Australian Government

Australian Pesticides and Veterinary Medicines Authority

Public Release Summary

on the evaluation of aminocyclopyrachlorin the product Method 240 SL Herbicide

APVMA product number 90496

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This publication is available from the APVMA website.

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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 Public Release Summary 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:

- toxicology of both the active constituent and product
- 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 Method 240 SL Herbicide containing aminocyclopyrachlor 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 6 September 2022 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 organisation name (if relevant)
- email or postal address (if available)
- the date you made the submission.

Please note: submissions will be published on the APVMA's website, unless you have asked for the submission to remain confidential, or if the APVMA chooses at its discretion not to publish any submissions received (refer to the public consultation coversheet).

Please lodge your submission using the public consultation coversheet, which provides options for how your submission will be published.

Note that all APVMA documents are subject to the access provisions of the *Freedom of Information Act 1982* and may be required to be released under that Act should a request for access be made.

Unless you request for your submission to remain confidential, the APVMA may release your submission to the applicant for comment.

Written submissions should be addressed to:

Case Management and Administration Unit

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GPO Box 3262

Sydney NSW 2001

Phone: +61 2 6770 2300

Email: casemanagement@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.

Introduction

This publication provides a summary of the data reviewed and an outline of the regulatory considerations for the proposed registration of Method 240 SL Herbicide. The active constituent aminocyclopyrachlor was approved in 2014. This is the first proposed product to contain aminocyclopyrachlor.

Applicant

Bayer Crop Science Pty Ltd.

Purpose of application

Bayer Crop Science Pty Ltd has applied to the APVMA for registration of the new product, Method 240 SL Herbicide, a soluble concentrate formulation containing 240 g/L of the approved active constituent aminocyclopyrachlor.

Aminocyclopyrachlor was approved as an active constituent in 2014 and the product Method 240 SL Herbicide is the first proposed product to contain aminocyclopyrachlor.

Proposed claims and use pattern

This proposed product, Method 240 SL Herbicide, is intended for use the control of woody weeds and other invasive weed species in native conservation areas, pastoral grazing land, industrial sites such as railways, roadways and utility rights-of-way.

Mode of action

The proposed product, Method 240 SL Herbicide, has a disruptor of plant cell growth mode of action and is a member of the herbicide mode of action group 4 (pyrimidine carboxylic acids).

Overseas registrations

Aminocyclopyrachlor is registered in the USA and Canada in a range of formulations for brush control and weed management in industrial vegetation management situations, rangeland and pasture. Aminocyclopyrachlor-containing products are registered in the USA and Canada under a number of tradenames including Method, Perspective, Streamline, Invora, Viewpoint, Plainview, Navius, TruVist and TruRange. In New Zealand, Method 240 SL Herbicide has been approved for release by the Environmental Protection Authority for control of wilding conifers and other woody and broadleaf weeds in unimproved pastures, conservation land and recreational parks.

Chemistry and manufacture

The active constituent aminocyclopyrachlor is manufactured overseas. Details of the chemical name, structure and physicochemical properties are listed below in Tables 1 and 2.

Aminocyclopyrachlor was evaluated by the APVMA as a new active constituent under application 65963/52378 and was approved in September 2014.

Aminocyclopyrachlor is a white amorphous solid with a melting point of 140°C. It has some solubility in water (2.81 g/L at 20°C) but is more soluble in methanol (36.7 g/L). It is practically insoluble in acetone, dichloromethane, acetonitrile and n-octanol. The vapour pressure (6.92×10^{-6} Pa at 20°C) and the Henry's law constant (5.24×10^{-7} Pa m^3/mol) indicates that volatilisation is not expected to be a significant route of dissipation for aminocyclopyrachlor. The octanol/water partition coefficient (Log P_{ow}) is –1.12 at 20°C, indicating that aminocyclopyrachlor is not bioaccumulative. There are no safety properties (e.g. flammability, explosive and/or oxidizing) of concern regarding aminocyclopyrachlor. Aminocyclopyrachlor technical active constituent is expected to be stable for at least 2 years storage under normal conditions.

Table 1: Nomenclature and structural formula of aminocyclopyrachlor

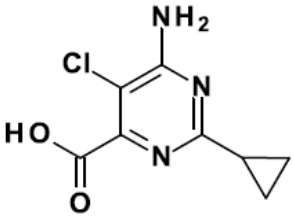
Common name (ISO):	Aminocyclopyrachlor
IUPAC name:	6-amino-5-chloro-2-cyclopropylpyrimidine-4-carboxylic acid
CAS registry number:	858956-08-8
Molecular formula:	$C_8H_8ClN_3O_2$
Molecular weight:	213.6 $gmol^{-1}$
Structural formula:	

Table 2: Key physicochemical properties of aminocyclopyrachlor

Physical form:	Solid
Colour:	White amorphous substance
Melting point:	138.9 to 140.1°C
Boiling point:	The test substance decomposes at 130°C
Relative density:	1.47 g/cm^3 at 20°C
Stability:	At elevated temperatures, no changes in the active were observed after 2 weeks storage at 54ºC. No adverse reactions with metals or metal ions (iron and aluminium metals and salts) were observed following storage at 54ºC for 2 weeks. Technical aminocyclopyrachlor is therefore expected to be stable in storage for at least 2 years under normal conditions.
Safety properties:	Not considered flammable. Not explosive. Not auto-flammable. Except for photo-degradation in water, the aminocyclopyrachlor technical does not show any chemical incompatibility with oxidising and reducing agents and is essentially non-hazardous.
Solubility in water:	2.81 g/L at 20ºC (unbuffered) 3.13 g/L at 20 °C (pH 4) 4.20 g/L at 20°C (pH 7) 3.87 g/L at 20°C (pH 9)
Organic solvent solubility (at 20 °C):	Methanol: 36.7 g/L Acetone: 0.96 g/L Ethyl acetate: 2 g/L Dichloromethane: 0.2 g/L Acetonitrile: 0.65 g/L n-octanol: 1.9 g/L
Dissociation constant (PK_a):	pKa= 4.65 at 20ºC
Octanol/water partition coefficient (at 20 °C):	log P_{ow}=-1.12 (water) log P_{ow}=-1.01 (pH 4) log P_{ow}=-2.48 (pH 7)
Vapour pressure:	6.92×10^{-6} Pa at 20ºC 4.91×10^{-6} Pa at 25ºC 1.17×10^{-6} Pa at 50ºC
Henry's law constant:	5.24×10^{-7} Pa m^3/mol (water)
UV/VIS absorption spectra:	ε= 21608 L.mol^{-1}.cm^{-1}(λ = 220 nm) (acidic solution) ε= 9358 L.mol^{-1}.cm^{-1} (λ = 240 nm) (basic solution) ε= 9312 L.mol^{-1}.cm^{-1}(λ = 240 nm) (neutral solution)

Photochemical oxidative degradation:	The estimated half-life of sample reacting with an average daily air concentration of hydroxyl radicals (12-hour day; 1.5×10^{-6} OH radicals/cm^3) is 42.29 hours based on the 2nd order rate constant (Atkinson method).

Formulated product

The product Method 240 SL Herbicide will be manufactured in Australia and overseas. Tables 3 and 4 outline some key aspects of the formulation and physicochemical properties of the product.

Method 240 SL Herbicide is brown coloured liquid with a mild odour. It contains 240 g/L of aminocyclopyrachlor present as the potassium salt as a soluble concentrate (SL) formulation. There are no safety properties (e.g. flash point, corrosion, explosive and/or oxidizing) of concern regarding Method 240 SL Herbicide. Method 240 SL Herbicide is expected to be stable for at least 2 years storage under normal conditions.

