

**FENPYROXIMATE**  
**in the product**  
**ACABAN MITICIDE**

This document is published by the  
National Registration Authority for  
Agricultural and Veterinary Chemicals.  
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## **EXECUTIVE SUMMARY**

### **Introduction**

The purpose of this document is to provide a summary of the data reviewed and an outline of regulatory considerations for the proposed registration of the chemical fenpyroximate in the product ACABAN MITICIDE as a miticide for the control of two spotted mite and European red mite in apples and pears in Queensland, New South Wales, Victoria, South Australia, Tasmania, Western Australia and the Australian Capital Territory.

The National Registration Authority for Agricultural and Veterinary Chemicals (NRA) invites public comment before deciding whether to proceed to approve this product for use in Australia.

The NRA has completed an assessment of the data submitted by the applicant in support of this use of fenpyroximate and has provided the following information for public comment:

### **Agricultural Aspects**

ACABAN MITICIDE is a new phenoxypyrazole miticide containing 50 g/L fenpyroximate. The product is for use by high volume sprayer and has been shown to give good control of two spotted mite and European red mite at rates of between 50 and 100 mL/100L in a minimum volume of 1,500 L/ha.

### **Environmental Aspects**

Environmental exposure to fenpyroximate will principally involve the soil compartment, as water solubility and vapour pressure are low. Laboratory studies indicate that fenpyroximate and its metabolites bind strongly to soils, where it degrades relatively readily. In water, it dissipates rapidly to sediment and suspended matter, where it also degrades relatively readily. Laboratory studies also show that it breaks down in water when exposed to sunlight. The high bioconcentration factor represents a potential hazard to aquatic species.

The ecotoxicological profile of fenpyroximate indicates low to negligible toxicity to birds and low to moderate toxicity to mammals and bees. To earthworms, it exhibits moderate to high toxicity. The toxicity to fish and daphnia is extremely high.

Fenpyroximate is of low persistence in the environment, and represents a low to moderate hazard to terrestrial fauna and flora. It is potentially an acute hazard to aquatic fauna, but application according to good agricultural practice and following label instructions should minimise this hazard.

## **Public Health Aspects**

### **Toxicology**

Fenpyroximate has low to moderate acute toxicities. In rats, it had low dermal toxicity, but by oral and inhalational routes, its toxicity was moderate. In rabbits, fenpyroximate produced slight eye irritation, but not skin irritation. It was a skin sensitiser in guinea pigs. ACABAN MITICIDE containing 5% fenpyroximate is much less toxic than the active ingredient alone. The formulation had low oral, dermal and inhalational toxicity in rats, and was a moderate eye irritant but not a skin irritant or sensitiser.

The main effects of repeated oral dosing of fenpyroximate were decreases in food intake and body weight gain. There were no specific target organs of intoxication. It was not carcinogenic in two chronic studies (mice and rats) and not mutagenic in a series of genotoxicity studies. Fenpyroximate did not affect fertility (rats) or foetal development (rats and rabbits).

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 use of ACABAN MITICIDE for control of fruit mites.

### **Residues in Food**

Residue data from apple and pear studies conducted in Australia and overseas, using use patterns relevant to that proposed for Australia, showed that residues of fenpyroximate were below 0.3 mg/kg in apples and pears after a 14 day withholding period. Laboratory animal studies indicate fenpyroximate is metabolised and excreted. Residues in animal commodities arising from consumption of produce grown from or treated with ACABAN MITICIDE are expected to be non-measurable. An appropriate animal grazing/feeding withholding period restraint ensures that animal consumption of treated apples and pears will not result in animal commodity residues.

### **Trade**

Fenpyroximate is registered as a miticide in more than 30 countries where registrations are for use on a wide variety of fruits and vegetables. MRLs for apples and pears are between 0.2 and 1 mg/kg with withholding periods of between 4 and 21 days, values which are comparable to the value of 0.3 mg/kg recommended for Australia. No Codex MRLs have been established for fenpyroximate at this time.

The data presented indicated that use of the product according to the proposed use pattern on apples and pears would not be expected to result in the recommended MRL for apples and pears being exceeded. Animal commodity residues are not expected and the proposed use is considered to present little hazard to Australian export trade.

## **Occupational Health and Safety**

Fenpyroximate and ACABAN MITICIDE are determined to be hazardous substances by Ciba-Geigy Australia Ltd.

Worksafe Australia has conducted a risk assessment on ACABAN MITICIDE containing fenpyroximate at 50 g/L suspension concentrate for use on apples and pears for the control of Two Spotted Mite and European Red Mite and concludes that it can be safely used by workers.

ACABAN MITICIDE will initially be imported fully formulated and re-packaged into sales packs in Australia. In future ACABAN MITICIDE may be formulated in Australia.

The product may be applied by ground spraying. The main hazards to end users are eye irritation resulting from splashing with the concentrate and toxicity resulting from inhalation of spray mist. Product use is restricted to one spray per orchard, to minimise the development of insect resistance.

Safety directions instruct users to wash eyes immediately if contaminated with the product and to wear elbow-length PVC gloves, goggles and half-face respirator while preparing and using the spray. No re-entry period is necessary for workers re-entering treated areas.

ACABAN Miticide can be used safely if handled in accordance with the control measures prescribed on the label. Additional information is provided on the Material Safety Data Sheet for the ACABAN Miticide.

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### APPENDIX I Draft Label

## INTRODUCTION

The purpose of this document is to provide the public with a summary of the data reviewed and an outline of the regulatory considerations for the proposed application of the chemical fenpyroximate as a miticide for control of Two Spotted Mite and European red Mite in apples and pears, and to seek public comment prior to the chemical product being approved for use in Australia. Responses to the public consultation will be considered prior to registration of the product and will be taken into account by the NRA in deciding whether the product should be registered and in determining appropriate conditions of registration and product labelling. Copies of full technical reports are available on request from the NRA.

