



Australian Government
**Australian Pesticides and
Veterinary Medicines Authority**



PUBLIC RELEASE SUMMARY

on the evaluation of the new mefentrifluconazole in the product Belanty
Fungicide

APVMA Product Number 84344

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PREFACE

The Australian Pesticides and Veterinary Medicines Authority (APVMA) is the Australian Government regulator responsible for assessing and approving agricultural and veterinary chemical products prior to their sale and use in Australia. Before approving an active constituent and/or registering a product, the APVMA must be satisfied that the statutory criteria, including the safety, efficacy, trade and labelling criteria, have been met. The information and technical data required by the APVMA to assess the statutory criteria of new chemical products, and the methods of assessment, must be consistent with accepted scientific principles and processes. Details are outlined on the [APVMA website](#).

The APVMA has a policy of encouraging transparency in its activities and seeking community involvement in decision making. Part of that process is the publication of Public Release Summaries for products containing new active constituents. This Public Release Summary is intended as a brief overview of the assessment that has been conducted by the APVMA and of the specialist advice received from advisory agencies, including other Australian Government agencies and State departments of primary industries. It has been deliberately presented in a manner that is likely to be informative to the widest possible audience to encourage public comment.

About this document

This is a Public Release Summary.

It indicates that the APVMA is considering an application for registration of an agricultural or veterinary chemical. It provides a summary of the APVMA's assessment, which may include details of:

- the toxicology of both the active constituent and product
- the residues and trade assessment
- occupational exposure aspects
- environmental fate, toxicity, potential exposure and hazard
- efficacy and target crop or animal safety.

Comment is sought from interested stakeholders on the information contained within this document.

Making a submission

In accordance with sections 12 and 13 of the Agvet Code, the APVMA invites any person to submit a relevant written submission as to whether the application for registration of the active mefenfentrifluconazole and the product Belanty Fungicide should be granted. Submissions should relate only to matters that the APVMA is required, by legislation, to take into account in deciding whether to grant the application. These matters include aspects of public health, occupational health and safety, chemistry and manufacture, residues in food, environmental safety, trade, and efficacy and target crop or animal safety. Submissions should state the grounds on which they are based. Comments received that address issues outside the relevant matters cannot be considered by the APVMA.

Submissions must be received by the APVMA by close of business on 7 May 2019 and be directed to the contact listed below. All submissions to the APVMA will be acknowledged in writing via email or by post.

Relevant comments will be taken into account by the APVMA in deciding whether the product should be registered and in determining appropriate conditions of registration and product labelling.

When making a submission please include:

- contact name
- company or group name (if relevant)
- email or postal address (if available)
- the date you made the submission.

All personal information, and confidential information judged by the APVMA to be confidential commercial information (CCI)¹ contained in submissions will be treated confidentially. Unless requested by the submitter, the APVMA may release a submission, with any CCI redacted, to the applicant for comment.

Written submissions on the APVMA's proposal to grant the application for registration that relate to the grounds for registration should be addressed in writing to:

Case Management and Administration Unit
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PO Box 6182
Kingston ACT 2604

Phone: +61 2 6210 4701
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Email: enquiries@apvma.gov.au

Further information

Further information can be obtained via the contact details provided above.

Copies of technical evaluation reports covering chemistry, efficacy and safety, toxicology, occupational health and safety aspects, residues in food and environmental aspects are available from the APVMA on request.

Further information on Public Release Summaries can be found on the [APVMA website](#).

¹ A full definition of 'confidential commercial information' is contained in the Agvet Code.

1 INTRODUCTION

This publication provides a summary of the data reviewed and an outline of the regulatory considerations for the proposed registration of Belanty Fungicide, and approval of the new active constituent, mefentrifluconazole.

1.1 Applicant

BASF Australia Ltd.

1.2 Purpose of application

BASF Australia Ltd has applied to the APVMA for registration of the new product Belanty Fungicide, containing 75 g/L of the new active constituent mefentrifluconazole as a suspension concentrate formulation.

This publication provides a summary of the data reviewed and an outline of the regulatory considerations for the proposed registration of the product Belanty Fungicide, and approval of the new active constituent mefentrifluconazole.

1.3 Proposed claims and use pattern

Belanty Fungicide is a fungicide intended for use as a preventative treatment for the control of black spot in apples, and powdery mildew in grapevines. It is applied at a rate of 80 mL/100 L in grapevines and apples, with up to three applications made at multiple time points in fruit development.

1.4 Mode of action

Mefentrifluconazole is a triazole fungicide with the demethylation inhibitor (DMI) mode of action. The Fungicide Resistance Action Committee (FRAC), has designated mefentrifluconazole as a Group 3 fungicide.

1.5 Overseas registrations

The active constituent mefentrifluconazole is currently registered with the Instituto Colombiano Agropecuario (Colombia) for use in combination with other fungicide active constituents in two products for use on coffee, rice and tomatoes. Mefentrifluconazole has been approved for use as an active constituent in the European Union and South Korea.

2 CHEMISTRY AND MANUFACTURE

2.1 Active constituent

The active constituent mefentrifluconazole will be manufactured overseas. Details of the chemical name, structure, and physicochemical properties of mefentrifluconazole are listed below (Tables 1–2).

Mefentrifluconazole is a white to off-white powder with a moderate thiolic odour in the case of the technical active. It has very low water solubility (<1 mg/L), while being soluble in polar organic solvents, slightly soluble in aromatic hydrocarbons and essential insoluble in aliphatic hydrocarbons.

Table 1: Nomenclature and structural formula of the active constituent mefentrifluconazole

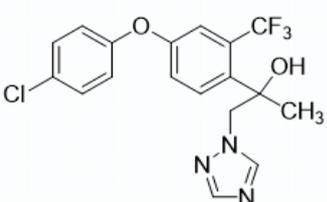
COMMON NAME (ISO):	Mefentrifluconazole
IUPAC NAME:	(2 <i>RS</i>)-2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1 <i>H</i> -1,2,4-triazol-1-yl)propan-2-ol
CAS REGISTRY NUMBER:	1417782-03-6
MOLECULAR FORMULA:	C ₁₈ H ₁₅ ClF ₃ N ₃ O ₂
MOLECULAR WEIGHT:	397.8 g/mol
STRUCTURAL FORMULA:	 The chemical structure of mefentrifluconazole is shown. It consists of a central benzene ring substituted at the 2-position with a (1 <i>H</i> -1,2,4-triazol-1-yl)methyl group, at the 4-position with a 4-chlorophenoxy group, and at the 1-position with a trifluoromethyl group and a 1-hydroxypropan-2-yl group. The trifluoromethyl group is labeled CF ₃ , the hydroxyl group is labeled OH, and the methyl group is labeled CH ₃ .

Table 2: Key physicochemical properties of the active constituent mefentrifluconazole

PHYSICAL FORM:	Technical grade—fine powder, purified active—solid powder
COLOUR:	Off-white (technical grade), white (purified active)
ODOUR:	Technical—moderate thiolic odour, purified—odourless
MELTING POINT:	Onset 126 °C.
BOILING POINT:	The test substance thermally decomposes at 300 °C before reaching the intrinsic boiling point under both atmospheric and reduced pressure
SAFETY PROPERTIES (TECHNICAL ACTIVE):	Not considered highly flammable. Not oxidising. Not explosive. Flash point not determined due to melting point > 40 °C
SOLUBILITY IN WATER (20 °C):	Water: 0.81 mg/L (pure water, resulting pH value: 6.8) pH 4: 0.66 mg/L (acetate buffer) pH 7: 0.71 mg/L (phosphate buffer)
ORGANIC SOLVENT SOLUBILITY (20 °C):	Acetone 93.2 (± 1.6) g/L Methanol 73.2 (± 3.2) g/L 1,2 dichloroethane 55.3 (± 0.4) g/L Xylene 8.5 (± 0.1) g/L <i>n</i> -heptane 9.46 × 10 ⁻² (± 0.9 × 10 ⁻³) g/L Ethyl acetate 116.2 (± 1.8) g/L Acetonitrile 49.4 (± 0.7) g/L
DISSOCIATION CONSTANT (PK _A):	3.0
OCTANOL/WATER PARTITION COEFFICIENT (LOG K _{OW} /K _{OW}):	pH 4*: log P _{ow} = 3.4 pH 7: log P _{ow} = 3.4 pH 7*: log P _{ow} = 3.3 pH 9*: log P _{ow} = 3.4 * buffered
VAPOUR PRESSURE:	3.2 × 10 ⁻⁶ Pa at 20 °C and 6.5 × 10 ⁻⁶ Pa at 25 °C
HENRY'S LAW CONSTANT:	1.6 × 10 ⁻³ Pa m ³ mol ⁻¹
UV/VIS ABSORPTION SPECTRA:	Neutral pH (methanol, pH = 6.1); λ _{max} values: 202 nm, 232 nm, 272 nm, 290 nm and 295 nm. Neutral pH (aqueous, pH = 6.4); λ _{max} values: 194 nm, 231 nm, 275 nm, 290 nm and 295 nm. Acidic, pH = 1.4; λ _{max} values: 199 nm, 231 nm, 272 nm, 290 nm and 295 nm. Basic, pH = 12.2; λ _{max} values: 231 nm, 277 nm, 290 nm and 295 nm.

The APVMA has evaluated the chemistry aspects of mefentrifluconazole (manufacturing process, quality control procedures, batch analysis results, analytical methods, physicochemical properties, stability and spectroscopic data) and found them to be acceptable.

On the basis of the data provided and the chemistry and toxicological assessments, the following APVMA Active Constituent standard is proposed for mefentrifluconazole:

CONSTITUENT	SPECIFICATION	LEVEL
Mefentrifluconazole	Mefentrifluconazole	965 g/kg minimum

2.2 Formulated product

The product Belanty Fungicide will be manufactured overseas. Tables 3 and 4 outline some key aspects of the formulation and physicochemical properties of the product.

Belanty Fungicide will be available in 1 L, 2 L, 2.5 L, 5 L and 10 L high density polyethylene (HDPE) containers.