Method 240 SL Herbicide will be available in 100 mL to 1000 L HDPE (high density polyethylene) containers.

Table 3: Key aspects of the formulation of Method 240 SL Herbicide

Distinguishing name:	Method 240 SL Herbicide
Formulation type:	Soluble concentrate (SL)
Active constituent concentration:	240 g/L aminocyclopyrachlor present as the potassium salt

Table 4: Physicochemical properties of Method 240 SL Herbicide

Physical form:	Clear brown liquid
PH:	6 to 8 (1% aqueous dilution), 7 to 9 (undiluted)
Relative density:	1.13 g/cm^3 at 20ºC
Persistent foaming:	≤60 mL foam after 1 minute
Dilution stability:	100%
Safety properties:	No flash point below 100ºC. Not classified as a corrosive liquid or an explosive and/or as an oxidising substance.
Storage stability:	There was sufficient data to conclude that the product is expected to remain within specifications for at least 2 years when stored under normal conditions.

Recommendations

The APVMA has evaluated the chemistry of the active constituent aminocyclopyrachlor and associated product Method 240 SL Herbicide, including the identification, physicochemical properties, manufacturing

process, quality control procedures, stability, 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 2 years when stored under normal conditions.

Based on a review of the chemistry and manufacturing details, the registration of Method 240 SL Herbicide is supported from a chemistry perspective.

Toxicological assessment

The toxicological database for aminocyclopyrachlor was considered sufficient to determine the toxicology profile of aminocyclopyrachlor and characterise the risk to humans.

Evaluation of toxicology

Chemical class

Aminocyclopyrachlor is part of the pyrimidine carboxylic acid class of chemicals, which mimic the naturally occurring phytohormone indole acetic acid (auxin), thereby disrupting plant growth.

Pharmacokinetics

Metabolism studies in rats showed that aminocyclopyrachlor was absorbed at a rapid rate (T_{max} ~1 hour) after single dose oral administration. Gastrointestinal absorption is moderate, with a large portion of the dose (32 to 57.25%) excreted unchanged in faeces in single and repeat dose oral studies in non-cannulated rats. This was supported by urinary excretion data showing gastrointestinal absorption of aminocyclopyrachlor ranging 39 to 56% after single and repeat dose in non-cannulated rats. Further evidence of moderate oral absorption was that tissue distribution, while extensive, was minimal, with a large proportion of administered radiolabelled material limited to the gastrointestinal tract. No accumulation of radiolabelled residues was observed in tissues or carcass and in cannulated rats biliary excretion was low (≤0.25%).

Distribution of aminocyclopyrachlor to plasma was rapid. Toxicokinetic data indicated a one compartmental kinetics profile (rapid equilibrium between tissue and plasma distribution) and a T_{max} of 0.4 to 1 hours, independent of dose. In a tissue distribution study at T_{max} (1 h), the majority of the administered dose was associated with the GI tract and contents, with levels ≤1.4% of administered dose detected in all other tissues, indicating a wide, but limited distribution. Across single oral dose experiments and from a repeat oral dose experiment (14 days), minimal residues were detected in the tissues at 72 hours post-dose (total radiolabel recovery from tissues and carcass was <0.23% of the administered dose), indicating no bioaccumulation of aminocyclopyrachlor.

No metabolism of aminocyclopyrachlor was observed *in vivo*, with blood (plasma and RBC), excreta (urine and faeces) and bile analyses indicating that the administered test material accounted for essentially all detected radiolabel in these fractions. However, in a subchronic study in rats, low concentrations of the metabolite IN-LXT69 (<0.51% of the administered dose at 1045/1425 mg/kg bw/day (M/F)) were detected in plasma at day 56 of dosing, with metabolite levels increasing in a sub-linear trend with increasing dose. From the proposed metabolic pathway, the metabolite IN-LXT69 is formed through a decarboxylation process, noting that based on the results of toxicokinetic studies and the sub-chronic study in rats, only minor amounts of this metabolite were formed compared to unchanged parent compound.

Aminocyclopyrachlor was rapidly eliminated from plasma after a single oral dose ($T_{1/2}$ ~5.6 to 5.7 hours). The majority of administered material was eliminated in excreta (urine and faeces) in equal distribution within the first 24 hours and low amounts of elimination (typically <1%) observed after the first 48 hours. Urinary and faecal elimination (48h) accounted for up to 40 to 56.5% and 39.5 to 56.5% respectively, after single doses. It

was considered that excreta (urine and faeces) data in cannulated rats was not as reliable as in non-cannulated rats, based on the potential effects of increased acidity in hydration solutions used in the cannulated animal studies (i.e. changes in pH are known to effect urinary excretion). The available data on urinary excretion indicated that saturation of gastrointestinal absorption may occur following a high single oral dose or repeat dosing. Biliary elimination after oral administration was low (≤0.25% of administered dose) and no radioactive residues were detected in exhaled volatiles. The excreta (urine and faeces) profile was not meaningfully altered with repeated oral dosing.

Acute toxicity (active constituent)

Aminocyclopyrachlor has a low acute toxicity by oral, dermal and inhalational routes. It is not a skin irritant, does not have the potential for skin sensitisation, but is a slight eye irritant.

Acute toxicity (product)

Based on acute toxicity studies conducted on the formulation, Method 240 SL Herbicide has very low toxicity via the oral, dermal and inhalation routes, is non-irritating to the eyes and skin and is not a skin sensitiser.

Repeat-dose toxicity

Repeat-dose studies with aminocyclopyrachlor demonstrated treatment-related toxicity, though the effects were mainly restricted to decreases in body weight gain with associated decreases in food efficiency, typically observed at the highest doses tested in studies.

A short-term (4-week) dermal toxicity study, rats did not produce treatment-related effects at the limit dose of 1,000 mg/kg bw/day.

In a sub-chronic (13-week) dietary toxicity study in rats, treatment-related findings were limited to decreases in body weight gain and associated decreases in food efficiency, noted at the highest dose tested (1,045 mg/kg bw/day). A full functional observation battery (FOB), motor activity (MA) analysis and neurohistopathological examination conducted as part of the 13-week toxicity study in rats did not reveal treatment-related changes.

In a sub-chronic dietary toxicity study in mice, no treatment-related effects were noted at up to the highest dose tested (1,623 mg/kg bw/day), though it is noted that a full guideline-compliant set of parameters (clinical chemistry and blood clotting endpoints) were not examined.

In a sub-chronic dietary toxicity study in beagle dogs, no treatment-related effects were observed at the highest dose tested (426 mg/kg bw/day).

In a long-term dietary study in beagle dogs, no clinical signs of toxicity or additional treatment-related effects were observed at the highest dose tested (1,077 mg/kg bw/day).

Chronic toxicity and carcinogenicity

No evidence of carcinogenicity was observed in mice or rats.

In the mouse study, no treatment-related clinical signs of toxicity, or additional treatment-related effects were observed at up to the highest dose tested (1,190.0 mg/kg bw/day).

In the rat study, treatment-related signs of toxicity were limited to decreases in body weight/body weight gain and associated decreases in food efficiency at the top dose (957 mg/kg bw/day).

Reproductive and developmental toxicity

There were no treatment-related effects on reproductive or developmental parameters, with pup toxicity (decreased body weight gain and associated decreased spleen weight) only observed at doses that were maternotoxic.

In a 2-generation dietary study in rats, aminocyclopyrachlor was not a reproductive toxicant, with no effects on fertility seen at the highest dose tested (1,158 mg/kg bw/day). Parental toxicity, decreased body weight gain and related decreases in food efficiency were seen at 299 mg/kg bw/day in males and at 1,243 mg/kg bw/day in females. Offspring toxicity was restricted to reduced body weight gain in both generations during the lactation period at the highest dose.