Comments should be received by Tues 15 October 1996 and sent to:

Ms E Taverner  
Agricultural Registration  
NRA  
PO Box 240  
KINGSTON ACT 2604  
FAX: (06) 272 3218

### **Applicant**

Ciba-Geigy Australia Limited has applied for registration of a miticide product containing a new active constituent, fenpyroximate, a phenoxypyrazole insecticide.

### **Product Details**

Fenpyroximate will be marketed under the trade name ACABAN MITICIDE as a suspension concentrate formulation containing 50 g/L of active constituent.

ACABAN MITICIDE will be imported fully formulated and repacked in Australia.

Ciba-Geigy Australia Limited intends to market ACABAN MITICIDE in NSW, ACT, Vic, Tas, SA, and Qld only for the control of Two spotted mite and European Red Mite and in WA for control of Two Spotted Mite only.

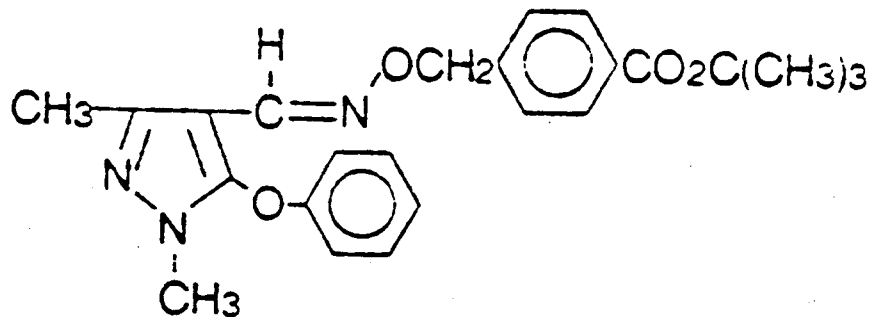
## CHEMICAL PROPERTIES

### Active Constituent

The chemical active constituent fenpyroximate is manufactured in Japan and has the following properties:

Common name (ISO):	fenpyroximate
Chemical name:	<u>tert</u> -butyl(E)- $\alpha$ -(1,3-dimethyl-5-phenoxy-pyrazol-4-yl methyleneamino-oxy-p-toluate
Product name:	Acaban Miticide
CAS Registry Number:	111812-58-9
Empirical formula:	$C_{24}H_{27}N_3O_4$
Molecular Weight:	421.50
Physical form:	powder at ambient temperature
Colour:	colourless
Odour:	odourless
Melting point:	101.1-102.4°C
Density:	1.249 at 20°C
Octanol/water partition coefficient ( $K_{ow}$ )	$\log P_{ow}$ 5.01 (by HPLC method)
Vapour pressure at 25 °C:	$5.6 \times 10^{-8}$ mm Hg

### Structural Formula:



### Formulated product

The active ingredient fenpyroximate is formulated into a suspension concentrate in the agricultural chemical product ACABAN MITICIDE at the site of manufacture in Japan. The fully formulated product will be imported into Australia.

## AGRICULTURAL ASSESSMENT

### Justification for Use

ACABAN Miticide and the active constituent fenpyroximate are new to Australia. Fenpyroximate is a member of the pyrazole group of acaricides. It is proposed to be used in the control of *Tetranychus urticae* (Tetranychidae), two-spotted mite and *Panonychus ulmi* (Tetranychidae), European red mite, in apple and pear orchards.

The product shows efficacy against adult mite, larvae and nymph stages and also has some effect on mite eggs.

Tetranychid mites have the ability to develop resistance to active ingredients to which they are exposed; this takes the form of resistance both to individual chemicals and to whole classes of chemicals to which they may have never previously been exposed. This ability to quickly develop populations which have frequent genes for resistance and the damaging nature of the tetranychid mites to their host plants makes a new acaricide an important addition to the limited number of active constituents available to the apple and pear industries.

### Use Pattern

The label allows for use to control Two Spotted Mite on apples and pears in Qld, NSW, Vic, SA and Tas and Two Spotted Mite only on apples and pears in WA. European Red Mite does not appear in WA orchards.

The product is recommended for high volume use only due to concerns with effects on bees with concentrate spraying. A lower application rate (50mL(2.5g ac)/100L) is recommended for IPM situations compared with the non-IPM rate of 100mL(5g ac)/100L.

The label recommends that the product should be applied before mite numbers reach critical levels (8-10 mites per leaf or 70% infestation of leaves for apples; 1-2 mites per leaf or 25% infestation of leaves for pears).

### Evaluation of Efficacy

Data provided in support of registration of ACABAN MITICIDE was reviewed by all States. Seventeen separate trial reports were provided, covering trial sites in SA, Vic, NSW and WA. The efficacy of ACABAN was also compared with that of currently registered miticide products.

The reviewers supported registration with a number of label changes being requested. Concentrate spraying recommendations were removed from the label and the critical comments for apples were modified to make treatment thresholds clear to the user.



### **Phytotoxicity**

No serious phytotoxicity to major target fruit crops has been observed at the recommended application rate.

### **Resistance Management**

Use of the product is limited to once each season in order to avoid the development of resistance. Limited use is also desirable for environmental reasons.

The applicant claims that no cross resistance has been observed with the use of fenpyroximate to control mites.

### **IPM**

Integrated pest management programs have been developed in many apple and pear growing regions to combine chemical and non-chemical means of controlling pest problems. ACABAN MITICIDE has the potential to be one of the relatively few chemicals which are capable of being combined with established integrated pest management programs. A rate which is appropriate for use in integrated pest management situations has been included in the General Instructions part of the label. ACABAN Miticide is relatively non toxic to those insects and mites which are the most important predators of tetranychid mites in apple and pear orchards.