Table 3: Key aspects of the formulated product Belanty Fungicide

DISTINGUISHING NAME:	Belanty Fungicide.
FORMULATION TYPE:	Suspension concentrate (SC)
ACTIVE CONSTITUENT CONCENTRATION:	75 g/L mefentrifluconazole

Table 4: Physicochemical properties of the product Belanty Fungicide

PHYSICAL FORM:	Off-white liquid suspension with a faint fruity odour
PH:	pH 5.7 (CIPAC water D)
SPECIFIC GRAVITY/DENSITY:	1.051 g/mL @ 20 °C, 1.045 g/mL @ 40 °C
KINEMATIC VISCOSITY:	Non-Newtonian fluid: viscosity decreasing with increasing shear rate.
SAFETY PROPERTIES:	No flash point up to 98 °C. Auto-ignition temperature is 450 °C. Exhibited an exothermic decomposition at 280 °C with an energy release of > -1360 J/g. No oxidising or explosive properties.
STORAGE STABILITY:	There was sufficient data to conclude that the product is expected to remain within specifications for at least two (2) years when stored under normal conditions

The APVMA has evaluated the chemistry aspects of the formulated product Belanty Fungicide, including the manufacturing process, quality control procedures, stability, physico-chemical properties, batch analysis results and analytical methods, and found them to be acceptable. The available storage stability data

indicate that the formulated product is expected to remain stable for at least two years when stored under normal conditions.

2.3 Recommendations

Based on a review of the chemistry and manufacturing data, the registration of Belanty Fungicide, and approval of the active constituent mefentrifluconazole, are supported from a chemistry perspective.

3 TOXICOLOGICAL ASSESSMENT

3.1 Evaluation of toxicology

The toxicological data submitted on the active mefentrifluconazole are considered sufficient to determine its toxicology profile and to characterise the risk to humans. The data included metabolism studies, acute toxicity studies (active constituent and product), short-term toxicity studies (oral and dermal), long-term oral toxicity studies (including carcinogenicity), reproductive and developmental toxicity studies, genotoxicity studies, neurotoxicity studies (acute), studies on metabolites and other information to address the human safety criteria.

In interpreting the data, it should be noted that toxicity tests generally use doses that are high compared with likely human exposures. The use of high doses increases the likelihood that potentially significant toxic effects will be identified. Findings of adverse effects in any one species do not necessarily indicate such effects might be generated in humans. From a conservative risk assessment perspective however, adverse findings in animal species are assumed to represent potential effects in humans, unless convincing evidence of species specificity is available. Where possible, considerations of the species specific mechanisms of adverse reactions weigh heavily in the extrapolation of animal data to likely human hazard. Equally, consideration of the risks to human health must take into account the likely human exposure levels.

Chemical class

Mefentrifluconazole is a triazole fungicide belonging to the group of sterol biosynthesis inhibitors in the sub group of demethylation inhibitors. The mode of action is the blocking of ergosterol biosynthesis through inhibition of cytochrome P450 sterol 14-demethylase, resulting in inhibition of growth and cell membrane disruption. Due to the presence of a unique isopropanol moiety, mefentrifluconazole is considered to belong to a new sub-group of triazole fungicides, the isopropanol azoles. Mefentrifluconazole is a 50:50 mix of R- and S-enantiomers (isomers). No toxicological studies were performed on the individual enantiomers.

Pharmacokinetics

Mefentrifluconazole was extensively absorbed after oral administration in mice and rats. Radioactivity associated with the administration of [14C]-mefentrifluconazole was widely and rapidly distributed with the highest levels detected in the plasma, liver, kidneys and adrenals. It was extensively metabolised and rapidly eliminated, with the majority of radioactivity excreted within 48 h, primarily via the bile into the faeces and, to a lesser extent, in urine. There was no evidence of accumulation or significant differences between sexes. Mefentrifluconazole was considered the only toxicologically significant compound.

Dermal penetration of radiolabelled mefentrifluconazole in human split thickness skin in diffusion cells was between 0.12 per cent and 2.36 per cent.

Acute toxicity (active constituent)

Mefentrifluconazole is of very low acute oral toxicity in rats ($LD_{50} > 2000$ mg/kg bw with no deaths), and of low acute dermal toxicity ($LD_{50} > 5000$ mg/kg bw) and inhalational toxicity ($LC_{50} > 5,314$ mg/m³). The active is

classified as non-irritating to the skin and eyes of rabbits. Mefentrifluconazole is a skin sensitizer in guinea pigs by the maximisation assay.

Acute toxicity (product)

Based on submitted toxicological studies, the formulated product, containing 75 g/L mefentrifluconazole, has low acute toxicity in rats by the oral ($LD_{50} > 2000$ mg/kg bw), dermal ($LD_{50} > 5000$ mg/kg bw) and inhalation ($LC_{50} > 5400$ mg/m³) routes. The product was not a skin or eye irritant in rabbits, or a skin sensitiser in guinea pigs.

Repeat-dose toxicity

Following repeat-dosing in mice, rats and dogs, the liver was the primary target organ. Hepatocellular hypertrophy and increased liver weight as well as reduced body weight or body weight gain were seen at dietary doses from 58 mg/kg bw/day in mice, 334 mg/kg bw/day in rats, and oral doses of 180 mg/kg bw/day in dogs. In a 28 day dermal study in rats, no treatment related effects were seen at any dose and the No Observed Adverse Effect Level (NOAEL) was therefore 100 mg/kg bw/d.

Chronic toxicity and carcinogenicity

Following chronic dietary administration for 18 months, the main effects seen in mice were reduced weight gain and increased liver weight with associated degenerative liver changes, as well as increased adrenal weight at 36 mg/kg bw/day in males and 62 mg/kg bw/day in females. Thyroid follicular cell hyperplasia was seen at 36 mg/kg bw/day in males only. The NOAEL from this study was 9.1 mg/kg bw/d.

In a two-year dietary study in rats, changes in blood chemistry were seen at 29 mg/kg bw/day in males and 41 mg/kg bw/day in females. In dogs given mefentrifluconazole in capsules for 12 months, changes in blood chemistry and increase liver weights were seen at 150 mg/kg bw/day. No treatment related tumours were seen in mice or rats, with all tumours seen in rats (malignant lymphoma and adenocarcinoma of the uterus) being within the historical control ranges. The NOAEL from this study was 5 mg/kg bw/d. Mefentrifluconazole is not considered to be a human carcinogen.

Reproductive and developmental toxicity

Mefentrifluconazole was not a reproductive toxin in rats, with effects on pup mortality seen only at maternotoxic doses of 200 mg/kg bw/day. It was not a developmental toxin in rats or rabbits, with no developmental effects in rats at 400 mg/kg bw/day (a dose which produced maternal toxicity), or in rabbits at 25 mg/kg bw/day, the highest dose tested.

Genotoxicity

Mefentrifluconazole was not genotoxic in a range of tests including *in vivo* and *in vitro* assays.

Neurotoxicity

No signs of neurotoxicity were seen in an acute neurotoxicity study in rats. Signs of systemic toxicity, including decreased motor activity and an unsteady gait, were seen on the day of dosing at 600 and 2000 mg/kg bw, with decreased body weight gain seen at 2000 mg/kg bw.

Mode of Action (toxicology)

Mode of action studies of liver cell proliferation and enzyme induction were conducted in Wistar rats and CAR/PXR KO (KO) C57BL/6J mice, at doses equal to those used in the carcinogenicity studies. Additionally, *in vitro* comparisons between human and mouse liver cell cultures were done. In the rat, weak responses were seen, with no increase in cell proliferation and a modest impact on enzyme activities. In wild type (WT) mice, induction of enzymes and increase in liver cell proliferation was seen, along with increased levels of liver enzymes, liver weight increases and hepatocyte hypertrophy without degenerative changes in liver cells. Overall, the data indicated that the liver effects in mice are mediated through an androstane (CAR) receptor. As human hepatocytes are comparatively refractory to the effects of CAR activators, as demonstrated through *in vitro* comparisons between human and mouse primary hepatocyte cultures, the mouse is considered to be more sensitive than humans. On this basis, the adaptive liver changes seen in mice and rats, such as liver enlargement or cell hypertrophy were not considered as adverse, and the No Observed Adverse Effect Level (NOAEL) was based on signs of clear liver toxicity.

Toxicity of metabolites and/or impurities

Metabolite M750F022, formed by replacement of the triazole ring with a hydroxyl moiety, was identified in a hen metabolism study. This metabolite was of low acute oral toxicity in rats (LD₅₀ >2000 mg/kg bw with no deaths). It was not genotoxic in a range of assays. In a short term (28 day) toxicity study in mice, body weight loss, increased levels of liver enzymes and other clinical chemistry signs were seen at the highest dose tested of 587 mg/kg bw/day in males and 718 mg/kg bw/day in females. Liver changes, including enlarged liver cells and necrosis were seen at doses of 80 mg/kg bw/day in males. These effects were similar to the effects of mefentrifluconazole, indicating that the metabolite and the parent compound have similar toxicity.

Reports related to human toxicity

Other than *in vitro* mode of action studies, no human data are available as this is a new active constituent.

3.2 Health-based guidance values and poisons scheduling

Poisons Standard

On 28 September 2018, the Delegate of the Secretary of the Department of Health published a final Scheduling decision to include mefentrifluconazole in Schedule 5 of the Poisons Standard **except** in preparations containing 7.5 per cent or less of mefentrifluconazole. The Delegate's decision took into consideration the low acute toxicity for the product but noted the potential for skin sensitisation. An

implementation date of 1 October 2018 for mefentrifluconazole in the Poisons Standard was adopted. Belanty Fungicide containing 75 g/L (7.5 per cent) mefentrifluconazole will be unscheduled.

Health-based guidance values

Acceptable Daily Intake (ADI)

The Acceptable Daily Intake (ADI) is that quantity of a chemical compound that can safely be consumed on a daily basis for a lifetime.

The ADI for mefentrifluconazole was established at 0.05 mg/kg bw/d. This is based on a NOAEL of 5 mg/kg bw/d for clinical chemistry effects secondary to liver toxicity at 29 mg/kg bw/d in a 2-y rat study, with the application of an uncertainty factor of 100. This ADI is supported by the NOAEL of 9.1 mg/kg bw/d in a mouse 18-month dietary study, with reduced weight gain and increased liver weight and degenerative changes in the liver at 36 mg/kg bw/d.

Acute Reference Dose (ARfD)

The Acute Reference Dose (ARfD) is the maximum quantity of a chemical that can safely be consumed over a short period of time, usually in one meal or during one day.

An ARfD was not required for mefentrifluconazole based on its low acute toxicity, lack of evidence for any acute neurotoxicity and absence of any other toxicologically relevant effects attributable to a single dose.

3.3 Recommendations

There are no objections on human health grounds to the approval of mefentrifluconazole.

There are no objections on human health grounds to the registration of the product Belanty Fungicide, containing 75 g/L of mefentrifluconazole.