Aminocyclopyrachlor was not a developmental toxicant in rats, with no maternal or foetal toxicity findings at the 1,000 mg/kg bw/day limit dose. While aminocyclopyrachlor was not a developmental toxicant in rabbits, the data indicated that pregnant rabbits were more sensitive than pregnant rats, with 2 maternal deaths attributed to treatment, along with maternal clinical signs of toxicity, decreased body weight, overall and net (minus gravid uterine weight) body weight gain at doses ≥500 mg/kg bw/day and increased frequency of abortions and maternal death at 1,000 mg/kg bw/day. However, while the abortions were considered treatment-related, they were also considered secondary to the severe maternal toxicity seen at this dose level, as indicated by substantial decreases in food consumption (up to 28.2%) and body weight gain (up to 70.5%) compared with controls.

Genotoxicity

Aminocyclopyrachlor was negative in *in vitro* and *in vivo* mutagenicity and/or genotoxicity studies and *in vitro* mutagenicity studies on aminocyclopyrachlor, aminocyclopyrachlor-methyl and an impurity.

The formulation was negative in *in vitro* and *in vivo* mutagenicity studies.

Neurotoxicity/immunotoxicity

Aminocyclopyrachlor was not neurotoxic in acute and subchronic studies or immunotoxic *in vivo* in mice and rats.

Toxicity of metabolites and/or impurities

Aminocyclopyrachlor (DPX-MAT28) is the parent acid of the methylester aminocylopyrachlor-methyl (DPX-KJM44). The available toxicological database includes studies on both compounds, which demonstrate similar toxicity profiles.

Supplementary toxicology data provided on the methyl ester form of aminocyclopyrachlor (aminocyclopyrachlor-methyl) indicated that the methyl ester is more readily absorbed by the oral route, though toxicokinetic parameters and tissues distribution were comparable to aminocyclopyrachlor. Plasma metabolic profiling demonstrated rapid *in vivo* biotransformation of the methyl ester compound to aminocyclopyrachlor within the first 0.5 hours after dosing. The overall toxicological profile from acute, repeat-dose, reproductive and genotoxicity studies was comparable to aminocyclopyrachlor. The doses can be directly compared by expressing doses as aminocyclopyrachlor acid equivalents (ae).

Studies on the impurity 'IN-MAT 26' demonstrated low acute oral toxicity, an absence of skin sensitisation and no mutagenicity.

A supplementary repeat dose (90-day) oral toxicity study in rats on the environmental metabolite cyclopropane carboxylic acid (IN-V0977) indicated the metabolite to be of greater toxicity following repeat dosing compared to the parent compound aminocyclopyrachlor. Clinical signs of toxicity (increased absolute and relative liver weights, clinical pathology and gross pathology findings indicative of liver toxicity and histopathological changes in the liver, thymus, heart and pancreas) were reported at doses much lower than those administered to elicit clinical signs of toxicity using aminocyclopyrachlor. This compound however does not contribute significantly to the toxicity of administered aminocyclopyrachlor since it is not a rodent metabolite.

Health-based guidance values and poisons scheduling

Poisons Standard

Aminocyclopyrachlor is in Schedule 5 of the Standard for the Uniform Scheduling of Medicines and Poison (SUSMP), except in preparations containing 25 per cent or less of aminocyclopyrachlor[1].

The product label for Method 240 SL Herbicide (240 g/L aminocyclopyrachlor) therefore will not require a signal heading.

Health-based guidance values

Acceptable daily intake

The acceptable daily intake (ADI) for aminocyclopyrachlor is 2.8 mg/kg bw/d, based on a No-Observed-Adverse-Effect-Level (NOAEL) of 297 mg/kg bw/d in a 2-year rat study, based on decreased body weight gain and associated decreased food efficiency.

[1] Therapeutic Goods Administration, *Notice of amendments to the Poisons Standard in relation to New Chemical Entities (NCEs) and Delegate-only decisions*, TGA website, 13 April 2022.

Acute reference dose

An acute reference dose (ARfD) for the general population is not considered necessary for aminocyclopyrachlor on the basis of its low acute toxicity, the lack of evidence for any acute neurotoxicity and the absence of any other toxicologically relevant effect that might be attributable to a single dose.

Recommendations

There are no objections on human health grounds to the registration of the product Method 240 SL Herbicide, containing 240 g/L of aminocyclopyrachlor, when used in accordance with the directions for use (DFU).

Residues assessment

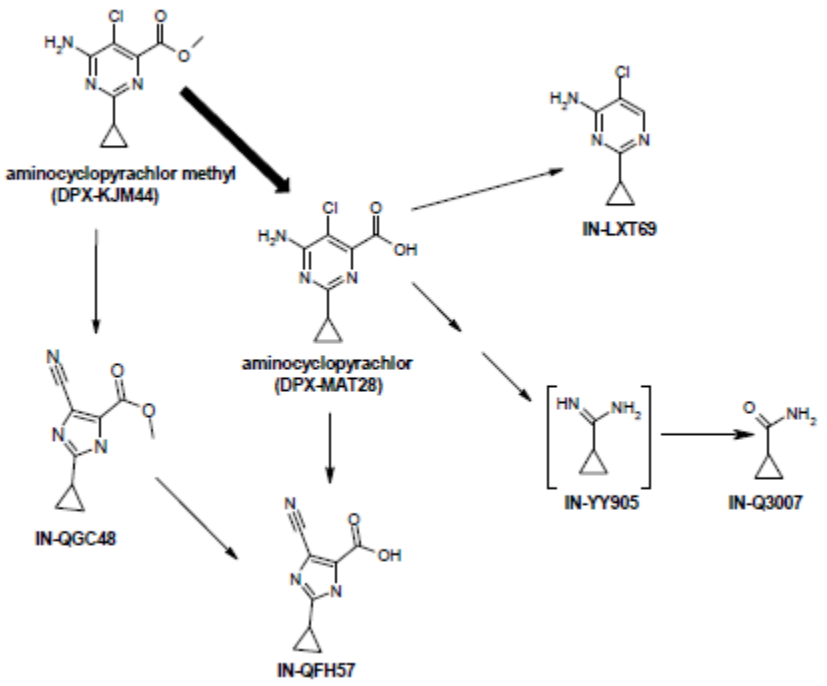
Plant and target animal metabolism data, residue trial data, analytical methodology, fate in storage and residues and trade information for aminocyclopyrachlor have been considered.

Metabolism

Metabolism studies on grass, lactating goats and confined rotational crops (cabbage, turnip and maize) have been evaluated. It is noted that the metabolism studies were conducted with aminocyclopyrachlor methyl ester (DPX-KJM44). However, the studies showed that DPX-KJM44 is rapidly converted to aminocyclopyrachlor, which remains the major component of the residue. This was considered acceptable by the 2014 JMP Report of Pesticide residue in food2 and is considered acceptable by the APVMA.

Following foliar application of aminocyclopyrachlor methyl ester (DPX-KJM44) to grass, the major component of the residue was aminocyclopyrachlor (33 to 68% TRR). All components formed from aminocyclopyrachlor were minor (<6.1% TRR). The proposed metabolic pathway for DPX-KJM44 and aminocyclopyrachlor in grass is given in Figure 1.

