 100, an ADI of 0.0002 mg/kg/day for fipronil was established.

6. RESIDUES IN FOOD AND TRADE ASSESSMENT

Background

Fipronil, the active compound in Regent 200 SC Insecticide and Regent 800 WDG Insecticide, is registered in a number of countries for the treatment of a wide range of insect pests and animal parasites.

Appropriate residue and metabolism studies were provided, in accordance with the *Requirements for Clearance of Agricultural and Veterinary Chemical Products,* to support the use of fipronil in bananas and mushrooms in Australia.

Residues in Food Commodities

Australian residue trial data were presented for bananas and mushrooms. All trials were conducted using the suspension concentrate, and it was considered that the residues from the water dispersible granules would not be greater than those from the concentrate as the same spray concentrations were used.

Bananas

Trials were conducted in Northern NSW and Queensland. Banana plants were treated with two applications at rates of 0.15 and 0.30 g ai/stool and 0.20 and 0.50 g ai/stool (up to 3.3 times the recommended rate). Fruits were tested for fipronil and four metabolites between 0 and 60 days after treatment, and in the same interval following re-treatment. No detectable residues were found in any of the five trials (< 0.002 mg/kg).

Mushrooms

Two trials were conducted from which residue samples were taken. In both trials, fipronil was applied at twice and approximately four times the recommended rate to the casing material. Mushrooms harvested at the requested withholding period of 19 days, contained residues of 0.0026 - 0.0087 mg/kg of the parent compound, at twice the recommended treatment rate. Residues of 0.0046 - 0.0102 mg/kg were found at four times the recommended application rate.

The residue trial data indicate that, in accordance with the recommended pattern of use, the following withholding periods are appropriate:

bananas - nil mushrooms - 19 days

Metabolism studies conducted in the UK. on three crop types, sunflowers, sugarbeet and maize, showed that common metabolites were present in all species investigated. Similarly, in studies of laboratory animals (mouse, rat and rabbit), the parent and two common metabolites (the sulphonyl and sulphenyl derivatives) were found in tissues and faeces of all three animal species. In dairy goat and hen metabolism studies, the metabolites found were the same as those detected in laboratory animals, with the residues being predominantly present in the fat, and lower concentrations being found in tissues and milk. The data showed that the significant residues in both plants and animals 'are the parent fipronil and two metabolites - the sulphonyl and sulphenyl derivatives.

Detailed descriptions of the analytical method were provided. The residues were detected and analysed using GC or HPLC. With both methods, the parent plus four or more metabolites can be observed on a single trace. The limits of determination varied, with improvement of the analytical method, from 0.01 - 0.002 mg/kg.

MRL Standard

The following additions have been recommended to the *MRL Standard:*

Table 1

Compound	Food	MRL (mg/kg)
Add:		
Fipronil	FI 0327 Bananas	*0.01
	VO 0450 Mushrooms	0.05

and

Table 3

Compound	Residue
Add:	
Fipronil	Sum of fipronil, the sulphenyl metabolite (5-amino-l-[2,6-dichloro-4-(trifluoromethyl)phenyl]-4-[(trifluoromethyl)sulphenyl]-1*H*-pyrazole-3- carbonitrile) and the sulphonyl metabolite (5-amino-l-[2,6-dichloro-4- (trifluoromethyl)phenyl]-4-[(trifluoromethyl)sulphonyl]-1*H*-pyrazole-3- carbonitrile.

Trade

Fipronil products are registered in a number of overseas countries. However, there are no overseas registrations in mushrooms, and use in bananas is only registered in a few countries, including France.

Overseas MRLs are set in some crops, including 0.01 mg/kg for bananas in France. There are no CODEX MRLs.

However, the amount of export of mushrooms and bananas is very small. Figures from relevant growers associations and Australian Bureau of Statistics show that 25 tonnes of mushrooms , or 0.07 % of the Australian production, and 465 tonnes of bananas, or 0.22 % of the total Australian crop were exported in 1994-1995.

Bananas, mushrooms, their products or wastes are not normally used for animal feeds.

In view of the very limited export market, the low levels of the MRLs set for Australia, and the improbability of residues arising in animals, it is considered that the use of the products will not pose any threat to Australia's trade.