4 RESIDUES IN FOOD ASSESSMENT

As part of the residues assessment of mefentrifluconazole (in Belanty Fungicide), plant and animal metabolism studies, supervised residue trials for grapes and pome fruit, animal transfer studies, analytical methodology, fate in storage and processing data and residues in trade information were considered.

4.1 Metabolism

Metabolism studies were provided for wheat, soybeans, grapes, rotational crops, hen, goat and trout. The metabolism and distribution of mefentrifluconazole was investigated using mefentrifluconazole labelled either in the chlorophenyl ring or the 3(5)-position of the triazole ring. For the laying hen and lactating goat studies the active substance was also radiolabelled in the trifluoromethylphenyl ring (TFMP-label).

Plants

Studies were conducted on wheat, soybeans and grapes with two or three applications at approximately 125–150 g ai/ha. In most matrices the unchanged parent was the predominant component of the residue; in forage of wheat (84–89 per cent of the total radioactive residue [TRR]) and soybean (79–80 per cent TRR), leaf (60–70 per cent TRR) and stalk (86–92 per cent TRR) of grapevine, wheat straw (59–69 per cent TRR), soybean hull (79–83 per cent TRR), soybean rest-of-plant (60–71 per cent TRR), green pod of soybean (69 per cent TRR) and in grapes (64–70 per cent TRR). Sugar conjugates of the hydroxylated parent were found at up to a sum of 16 per cent of the radioactive residue in wheat straw and up to 22 per cent in grape leaf, while sugar conjugates of the unchanged parent were found at up to 6 per cent of the radioactive residue.

In contrast, the predominant component of the residue in wheat grain and soybean seed was the group of triazole derivative metabolites (TDM), with triazole alanine as the most abundant component. These compounds are common to a range of azole fungicides. They were not observed in any grape matrix. Unchanged parent was absent from wheat grain, and found only in lower amounts in soybean seed (up to 4 per cent radioactive residue).

A similar metabolite pathway was observed in the confined rotational crop study where the unchanged parent was the predominant component of the residue in most matrices and the group of TDM was the predominant component of the residue in grain.

Animals

The laying hen study involved repeated oral administration for 14 consecutive days at 15.0–16.7 ppm feed. The cleavage metabolite M750F022, formed by replacement of the triazole ring with a hydroxyl moiety, together with its fatty acid conjugates, was the predominant component of the residue, together accounting for 53–87 per cent TRR in egg yolk, muscle, and fat, and 20–44 per cent TRR in liver and kidney (egg white with TRR<0.01 mg eq./kg was not further investigated). M750F022 was the most abundant compound in muscle, liver, kidney and yolk, while in fat (C-label) the conjugates were dominant. The cleavage metabolite 1,2,4-triazole was found at major level in all matrices. Proportions were >65 per cent TRR in egg white, muscle, liver, kidney and fat, and 41 per cent TRR in egg yolk. Parent mefentrifluconazole was present in all matrices investigated except egg white. Major amounts of parent were determined in in egg yolk (7–44 per

cent TRR) and fat (5–20 per cent TRR), while proportions were low in muscle, liver and kidney (≤ 7 per cent TRR).

The lactating goat study involved repeated oral administration for 12–14 consecutive days at 15.5–23.4 ppm feed. The major components of the residue in goat were identified as unchanged parent mefen-trifluconazole and the TDM which together represent a large proportion of the residue. In the T-label, TDM exceed parent in all matrices except fat. In the C- and TFMP-labels, parent represents ≥ 85 per cent TRR in muscle and fat, ≥ 45 per cent of TRR in milk and liver and 28–46 per cent TRR in kidney. The cleavage product M750F022 was present at much lower levels (< 8 per cent TRR, except one kidney sample at 11 per cent TRR).

The rainbow trout study involved repeated oral administration at 5.4 or 5.8 ppm feed. Unchanged parent was seen in edible tissues (filet and filet skin) at 64–74 per cent TRR with the C- label and 15–36 per cent with the T-label. With the T-label, the cleavage product 1,2,4-triazole was also detected, at > 48 per cent TRR. The composition of the radioactive residue in liver was also analysed. Besides unchanged parent and 1,2,4-triazole, an additional liver-specific compound (M750F086) was found only in minor amounts (≤ 7 per cent TRR), resulting from hydroxylation of the triazole ring.

For goats and hens the residue was rapidly and extensively eliminated *via* excreta, reaching a plateau in milk and egg within seven days. The animal metabolism studies taken together, confirm that ruminants, poultry and fish, have common basic metabolic routes of mefen-trifluconazole which are comparable to the metabolic routes identified in rat.

4.2 Analytical methods and storage stability

Analytical methods

In the submitted Australian apple and grape trials, residues of mefen-trifluconazole were extracted from blended homogeneous samples using methanol/water/2N hydrochloric acid. An aliquot of the extract was taken and partitioned with cyclohexane in alkaline conditions. An aliquot of the organic fraction was taken and evaporated to dryness. The samples were reconstituted in methanol/water. Mefen-trifluconazole residues were determined by reverse-phase Ultra Performance Liquid Chromatography (UPLC) coupled with tandem mass spectrometric detection (MS-MS). Quantitation was achieved using external matrix-matched standards. The limit of quantitation (LOQ) was 0.01 mg/kg for mefen-trifluconazole in apples, grapes, wine, grape juice and grape pomace. Validation results were within acceptable limits.

For animal matrices containing fat, mefen-trifluconazole was extracted with a mixture of acetonitrile and iso-hexane. An aliquot of the extract was centrifuged and twice partitioned against iso-hexane. For animal matrices containing protein, mefen-trifluconazole was extracted with a mixture of methanol, water and hydrochloric acid. An aliquot of the extract was centrifuged and partitioned twice using alkaline conditions against cyclohexane. Final analysis for mefen-trifluconazole was performed by LC-MS/MS. The method has a limit of quantitation of 0.01 mg/kg for mefen-trifluconazole in animal matrices.

Studies were submitted describing a number of other validated analytical methods for determining residues of mefen-trifluconazole and its metabolites separately in plant and animal matrices. It is noted that three different methods are required to analyse for parent mefen-trifluconazole, M750F022 and fatty acid conjugates of M750F022.

Stability of the pesticide in stored analytical samples

The freezer ($\leq -18^{\circ}\text{C}$) storage stability of mefentrifluconazole was investigated in plant matrices. It was shown that residues of for mefentrifluconazole are stable for at least 24 months in tomato fruit, grapes, lemons, wheat grain, dried bean seed, dried peas seed, soybean seed, rape seed, wheat whole plant no roots, wheat straw and potato tuber.

Further studies showed that residues of mefentrifluconazole and M750F022 are stable in animal matrices (cow liver, kidney, muscle, fat, milk and cream and hen egg) for at least six months when stored under deep frozen conditions.

In the apple and grape residue trials submitted, all samples were maintained under freezer conditions, (ie -18°C) prior to analysis and tested within approximately 20 months of collection. This is acceptable for the purposes of the current application.

4.3 Residue definition

Plant commodities

As parent mefentrifluconazole was shown to be a major component of the radioactive residues in both primary and secondary crops, the proposed residue definition for compliance and risk assessment for plant commodities is mefentrifluconazole.

Animal commodities

Parent mefentrifluconazole is the dominant residue in goat and trout commodities with only low levels of M750F022 observed in the goat metabolism study (and no fatty acid conjugates in any matrix) and none of M750F022 or its fatty acid conjugates observed in the trout metabolism study. Although M750F022 (with its fatty acid conjugates) is a significant metabolite for poultry, the available toxicity data suggest that M750F022 is of no greater toxicity than parent. While the poultry feeding study confirms that residues of M750F022 will be of the same order as and generally higher than residues of parent in poultry, the lactating cow feeding study confirms that much higher levels of parent were observed compared with M750F022 in mammalian matrices and that no quantifiable residues of M750F022 are expected in mammalian matrices at the present dietary burden.

Of the proposed uses, the only commodity fed to poultry is grape pomace which is considered to be only fed to turkeys. Parent mefentrifluconazole is therefore also considered appropriate for risk assessment for animal commodities for the proposed use pattern.

Summary

Based on the major metabolites identified in the available plant and animal metabolism data, the capability of the analytical methods, toxicological advice and the use patterns proposed in the current application, it is concluded that a residue definition of mefentrifluconazole is appropriate for enforcement and risk assessment of mefentrifluconazole residues for commodities of plant and animal origin.

4.4 Residues in food and animal feeds

The proposed use pattern of *Belanty Herbicide* in apples and grapes is for a maximum of three applications of mefenftrifluconazole per season at 6 g a.i./100L. For apples applications should be at seven to 10 day intervals prior to petal fall and during periods of rapid growth. Later applications should be at 10–14 day intervals. For grapes applications should be at seven to 10 day intervals. For both crops the proposed harvest withholding period (WHP) is seven days.

Apples

In five trials conducted in Australia and the USA, the observed residues at a seven day WHP, after three applications at a concentration of 6 g a.i./100L (or after conversion to expected residues after application at 6 g a.i./100L), are in ranked order:

0.086, 0.17, 0.20, 0.28 and 0.51 (pear) mg/kg.

Based on this data the Organisation for Economic Cooperation and Development (OECD) maximum residue limit (MRL) calculator estimated an MRL of 0.9 mg/kg. Supporting overseas data involving a pre-harvest interval (PHI) of 0 days showed that in all cases expected residues after scaling to an application concentration of 6 g a.i./100L were below 1 mg/kg.

An MRL set at 1 mg/kg is considered appropriate for the proposed use of mefenftrifluconazole on FP 0226 Apple in conjunction with a 7 day WHP.

Apple pomace

The highest processing factor is 11.5x. Based on a highest residues in apples (0.28 mg/kg), at a seven day WHP the highest estimated residue (HR-P) in dry pomace is 3.22 mg/kg. An MRL of 5 mg/kg is considered appropriate for mefenftrifluconazole in AB 0226 apple pomace, dry.

Grapes

In six trials conducted in Australia and the USA, the observed residues at a 7 day WHP, after three applications at a concentration of approximately 6 g a.i./100L, are in ranked order:

0.076, 0.078, 0.24, 0.26, 0.40 and 0.49 mg/kg.

Based on this data the OECD calculator estimated an MRL of 1 mg/kg. Supporting overseas data involving a PHI of 0 days showed that in all cases expected residues after scaling to an application concentration of 6 g a.i./100L were below 1 mg/kg.

An MRL set at 1 mg/kg is considered appropriate for the proposed use of mefenftrifluconazole on FB 0269 grapes in conjunction with a 7 day WHP.