Figure 1: Metabolism of DPX-KJM44 and aminocyclopyrachlor (DPX-MAT28) in grass

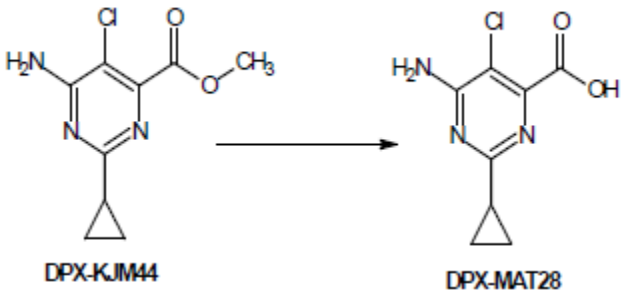


[2] Food and Agriculture Organization of the United Nations, *Pesticide residue in food—2014. Report of the Joint Meeting of the FAO Panel of Experts on Pesticide Residues in Food and the Environment and the WHO Core Assessment Group on Pesticide Residues*, FAO Plant Production and Protection Paper, 221, 2015.

In the confined rotational crop study, aminocyclopyrachlor accounted for 60 to 61%TRR (0.008 to 0.014 mg equiv/kg) in mature cabbage from plots treated at 30 and 60 days prior to sowing (low application rate) and for 83% TRR (0.010 mg equiv/kg) from plots treated 300 days prior to sowing (high application rate). DPX-KJM44 was only observed at trace levels (0.001 mg/kg) in mature cabbage. Unidentified residues accounted for ≤0.004 mg equiv/kg. TRRs in turnip roots were low (≤0.004 mg equiv/kg). Aminocyclopyrachlor accounted for 40 to 59% TRR (0.004 to 0.007 mg equiv/kg) of the ^{14}C present in mature turnip tops from crops sown 60- and 120-days following application (DAA). DPX-KJM44 (17% TRR, 0.002 mg equiv /kg) was only detected in the mature tops from the 60 DAA planting interval. Unidentified components were individually present at <0.01 mg equiv/kg. Aminocyclopyrachlor was the principal component in maize forage (63 to 71% TRR), stover (46 to 72% TRR) and grain (71 to 76% TRR). DPX-KJM44 was found at up to 10% TRR in maize forage.

Livestock may be exposed to residues present in feeds. In a lactating goat metabolism study with DPX-KJM44, the ester was rapidly converted to aminocyclopyrachlor, which was the major component of the residue in all tissues and milk (kidney 55% TRR, liver 66% TRR, muscle 43% TRR, fat 47 to 84% TRR, milk 16% TRR), with no individual metabolite of aminocyclopyrachlor identified as present at levels above 0.01 mg equiv/kg. The metabolism of DPX-KJM44 and aminocyclopyrachlor (DPX-MAT28) in lactating goat is given in Figure 2.

Figure 2: Metabolism of DPX-KJM44 and aminocyclopyrachlor (DPX-MAT28) in the lactating goat



Analytical methods and storage stability

In Australian pasture residue trials, samples were extracted by blending with water/acetonitrile + formic acid. Samples were centrifuged and the extract filtered and evaporated to dryness. Samples were reconstituted in water with formic acid prior to analysis for parent aminocyclopyrachlor by HPLC-MS/MS.

The limit of quantitation LOQ for aminocyclopyrachlor was 0.01 mg/kg. Recoveries of aminocyclopyrachlor from fortified control samples were generally within acceptable limits.

The method suitable for DPX-KJM44, aminocyclopyrachlor and IN-LXT69 in animal commodities involved extraction with acetonitrile/formic acid for milk. An aliquot was diluted with formic acid for analysis. For tissues, extraction was with acetonitrile/formic acid. Extraction was on ice. For muscle, an aliquot of extract was diluted with formic acid and passed through a MCX SPE cartridge. Analysis was by LC-MS/MS with an LOQ of 0.01 mg/kg for each analyte. Recoveries from fortified control samples were generally within acceptable limits.

Storage stability

The applicant has provided studies on the stability of DPX-KJM44, aminocyclopyrachlor, IN-LXT69, IN-QFH57 and IN-QGC48 in grass and hay stored frozen. These studies were also evaluated by the 2014 JMPR. The compounds were all stable in grass and hay for the duration of the stability studies; 500 days for DPX-KJM44, aminocyclopyrachlor, IN-LXT69 and 400 days for IN-QFH57 and IN-QGC48.

In animal matrices fortified separately with DPX-KJM44, aminocyclopyrachlor and IN-LXT69, residues were stable in milk, muscle, fat and hens' eggs for at least 133 days. Aminocyclopyrachlor and IN-LXT69 were stable in liver and kidney for at least 147 and 88 days, respectively. DPX-KJM44 was not stable in liver and kidney, being converted to aminocyclopyrachlor either during storage, or subsequent analysis.

In the residue trials submitted, all samples were maintained under freezer conditions, (i.e.–18^{o}C) prior to analysis and tested within 401 days of collection. This is acceptable for the purposes of the current application.

Residue definition

Following foliar application of aminocyclopyrachlor methyl ester (DPX-KJM44) to grass, the major component of the residue was aminocyclopyrachlor (33 to 68% TRR). All components formed from aminocyclopyrachlor were minor (<6.1% TRR).

Livestock may be exposed to residues present in feeds. In a lactating goat metabolism study with DPX-KJM44, the ester was rapidly converted to aminocyclopyrachlor, which was the major component of the residue in all tissues and milk (kidney 55% TRR, liver 66% TRR, muscle 43% TRR, fat 47 to 84% TRR, milk 16% TRR) with no individual metabolite of aminocyclopyrachlor identified as present at levels above 0.01 mg/kg.

The recommended definition of a residue for enforcement with MRLs and estimation of dietary exposure (for animal and plant commodities) is aminocyclopyrachlor. This is the same definition as recommended by the 2014 JMPR.

Residues in food and animal feeds

The applicant has provided full details of residue trials conducted on mixed pastures in Australia, New Zealand and North America.

The maximum proposed broadcast application rate on the label is 312 g a.c./ha to bare ground. It is considered that plant material grown after this bare ground treatment may be grazed by livestock. The individual plant (spot spray) treatments on the label including at up to 500 mL/100 L (120 g a.c./100 L) for pastoral grazing land, are expected to be of lower residue potential than broadcast applications. The directions for use table states "Avoid spraying to point of run off as injuries to desirable species or ground cover may occur", noting also that the recommended spray volume range for broadcast ground application is 100 to 400 L/ha, which would allow application at up to 1.3 L/100 L (312 g a.c./100 L) as a broadcast treatment.

Data to demonstrate residues in plant material grown after a bare ground treatment, or data specific to the proposed spot spray use, are not available. The maximum application rate for broadcast application to bare ground of 312 g a.c./ha will therefore be considered in respect to the available residue data, which involved treatment of pasture. The proposed grazing withholding period is 'Nil'.

Residues in mixed pastures in Australian trials at 0 days (or more if residues increased with time) after application at the nominal rate of 312 g a.c./ha (1× proposed rate) were 42, 51, 62 and 79 mg/kg on a dry weight basis.

Residues in mixed pastures in New Zealand trials at 0 days after application at the nominal rate of 312 g a.c./ha (1× proposed rate) were 61, 72, 95 and 141 mg/kg on a dry weight basis.

Residues in grass forage from North American trials at 0 days after application at 308 to 319 g a.c./ha (approximately 1× proposed rate) were 58, 60, 72, 77, 79 and 83 mg/kg on a dry weight basis.

Residues in grass hay from North American trials cut at 0 days after application at 308 to 319 g a.c./ha (approximately 1× proposed rate) were 40, 45, 46, 49, 59 and 60 mg/kg on a dry weight basis. Residues in grass hay were therefore lower than those in grass forage.