7. OCCUPATIONAL HEALTH AND SAFETY ASSESS:MENT

Introduction

Fipronil is a hazardous substance, according to the National Occupational Health and Safety Commission (NOHSC) Approved Criteria for Classifying Hazardous Substances.

The end use products, REGENT 200 SC INSECTICIDE and REGENT 800 WDG INSECTICIDE are determined to be hazardous substances, according to the NOHSC criteria.

Technical grade fipronil and both end use products are Class 6.1 (a) dangerous goods, under the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code).

Formulation, transport, storage and retailing

Future chemical industry workers involved in the formulation, testing and packaging of the products should be protected by a closed extraction system, safe work practices, air monitoring and training commensurate with the risks identified in the workplace assessment process. These workers should wear PVC gloves, respirator with combined gas and dust cartridge, face shield or goggles, cotton overalls, impervious aprons and impervious footwear.

Workers involved in the transport, storage and retailing of the active ingredient and end use products could only be contaminated if packaging were breached.

Advice on the safe handling of fipronil, REGENT 200 SC INSECTICIDE and REGENT 800 WDG INSECTICIDE during routine transport, storage .and retailing is provided on the respective labels and material safety data sheets (MSDS). The labels and MSDS contain adequate information to enable workers to handle spills.

End use

In bananas, both products are diluted with water and sprayed onto the stem and surrounding soil. The fipronil concentration in the spray is identical for both products (0.03 %). The products will be used no more than twice per year.

In mushrooms, the products are diluted in a small quantity of water and mixed with the peatmoss, at a concentration of 3.2 g fipronil per 300 L peatmoss. Several cultivation cycles can take place per year, with the products used once per cycle.

End users can be exposed to the products when opening containers, preparing product for use, applying products to bananas and peatmoss and cleaning up spills and equipment. The main route of occupational exposure to both products is via the skin. Inhalation exposure to REGENT 200 SC INSECTICIDE is not expected to be significant.

Workers handling both products are warned to avoid skin and eye contact with the products. End users handling concentrated REGENT 200 SC INSECTICIDE should wear cotton overalls or equivalent clothing and elbow-length PVC gloves.

Contact with the spray solution of either product is not expected to result in substantial exposure to fipronil, due to the high dilution of the spray. Special protective equipment is not required when applying spray.

End users are expected to follow instructions on the product labels and adopt good work practices and personal hygiene.

Entry into treated areas or handling treated crops

Entry into treated banana plantations or handling treated peatmoss for mushrooms is not of occupational health and safety concern. Worksafe Australia does not recommend any re-entry or re-handling restrictions for either product at this time.

Recommendations for safe use - all workers

If REGENT 200 SC INSECTICIDE and REGENT 800 WDG INSECTICIDE are formulated in Australia, workers involved in formulation and packing should be protected by a closed extraction system, adequate ventilation, safe work practices and appropriate training. Where these processes are not fully contained, workers should wear PVC gloves [AS 2161-1978, Industrial Safety Gloves and Mittens (Excluding Electrical and Medical Gloves)], respirator with combined gas and dust cartridge [AS/NZS 1715-1994, Selection, Use and Maintenance of Respiratory Protective Devices and AS/NZS 1716-1994, Respiratory Protective Devices], face shield or goggles [AS 1337-1992, Eye Protection, Industrial], cotton overalls and impervious aprons [AS 3765-1990, Clothing for Protection Against Hazardous Chemicals] and impervious footwear [AS/NZS 2210 - 1994, Occupational Protective Footwear].

Vehicles transporting goods in Class 6.1 of the ADG Code are required to carry an eye wash kit filled and ready for use, full face shields, canister or cartridge type respirators and chemically resistant gauntlet gloves, overalls and boots.

End users should follow the instructions and safety directions on the product labels. They should wear cotton overalls buttoned to the neck and wrist [AS 3765-1990, Clothing for Protection Against Hazardous Chemicals] or equivalent clothing and elbow-length PVC gloves [AS 2161- 1978, Industrial Safety Gloves and Mittens (Excluding Electrical and Medical Gloves)], when opening containers and preparing spray for REGENT 200 SC INSECTICIDE. Safety directions for REGENT 800 WDG INSECTICIDE include the use of cotton overalls buttoned to the neck and wrist [AS 3765-1990, Clothing for Protection Against Hazardous Chemicals] or equivalent clothing and elbow-length PVC gloves [AS 2161-1978, Industrial Safety Gloves and Mittens (Excluding Electrical and Medical Gloves)] and face shield or goggles [AS 1337-1992, Eye Protection, Industrial], when opening containers and preparing spray.