Grape juice

Processing trials submitted with the application indicate that mefentrifluconazole residues do not concentrate in juice (all processing factors ≤ 0.25) so it is not necessary to establish a separate MRL.

Wine

Quantifiable residues were not observed in wine processed from grapes harvested at seven days or later in the Australian trials.

The processing trials indicate that mefentrifluconazole residues do not concentrate in wine (all processing factors ≤ 0.03) so it is not necessary to establish a separate MRL.

Raisins

The highest processing factor is 3.9x. Based on the highest residues in grapes (0.49 mg/kg), the highest estimated residue value (HR-P) in raisins is 1.9 mg/kg. An MRL of 3 mg/kg is recommended for mefentrifluconazole on DF 0269 dried grapes (=currants, raisins and sultanas).

Grape pomace

The highest dry pomace processing factor from grapes harvested at seven days in the Australian trials, is 8.8x. Based on the highest residues (HR) in grapes (0.49 mg/kg), the highest estimated residue value (HR-P) in dry grape pomace is 4.3 mg/kg. An MRL of 5 mg/kg is recommended for mefentrifluconazole on AB 0269 Grape pomace, dry.

4.5 Crop rotation

A confined rotational crop study suggests residues of mefentrifluconazole may occur in succeeding feed crops at certain rates. However, as apples and grapes are not considered to be rotational crops, it is not necessary to establish MRLs in following crops/ animal feeds.

4.6 Residues in animal commodities

Animal transfer studies for mefentrifluconazole have been provided. Apple pomace can form up to 20 per cent of the diet for beef cattle and 10 per cent of the diet for dairy cattle in Australia. Residues may also be found in grape pomace which may contribute up to 20 per cent of the diet for beef cattle and 20 per cent of the diet for dairy cattle, and 20 per cent of the diet for turkeys. No data was provided to demonstrate the residue potential of inter-row plants that may be grazed. In the absence of relevant data, the grazing restraint "DO NOT graze any treated area or cut for stock food" will apply to these uses.

Bioaccumulation potential

The K_{ow} logP for mefentrifluconazole is 3.4 at pH 7 indicating the potential for fat solubility and bioaccumulation in fat. The mefentrifluconazole lactating cow feeding study indicated that residues

concentrated in perirenal, mesenteric and subcutaneous fat in comparison with muscle, and in cream in comparison with milk. The laying hen feeding study indicated that residues concentrated in fat in comparison with muscle. The lactating goat and laying hen metabolism studies also indicated that residues concentrated in the fat in comparison to muscle.

Animal meat MRLs for mefentrifluconazole will be established 'in the fat'.

Cattle

Based on the apple fruit supervised trial median residue (STMR) observation of 0.185 mg/kg (wet weight) at a seven day withholding period (WHP) and the (median) dry apple pomace processing factor of 9.9, and on the grape STMR residue observation of 0.25 mg/kg (wet weight) at a seven day WHP and the (median) dry grape pomace processing factor of 6.3 (seven day data), the anticipated dietary burden of mefentrifluconazole to livestock (beef and dairy cattle) was calculated.

The estimated maximum dietary burdens of mefentrifluconazole for beef and dairy cattle resulting from the proposed uses are calculated to be 0.69 and 0.50 ppm respectively.

A feeding study was submitted showing the residues of mefentrifluconazole in milk and tissues after oral administration to lactating cows for 28 days at concentrations in the feed of various feeding levels ranging from 1.57 up to 149 ppm. Depuration data were obtained at three, seven and 14 days.

The estimated maximum residues in milk and tissues after feeding at the calculated maximum dietary burdens of 0.69 ppm (beef cattle) and 0.50 ppm (dairy cattle), were calculated after extrapolation from the observed maximum residues after feeding dairy cattle for 28 days at 1.57 ppm, which is the closest feeding level in the mefentrifluconazole dairy cattle feeding study to the calculated maximum dietary burdens.

Based on the predicted maximum residues, the following mefentrifluconazole MRLs are considered to be appropriate:

- edible offal (mammalian) 0.02 mg/kg
- meat (mammalian) [in the fat] 0.02 mg/kg
- milks *0.01 mg/kg.

Although residues are concentrated in cream in comparison with milk, reflecting the fat solubility of mefentrifluconazole, no residues are expected in milk fats at the maximum dietary burden for dairy cattle. It is therefore not considered necessary to establish a separate MRL for milk fats at this time.

Poultry

Poultry are not fed apples, or any apple processed commodities. Poultry layers and broilers are not fed grapes, or any grape processed commodities. Turkeys only are fed grape pomace at 20 per cent of the diet.

The estimated maximum dietary burden of mefentrifluconazole for turkeys resulting from the proposed use on grapes was calculated to be 0.32 ppm.

A feeding study was submitted showing the residues of mefentrifluconazole in eggs and tissues after oral administration to laying hens for 33 days at concentrations in the feed of 0, 0.18, 1.74, 5.12, 17.25 and 17.19 ppm. Depuration data were obtained at two, seven and 14 days.

Based on the predicted maximum residues, the following mefentrifluconazole MRLs are considered to be appropriate:

- poultry, edible offal of 0.02 mg/kg
- eggs *0.01 mg/kg
- poultry meat [in the fat] *0.01 mg/kg.

4.7 Spray drift

The draft label indicates that mefentrifluconazole should not be applied by aerial application, so therefore the potential for spray drift from ground application only was considered.

A no-spray zone is not considered necessary for the proposed use on grapes. The following mandatory no-spray zone is considered necessary in relation to the proposed use on apples and should be added to the draft label:

MANDATORY NO-SPRAY ZONES

No spray zone for protection of international trade

DO NOT apply if there are livestock, pasture or any land that is producing feed for livestock downwind from the application area and within the mandatory no-spray zone shown below:

FOR GROUND APPLICATION TO APPLES

WIND SPEED RANGE AT TIME OF APPLICATION	DOWNWIND MANDATORY NO-SPRAY ZONE
From 3 to 20 kilometres per hour	20 metres

4.8 Dietary risk assessment

Estimated dietary intake

The chronic dietary exposure to mefentrifluconazole is estimated by the National Estimated Daily Intake (NEDI) calculation encompassing all registered/temporary uses of the chemical and the mean daily dietary consumption data derived primarily from the 2011–12 National Nutritional and Physical Activity Survey. The NEDI calculation is made in accordance with WHO Guidelines and is a conservative estimate of dietary exposure to chemical residues in food. The NEDI for mefentrifluconazole is equivalent to <5 per cent of the ADI.

HARVEST Modelling of chronic dietary exposure is performed on new chemicals. The HARVEST model estimated the chronic dietary exposure of mefentrifluconazole as <5 per cent of the ADI for the general population.

It is concluded that the chronic dietary exposure to mefentrifluconazole is acceptable.

The acute dietary exposure is estimated by the National Estimated Short Term Intake (NESTI) calculation. The NESTI calculations are made in accordance with the deterministic method used by the Joint FAO/WHO Meeting on Pesticide Residues (JMPR) with 97.5th percentile food consumption data derived primarily from the 2011–12 National Nutritional and Physical Activity Survey. NESTI calculations are conservative estimates of short-term exposure (24 hour period) to chemical residues in food.

An ARfD was not required for the general population or identifiable sub-populations. Therefore a NESTI calculation was not made.

4.9 Recommendations

The following amendments are required to be made to the APVMA MRL Standard (Table 5).

Table 5: Amendments to the APVMA MRL Standard

AMENDMENTS TO TABLE 1			
COMPOUND		FOOD	MRL (mg/kg)
ADD:			
MEFENTRIFLUCONAZOLE			
FP	0226	Apple	1
DF	0269	Dried grapes (=currants, raisins and sultanas)	3
MO	0105	Edible offal (mammalian)	0.02
PE	0112	Eggs	*0.01
FB	0269	Grapes	1
MM	0095	Meat (mammalian) [in the fat]	0.02
ML	0106	Milks	*0.01
PO	0111	Poultry, edible offal of	0.02
PM	0110	Poultry meat [in the fat]	*0.01
AMENDMENTS TO TABLE 3			
COMPOUND		RESIDUE	
ADD:			

AMENDMENTS TO TABLE 3	
COMPOUND	RESIDUE
MEFENTRIFLUCONAZOLE	Mefentrifluconazole

AMENDMENTS TO TABLE 4		
COMPOUND	ANIMAL FEED COMMODITY	MRL (mg/kg)
ADD:		
MEFENTRIFLUCONAZOLE		
AB 0226	Apple pomace, dry	5
AB 0269	Grape pomace, dry	5

5 ASSESSMENT OF OVERSEAS TRADE ASPECTS OF RESIDUES IN FOOD

5.1 Commodities exported and main destinations

Apples, grapes, dried grapes and wine are considered to be major export commodities as are commodities of animal origin, such as meat, offal and dairy products, which may be derived from livestock fed feeds produced from treated apples and grapes. Residues in these commodities resulting from the use of Belanty Fungicide may have the potential to unduly prejudice trade.

Apples

Australian exports of apples were worth \$12.8 million during 2016–17 (ABARES 2017).

The Applicant has noted that the main export markets for apples in 2015 were Papua New Guinea, the UK, Indonesia, Singapore and China.

The Applicant has also noted that other countries where smaller amounts of apples are exported include United Arab Emirates, India, Thailand, Hong Kong, Taiwan and Malaysia, and that apple juice is also exported to Japan.

Grapes (including dried vine fruit and wine)

Grapes are a significant export, particularly as wine, although table grapes and dried fruit are also exported. In 2016–17 Australia exported 789 ML of wine worth \$2366 million. Australia exports wine to China, USA, EU, Canada, New Zealand, Hong Kong, Singapore, Malaysia and Japan. A smaller volume of table grape exports are predominantly to Asian markets. Dried grapes are exported worldwide. In 2016–17 Australia exported 4.5 kt of dried vine fruit worth \$19 million (ABARES 2017).

5.2 Comparison of Australian MRLs with Codex and international MRLs

The Codex Alimentarius Commission (Codex) is responsible for establishing Codex Maximum Residue Limits (CXLs) for pesticides. CXLs are primarily intended to facilitate international trade, and accommodate differences in Good Agricultural Practice (GAP) employed by various countries. Some countries may accept Codex CXLs when importing foods. Mefentrifluconazole has not been considered by Codex.

5.3 Potential risk to trade

Apples

A finite MRL (1 mg/kg) is proposed for apples. Finite residues (Highest residue [HR] = 0.51 mg/kg, STMR = 0.20 mg/kg) of mefentrifluconazole may be expected in exported apples. There is a potential risk to trade as no export markets for apples have established MRLs.