The combined dataset for grass forage suitable for MRL estimation is 42, 51, 58, 60, 61, 62, 72, 72, 77, 79, 79, 83, 95 and 141 mg/kg. The OECD MRL calculator recommends an MRL of 300 mg/kg (STMR =72 mg/kg, n=14).[3] An MRL of 300 mg/kg is recommended for aminocyclopyrachlor on mixed pastures (leguminous/grasses) in conjunction with a 'Nil' grazing withholding period.

Crop rotation

The proposed use is for pastoral grazing land; native conservation areas; industrial sites such as railways; roadways; and utility rights-of-way. It is considered unlikely that rotational crops will be grown in treated areas and plant back intervals or an "all other foods" MRL will not be recommended for aminocyclopyrachlor at this time.

Residues in animal commodities

A lactating dairy cow feeding study for DPX-KJM44 (aminocyclopyrachlor methyl ester) has been provided. A review of the laboratory animal and lactating goat metabolism studies showed that DPX-KJM44 is rapidly converted to aminocyclopyrachlor and significant differences are not expected in residues arising from dosing with DPX-KJM44 or aminocyclopyrachlor. The JMPR previously decided the DPX-KJM44 feeding study could be used to estimate aminocyclopyrachlor residues in meat, edible offal and milk and agreed that in estimating residues levels, the feed levels should be expressed in terms of aminocyclopyrachlor acid equivalents. This is considered acceptable for the purposes of the current evaluation.

[3] Organisation for Economic Co-operation and Development, *OECD Maximum Residue Limit Calculator*, OECD website.

Pastures can form 100% of the diet for mammalian livestock. The maximum livestock dietary burden is therefore 141 ppm.

Estimated residues in milk and tissues and required MRLs for a feeding level of 141 ppm (as aminocyclopyrachlor) are given in Table 5 (compared to a feeding level of 150 ppm aminocyclopyrachlor equivalents).

Table 5: Estimated residues in milk and tissues and required MRLs in Cattle

Feeding level (ppm)	Milk	Muscle	Liver	Kidney	Fat
	Aminocyclopyrachlor residue (mg/kg)				
150 acid equiv.	0.012	0.012	0.064	0.40	0.040
141 – beef, estimated burden	–	0.011	0.060	0.38	0.038
141 – dairy, estimated burden	0.011	–	–	–	–
Established MRLs	–	–		–	–
Recommended MRLs	0.02	0.05 (in fat)		0.5 (offal)	–

The following mammalian animal commodity MRLs are recommended for aminocyclopyrachlor in conjunction with a 'Nil' grazing withholding period:

- MO 0105 Edible offal (mammalian): 0.5 mg/kg
- MM 0095 Meat (mammalian) [in the fat]: 0.05 mg/kg
- ML 0106 Milks: 0.02 mg/kg

Dietary risk assessment

The chronic dietary exposure to aminocyclopyrachlor 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 aminocyclopyrachlor is equivalent to <1% of the ADI. It is concluded that the chronic dietary exposure to aminocyclopyrachlor 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 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 acute reference dose was considered to be unnecessary for aminocyclopyrachlor. A NESTI calculation is not required.

Recommendations

The following amendments are required to be made to the APVMA MRL Standard (Table 6).

Table 6: Amendments to the APVMA MRL Standard

Amendments to Table 1		
Compound	**Food**	**MRL (mg/kg)**
Add:		
Aminocyclopyrachlor		
MO 0105	Edible offal (mammalian)	0.5
MM 0095	Meat (mammalian) [in the fat]	0.05
ML 0106	Milks	0.02
Amendments to Table 3		
Compound	**Residue**	
Add:		
Aminocyclopyrachlor	Aminocyclopyrachlor	
Amendments to Table 4		
Compound	**Animal feed commodity**	**MRL (mg/kg)**
Add:		
Aminocyclopyrachlor		
	Mixed pastures (leguminous/grasses)	300

Assessment of overseas trade aspects of residues in food

Commodities exported and main destinations

Commodities of animal origin, such as meat, offal and dairy products, which may be derived from livestock grazed on treated pasture, are considered to be major export commodities. Residues in these commodities resulting from the use of Method 240 SL Herbicide may have the potential to unduly prejudice trade.

The significant export markets for Australian beef, sheep, pig meat and offal are listed in the APVMA Regulatory Guidelines – Data Guidelines: Agricultural - Overseas trade (Part 5B).[4]

In 2019–20, Australia exported 1,290 kt of beef and veal (worth $11.26 billion, ABARES).[5] Significant export markets for Australian beef and veal include China, Japan, the United States, the Republic of Korea and Indonesia.

In 2019–20, Australia exported 280 kt of lamb (worth $2.7b, ABARES) and 182 kt of mutton (worth $1.4 billion). The significant export markets for sheep commodities include China, the Middle East and the United States.

Total exports of Australian dairy products were worth $2,194 million in 2019–20 (ABARES, Agricultural Commodity Statistics).[6] Major export markets for cheese were Japan, China, Malaysia, Korea, Philippines and Singapore; butter and butter fat were Thailand, China, Singapore and Malaysia; skim milk powder were China, Indonesia, Thailand and Kuwait and whole milk powder were China, Singapore and Hong Kong.

Overseas registrations and approved label instructions

Aminocyclopyrachlor products are registered for use on rangelands, non-crop land and for vegetation management in the USA and Canada.

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

[4] Australian Pesticides and Veterinary Medicines Authority, *APVMA Regulatory Guidelines: Overseas Trade (Part 5B)*, APVMA website, 20 July 2020.

[5] Department of Agriculture, Fisheries and Forestry, *Australian Bureau of Agricultural and Resource Economics and Sciences*, DAFF website.

[6] Department of Agriculture, Fisheries and Forestry, *Australian Bureau of Agricultural and Resource Economics and Sciences Agricultural Commodity Statistics*, DAFF website.

Codex CXLs when importing foods. Aminocyclopyrachlor has been considered by Codex. The following relevant international MRLs have been established for aminocyclopyrachlor (Table 7).

Table 7: Proposed Australian and current international MRLs for aminocyclopyrachlor

Commodity	Tolerance for residues arising from the use of aminocyclopyrachlor (mg/kg)						
	Australia (proposed)	EU	Japan	Codex	Korea	Taiwan	USA
Residue definition	Amino-cyclopyrachlor	–	Amino-cyclopyrachlor	Amino-cyclopyrachlor	–	–	Sum of aminocyclopyrachlor, 6-amino-5-chloro-2-cyclopropyl-4-pyrimidinecarboxylic acid and aminocyclopyrachlor methyl ester, methyl 6-amino-5-chloro-2-cyclopropyl-4-pyrimidinecarboxylate, calculated as the stoichiometric equivalent of aminocyclopyrachlor.†
Edible offal (mammalian)	0.5	–	0.3	0.3	–	–	0.3 (meat byproducts)
Meat (mammalian)[in the fat]	0.05	–	0.01 (muscle) 0.03 (fat)	0.01 (meat) 0.03 (fat)	–	–	0.01 (meat) 0.05 (fat)
Milks	0.02	–	0.02	0.02	–	–	0.01

†*The residue definition in the USA includes aminocyclopyrachlor methyl ester. This esterified active was included in early product formulations but was not commercialised. This difference in residue definition is of no consequence for the Australian use pattern in which the potassium salt of aminocyclopyrachlor will be applied.*

Proposed trade advice label statement

The following trade advice statements have been supported by the residues and trade assessment:

Livestock destined for export markets

The grazing withholding period only applies to stock slaughtered for the domestic market. Some export markets apply different standards. To meet these standards, ensure that in addition to complying with the grazing withholding period, the Export Slaughter Interval is observed before stock are sold or slaughtered.

Export slaughter interval (ESI) – 12 days: Livestock that has been grazed on or fed treated crops should be placed on clean feed for 12 days prior to slaughter.