### **Conclusion**

ACABAN MITICIDE has the potential to be a useful tool in the control of mites in both IPM and non-IPM apple and pear orchards when used according to label directions.

## ENVIRONMENTAL ASSESSMENT

### Environmental Fate

Fenpyroximate will be applied to pome fruit for the control of mites by high volume or low volume spray application using ground based, air assisted orchard spray equipment. Environmental exposure will principally involve the soil, as water solubility and vapour pressure are low. The following tests were carried out to determine the fate of fenpyroximate.

### Hydrolysis

Fenpyroximate proved relatively stable under acid, neutral and alkaline conditions. A half life of 65.7 days at 25 °C and at pH 7 was calculated. The main metabolite of hydrolysis was formed by the hydrolysis of the ester group to the acid.

### Photolysis

Fenpyroximate degraded rapidly in solution when irradiated with a xenon lamp ( $KD_{50}$  2.8-3.1 hr) or in natural daylight ( $KD_{50}$  2.6 days). The main metabolite in both cases was the *cis* isomer with degradation continuing further by the cleavage of the oxime-ether bond.

### Metabolism in Soils and Aquatic Systems

Laboratory studies in two soil types that cover the typical range of agricultural soils were carried out to Japanese MAFF guidelines. Strong binding of fenpyroximate to all the tested soil types, and subsequent microbial breakdown in soil were all demonstrated as ways in which fenpyroximate could dissipate or degrade under laboratory test conditions. Half lives ( $DT_{50}$ ) were of the order of 30-40 days.

Microbial breakdown in soil under aerobic conditions was found to be an important breakdown pathway, with speed of this process probably determined by soil conditions that are conducive to microbe presence. In aerobic water/sediment conditions, the water suspended fraction dissipated rapidly ( $DT_{50}$  3-1.8 days), due largely to adsorption to the sediment. Fenpyroximate in the moist sediment phase was not persistent ( $DT_{50}$  1926 days).

### Mobility in Soil.

The ability of fenpyroximate to bind to soils in the presence of clay and organic matter in acidic soils was well demonstrated in laboratory tests on four soil types under OECD guidelines. Low potential to leach in soils of pH below 7 was also demonstrated. The molecule does not dissociate, hence mobility should be similarly slow in neutral to alkaline soils. A soil column leaching study showed that the depth of leaching after two days was reduced by increasing clay and organic matter content, with no movement deeper than 10 cm in a loamy sand and a sandy loam soil (2.3%

and 1.3% organic carbon respectively) and some leaching to 20 cm in a sand (0.7% organic carbon).

### **Accumulation and Bioaccumulation.**

Fish were exposed to a concentration of fenpyroximate for a period of seven days followed by a depuration period in clean water of fourteen days. The result obtained was quick uptake, followed by slower depuration, giving a bioconcentration factor (BCF) in excess of 1000. Under US EPA guidelines, this BCF would rate as high by a factor of 10 over the BCF benchmark of 100 for a high classification.

### **Environmental Effects**

#### **Birds**

Both acute and eight day dietary studies were carried out on bobwhite quail, Japanese quail and mallard duck. No deaths occurred in either type of test at the highest rates tested. Fenpyroximate can be classed as practically non toxic to avian species.

#### **Aquatic organisms**

Testing was conducted under controlled laboratory conditions, with actual concentrations of fenpyroximate in test waters determined because nominal concentrations used in earlier tests were likely to be inaccurate due to adsorption of fenpyroximate to glassware. Acute toxicity of fenpyroximate applied as the technical grade active constituent (TGAC) to rainbow trout (the most sensitive fish species of those tested) and to the aquatic invertebrate *Daphnia magna* was very high ( $LC_{50} = 1.05$  ug/L for trout and  $EC_{50, \text{immobilisation}} = 3.3$  ug/L for *Daphnia*). Fenpyroximate applied as a flowable 5% formulation, similar to Acaban, was much less toxic to these species, but was still highly toxic ( $LC_{50} = 41$  ug/L for trout and  $EC_{50} = 22$  ug/L for *Daphnia*). Chronic (21 day) toxicity of the TGAC ( $LC_{50, 21 \text{ days}}$ ) for rainbow trout was approximately one third that for 96 hours, whereas that for *Daphnia* was inconsistent with the acute toxicity data, the  $LC_{50, 21 \text{ days}}$  being higher than the  $LC_{50, 48 \text{ hours}}$ .

A "special aquatic study" was reported which simulated a water body being contaminated with fenpyroximate adsorbed on soil from a treated field. The study indicated that contamination with soil treated with the top label rate proposed in Australia of 175 g/ha, mixed evenly with the top 5 cm of soil and therefore having a soil concentration of 0.35 mg/kg, would be unlikely to harm carp in farm dams or streams. However, concentrations of fenpyroximate in water were not measured, hence the toxicity to more sensitive species than carp is unclear.

#### **Non-target invertebrates**

Testing of fenpyroximate on earthworms was carried out in artificial soil conditions according to OECD guidelines. The 14 day  $LC_{50}$  was established at 180 mg/kg dry soil, and the No Effect Concentration (NOEC) as 32 mg/kg dry soil, indicating moderate to high toxicity.

Honeybees were not affected by application rates comparable to maximum rates labelled for Australia. Bees visiting flowering crops and inhabiting hives in areas sprayed with fenpyroximate were assessed for periods of up to a month after exposure. No differences were found in hive vigour or the number and frequency of flowers visited when compared to hives not exposed to fenpyroximate.

Beneficial, predatory mites used in integrated pest management (IPM) programs are affected by full label rates of fenpyroximate. However, the rates of application for mite control in orchards using IPM has been lowered in the proposed label to below the full efficacy rate, so as to lessen the effects on the beneficial mite species.

## **Environmental Hazard**

### **Birds and animals**

Birds and mammals exposed to field concentrations of fenpyroximate by direct contact or ingestion are unlikely to be adversely affected, as the rates of application are well below the exposure rates required to cause toxicity.