On the basis of the risk assessment, Worksafe Australia does not believe that occupational health and safety regulatory standards, such as Health Surveillance and Exposure Standards, are necessary for fipronil.

Conclusion

Worksafe Australia has conducted a risk assessment on REGENT 200 SC INSECTICIDE and REGENT 800 WDG INSECTICIDE containing fipronil 200 g/L and 800 g/kg respectively. REGENT 200 SC INSECTICIDE is a suspension concentrate and REGENT 800 WDG

INSECTICIDE water dispersible granules. Worksafe Australia concludes that these products can be safely used by workers on bananas and mushrooms.

POISON

KEEP OUT OF REACH OF CHILDREN
READ SAFETY DIRECTIONS BEFORE OPENING OR USING

8. Regent®
200SC Insecticide

Active Constituent: 200 g/L FIPRONIL

For the control of Banana Weevil Borer in Bananas as specified in the Directions for Use.

1, 5 and 20 Litres

^
RHONE-POULENC

^
RHONE-POULENC RURAL AUSTRALIA PTY L TO ACN 000 226 022
3 - 5 Railway Street, Baulkham Hills, N.S.W. 2153
Telephone: (02) 639 9966 Fax: (02) 639 6392

PROTECTION OF WILDLIFE, FISH, CRUSTACEA AND ENVIRONMENT: DO NOT contaminate streams, rivers or waterways with the chemical or used containers.

STORAGE AND DISPOSAL: Store in the closed, original container in a dry well-ventilated area, as cool as possible. **DO NOT** store for prolonged periods in direct sunlight. Triple rinse container before disposal, and dispose of washings in a disposal pit away from desirable plants and their roots. Wash sprayer thoroughly after use. Destroy empty container by breaking, crushing and puncturing. Bury the container at a depth of 500 mm or more at a safe disposal site, or take to a dump that does not burn its refuse. DO NOT burn empty container or product.

SAFETY DIRECTIONS: Harmful if inhaled or swallowed. Will irritate the eyes and skin. Avoid contact with eyes and skin. When opening the container and preparing product for use wear cotton overalls buttoned to the neck (or equivalent clothing) and elbow-length PVC gloves. Wash hands after each days use, wash gloves and contaminated clothing.

FIRST AID: If poisoning occurs contact a doctor or Poisons Information Centre. **If swallowed,** and if more than 15 minutes from a hospital, induce vomiting, preferably using Ipecac Syrup APF.

CONDITIONS OF SALE: The product as supplied is of high quality and is believed to be suitable for the purposes for which it is recommended. The buyer or user is responsible for any misuse or negligence in the handling storage and use of this material. This product must only be used in strict compliance with the directions given on this label. No representative of the manufacturer or seller has authority to add to or alter these conditions.

IN A TRANSPORT EMERGENCY DIAL 000, POLICE OR FIRE BRIGADE	**SPECIALIST ADVICE IN EMERGENCY ONLY: PHONE 1800 033111 ALL HOURS - AUSTRALIA WIDE**

3/96

PRODUCT ID:
LABEL ID:

BATCH NO:
DATE OF MANUFACTURE:

DIRECTIONS FOR USE:

Crop	Pest	State	Rate	Critical Comments
Bananas	Banana Weevil Borer *(Cosmopolites sordidus)*	Qld,NSW, WA,NT only	150mL/100L water	Lay baits (cut billets of stem base) flat on son beside stools and inspect regularly to determine when beetles are active. Apply in a fine spray covering the stem to a height of 30cm and the soil in a 30cm radius from the stem base. Apply a total volume of 500mL solution per stool. Ensure thorough coverage of butt suckers, trash and exposed soil. Applications should be made in spring and/or autumn when weevil numbers reach 4per bait (NSW and NQld) and 2per bait (SE Qld) or where commercial damage is likely.