In the livestock feeding study, an average residue of 0.98 mg/kg in kidney declined to <0.01 mg/kg after 14 days giving an estimated half-life of 2.12 days. It would take approximately 11.1 days for the estimated residue of 0.38 mg/kg in kidney to decline to LOQ (0.01 mg/kg). A 12-day ESI should ensure there are no quantifiable residues in animal tissues for export.

Potential risk to trade

Export of treated produce containing finite (measurable) residues of aminocyclopyrachlor may pose a risk to Australian trade in situations where (i) no residue tolerance (import tolerance) is established in the importing country or (ii) where residues in Australian produce are likely to exceed a residue tolerance (import tolerance) established in the importing country.

The proposed MRLs for mammalian offal at 0.5 mg/kg is higher than the Codex, US and Japanese MRLs at 0.3 mg/kg. The proposed Meat [in the fat] MRL at 0.05 mg/kg is higher than the Codex and Japanese fat MRLs at 0.03 mg/kg. The 2014 JMPR considered the Canadian GAP for use on grass pastures which allows application at 0.85× the rate proposed for Australia and considered the North American pasture and hay trials considered here. It is noted that the proposed Australian animal commodity MRLs are driven by the results of the New Zealand pasture trials which were not considered by the JMPR.

Animal commodity MRLs for aminocyclopyrachlor do not exist in all major markets and therefore residues should be below the LOQ of 0.01 mg/kg to prevent a risk to export trade. The LOQ for the analytical method for animal commodities was 0.01 mg/kg. A 12-day ESI should ensure there are no residues above this level in meat and offal commodities for export.

A milk MRL has been proposed at 0.02 mg/kg, the same level as the Codex MRL. Given that the estimated milk HR is approximately at the LOQ (0.01 mg/kg), that milk is bulked and blended and that the proposed use is for pastoral grazing land, bare ground situations, native conservation areas and industrial sites such as railways, roadways and utility rights-of-way which are unlikely to be commonly grazed by dairy animals, the risk to trade in dairy products is considered to be low.

Work health and safety assessment

Health hazards

Method 240 SL Herbicide has low/very low acute toxicity by the oral, dermal and inhalation routes. It is not irritating to the eyes or skin of rabbits and is not a skin sensitiser.

Occupational exposure

Method 240 SL Herbicide, containing 240 g/L aminocyclopyrachlor present as the potassium salt in a soluble concentrate (SL) formulation, is intended for use as herbicide for the control of woody weeds and broadleaf weeds in various situations including native conservation areas, pastoral grazing land, industrial sites (e.g. railways, roadways, utility rights-of-way) and bare ground situations (e.g. rail crossings, rail yards, utility sites such as generating facilities, electrical substations).

Exposure during use

Method 240 SL Herbicide is intended for professional use and will be applied mechanically by ground application methods (broadcast by ground boom, hand-held sprayer, knapsack sprayer and individual plant treatment using hand lance, knapsack sprayer, cut-stump or trunk injection method). The product is to be applied at a rate of 1.3 L/ha (240 g a.c./ha), in a water volume of 100-400 L/ha. The product is applied as a single application at any time of the year; however, it may be used regularly at multiple sites and the pattern of occupational exposure is therefore considered intermediate to long-term in duration.

With an adequate short-term dermal toxicity study showing no adverse effects at the limit dose of 1,000 mg aminocyclopyrachlor/kg bw/day and the active ingredient not neurotoxic or a developmental toxicant, a quantitative risk assessment for repeat exposure was not required for this product and the assessment is based on acute hazard only. This applies to mixing, loading and application, as well as re-entry and bystander (spray drift) assessments.

Exposure during re-entry or rehandling

Assessment not required (see ‘Exposure during use’).

Public exposure

Method 240 SL Herbicide is not intended for use by the general public. An assessment for bystander exposure from spray drift was not required (see ‘Exposure during use’).

Recommendations

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

First aid instructions

For aminocyclopyrachlor >25%: If poisoning occurs, contact a doctor or Poisons Information Centre. Phone Australia 13 11 26, New Zealand 0800 764 766

Safety directions

Not required.

Precautionary (warning) statements

Not required.

Environmental assessment

Fate and behaviour in the environment

Soil

Aminocyclopyrachlor could be susceptible to photodegradation on soil surfaces. The degradation of aminocyclopyrachlor was faster in continuously irradiated samples than the dark controls resulting in a photolysis DT_{50} of 40 days. No metabolites were observed at >10% AR.

The degradation rate of aminocyclopyrachlor was evaluated in the laboratory on 3 soils when applied as the active constituent and on a 4th soil applied as the methyl ester, both under aerobic and anaerobic conditions, at 20°C, in the dark. In aerobic soils, degradation followed first order kinetics and soil half-lives ranged from 118 days to 435 days (geometric mean 206 days). Mineralisation was <1% in 3 soils and up to 23% in the 4th soil. Non-extractable residues ranged from 13 to 43% AR at the end of the studies. No major metabolites were formed. In the single anaerobic soil degradation study, there was no discernible degradation of aminocyclopyrachlor over the 120-day incubation period and no major metabolites were formed.

A total of 7 field dissipation studies were provided (4 from USA and 3 from Canada). Five of these applied aminocyclopyrachlor, formulated as the methyl ester, to bare ground (n= 4) and turf (n= 1). The other 2 studies each tested 3 different formulations of aminocyclopyrachlor applied to bare soil. Aminocyclopyrachlor was demonstrably mobile at several of the sites, moving to 90 cm in the soil layer (deepest level measured). For assessment purposes, the APVMA considered the field half-lives in the top 30 cm soil layer to determine a $DegT_{50}$. The range of half-lives (n= 11) was 14 to 217 days (geometric mean 49 days). Dissipation in this layer was mainly described by first order kinetics. No major metabolites were formed.

The mobility observed in the field studies was supported by soil adsorption studies and a column leaching study. The mobility of aminocyclopyrachlor was tested with a standard batch equilibrium study in 5 soils. Freundlich K_F values ranged from 0.004 to 0.941 L/kg (K_{FOC} 0.8 to 24.8 L/kg) indicating aminocyclopyrachlor could be very mobile in the soil environment. A positive relationship between K_F and soil organic carbon was apparent and regression derived K_F values for 1% and 5% soil organic carbon are 0.045 and 1.24 L/kg, respectively. Sorption appeared to be slightly concentration-dependent, with an average 1/n= 0.92. Desorption could be significant with total desorption ranging 24 to 70% from 2 desorption cycles.

A column leaching study with 3 different soils (loam, clay and sandy loam) showed significant mobility below the 30 cm soil column used for each soil. Residues remaining in the soil column were enriched at the bottom of the column with 61 to 89% of the applied aminocyclopyrachlor moving through the columns and being found in the eluate.