Grapes

A finite MRL (1 mg/kg) is proposed for grapes. Finite residues (HR = 0.49, STMR = 0.25 mg/kg) of mefenftrifluconazole may be expected in exported grapes. There is a potential risk to trade as no export markets for grapes have established MRLs.

Given residues concentrated on processing to raisins there will be a similar risk to trade in dried grapes, with a proposed MRL of 3 mg/kg, as no export markets have established MRLs.

Wine

Residues in all wine samples processed from grapes samples taken at the proposed harvest WHP of seven days were <0.01 mg/kg (ie < LOQ). The risk to trade in wine is considered to be low as finite residues are not expected.

The Applicant has proposed the following statement to mitigate the risk to trade in treated apples and grapes, dried fruit or wine:

EXPORT OF TREATED FRUIT OR WINE

Growers should note that Maximum Residue Limits (MRLs) or import tolerances do not exist in all markets for fruit treated with Belanty Fungicide. Additionally, some export markets have established MRLs different to those in Australia. If you are growing fruit for export (either fresh or as wine), please check with BASF Australia Ltd or the [Australian Wine Research Institute](#) for the latest information on MRLs and import tolerances BEFORE using Belanty Fungicide.

Animal commodities

MRLs for animal commodities are proposed at the LOQ (0.01 mg/kg) except for mammalian edible offal, mammalian meat (in the fat) and poultry edible offal (all 0.02 mg/kg).

It is noted that export slaughter intervals (ESIs) may be difficult to manage for by-products such as apple and grape pomace which may not be produced directly on the farm where they are consumed. However, such by-products would not normally be fed to animals within 60 days of slaughter for export without declaration.

The maximum residues of mefenftrifluconazole expected in livestock tissues, requiring a finite MRL, after feeding at the estimated maximum dietary burden of 0.69 ppm were 0.015 mg/kg in liver and 0.008 mg/kg in fat. It is noted that depuration data obtained in the lactating cow feeding study indicates that residues in liver will be <0.01 mg/kg after three days on clean feed and in fat after seven days on clean feed.

The maximum residues of mefenftrifluconazole expected in poultry liver after feeding at the estimated maximum dietary burden of 0.32 ppm were 0.011 mg/kg. Depuration data obtained in the laying hen feeding study indicates that residues in liver will be <0.01 mg/kg after two days on clean feed.

It is also noted that a 20 metre mandatory no-spray zone is required for protection of international trade for the proposed use on apples. A mandatory no-spray zone is not required for protection of international trade for the proposed use on grapes.

5.4 Recommendations

There are no objections on trade grounds to the approval of mefentrifluconazole.

There are no objections on trade grounds to the registration of the product Belanty Fungicide, containing 75 g/L of mefentrifluconazole.

6 WORK HEALTH AND SAFETY ASSESSMENT

6.1 Health hazards

Repeat dose studies in animals are considered relevant for the assessment of worker exposure. As a conservative measure, a 90 day dietary study in the mouse was selected, which had a NOAEL of 11 mg/kg bw/d based on liver damage seen at 58 mg/kg bw/d. Dermal absorption was calculated to be 0.2 per cent for the concentrate and 3.0 per cent for the diluted product based on in vitro test results on human skin cultures.

6.2 Occupational exposure

Exposure during use

Workers may be exposed to the product when opening containers, mixing/loading/application, cleaning up spills, maintaining equipment and entering treated crops. The main route of exposure to the product spray will be dermal and inhalation, with potential for ocular exposure.

In the absence of specific exposure data for the proposed mode of application, the US EPA Pesticide Handler Exposure Database (PHED) Surrogate Exposure Guide (1998) was used to estimate exposure.

The toxic endpoints of concern and the identified NOAEL for risk assessment were derived from a repeat dose study in animals; and therefore in this instance a margin of exposure (MOE) of 100 or above is considered acceptable. The MOE takes into account both potential inter-species extrapolation and intra-species variability. Based on the risk assessment, the proposed use of the product does not require any personal protective equipment. However, while basic PPE for mixing/loading/application has not been deemed necessary, the applicant has proposed to include safety directions as outlined below which the APVMA does not oppose.

Exposure during re-entry or rehandling

Workers may be exposure through re-entry into treated areas. Based on the low risks identified during spray application, and the absence of relevant acute toxicity endpoints, there were no identifiable risks from re-entry once the spray had dried. However, while basic PPE for entry prior to the spray drying has not been deemed necessary, the applicant has proposed to include a re-entry statement as outlined below which the APVMA does not oppose.

6.3 Public exposure

Belanty Fungicide is not intended for sale as a home garden product, and public exposure is therefore not considered to be likely.

6.4 Recommendations

The following first aid instructions, safety directions and precautionary (warning) statements are recommended for the product label.

First aid instructions

If poisoning occurs, contact a doctor or Poisons Information Centre. Phone Australia 13 11 26; New Zealand 0800 764 766.

Safety directions

When opening the container and preparing spray, wear elbow length PVC gloves. After each day's use, wash gloves. Wash hands after use.

Precautionary (warning) statements

RE-ENTRY PERIOD

DO NOT allow entry into treated areas until the spray has dried. When prior entry is necessary, wear cotton overalls buttoned to the neck and wrist (or equivalent clothing) and chemical resistant gloves. Clothing must be laundered after each day's use.

7 ENVIRONMENTAL ASSESSMENT

A full suite of environmental fate and toxicity data were provided for the formulated product, the technical active constituent, and several of its metabolites.

Foraging birds and mammals can be exposed through their diet by feeding on insects, seeds or vegetation in treated fields or directly through drinking water. Aquatic organisms may be exposed as the result of spray drift, run-off and through leaching of the chemical into the groundwater.

Non-target terrestrial invertebrates including bees and other arthropods, soil dwelling organisms such as earthworms and soil microbes, can also be exposed through the proposed application. Similarly, terrestrial plants may be exposed to a fraction of the application rate of mefentrifluconazole through spray drift.

7.1 Fate and behaviour in the environment

Soil

Mefentrifluconazole was shown to be stable to sunlight and no metabolites were produced exceeding 5 per cent of the applied radioactivity during the test. The half-life of mefentrifluconazole ranged from 93–170 days depending on the position of the radiolabel, compared to 173–225 days in the dark control.

Three laboratory aerobic degradation studies assessing the breakdown behaviour of mefentrifluconazole in four soils were considered. One of the soils was tested in two different experiments. The incubation period in all cases was 120 days and during that period, <50 per cent degradation was observed. Best fit kinetic models were biphasic (either first-order multi-compartment or double first-order in parallel models), however, DT₅₀ and DT₉₀ values were extrapolated well beyond the incubation period and DT₅₀ values ranged from 202 days to >1000 days. Due to slow degradation through the incubation period, the results from the laboratory studies are considered only indicative, but not reliable for predicting exposure concentrations in the risk assessment. Over the course of the studies, mineralisation was not significant (0.2–9.7 per cent CO₂) and non-extractable residues ranged from 13–27 per cent of applied radioactivity. No metabolite exceeded 5 per cent applied radioactivity with the one exception of M750F001 (1, 2, 4-triazole) being found at a maximum 5.1 per cent applied radioactivity (AR) at day 90 in one soil. Kinetic analysis was undertaken on the degradation results from the four soils. The minimum resulting DT₅₀ value calculated by best-fit kinetics (non-normalised) was 434 days, indicating field dissipation studies are necessary.

An anaerobic degradation study assessing the degradation behaviour of mefentrifluconazole in anaerobic conditions in four soils was submitted by the Applicant. Mefentrifluconazole was observed to degrade slowly under anaerobic conditions and no new or novel major metabolites were detected. Kinetic analysis resulted in DT₅₀ values in excess of 349 days for the soils (at 20°C and 50 per cent maximum water-holding capacity).

Mefentrifluconazole was tested in field dissipation studies in Europe (n = 6) and North America (n = 6). The trials undertaken in Europe were designed to minimise dissipation processes, particularly soil surface influences such as volatilisation and photolysis. The results are considered representative of soil degradation processes. The North American trials did not undertake such precautions. However, they were addressed in

the study report and the residues results available indicate such dissipation processes were unlikely to have resulted in significant loss of the chemical. There was no statistically significant difference between the European and North American field half-lives. The half-lives ranged 101–847 days applying the non-normalised values from the European trials, and applying single first-order (SFO) kinetics in all cases. The average half-life was 288 days, and this corresponded to approximately the 83rd percentile of the available field dissipation results ($n = 12$). There were only two half-lives exceeding the mean value and it is considered appropriate to apply in the risk assessment. The field studies monitored for two soil metabolites, M750F001 and the cleavage metabolite M750F003. No residues above the limit of quantitation (LOQ) were determined with one exception in the France field site where M750F001 was measured at 0.003 mg/kg in one 0–10 cm soil layer. There was no significant movement of mefentrifluconazole residues through the soil profile with detections being almost exclusively in the top 20 cm in the European studies and in the top 15 cm in the North American studies. At several of the North American sites, movement down to 120 cm was observed. While the whole soil profile values were used to calculate DT_{50} values, movement beyond 15 cm was relatively minor in terms of the amount of active constituent measured and given the persistence of mefentrifluconazole in the soil. The APVMA has calculated the field half-lives based on residues in the top 30 cm of soil applying SFO kinetics.

Standard batch equilibrium test results were available for eight soils in one study. The soils tested had a range of 0.60 to 3.4 per cent organic carbon. In all cases, the Freundlich exponent ($1/n$) approximated a value of one with an average of 0.98 across all soils. This indicates sorption is not dependent on environmental concentrations, and the choice of K_f from the range of results can be applied as a surrogate for K_d in the risk assessment. The K_f values ranged from 25 to 126 L/kg and corresponding K_{foc} values ranged from 2010 to 4931 L/kg. Based on these results, mefentrifluconazole is not expected to be significantly mobile in soil.

The data show a reasonable correlation between soil sorption and organic carbon. The relationship from the regression equation indicates a K_d 35 L/kg for a soil with 1 per cent organic carbon, which is considered tier 1 value for the risk assessment.

Mefentrifluconazole is persistent in the soil environment. Field dissipation results from 12 different sites in Europe and North America resulted in a mean field half-life of 288 days. There were no major metabolites (>5 per cent AR) observed attributable to the breakdown of mefentrifluconazole in the field. The active is not expected to be mobile in the soil and is sorbed to soil with a positive relationship between sorption and the amount of organic carbon in the soil. There is no concentration dependence with respect to sorption capacity.