NOT TO BE USED FOR ANY PURPOSE OR IN ANY MANNER CONTRARY TO THIS LABEL UNLESS AUTHORISED UNDER APPROPRIATE LEGISLATION

Withholding Period: Bananas: **Nil**

General Instructions

Mixing: Slowly add the required amount of product to water in the spray tank while stirring or agitating. Agitate while spraying. Ensure thorough coverage of butts, suckers and surrounding trash and exposed soil.

PROTECTION OF WILDLIFE, FISH, CRUSTACEA AND ENVIRONMENT: DO NOT contaminate streams, rivers or waterways with the chemical or used containers.

STORAGE AND DISPOSAL: Store in the closed, original container in a dry well-ventilated area, as cool as possible. **DO NOT** store for prolonged periods in direct sunlight. Triple rinse container before disposal, and dispose of washings in a disposal pit away from desirable plants and their roots. Wash sprayer thoroughly after use. Destroy empty container by breaking, crushing and puncturing. Bury the container at a depth of 500 mm or more at a safe disposal site, or take to a dump that does not burn its refuse. DO NOT burn empty container or product.

SAFETY DIRECTIONS: Harmful if inhaled or swallowed. Will irritate the eyes and skin. Avoid contact with eyes and skin. When opening the container and preparing product for use wear cotton overalls buttoned to the neck (or equivalent clothing) and elbow-length PVC gloves. Wash hands after each days use, wash gloves and contaminated clothing.

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POISON

NOT TO BE TAKEN

KEEP OUT OF REACH OF CHILDREN

READ SAFETY DIRECTIONS BEFORE OPENING

9. Presto®
Mushroom Insecticide

Active Constituent: 200 g/L FIPRONIL

For the control of Mushroom Flies in Mushroom Houses as specified in the Directions for Use.

^
RHONE-POULENC

^
RHONE-POULENC RURAL AUSTRALIA PTY L TO ACN 000 226 022
3 - 5 Railway Street, Baulkham Hills, N.S.W. 2153
Telephone: (02) 639 9966 Fax: (02) 639 6392

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IN A TRANSPORT EMERGENCY DIAL 000, POLICE OR FIRE BRIGADE	**SPECIALIST ADVICE IN EMERGENCY ONLY: PHONE 1800 033111 ALL HOURS - AUSTRALIA WIDE**

3/96

PRODUCT ID: BATCH NO:
LABEL ID: DATE OF MANUFACTURE:

DIRECTIONS FOR USE:

Crop	Pest	State	Rate	Critical Comments
Mushrooms	Mushroom Flies All (Sciarids, Phorids and Cecids)	All States	16mL/300L bale of peatmoss	Prepare solution by mixing Fipronil with a small volume of water. Apply mixture to peatmoss during preparation of casing. Ensure thorough mixing with peat moss.

NOT TO BE USED FOR ANY PURPOSE OR IN ANY MANNER CONTRARY TO THIS LABEL UNLESS AUTHORISED UNDER APPROPRIATE LEGISLATION

Withholding Period: Mushrooms **19 days**

General Instructions

Mixing: Add required amount of Fipronil to a small quantity of water, ensuring thorough mixing. Apply mixture to peat moss during preparation of casing, ensuring even mixing in peat moss.

PROTECTION OF WILDLIFE, FISH, CRUSTACEA AND ENVIRONMENT: DO NOT contaminate streams, rivers or waterways with the chemical or used containers.

STORAGE AND DISPOSAL: Store in the closed, original container in a dry well-ventilated area, as cool as possible. **DO NOT** store for prolonged periods in direct sunlight. Triple rinse container before disposal, and dispose of washings in a disposal pit away from desirable plants and their roots. Wash sprayer thoroughly after use. Destroy empty container by breaking, crushing and puncturing. Bury the container at a depth of 500 mm or more at a safe disposal site, or take to a dump that does not burn its refuse. DO NOT burn empty container or product.

SAFETY DIRECTIONS: Harmful if inhaled or swallowed. Will irritate the eyes and skin. Avoid contact with eyes and skin. When opening the container and preparing product for use wear cotton overalls buttoned to the neck (or equivalent clothing) and elbow-length PVC gloves. Wash hands after each days use, wash gloves and contaminated clothing.

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