Water and sediment

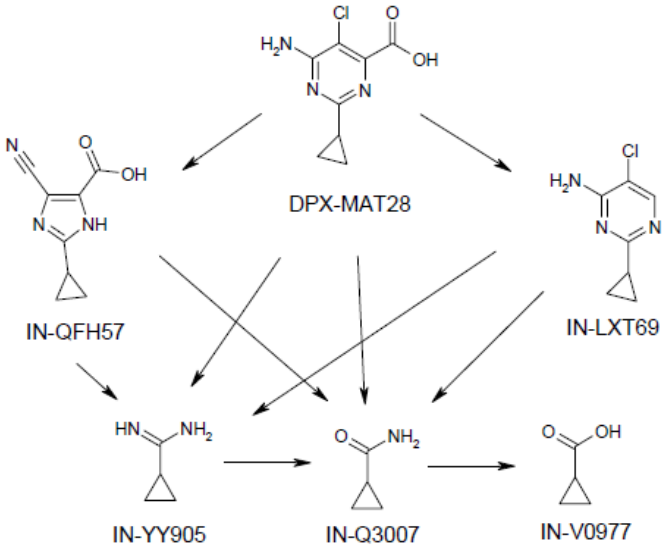
Aminocyclopyrachlor was stable to hydrolysis in the environmentally relevant pH range (DT_{50} >1 year). However, photolysis could be a major removal route for aminocyclopyrachlor in the environment. In an aqueous photolysis study in a sterile, pH 4 buffer solution, or sterile natural water, the half-lives observed equated to approximately 15 days in pH 4 buffer and 2.6 days in natural water for mid-summer sunlight,

assuming a 12 h light/dark cycle. Three metabolites were observed at >10% AR, namely, IN-V0977 (12%, 360 d), IN-QFH57 (14%, 360 d) and IN-LXT69 (16%, 360 d).

When applied to aerobic water-sediment systems that were incubated in the dark, aminocyclopyrachlor was persistent with water DT_{50} values of 153 to 445 days and total system DT_{50} values exceeded 1000 days. No major metabolites were observed and at the end of the 100-day incubation period, aminocyclopyrachlor remained at 57% in the water column and 31% in the sediment. In an anaerobic water/sediment system, there was <10% degradation in the whole system over 365 days.

Dissipation in an outdoor aquatic system resulted in the rapid removal of aminocyclopyrachlor from both water and sediment, possibly due to photolysis. The water, sediment and total system DT_{50} values from the field study were 0.28, 1.4 and 1.0 days, respectively.

Figure 3: Proposed photodegradation pathway for aminocyclopyrachlor in pH 4 buffer and natural water



Air

Standard modelling was undertaken to predict the atmospheric half-life of aminocyclopyrachlor through reaction with hydroxyl radicals. Based on a global, annual average 24-hour concentration of 1.5×10^6 OH^- radicals/cm^3, reaction with hydroxyl radicals and a 12-hour day, an atmospheric DT_{50} was calculated to be 3.5 days. Aminocyclopyrachlor is not volatile (vapour pressure 6.9×10-6 Pa at 20°C), so is not expected to partition to the atmospheric compartment.

Effects and associated risks to non-target species

Terrestrial vertebrates

Following gavage administration, aminocyclopyrachlor had low toxicity to mammals (LD_{50} >5000 mg ae/kg bw, *Rattus norvegicus*) and birds (LD_{50} >2075 mg ae/kg bw, *Colinus virginianus*). The SL formulation did not enhance toxicity to mammals. Similarly, aminocyclopyrachlor had low toxicity to birds

following dietary administration (LDD_{50} >1177 mg ae/kg bw/d, 2 species tested). Following long-term dietary administration in reproductive toxicity studies, reduction in pup weights was observed in mammals at doses as low as 1085 mg ae/kg bw/d (NOAEL 299 mg ae/kg bw/d, *Rattus norvegicus*), while no adverse effects were observed in birds at the lowest test concentration (lowest NOEL 101 mg ae/kg bw/d, *Colinus virginianus*).

Risks of aminocyclopyrachlor to terrestrial vertebrates were determined to be acceptable under a realistic worst-case scenario (direct dietary exposure within the treatment area at the maximum exposure rate). No protection statements are required for terrestrial vertebrates.

Aquatic species

Aminocyclopyrachlor has low toxicity to aquatic vertebrates (lowest LC_{50} >100 mg ae/L, *Rana limnocharis*), aquatic plants (E_rC_{50} >122 mg ae/L, *Lemna gibba*) and moderate toxicity to aquatic invertebrates (lowest EC_{50} 43 mg ae/L, *Daphnia magna*) and algae (lowest E_rC_{50} 57 mg ae/L, *Navicula pelliculosa*). The SL formulation did not enhance toxicity to fish or algae and metabolite IN-MAT26 was less toxic than the parent substance to fish, aquatic invertebrates and algae. Following long-term exposure to aminocyclopyrachlor, no adverse effects were observed in fish in the early life stages at the highest tested concentration (NOEC 11 me ae/L, *Oncorhynchus mykiss*), while reduced growth of aquatic invertebrates was observed at concentrations as low as 9.9 mg ae/L (NOEC 6.0 mg ae/L, *Daphnia magna*).

Risks of aminocyclopyrachlor to aquatic species were determined to be acceptable under a realistic worst-case scenario (direct exposure within the treatment area at the maximum exposure rate). No protection statements are required for aquatic species.

Bees and other non-target arthropods

Aminocyclopyrachlor had low toxicity to adult bees (*Apis mellifera*) by contact exposure (LD_{50} >98 µg a.c./bee) and oral exposure (LD_{50} >110 µg a.c./bee). No adverse effects on mortality or behaviour were observed at the highest tested concentrations. The SL formulation did not enhance toxicity to bees. Risks of aminocyclopyrachlor to bees were determined to be acceptable under a realistic worst-case scenario (direct exposure within the treatment area at the maximum exposure rate). No protection statements are required for bees.

One screening test examining the toxicity of fresh-dried residues of aminocyclopyrachlor (applied in acetone) on glass plates provided an LR_{50} of 240 g ae/ha for the parasitic wasp species *Trichogramma nubilale*, which is a field-relevant rate (Method 240 SL Herbicide can be applied at rates up to 312 g ae/ha). No further information is available on toxicity to other species or under more realistic conditions. Therefore, use of the product is not considered compatible with integrated pest management (IPM) programs utilising beneficial arthropods.

Soil organisms

Aminocyclopyrachlor had low toxicity to soil macro-organisms such as earthworms (LC_{50} >1000 mg ae/kg dry soil, *Eisenia fetida*). The SL formulation did not enhance toxicity to earthworms. Aminocyclopyrachlor did not

adversely influence soil processes such as nitrogen transformation at the highest test concentration (NOEC 3.7 mg ae/kg dry soil).

Risks of aminocyclopyrachlor to soil organisms were determined to be acceptable under a realistic worst-case scenario (direct exposure within the treatment area at the maximum exposure rate). No protection statements are required for soil organisms.

Non-target terrestrial plants

Aminocyclopyrachlor is a synthetic auxin that is readily absorbed by plant leaves and roots. Seedling emergence and vegetative vigour studies were available on 4 formulations of aminocyclopyrachlor[7] which demonstrated toxicities in ten crop species were not substantially different from each other. Following pre-emergent exposure, the most sensitive plant was sugar beet (ER_{50} 1.8 g ae/ha*, Beta vulgaris*) and the species sensitivity distribution (SSD) with the lowest ER_{50} from all 10 test species tested resulted in an HR_5 of 1.3 g ae/ha. Following post-emergent exposure, the most sensitive plant was bean (ER_{50} 0.24 g ae/ha, *Phaseolus vulgaris*) and the SSD with the lowest ER_{50} from each species resulted in an HR_5 of 0.28 g ae/ha.

Recommendations

In considering the environmental safety of the proposed use of Method 240 SL Herbicide, the APVMA had regard to the toxicity of the active constituent in relation to relevant organisms and ecosystems. Based on the available information, the APVMA can be satisfied that the proposed use of the product is unlikely to have an unintended effect that is harmful to animals, plants or things or to the environment.

[7] SG 50% formulation, SL dimethylamine formulation, SL triethylamine formulation, and WG methyl ester formulation.

Efficacy and safety assessment

Proposed product use pattern

Method 240 SL Herbicide is proposed for the control of woody weeds and broadleaf weeds in broadcast applications and as individual plant treatments. The product will be applied via spot spraying, cut stump and stem treatments and basal bark and trunk injection in individual plant treatments. The product will also be applied to bare ground post-emergent situations, via ground application.