Water

Mefentrifluconazole was shown to be stable over the pH range 4-9 with only negligible degradation occurring. An aqueous photolysis study was conducted in pure water at pH 7 and at 25°C. The study lasted 15 days with the samples continuously exposed to a xenon lamp to mimic natural light. Photolysis in surface water is a potential degradation mechanism for mefentrifluconazole with a DT_{50} of 2.3 days in a continuously irradiated system. Several major photolysis metabolites were observed. Two of these (M750F007 formed by cleavage of the chlorphenol ring, and M750008 by subsequent cleavage of the trifluoromethyl group) were either still increasing at the end of the study (M750F007, max 44 per cent) or had not yet demonstrated a

decline from peak formation (M750F008, max 7.3 per cent). The other two major metabolites found were M750F005 (peak 32 per cent, day 6, DT₅₀ 35 d) and M750F006 (peak 31 per cent, day 9, DT₅₀ 12.4 d).

The aerobic mineralisation of mefentrifluconazole was tested to OECD guidelines. Stream water was used containing suspended sediment. There was no degradation of mefentrifluconazole in a microbially active water system incubated in the dark over 63 days for both test concentration (10 µg/L and 100 µg/L), therefore, kinetic analysis could not be undertaken.

The behaviour of mefentrifluconazole in two water/sediment systems was investigated. The study was conducted over 100 days and at 20 ± 1 °C in the dark. Mefentrifluconazole was observed to dissipate rapidly from the water phase, mostly partitioning to sediment. The initial fast dissipation half-lives were 1.3–1.7 days. The degradation half-lives (SFO) in water were 6.6–7.9 days. By the end of the study period, <5 per cent mefentrifluconazole was detected in the water phase with 45.6 to 67.3 per cent in the sediment phase. Two major metabolites were detected in the study: M750F001 and M750F003. M750F001 was detected at a maximum concentration of 10.2 per cent in the water phase and 4.9 per cent in the sediment phase at day 100. M750F003 was detected at a maximum concentration of 3.3 per cent in the water phase and 5.9 per cent in the sediment phase at day 100; the mean day 100 values in water and sediment were 3.1 per cent and 5.4 per cent respectively. A maximum amount of 9.6 per cent AR was observed to mineralise to CO₂ and a maximum 26.6 per cent was observed to degrade to non-extractable residue. DT₅₀ values indicate that mefentrifluconazole can be classed as persistent in sediment. Because the extent of photolysis in the natural surface water environment is unclear and mefentrifluconazole has been shown to quickly partition to sediment, the true persistence of mefentrifluconazole in water is unclear. Without further data on the influence of photolysis on natural water bodies, mefentrifluconazole is classified as potentially persistent. The total system DT₅₀ modelling endpoints for both test systems were 126 and 213 days (geometric mean value of 163 days).

Mefentrifluconazole is not readily biodegradable in water.

Air

Using standard modelling methodology, mefentrifluconazole is predicted to have an atmospheric half-life of 1.7 days based on 12 hours of sunlight per day. Because of this, and its low vapour pressure, mefentrifluconazole is unlikely to move significant distances in the atmosphere.

7.2 Effects and associated risks to non-target species

Terrestrial vertebrates

Mefentrifluconazole was slightly toxic to birds through oral administration. The lowest acute oral LD₅₀ for birds is 816 mg ac/kg bw for *Colinus virginianus*. Reduced egg production and offspring survival was observed in *C. virginianus* at 45 mg ac/kg bw/d (no observable effect concentration [NOEC] 25 mg ac/kg bw/d).

The risk to mammals and birds was determined by considering relevant Australian species. This was done on a dose basis by taking into account the species' energy requirements and hence food intake, and the

amount of mefentrifluconazole predicted to be present on that food. This dose was then compared with the studied acute and chronic effects of mefentrifluconazole on birds and mammals. In all cases the risk was found to be acceptable.

Aquatic species

Four acute fish toxicity studies were submitted, the most sensitive species was *Oncorhynchus mykiss* with a 96-h LC50 of 0.53 mg ac/L. Four chronic fish toxicity studies were provided; the critical endpoint was a NOEC of 0.023 mg ac/L for *Danio rerio* (reduced F1 swim-up, reduced F0 growth and fecundity was observed at 0.044 mg ac/L). Mefentrifluconazole was shown to not bioconcentrate in a standard fish study with a whole fish bioconcentration factor (lipid normalised at steady state) of 385 L/kg and a growth-corrected depuration half-life of 0.60 days.

Three aquatic invertebrate studies were submitted and evaluated as acceptable. The most sensitive species was *Daphnia magna* with a 48-h EC50 of 0.94 mg ac/L. One study was performed on *Crassostrea virginica* and the 96-h EC50 of 0.95 mg ac/L was based upon shell growth. Four chronic toxicity studies were submitted covering three species of *Daphnia* and *Americamysis bahia*. *Daphnia magna* was the most sensitive species with a 21-day NOEC of 0.010 mg ac/L (reduced reproduction rate was observed at 0.020 mg ac/L).

Four acceptable algal species were tested in growth inhibition tests for growth rate, and the most sensitive species is *Skeletonema costatum* with both 72-h and 96-h ErC50 values being 0.68 mg ac/L. *Lemna gibba* was the only species of aquatic plant tested with a 7-d ErC50 of >2.0 mg ac/L.

One chronic toxicity study was submitted on *Chironomus riparius* (spiked sediment). This study had a 28 day NOEC of 1.2 mg ac/kg dry sediment (no adverse effects were observed at the highest dose). Additionally, acute toxicity studies were submitted on three species of sediment dwelling invertebrates (spiked sediment) which were shown not to be sensitive to mefentrifluconazole (10-d LC50s >95 mg ac/kg dry sediment).

Data for fish, *Daphnia* and algae on the relevant metabolites have been submitted with the exception of M750F001. The metabolite endpoints for non-target aquatic species have been based upon those of the active substance as the data indicate no increase in toxicity compared to the active constituent mefentrifluconazole.

A screening level risk assessment indicates that reduced rate of reproduction of aquatic invertebrates is the effect of greatest concern in aquatic systems. A spray drift assessment using the standard APVMA scenario for sparse orchards indicated a downwind no spray zone of 25 metres is appropriate for the protection of aquatic species.

The risk to aquatic species from run-off water containing mefentrifluconazole from treated fields entering the aquatic environment was also considered. Runoff risks were determined to be acceptable.

Bees and other non-target arthropods

Bees

Toxicity data have been provided addressing acute and long term toxicity to honeybees, honeybee larvae and bumblebees for the active constituent mefentrifluconazole.

One acute toxicity test to honeybees study has been submitted, performed on the honeybee *Apis mellifera*. The critical endpoints are 48 hour oral/contact LD50 of >100 µg ac/bee. One acute toxicity to bumblebees study (consisting of oral and contact routes of exposure) has been submitted, performed on the bumblebee *Bombus terrestris*. The endpoints are 96-hour oral and contact LD50 values of >195 and >200 µg ac/bee, respectively.

One acute toxicity to honeybee larvae has been submitted, examining eight day of exposure with *A. mellifera* larvae, the eight day LD50 of 44 µg ac/larva and an 8-day no observable effect dose (NOED) of 30 µg ac/larva was reported (significant mortality was observed at 59 µg ac/larva).

One chronic toxicity study to honeybees has been submitted and was performed on the honeybee *A. mellifera*. It was concluded to be reliable. The endpoints are a 10 day chronic LD50 of >110 µg ac/bee/day and a 10 day chronic NOED of 110 µg ac/bee/day (no adverse effect at highest dose).

The overall risk to bees was found to be acceptable.

Non-target arthropods

Data have been provided addressing the contact toxicity of fresh dried residues of a representative SC formulation of mefentrifluconazole to the indicator species *Typhlodromus pyri* and *Aphidius rhopalosiphii*. The studies provided were Tier 1 (glass plate) studies with LR50 values >362 g ac/ha for both test species, the highest rate tested.

The in-field and off-field risk to these organisms was found to be acceptable.

Soil organisms

Earthworms and soil macro-organisms

Toxicity data has been provided addressing the chronic toxicity of the active constituent mefentrifluconazole, and metabolite M750F001 to non-target soil meso- and macro-fauna.

An acute earthworm study was provided showing no toxicity to earthworms (LC50_{corr} >500 mg ac/kg dry soil). A chronic earthworm study with mefentrifluconazole was provided, performed on the earthworm *Eisenia fetida* and considered acceptable for use in the risk assessment. In a 56-day reproduction study with mefentrifluconazole no adverse effects on survival and biomass development were determined at concentrations up to and including 16 mg ac/kg dry soil. Statistically significant effects on number of juveniles of *E. fetida* were determined at 16 mg ac/kg dry soil. Therefore, the NOEC for mortality and biomass was 16 mg ac/kg dry soil (no adverse effect at highest dose tested), whereas the EC₁₀ for

reproduction was 5.3 mg ac/kg dry soil. Adjusting the toxicity by a factor of two due to the high log Kow of mefentrifluconazole results in an EC_{10-corr} of 2.6 g ac/kg dry soil.

Chronic toxicity to other soil macro-organisms was assessed in two studies with the active constituent mefentrifluconazole, and one study for the metabolite M750F001 were submitted. These were performed on the indicator species *Folsomia candida* and *Hypoaspis aculeifer*. Endpoints were corrected by a factor of two due to the high log Kow of mefentrifluconazole resulting in NOEC_{corr} 500 mg ac/kg dry soil (*H. aculeifer*) and NOEC_{corr} 200 mg ac/kg dry soil (*F. candida*). No adverse effects were observed at the limit doses tested.

In the study with the metabolite M750F001 no adverse effects on reproduction were observed at the limit dose of 500 mg/kg dry soil for *H. aculeifer*.

The risk to earthworms and other soil macro-organisms was found to be acceptable.

Soil micro-organisms

Toxicity of mefentrifluconazole to soil micro-organisms was assessed in nitrogen transformation and carbon mineralisation studies. Less than 25 per cent effects were observed at the limit test concentration of 2.5 mg ac/kg dry soil. The risk to soil micro-organisms was found to be acceptable.

Non-target terrestrial plants

Data have been provided addressing the toxicity of a representative SC formulation of mefentrifluconazole to terrestrial non-target higher plants. Two studies examining the effects on seedling emergence and vegetative vigour were submitted and found to be acceptable. No effects were observed on any plant species (n = 10) for either pre- or post-emergent application. The ER₅₀ and ER₂₅ were both >176 g ac/ha, the only rate tested. The risk to non-target terrestrial plants was found to be acceptable.