### **Non target invertebrates**

Earthworms are likely to be exposed when they move into the upper horizons of the soil to feed. The EEC calculated on the incorporation of the application of maximum rate of application into the top 5 cm of soil would result in an exposure of 0.35 mg/kg, which is well below the LC<sub>50</sub> established by the above test.

### **Aquatic organisms**

Although the incidence of natural water bodies near the crops to be sprayed is likely to be low, there are a number of irrigation districts where water is supplied to the farm and drained away in open channels and where there may be farm dams. Using US EPA methodology a worst case scenario can be estimated for a direct overspray on to 15 cm deep lentic water of the formulated product at the maximum label rate (175 g/ha active ingredient). This results in an estimated environmental concentration (EEC) of 117 ug/L fenpyroximate. This value is significantly higher (2.9-5.4 times higher for the EUP and 36-111 times higher for the TGAC) than the indicated aquatic toxicity data with rainbow trout and *Daphnia magna* discussed above. Using the quotient method for environmental risk analysis  $Q = \text{EEC}/\text{LC}_{50}$ , a  $Q > 0.5$  indicates an unacceptable risk to aquatic organisms exists from a direct overspray. Therefore, fenpyroximate would be likely to present a significant hazard to aquatic organisms were surface water to be contaminated by direct spraying at the maximum label rate.

Because of the use pattern in orchards, surface water would not be expected to be contaminated directly, but may be contaminated by spray drift or run-off of material sorbed to particles, where the amounts of fenpyroximate reached in water would be expected to be considerably lower than the estimated EEC of 117 ug/L fenpyroximate. The US EPA estimates that for pesticides applied by air or mist blower,

approximately 10% of the amount will reach the aquatic environment via spray drift. Assuming a worst case as above, this would lead to an EEC of 11.7 ug/L fenpyroximate, giving Q values in the range 0.29-0.54 for the EUP and 3.6-11.1 for the TGAC with trout and *Daphnia*. Thus a potential hazard still exists for both fish and *Daphnia*. While fenpyroximate dissipates rapidly from water to sediment, the EPA believes that its half life in water of 0.3-1.8 days is sufficient for harm to aquatic animals to occur from these concentrations.

However, the company has indicated that application volumes per hectare are likely to be lower than the maximum label rate of 3,500 L/ha and argues that spray drift is also likely to be <10%, while average water depths in waterbodies which might be affected are likely to exceed 15 cm. These factors moderate the aquatic hazard for the EUP such that in most situations,  $Q < 0.1$  (e.g. 5% spray drift, 30 cm deep water and an application volume of 2,500 L/ha produce  $Q = 0.1$ ). A hazard is still indicated under similar conditions with the TGAC, but rapid dissipation to sediment makes the EUP toxicity data the more appropriate in assessing the hazard from use of ACABAN.

The potential aquatic hazard from inappropriate use will be minimised by the company including appropriate warnings on the label, and ensuring growers are aware of these warnings and the need for them as part of their product stewardship.

### **Non target plants**

The company has indicated that no serious toxicity to target species has been observed at likely rates of application, but has not supplied data on phytotoxicity to non-target species. However, as spray drift rather than direct overspray is the most likely method of exposure to non-target vegetation, there is a low probability of significant phytotoxicity occurring to native plants from a single annual spray.

### **Conclusions**

The submission contains adequate environmental fate and toxicity data and the EPA believes that overall, a low hazard to the environment is indicated and that the use of fenpyroximate according to label recommendations and good agricultural practice should not result in environmental contamination or acute poisoning of wildlife, fish, etc. The greatest hazard is that fenpyroximate could affect aquatic animals as a result of spray drift entering water bodies adjacent to orchards. However, the risk of spray drift occurring will be reduced by the company including a warning to avoid spraying under unsuitable meteorological conditions and not to use inappropriate equipment, and ensuring that growers are aware of these precautions and the need for them, as part of their product stewardship.

## EVALUATION OF TOXICOLOGY

The toxicological database for fenpyroximate which consists primarily of toxicity tests conducted using animals, is quite extensive. In interpreting the data, it should be noted that toxicity tests generally use doses which are high compared to likely human exposures. The use of high doses increases the likelihood that potentially significant toxic effects will be identified. Toxicity tests should also indicate dose levels at which the specific toxic effects are unlikely to occur. Such dose levels 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

Following oral administration to rats, 10-18% of the dose was absorbed and excreted in the urine with the remainder excreted in the faeces. Fenpyroximate was widely distributed to the tissues and extensively metabolised prior to excretion. Elimination of a 2 mg/kg oral dose was complete in 3 days, but a 400 mg/kg dose required at least 7 days.

### Acute Studies

The acute oral and inhalational toxicity of fenpyroximate in rats was moderate, while dermal toxicity was low. Estimated oral lethal doses are of the order of 250-500 mg/kg body wt. It was a slight eye irritant in rabbits and a skin sensitiser in guinea pigs, but it was not a skin irritant in rabbits. ACABAN Miticide had low oral, dermal and inhalation toxicities (rats) and was a moderate eye irritant (rabbits). The formulation was not a skin irritant but caused skin sensitisation by repeated dermal exposure (guinea pigs).

These data confirm the low risk of acute poisoning with the formulated product, but indicate the need to prevent exposure to the eyes and skin.

### Repeat-dose Studies

Repeated oral dosing of fenpyroximate up to 2 years caused mainly decreases in food intake and body weight gain (mice, rats and dogs). No specific organs were seriously affected. Dogs were more sensitive to fenpyroximate than rodents and in three long-term studies, the NOELs were 0.5 mg/kg/day, 2.4 mg/kg/day and 0.97 mg/kg/day for dogs (1 year), mice (1.5 years) and rats (2 years), respectively.