7.3 Recommendations

The registration of Belanty Fungicide, containing 75 g/L mefentrifluconazole, for the control of powdery mildew in grapes, and black spot in apples is supported. Belanty Fungicide, when used according to instruction, would not be likely to have an unintended effect that is harmful to animals, plants, or things or to the environment.

8 EFFICACY AND SAFETY ASSESSMENT

8.1 Proposed product use pattern

Belanty Fungicide is an azole fungicide intended for the control of black spot (*Venturia inaequalis*) in apples, and powdery mildew (*Uncinula necator*) in grapevines.

The product is to be applied at a single rate of application 80 mL/100 L sprayed to the point of runoff by dilute spraying, or at up to 5x concentrate spraying. The product should be applied in a sufficient volume of water to ensure thorough coverage of the target crop. Applications may be made at seven to 14 day intervals. No more than three applications of Belanty Fungicide may be applied to apples or grapes per growing season.

Belanty Fungicide is intended for use in a spraying program with a range of fungicides as part of a fungicide resistance management program.

8.2 Efficacy and target crop / animal safety

Efficacy

The applicant presented results from eighteen Australian replicated small-plot field trials conducted in apples and grapevines from 2013–17. Additional data was provided from one New Zealand trial on efficacy and safety in apples in 2017. In the trials sprays were applied at key stages including over flowering and prior to infection. Belanty Fungicide was applied as a standalone product or in conjunction with sprays of registered standard fungicides. Disease pressure ranged in the trials from low to very high.

Apples

Belanty Fungicide was tested at rates of 40–100 mL/100 L including the proposed label rate of 80 mL/100 L for dilute spraying. Nine Australian field trials were conducted in commercial apple orchards in Victoria, Tasmania, New South Wales and Queensland, representative of Australian apple growing regions. A further trial conducted in New Zealand was considered. Efficacy was assessed on natural disease infections. Assessments were made on the extent of *V. inaequalis* infection (expressed as black spot) on randomly sampled leaves and fruit. Disease incidence was assessed by the presence or absence of black spot as a percentage, and the severity was assessed by the proportion of leaf or fruit surface affected by black spot. The product was applied as a preventative treatment in spray volumes of 1000–2000 L/ha at key stages in apple development including across flowering, green tip, and on nascent fruit. Up to nine applications were made seven to 14 day intervals, either alone or as part of a spray program with registered industry standard fungicides.

Belanty fungicide provided significant control of *V. inaequalis* when applied at 80 mL/100 L in all field trials in which significant disease developed, and was as effective as or more effective than a range of industry standard fungicides.

Grapevines

Belanty Fungicide was tested at rates of 40–100 mL/100 L, including the proposed label rate of 80 mL/100 L, in programs of up to eight sprays. Nine Australian replicated small plot field studies were conducted in Victoria, South Australia and Western Australia in locations representative of Australian wine growing regions. Efficacy was assessed on natural infections of *U. necator*, which causes the disease powdery mildew in grapevines. All trials used a randomised complete block design with 4 replicates. Disease incidence was assessed by the presence of disease on randomly selected leaves and grape bunches, and severity was rated as a percentage of covered leaf or bunch area. The product was applied as a preventative treatment in spray volumes of 400–1600 L/ha in programs of up to four sprays at intervals of seven to 17 days. Spray applications were made at multiple time points in crop development, including multiple time points across flowering.

Belanty Fungicide provided significant control of *U. necator* on leaves and bunches when applied at 80 mL/100 L in five out of five crop trials in which significant disease developed. Four further trials used developmental surrogate formulations that showed a similar level of control of *U. necator* when applied at the same rate of active constituent. Belanty Fungicide was as effective as, or more effective than a range of industry standard fungicides.

Crop safety

Detailed assessments of phytotoxicity were made in efficacy and safety trials for apples and grapevines. These included assessments of fruit marketability in apples, and special consideration was made of the potential for effects on wines or vinification. No phytotoxic symptoms were observed in any of the trials for grapevines or apples. The field trials demonstrated that Belanty Fungicide was safe to use at rates up to 100 mL/100 L (1.25x label rate) x 9 applications in apples with no damage observed in flowers, foliage or fruit. Apple marketability was determined to exceed that of registered industry standard fungicides. Belanty Fungicide was also safe to use at rates of 100 mL/100 L in grapevines (1.25x label rate) x four applications with no observable damage to foliage, flowers or fruit. These data demonstrate acceptable crop safety.

Further data were submitted relating to potential effects on vinification and organoleptic effects in wine from trials conducted overseas. Trials were conducted on representative white and red wines and found no negative effect on the vinification process after multiple applications of Belanty Fungicide. Furthermore, sensory evaluation of wines produced from the treated grapes found no reportable faults. The APVMA seeks comment from the Australian wine industry on the use of Belanty Fungicide containing 75 g/L mefentrifluconazole on Australian grape crops destined for vinification.

Resistance management

Mefentrifluconazole is a new triazole active constituent belonging to the demethylation inhibitor mode of action (DMI). The fungicide resistance action committee (FRAC) has assigned mefentrifluconazole to FRAC group 3. The primary mode of action of DMIs is the blocking of ergosterol biosynthesis through inhibition of cytochrome P450 sterol C 14-demethylase. The depletion of ergosterol and accumulation of non-functional 14 α -methyl sterols results in inhibition of growth and cell membrane disruption. Mefentrifluconazole is foliar systemic and rapidly taken up from the leaves.

The use of Group 3 fungicides to treat Black spot in Apples and Powdery mildew in Grapevines are subject to CropLife Australia resistance management strategies (RMS) that limit applications of group 3 fungicides per season. These RMSs are available at the [CropLife Australia](#) Website.

As an additional control over and above the CropLife Australia RMSs, the proposed use of Belanty Fungicide in apples is voluntarily limited to three applications per season.

8.3 Recommendations

Trial data support that Belanty Fungicide will provide acceptable control against black spot (*V. inaequalis*) in apples, and powdery mildew (*U. necator*) in grapevines when used as directed. Acceptable crop safety is expected when the product is used as directed. The directions for use are appropriate and consistent with fungicide use in commercial agriculture in Australia.

There are no objections on efficacy or target-crop safety grounds to the registration of the product Belanty Fungicide, containing 75 g/L of mefentrifluconazole.

9 LABELLING REQUIREMENTS

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

BELANTY[®] FUNGICIDE

ACTIVE CONSTITUENT: 75 g/L MEFENTRIFLUCONAZOLE

GROUP	3	FUNGICIDE
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For the control of powdery mildew in grapes and black spot in apples as per the Directions for Use Table.

CONTENTS: 1L, 2L, 2.5L, 5L, 10L

BASF Australia Ltd ABN 62 008 437 867
 Level 12, 28 Freshwater Place Southbank VICTORIA 3006

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APVMA Approval No.:

DIRECTIONS FOR USE**RESTRAINTS**

DO NOT apply by aircraft.

DO NOT apply if heavy rains or storms are forecast within 3 days.

DO NOT irrigate to the point of runoff for at least 3 days after application.

SPRAY DRIFT RESTRAINTS

Except when applying with orchard airblast equipment, DO NOT apply with spray droplets smaller than a MEDIUM spray droplet size category according to nozzle manufacturer specifications that refer to the ASAE S572 Standard or the BCPC Guideline.

DO NOT apply when wind speed is less than 3 or more than 20 kilometres per hour as measured at the application site.

DO NOT apply during surface temperature inversion conditions at the application site.

Users of this product MUST make an accurate written record of the details of each spray application within 24 hours following application and KEEP this record for a minimum of 2 years. The spray application details that must be recorded are: 1) date with start and finish times of application; 2) location address and paddock/s sprayed; 3) full name of this product; 4) amount of product used per hectare and number of hectares applied to; 5) crop/situation and weed/pest; 6) wind speed and direction during application; 7) air temperature and relative humidity during application; 8) nozzle brand, type, spray angle, nozzle capacity and spray system pressure measured during application; 9) name and address of person applying this product. (Additional record details may be required by the state or territory where this product is used.)

MANDATORY NO-SPRAY ZONES**NO SPRAY ZONE FOR THE PROTECTION OF THE AQUATIC ENVIRONMENT**

DO NOT apply if there are aquatic and wetland areas including aquacultural ponds, surface streams and rivers within 25 metres downwind from the application area.

NO SPRAY ZONE FOR THE PROTECTION OF INTERNATIONAL TRADE**FOR GROUND APPLICATION TO APPLES**

DO NOT apply if there are livestock, pasture or any land that is producing feed for livestock within 20 metres downwind from the application area.

CROP	DISEASE	RATE	CRITICAL COMMENTS
Grapes	Powdery mildew (<i>Uncinula necator</i>)	80mL/100L	Also see 'EXPORT OF TREATED FRUIT OR WINE' section re export commodities. Apply up to three sprays per season as part of a complete disease control programme. If applying consecutive applications of Belanty, a spray interval of 7-21 days is required. Apply before the development of the disease. Apply by dilute or concentrate spraying equipment. Apply the same total amount of product to the target crop whether applying this product by dilute or concentrate spraying methods. Do not apply to established powdery mildew infections

CROP	DISEASE	RATE	CRITICAL COMMENTS
			<p>DO NOT use in equipment that requires concentrations greater than 62.5 mL / 100 L of water (5x concentration).</p> <p>The use of Belanty Fungicide is subject to the CropLife Australia Resistance Management Strategy. Apply no more than two consecutive sprays of Group 3 fungicides per season, and no more than three in total per season. Use a fungicide of a different mode of action should further applications be required.</p>
Apples	Black spot (<i>Venturia inaequalis</i>)		<p>Application may commence at spurburst for black spot (scab).</p> <p>Apply at 7 to 10 day intervals prior to petal fall and during periods of rapid growth. Later applications after petal fall should be at 10 to 14 day intervals, or according to prevailing weather conditions and disease incidence.</p> <p>Apply by dilute or concentrate spraying equipment. Apply the same total amount of product to the target crop whether applying this product by dilute or concentrate spraying methods.</p> <p>DO NOT use in equipment that requires concentrations greater than 62.5 mL / 100 L of water (5x concentration).</p> <p>Ensure thorough and even coverage of all plant parts. The use of Belanty Fungicide is subject to the CropLife Australia Resistance Management Strategy. Apply no more than two consecutive sprays of Group 3 fungicides, and no more than three in total per season.</p>

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

WITHHOLDING PERIODS

Apples: DO NOT harvest for 7 days after application.

Grapes: DO NOT harvest for 7 days after application.

Grazing Restraint:

DO NOT GRAZE ANY TREATED AREA OR CUT FOR STOCKFOOD

EXPORT OF TREATED FRUIT OR WINE

Growers should note that Maximum Residue Limits (MRLs) or import tolerances do not exist in all markets for fruit treated with Belanty Fungicide. Additionally, some export markets have established MRLs different to those in Australia. If you are growing fruit for export (either fresh or as wine), please check with BASF Australia Ltd or the Australian Wine Research Institute, www.awri.com.au, for the latest information on MRLs and import tolerances BEFORE using Belanty Fungicide.

GENERAL INSTRUCTIONS

FUNGICIDE RESISTANCE WARNING

GROUP	3	FUNGICIDE
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Belanty Fungicide is a member of the DMI group of fungicides. For fungicide resistance management, Belanty Fungicide is a Group 3 fungicide. Some naturally-occurring individual fungi resistant to Belanty Fungicide and other Group 3 fungicides may exist through normal genetic variability in any fungal population. The resistant individuals can eventually dominate the fungal population if these fungicides are used repeatedly. These resistant fungi will not be controlled by Belanty Fungicide or other Group 3 fungicides, thus resulting in a reduction in efficacy and possible yield loss. Since the occurrence of resistant fungi is difficult to detect prior to use, BASF Australia Ltd accepts no liability for any losses that may result from the failure of Belanty to control resistant fungi.

MIXING

To ensure even mixing, half-fill the spray tank with clean water and add the required amount of product. If required, add compatible products and agitate thoroughly, then add the remainder of the water. Agitate again before spraying commences.

APPLICATION

Ensure thorough coverage of plants, especially the underside of leaves and young grape bunches.

DO NOT apply by aircraft.

Application to Grapevines and Apples

Dilute Spraying

- Use a sprayer designed to apply high volumes of water up to the point of run-off and matched to the crop being sprayed.
- Set up and operate the sprayer to achieve even coverage throughout the crop canopy. Apply sufficient water to cover the crop to the point of run-off. Avoid excessive run-off.
- The required spray volume to achieve point of run-off may be determined by applying different test volumes, using different settings on the sprayer, from industry guidelines or other expert advice.
- Add the amount of product specified in the Directions for Use table for each 100 L of water. Spray to the point of run-off.
- The required dilute spray volume to achieve point of run-off will change and the sprayer set up and operation may also need to be changed, as the crop grows.

Concentrate Spraying

- Use a sprayer designed and set up for concentrate spraying (that is a sprayer which applies water volumes less than those required to reach the point of run-off) and matched to the crop being sprayed.
- Set up and operate the sprayer to achieve even coverage throughout the crop canopy using your chosen water volume.
- Determine an appropriate dilute spray volume (See Dilute Spraying above) for the crop canopy. This is needed to calculate the concentrate mixing rate.

- The mixing rate for concentrate spraying can then be calculated in the following way:

EXAMPLE ONLY

(i) Dilute spray volume as determined above: For example 1500 L/ha

(ii) Your chosen concentrate spray volume: For example 500 L/ha

(iii) The concentration factor in this example is: 3 X (ie $1500 \text{ L} \div 500 \text{ L} = 3$)

(iv) If the dilute label rate is 80 mL/100 L, then the concentrate rate becomes 3 x 80 that is 240 mL/100 L of concentrate spray.

The chosen spray volume, amount of product per 100 L of water, and the sprayer set up and operation may need to be changed as the crop grows.

Do not use a concentrate rate higher than that specified in the Critical Comments.

For further information on concentrate spraying, users are advised to consult relevant industry guidelines, undertake appropriate competency training and follow industry Best Practices.

RE-ENTRY PERIOD

DO NOT allow entry into treated areas until the spray has dried. When prior entry is necessary, wear cotton overalls buttoned to the neck and wrist (or equivalent clothing) and chemical resistant gloves. Clothing must be laundered after each day's use.

PROTECTION OF WILDLIFE, FISH, CRUSTACEANS AND ENVIRONMENT

Very toxic to aquatic life. DO NOT contaminate wetlands or watercourses with this product or used containers.

STORAGE AND DISPOSAL

Store in the closed, original container in a cool, well-ventilated area. DO NOT store for prolonged periods in direct sunlight. Triple-rinse containers before disposal. Dispose of rinsate or any undiluted chemical according to state/territory legislative requirements. If recycling, replace cap and return clean containers to recycler or designated collection point.

If not recycling, break, crush or puncture and deliver empty packaging to an approved waste management facility. If an approved waste management facility is not available, bury the empty packaging 500 mm below the surface in a disposal pit specifically marked and set up for this purpose, clear of waterways, desirable vegetation and tree roots, in compliance with relevant local, state or territory government regulations. Do not burn empty containers or product.

SAFETY DIRECTIONS

When opening the container and preparing spray, wear elbow length PVC gloves. After each day's use, wash gloves. Wash hands after use.

FIRST AID

If poisoning occurs, contact a doctor or Poisons Information Centre. Phone Australia 13 11 26.

MATERIAL SAFETY DATA SHEET

Additional information is listed in the Material Safety Data Sheet.

CONDITIONS OF SALE

All conditions and warranties rights and remedies implied by law or arising in contract or tort whether due to the negligence of BASF Australia Ltd or otherwise are hereby expressly excluded so far as the same may legally be done provided however that any rights of the Buyer pursuant to non- excludable conditions or warranties of the Consumer and Competition Act 2010 or any relevant legislation of any State are expressly preserved but the liability of BASF Australia Ltd or any intermediate Seller pursuant thereto shall be limited if so permitted by the said legislation to the replacement of the goods sold or the supply of equivalent goods and all liability for indirect or consequential loss or damage of whatsoever nature is expressly excluded. This product must be used or applied strictly in accordance with the instructions appearing hereon. This product is solely sold for use in Australia and must not be exported without the prior written consent of BASF Australia Ltd.

APVMA Approval No:

Batch No:

Date of Manufacture:

® = Registered trademark of BASF

BASF Australia Ltd

ABN 62 008 437 867

Level 12, 28 Freshwater Place

Southbank VICTORIA 3006

FOR SPECIALIST ADVICE IN AN EMERGENCY ONLY PHONE 1800 803 440 TOLL FREE-ALL HOURS-AUSTRALIA WIDE.

ABBREVIATIONS

Ac	Active constituent
ADI	Acceptable Daily Intake (for humans)
ai	active ingredient
APVMA	Australian Pesticides and Veterinary Medicines Authority
AR	Applied radioactivity
ARfD	Acute Reference Dose
bw	bodyweight
C	Celsius
CCI	Confidential commercial information
CIPAC	Collaborative International Pesticides Analytical Council
CO ₂	Carbon dioxide
Codex	Codex Alimentarius Commission
CXL	Codex Maximum Residue Limit for pesticides
d	day
DAT	Days After Treatment
DT ₅₀	Time taken for 50% of the concentration to dissipate
DT ₉₀	Time taken for 90% of the concentration to dissipate
E _b C ₅₀	concentration at which the biomass of 50% of the test population is impacted
EC ₅₀	concentration at which 50% of the test population are immobilised
EEC	Estimated Environmental Concentration
EEC	Estimated Environmental Concentration
E _r C ₅₀	concentration at which the rate of growth of 50% of the test population is impacted
ER ₂₅	Effective rate, 25 th percentile
ER ₅₀	Effective rate, 50 th percentile
ESI	Export Slaughter Interval
F ₀	original parent generation

FRAC	Fungicide Resistance Action Committee
g	gram
GAP	Good Agricultural Practice
h	hour
ha	hectare
HDPE	High-density polyethylene
HPLC	High Pressure Liquid Chromatography or High Performance Liquid Chromatography
HR	Highest residue
IPM	Integrated Pest Management
in vitro	outside the living body and in an artificial environment
in vivo	inside the living body of a plant or animal
J	Joule
kg	kilogram
K_d	Adsorption coefficient
K_F	Freundlich adsorption coefficient
K_{Foc}	Organic carbon normalized Freundlich adsorption coefficient
K_{OC}	Organic carbon partitioning coefficient
L	Litre
λ_{max}	Maximum absorption
LC	Liquid chromatography
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
LOD	Limit of Detection – level at which residues can be detected
Log	logarithm
Log K_{OW}	Log to base 10 of octanol water partitioning co-efficient, synonym P_{OW}
LOQ	Limit of Quantitation – level at which residues can be quantified
μ g	microgram

mg	milligram
mL	millilitre
MOE	Margin of Exposure
Mol	Moles; amount of substance
MRL	Maximum Residue Limit
MS	Mass spectrometry
MSDS	Material Safety Data Sheet
NEDI	National Estimated Daily Intake
NESTI	National Estimated Short Term Intake
ng	nanogram
NHMRC	National Health and Medical Research Council
NOEC/NOEL	No Observable Effect Concentration/Level
NOAEL	No Observed Adverse Effect Level
OC	Organic Carbon
OM	Organic Matter
Pa	Pascal
pH	Potential of hydrogen
PHED	United States Environmental Protection Agency Pesticide Handler Exposure Database
PHI	Pre-harvest interval
PK _A	Dissociation constant
P _{OW}	Octanol/water partition coefficient; See also Log K _{OW}
ppb	parts per billion
PPE	Personal Protective Equipment
ppm	parts per million
REI	Re-Entry Interval
s	second
SC	Suspension Concentrate

SFO	Single first-order rate kinetics
STMR	Supervised trial median residue
SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons
TDM	Triazole derivative metabolites
TFMP	Trifluoromethylphenyl ring
TGAC	Technical grade active constituent
TRR	Total radioactive residue
UPLC	Ultra performance liquid chromatography
WHP	Withholding Period
WT	Wild-type

GLOSSARY

Active constituent	The substance that is primarily responsible for the effect produced by a chemical product
Acute	Having rapid onset and of short duration
Carcinogenicity	The ability to cause cancer
Chronic	Of long duration
Codex MRL	Internationally published standard maximum residue limit
Desorption	Removal of a material from or through a surface
Efficacy	Production of the desired effect
Formulation	A combination of both active and inactive constituents to form the end use product
Genotoxicity	The ability to damage genetic material
Hydrophobic	Repels water
Leaching	Removal of a compound by use of a solvent
Metabolism	The chemical processes that maintain living organisms
Photodegradation	Breakdown of chemicals due to the action of light
Photolysis	Breakdown of chemicals due to the action of light
Subcutaneous	Under the skin
Toxicokinetics	The study of the movement of toxins through the body
Toxicology	The study of the nature and effects of poisons

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