The lowest NOEL of 0.5 mg/kg/day was established in dogs in a one-year oral dosing study, based on decreases in blood cholesterol levels.

### Carcinogenicity Studies

There was no evidence of tumourigenicity in mice and rats given fenpyroximate in the diet for 1.5 and 2 years, respectively.

## **Reproduction and Developmental Studies**

Fenpyroximate was given to rats in the diet for two generations. There were no adverse effects on the fertility or reproduction. However, maternal body weight gains and birth weights of the offspring were reduced at the highest dose (6.6 mg/kg/day). The NOEL for maternal and foetal toxicity was 2.0 mg/kg/day.

Rats administered fenpyroximate by oral gavage during organogenesis (gestation day 6-15) did not produce foetal malformations. The highest dose (25 mg/kg/day) produced maternal toxicity (reduced food intake and body weight gain). In a rabbit teratology study, there was no evidence of treatment related malformations in the foetuses. Maternal toxicity (decreases in food and water intake, body weight gain and faeces output) was observed in rabbits given 2.5 or 5 mg/kg/day of fenpyroximate.

## **Genotoxicity Studies**

Fenpyroximate was not mutagenic in bacterial (Salmonella typhimurium and Escherichia coli) and mammalian (Chinese hamster ovary cells) gene mutation assays and did not induce chromosomal damage in a mouse bone marrow micronucleus test. It did not induce primary DNA damage in the unscheduled DNA synthesis in rat hepatocytes and in a Bacillus subtilis rec-assay. Equivocal results were obtained in a study with cultured human lymphocytes.

## **PUBLIC HEALTH STANDARDS**

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

The NDPSC recommended that fenpyroximate be listed in Schedule 6 of the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP). There are provisions for appropriate warning statements and first-aid directions on the product label.

## RESIDUES IN FOOD AND TRADE ASSESSMENT

### Potential for Chemical Residues in Food

#### Background

Fenpyroximate is a pyrazole miticide which has biological activity against adult, larval and nymph stages of mite species such as *Tetranychus* and *Panonychus* species. The formulated material has the trade name ACABAN® Miticide and is a 50 g/L suspension concentrate applied by high volume spray to apple and pear trees at a maximum dilution of 100 ml ACABAN® per 100 L of water. Trees are sprayed to the point of run-off to ensure coverage of foliage and fruit.

Fenpyroximate is registered as a miticide in more than 30 countries. Registrations are for use on a wide variety of fruits and vegetables. MRLs for apples and pears generally appear to be between 0.2 and 1 mg/kg with withholding periods of between 4 and 21 days. In Australia there are currently temporary MRLs of 0.2 mg/kg for fenpyroximate in pear and in apples. These MRLs are due to expire on the 30 June 1997. The applicant has proposed an MRL of 0.2 mg/kg for apples and for pears with a 14 day withholding period to replace the present temporary MRLs. While the FAO/WHO Joint Meeting on Pesticides (JMPR) evaluated fenpyroximate in 1995 and decided that MRLs could not be recommended because of the absence of certain undefined critical studies, argument presented by the Australian applicant and calculations of possible residue levels in animal fat performed in the evaluation satisfactorily addressed a number of data gaps in the application and allowed MRL recommendations to be made.

To support full registration, rat, apple and tangerine metabolism studies, Australian and overseas residue data from supervised trials, an apple processing study, and environmental chemistry and fate data were evaluated or examined. Arguments from the applicant as to why residues in farm animals would not be of consequence were also submitted for evaluation.

#### Metabolism

Rat metabolism studies showed that faecal excretion was the major elimination route with urinary excretion also of importance. In the first 24 hours after dosing with radiolabelled fenpyroximate at 2 mg/kg body weight, maximum residues (as total carbon-14 equivalents) had been reached in the liver, kidney, and fat. After 7 days, fat residues were still measurable whereas residues in liver, kidneys and muscle were either not detectable or much lower than the levels in the fat. In the 2 mg/kg body weight studies, up to 0.04% of the administered dose was found in the fat. Comparable results were seen in rats dosed at 400 mg/kg body weight. The studies presented showed that liver, kidney and fat were sites of residue deposition and that depletion of residues was slowest in the fat. Analysis of the metabolites present in tissues was not investigated in the studies.



Apple metabolism studies showed that application of fenpyroximate at rates just above the proposed application rate resulted in a steady depletion of residues such that at harvest, apples had less than 0.02 mg/kg of fenpyroximate. Residues concentrated in apple pomace but were not found in apple juice. Fenpyroximate was the principal residue present.

### **Analytical methods**

Analytical methods presented satisfactorily determined fenpyroximate, its Z-isomer and dimethyl-fenpyroximate in fruits, apple pomace and apple juice. The methods were based on solvent extraction, partitioning into hexane or acetonitrile, column chromatography clean-up and HPLC determination. The methods had acceptable recoveries and limits of quantitation (0.01-0.05 mg/kg).

### **Residue definition**

Because fenpyroximate was the significant residue found in the plant metabolism studies and was readily measured by the analytical methodology, no change to the present residue definition in plants of "fenpyroximate" is required.

### **Storage stability**

Indirect evidence of storage stability was provided by the apple metabolism studies. This is consistent with the UK Ministry of Agriculture, Fisheries and Food and JMPR evaluations of fenpyroximate, which concluded fenpyroximate residues in apples were stable when stored at -20°C for over a year.

### **Residue trials**

Residue trials on apple trees were conducted in Japan, New Zealand, and Australia (South Australia and Queensland) at spray dilution rates of 50, 100, or 200 mL ACABAN/100L (equivalent to half the proposed, the proposed and twice the proposed maximum label rates). These trials used high volume spraying use patterns as proposed by the draft label. The residue results from trials considered to have been within the proposed use pattern (50 and 100 mL/100L dilutions, preharvest intervals of 14 days or greater) were:

0.004, ≤0.005 (4), 0.007, 0.008 (3), 0.01 (5), 0.013 (2), 0.02 (2), 0.03 (9), 0.04 (3), 0.05, 0.06 (2), 0.08, 0.1, 0.11 (2), 0.12 (2), and 0.18 mg/kg.

(Results sorted in ascending order with values in brackets being the number of times a particular residue concentration was recorded).

Trials on pear trees were conducted in Japan and Australia (South Australia and Queensland) at spray dilution rates of 100 or 200 mL ACABAN/100L and used high volume spraying use patterns as proposed by the draft label. The residue results from trials conducted at 100 mL/100L dilutions and with preharvest intervals of 14 days or greater were:

<0.005 (2), 0.02, 0.03, 0.04 (3), 0.05 (6), 0.06 (3), 0.07, 0.08, 0.1, 0.11, and 0.12 mg/kg.

On the basis of the residue levels found in the apples and pears, an MRL of 0.3 mg/kg is recommended for apples and pears. The 0.18 mg/kg result (generated in an Australian trial according to good agricultural practice) indicated that residues would probably reach or exceed on occasion, the 0.2 mg/kg level proposed by the applicant even when the product was used according to label directions.

Australian and Japanese residue data indicated that residues of the Z-isomer of fenpyroximate and dimethyl fenpyroximate were generally unmeasurable (<0.01 mg/kg) at the proposed withholding period and did not make a significant contribution to the residue concentrations.

### **Processing studies**

Two small scale apple processing studies were conducted in NSW and QLD and indicated an apparent 3 to 9 fold concentration of residues from the whole apples to the dry pomace (median concentration factor of 7.3). Assuming commercial processing lead to similar results, a maximum residue limit for apple and pear pomace (dry) of 2 mg/kg ( $\approx 7.3 \times 0.3$  mg/kg) was indicated.

Residue data from the apple processing studies showed that when used according to the proposed use pattern, fenpyroximate residues in apple juice would not be measurable.

### **Animal commodity MRLs**

Because there are finite residues in the treated crops, residues could occur in domestic animals fed treated apples and pears or their pomace. While a grazing/feeding restraint can control the direct feeding of apples or pears to animals, it is inapplicable to pomace. In such situations, animal commodity maximum residue limits would normally be established based on the residue levels found in the commodities fed to the animals and the results from animal transfer studies.

In the absence of farm animal feeding and metabolism studies, a calculation of possible maximum residue concentration in cattle fat after consumption of pomace indicated residues should be less than 0.00005 mg/kg and unlikely to result in detectable residues in cattle fat. This finding supported the applicant's argument that residues in animal commodities would be non-measurable and allowed the application to be progressed even though there was the lack of critical studies noted by the JMPR.

### **Theoretical Maximum Daily Intake**

The theoretical maximum dietary intake of fenpyroximate from the proposed use pattern on apples and pears is 7% of the acceptable daily intake value of 0.005 mg/kg body weight/day.

### **Bioaccumulation**

While a carp exposure study demonstrated a quick uptake and slow depuration of fenpyroximate, the rat metabolism studies pointed to effective metabolism and clearance from body organs and tissues. The lack of farm animal metabolism data has prevented a firm conclusion being reached on the bioaccumulation potential of fenpyroximate but on the basis of the observed rat metabolism, the expected low levels of exposure, and the calculated levels of residues which could be in the fat, bioaccumulation is not expected to be of significance.

### **Trade**

Apple exports represent about 10% of Australian production and pears, about 22%. These are considered significant values. The major export markets for Australian apples and pears are Singapore, Malaysia and Indonesia (pears) and Malaysia, Singapore and the Philippines (apples).

The recommended maximum residue limits for apples and pears (0.3 mg/kg) are of the same order of magnitude as MRLs established overseas. MRLs for fenpyroximate have been set in Japan at 1.0 mg/kg; other Asian countries do not appear to have set MRLs for fenpyroximate. On the basis of the Australian residue data presented, residues in exported apples and pears would be expected to meet overseas MRLs; however, it is recognised that the proposed Australian MRL is greater than some other national MRLs (0.2 mg/kg in some European countries such as Switzerland, Belgium and France).

No overseas country appears to have established animal commodity MRLs for fenpyroximate. Because residues are not expected in animal commodities, animal commodity MRLs have not been considered necessary at this time.

### **RECOMMENDATIONS**

MRLs of 0.3 mg/kg can be established for apples and pears on the basis of the data presented. The residue definition for plants will be "fenpyroximate". A grazing/feeding restraint is required to prevent direct exposure from farm animals grazing/feeding in treated areas or being fed treated apples or pears. Any request for further extension of use on food crops will require submission of farm animal metabolism and feeding studies.

## Withholding periods

The residue data and proposed use pattern indicate the following withholding period statements are appropriate:

### WITHHOLDING PERIOD

For apples and pears: DO NOT HARVEST FOR 14 DAYS AFTER APPLICATION.

To ensure that grazing or feeding of treated or failed crops does not result in measurable residues in animal commodities:

DO NOT GRAZE ANY TREATED AREA

DO NOT FEED PRODUCE HARVESTED FROM TREATED AREAS TO ANIMALS, INCLUDING POULTRY.

The 14 days withholding period was that proposed by the applicant and supported by the residue data submitted.

## MRLs

The following consequential amendments will be made to Table 1 of the MRL Standard:

**Table 1**

Compound	Food	MRL (mg/kg)
<b>Fenpyroximate</b>		
<b>DELETE:</b>		
FP 0226	Apple	0.2
FP 0230	Pear	0.2
<b>ADD:</b>		
FP 0226	Apple	0.3
FP 0230	Pear	0.3

## OCCUPATIONAL HEALTH AND SAFETY ASSESSMENT

Fenpyroximate is determined to be a hazardous substance by Ciba-Geigy Australia Ltd according to National Occupational Health and Safety Commission (NOHSC) Approved Criteria for Classifying Hazardous Substances.

ACABAN Miticide is determined to be a hazardous substance by Ciba-Geigy Australia Ltd, according to NOHSC Criteria.

ACABAN Miticide is a suspension concentrate containing 50 g/L of fenpyroximate. It will initially be imported fully formulated and re-packaged into sales packs in Australia. In future ACABAN Miticide may be formulated in Australia.

Fenpyroximate and ACABAN miticide are classified as dangerous goods under the Australian Code for the Transport of Dangerous Goods by Road and Rail.

### **Re-packaging, transport, storage and retailing**

Australian workers involved in the re-packaging of sales packs should be protected by safe work practices, an enclosed packaging process, ventilation and training commensurate with risks identified in the workplace assessment. Where handling processes are not contained, workers should wear personal protective equipment.

Australian workers involved in transport, storage and retailing of the product are unlikely to be exposed to the product unless the packaging is breached.

Advice on the safe handling of the product during routine transport and storage is provided on the Material Safety Data Sheet (MSDS) for ACABAN Miticide.

### **End use**

ACABAN Miticide may be applied by ground spray to control Two Spotted Mite and European Mite in apples and pears. It may be used by owner operators or contract workers. Its use is restricted to one spray per season for each orchard to minimise the development of insect resistance.

End users may become contaminated with ACABAN Miticide when making up the working strength solution and applying the spray. The concentration of product in the spray will be from 0.025% to 0.1% (0.00125% to 0.005% fenpyroximate). Workers will also need to clean up spills and maintain and clean spray equipment.

The product is of very low acute oral toxicity and low dermal toxicity and moderate inhalation toxicity. It is a moderate eye irritant but not a skin irritant or sensitiser. The main hazards for end users are eye irritation resulting from splashing with the concentrate and toxicity resulting from inhalation of spray mist.

End users should follow the safety directions on the ACABAN Miticide label. These directions instruct workers to wash eyes and skin immediately if contaminated with

ACABAN Miticide. Specific personal protective clothing recommended includes the use of goggles, elbow-length PVC gloves and a half-face respirator while preparing and using the product.

End users should refer to the product MSDS for additional information.

### **Entry into treated areas**

The draft label does not propose any restricted entry period however it states that end users should not enter the treated area without protective clothing until spray has dried.

ACABAN Miticide has low systemic and topical toxicity. It is highly diluted in the spray. Fenpyroximate has low vapour pressure and is degraded by natural light. Considering these factors, Worksafe Australia does not recommend a re-entry period at this stage.

### **Recommendations for safe use - all workers**

Workers involved in re-packaging should be protected by engineering controls such as exhaust ventilation, safe work practices and training. Where handling process are not fully contained workers should wear long sleeved overalls (AS 3765-1990 Clothing for protection against hazardous chemicals), approved safety boots (AS/NZS 2210.1-1994 Occupational protective footwear), safety glasses (AS/NZS 1337-1992 Eye protectors for industrial applications) and PVC or nitrile rubber gloves (AS 2161-1978 Industrial safety gloves and mittens).

End users should follow the safety directions on the ACABAN Miticide label. These directions instruct users to wash eyes immediately if contaminated with the product. Workers should wear goggles, elbow-length PVC gloves and a half-face respirator when handling the concentrate and applying the spray.

### **Conclusion**

ACABAN Miticide can be used safely if handled in accordance with the control measures described above. Additional information is available on the label and in the MSDS.

## Glossary of terms

<b>Active constituent</b>	The component of a treatment which is responsible for its biological effect.
<b>Acute toxicity -</b>	Immediately measurable effects of a toxin on an organism.
<b>Denatured</b>	Broken down
<b>Depuration</b>	Cleansing, purification
<b>Detritus</b>	rotting vegetable material
<b>Diploid</b>	Having two sets of chromosomes
<b>DNA</b>	deoxyribonucleic acid the generic component of the chromosomes which support the gene sequences.
<b>Gene</b>	A length of the DNA which holds the base sequences which code for the formation of a polypeptide chain (protein).
<b>IPM</b>	Integrated Pest Management. The combination of chemical and biological aspects of pest control to achieve pest management.
<b>Lentic water</b>	still water
<b>ppm</b>	Parts per million
<b>Pomace</b>	Pulpy residue from apples or other fruit after crushing and pressing
<b>Protease</b>	Enzymes which break down proteins.
<b>Proteolysis</b>	The process in which proteins chains are lysed (cut) as part of their digestion.
<b>Schedule</b>	The category into which a chemical is placed according to its human toxicity.

## SUGGESTED FURTHER READING

*Code of Practice for Labelling Agricultural Chemical Products* (available from the NRA)

Felton, JC, Oomen, PA and Stevenson, JH (1986) Toxicity and hazard of pesticides to honeybees: harmonisation of test methods. *Bee World* 67(3):114-124

Goring, CAI *et al.* (1975). Principles of pesticide degradation in soil. In Haque, R and freed, VH (Eds) *Environmental Dynamics of Pesticides*. Plenum Press, New York, pp135-172.

*Interim Requirements for the Registration of Agricultural and Veterinary Chemical Products* (available from the NRA)

*MRL Standard - Maximum residue limits in food and animal feedstuffs*. Commonwealth Department of Human Services and Health. AGPS, Canberra.

Whalon, M and Hollingworth, R (Eds) (1994). Fruit Crops Working Group. *Resistant Pest management Newsletter* 6(2). Internet site: <http://www.mstate.edu/Entomology/v6n2/fall94.html>



# POISON

KEEP OUT OF REACH OF CHILDREN

READ SAFETY DIRECTIONS BEFORE OPENING OR USING

Pesticide, liquid, toxic,  
N.O.S.

1 NO. 2902

Packaging Group III

Hazchem 2X



In a Transport  
Emergency Dial 000  
Police or Fire Brigade.

For specialist advice in  
an emergency only call 1(800)  
033 111 (24 hours)

## ACABAN®

### MITICIDE

Active Constituent: 50g/L fenpyroximate  
Pyrazole Miticide

Controls Two Spotted Mite and  
European Red Mite in Apples and Pears

1 Litre

(logo)

## Directions for use

**Restraint: DO NOT use in orchards, where products likely to cause mite flaring have been used, or are planned to be used.**

**DO NOT apply under meteorological conditions or from spray ~~gun~~ equipment which could be expected to cause spray drift onto adjacent areas, particularly wetlands, waterbodies or watercourses.**

Crop	Pest	State	Situation	Rate	Critical Comments
				Dilute (high volume) per 100L	
Apples & Pears	Two spotted mite ( <i>Tetranychus urticae</i> ) European red mite ( <i>Panonychus ulmi</i> )	Qld, NSW, Vic, SA, Tas only	IPM (where mite predators are present)	50 mL	Thorough coverage is essential. The minimum water volume is 1,500 L/ha. See application section in General Instructions for details. Use only one (1) application per season.
			non IPM (where no mite predators or very low levels are present)	100 mL	<u>Apples</u> Apply before mite numbers exceed 8-10 mites/leaf or 70% of leaves are infested. <u>Pears</u> Apply when there are 1-2 mites/leaf or 25% of leaves are infested (whichever comes first).
	Two spotted mite ( <i>Tetranychus urticae</i> )	WA only	IPM (where mite predators are present)	50 mL	<u>Apples</u> Apply before mite numbers exceed 8-10 mites/leaf or 70% of leaves are infested.
			non IPM (where no mite predators or very low levels are present)	100 mL	<u>Pears</u> Apply when there are 1-2 mites/leaf or 25% of leaves are infested (whichever comes first).

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

## Withholding Period

**Apples, Pears: DO NOT HARVEST FOR 14 DAYS AFTER APPLICATION.**

**DO NOT GRAZE ANY TREATED AREA**

**DO NOT FEED PRODUCE HARVESTED FROM TREATED AREAS TO LIVESTOCK, INCLUDING POULTRY.**

Batch No.	
Date of Manufacture	

## **General Instructions**

### **Application**

Apply by high volume (dilute) sprayer to the point of run-off to ensure thorough coverage of foliage and fruit. The following spray volumes are offered as a guide to proper spraying of average sized trees at conventional planting intervals.

Stage	Dilute volume per ha (average trees)	Rate of ACABAN / ha	
		@ 50 mL / 100L	@ 100 mL / 100L
Petal fall to first cover spray	1,500 to 2,500 litres	750 to 1,250 mL	1,500 to 2,500 mL
Full foliage	2,500 to 3,500 litres	1,250 to 1,750 mL	2,500 to 3,500 mL

### **Mixing**

Shake product before opening as settling of contents may occur during storage.

Partly fill tank with water and add the required amount of product to the spray tank while agitating.

Continue agitation while spraying.

### **Compatibility**

Acaban® can be mixed with Insegar®, Topas®, Dipel\*, Systhane\*, Wuxal\* calcium, and some formulations of azinphos methyl, calcium chloride, calcium nitrate, chlorpyrifos, mancozeb and parathion. For compatible mixes please contact your reseller or Ciba representative.

### **Mite Resistance Guidelines**

ACABAN is a pyrazole miticide. To prevent the onset of resistance do not apply more than one spray of a pyrazole miticide per season. If more sprays are necessary use a miticide from a different chemical group.

### **Protection of Livestock**

Low hazard to bees. No special precautions are required.

### **Protection of Wildlife, Fish, Crustacea and Environment**

DANGEROUS TO FISH AND OTHER AQUATIC ORGANISMS. Do not contaminate dams, ponds, waterways with product or used containers. ACABAN is compatible with Integrated Pest Management orchards where mite predators such as *Typhlodromus pyri*, *T. occidentalis* or *Stethorus* are established. Depending on rate, levels of these mite predators may be suppressed for 1-3 weeks after application.

### **Storage, Disposal, Protection of Others**

Store in the closed original container in a dry, well ventilated area as cool as possible out of direct sunlight.

Triple rinse containers before disposal. Add rinsings to tank mix or dispose of rinsate in a disposal pit. This pit must be away from aquatic areas and in a suitable area specifically marked and set up for the purpose. Do not dispose of undiluted chemicals on-site.

Destroy empty containers by breaking, crushing or puncturing them. Dispose of the containers at a local authority landfill that does not burn its refuse. If there is no local authority landfill readily available in your area, bury the containers at a depth of 500 mm or more at a licensed/approved disposal site. In some States wastes can only be buried at a licensed landfill. Do not burn empty containers or product.

### **Restricted Entry Interval**

Do not enter treated area without protective clothing until spray has dried.

### **Safety Directions**

Harmful if inhaled. Will irritate the eyes. Avoid contact with eyes and skin. Avoid inhaling spray mist. When preparing spray and using the prepared spray wear elbow-length PVC gloves and goggles and half-face respirator. If product gets in eyes, wash it out immediately with water. After use and before eating, drinking or smoking, wash hands, arms and face thoroughly with soap and water. After each day's use, wash gloves and goggles and respirator or face piece.

### **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.

### **Material Safety Data Sheet**

If additional hazard information is required refer to the Material Safety Data Sheet. For a copy telephone 1 800 025 931.

### **Manufacturing Warranty**

This product as supplied is of a high grade and believed to be suitable for any purpose for which it is expressly recommended and must be used in accordance with the direction for use given on the label. No responsibility is accepted in respect of this product, save those non-excludable conditions implied by any Federal and State legislation or law of a Territory.

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