Efficacy and target crop/animal safety

Efficacy

Bare ground situations for treatment of woody and broadleaf weeds by ground application

The applicant provided data from 5 Australian trials evaluating efficacy of the product in post-emergent bare ground situations. The trials evaluated rates from 500 mL/ha to 1.3 L/ha and included comparison to an untreated control. In 2 of the 5 trials, Method 240 SL Herbicide was used alone to treat Acacia and *Ipomoea plebeia*. In 3 of the trials, Method 240 SL Herbicide was used in combination with other herbicides. The trials demonstrated Method 240 SL Herbicide is efficacious against Acacia, *Ipomoea plebeia* and broadleaf weeds and support the proposed critical comments for use as a tank-mix partner with other herbicides to broaden the control spectrum.

Nature conservation areas, pastoral grazing land, industrial sites such as railways, roadways and utility rights-of-way

Via spot spraying: The applicant provided data from 18 Australian trials for this use pattern covering 26 separate weeds or genera (e.g. Acacia, Eucalyptus). All trials evaluated the maximum label rate of 500mL /100L and 3 trials evaluated a lower rate of 200 mL/100 L. In all cases, the rates of Method 240 SL Herbicide used provided significant reduction in weed criteria (percent brownout and regrowth) compared to the untreated control. The critical comments instruct to use the higher rate for difficult to control weeds.

Via cut stump and stem treatment: The applicant provided data from one Australian trial to assess eucalyptus control by cut stump application. The trial evaluated both 5 and 10 L rates and the data indicated that both rates provided significant control relative to the untreated control and equal control to industry standards.

Via basal bark treatment: The applicant submitted data from 3 Australian trials to demonstrate efficacy in support of this use pattern, one on a eucalypt and the other 2 on African olive trees. In all 3 trials, the 5 and 10 L rate provided significant control relative to the untreated control and performed equivalently to industry standards.

Via trunk injection: The applicant submitted the results from 43 Australian trials to support this use pattern. 19 trials assessed the label rate 0.5 mL/cut and 21 trials assessed the label rate of 0.5 mL/cut and twice the label rate (1.0 mL/cut). The trials assessed Method 240 SL Herbicide for woody weed control on a variety of

woody weeds including eucalyptus, angophora, wattle, tea tree and bitterbark. In all trials, the brownout assessment for 0.5 mL/cut of Method 240 SL Herbicide were superior or equal to the industry standard.

Crop safety

The proposed situations, other than pastoral grazing land, include bare ground, post-emergent situations and individual plant treatment, which are targeted and are unlikely to cause damage to off-target plants.

The label carries a number of risk mitigation statements to avoid damage to off-target plants, including the following statement in the critical comments for spot spraying:

Avoid spraying to point of runoff as injuries to desirable species or ground cover may occur.

The label also carries a precaution statement noting injury to crops:

> "Exposure to Method 240 SL Herbicide may injure or kill most crops and may injure or kill desirable vegetation. Injury may be more severe when the crops or desirable vegetation are irrigated.
>
> Low rates of Method 240 SL Herbicide can kill or severely injure most crops. Following a Method 240 SL Herbicide application, the use of spray equipment to apply other pesticides to crops on which Method 240 SL Herbicide is not registered may result in their damage. The most effective way to reduce this crop damage potential is to use dedicated mixing and application equipment.
>
> Applications should be made only when there is little or no hazard from spray drift. Very small quantities of spray, which may not be visible, may seriously injure susceptible plants.
>
> In non-crop areas adjacent to desirable vegetation, avoid overlapping spray applications and shut off spray to the spray boom while starting, turning, slowing, or stopping to avoid injury to desirable vegetation."

To address safety in pastoral grazing land, the applicant provided data from 3 Australian trials in pasture. In 2 of the trials, there was no effect from directed spot spraying of woody weeds on understory grasses. In the third trial, brownout of annual ryegrass occurred. In other trials presented by the applicant where grass weeds were targeted, generally there was a negative impact on the grass weeds.

A precaution statement specifically for pastures is included on the label:

> "Method 240 SL Herbicide may suppress or severely injure established grasses, especially when the grass plants are stressed due to adverse environmental conditions. Areas that contain these grass plants should recover as environmental conditions for good grass growth occur."

The proposed label has adequate warning where off-target effects are known.

Recommendations

Method 240 SL Herbicide applied at the proposed label rate was determined to be efficacious for the control of various weeds in bare ground broadcast applications and in individual plant treatments in native conservation areas, pastoral grazing land and industrial sites.

The product label provides adequate instructions to mitigate crop damage to off target plants.

Spray drift assessment

Regulatory Acceptable Levels (RALs) were established by each risk area and the APVMA Spray Drift Risk Assessment Tool (SDRAT), or Spray Drift Management Tool (SDMT) was used in order to calculate the appropriate spray drift buffer zones for Method 240 SL Herbicide. RALs are derived as detailed in the Spray Drift Risk Assessment Manual (SDRAM) on the APVMA website.

The product is proposed for use by ground application using coarse droplets.

The draft label included a restraint that the product should not be applied by aircraft.

Human health

As noted previously, based on the toxicity profile of the active constituent, a quantitative risk assessment for bystander exposure was not required.

Residues and trade

For aminocyclopyrachlor, the target tissue for compliance is kidney. The target residue level for the protection of international trade in for target tissue is 0.01 mg/kg. In a dairy cattle transfer study, feeding with DPX-KJM44 at 73 ppm (68.5 ppm as aminocyclopyrachlor acid equivalents) gave a maximum aminocyclopyrachlor residue of 0.17 mg/kg in kidney. The feeding level for residues to be at the LOQ (0.01 mg/kg) is therefore 4.0 ppm.

The APVMA Spray Drift Risk Assessment Tool (SDRAT) indicates that buffer zones are required (see draft label below) for ground application for the protection of the livestock and the protection of international trade based on a Regulatory Acceptable Level (RAL) of 4.0 ppm (For protection of natural aquatic areas, the RAL was set at 4300 µg ae/L based on the EC50 43 mg ae/L for *Daphnia magna* and an assessment factor of 10.

For protection of pollinator areas, the RAL was set at 16333 g ae/ha based on the contact LD50 >98 g ae/ha for *Apis mellifera* and a conversion factor of LOC 0.4/ExpE 2.4 * 1000.

For protection of vegetation areas, the RAL was set at 0.28 g ae/ha based on the HR5 0.28 g ae/ha based on the SSD of post-emergent ER50 values for 10 crop species and an assessment factor of 1.

Table 8).

Environment

For protection of natural aquatic areas, the RAL was set at 4300 µg ae/L based on the EC50 43 mg ae/L for *Daphnia magna* and an assessment factor of 10.

For protection of pollinator areas, the RAL was set at 16333 g ae/ha based on the contact LD50 >98 g ae/ha for *Apis mellifera* and a conversion factor of LOC 0.4/ExpE 2.4 * 1000.

For protection of vegetation areas, the RAL was set at 0.28 g ae/ha based on the HR5 0.28 g ae/ha based on the SSD of post-emergent ER50 values for 10 crop species and an assessment factor of 1.

Table 8. Summary of RALs for Method 240 SL Herbicide

Sensitive area	Regulatory acceptable level	
	Level of active	Units
Livestock	4.0	ppm
Aquatic	4 300	µg/L
Pollinator	16 333	g/ha
Vegetation	0.28	µg/L

Buffer zones calculated by the SDRAT or SDMT, using the RALs in For protection of natural aquatic areas, the RAL was set at 4300 µg ae/L based on the EC50 43 mg ae/L for *Daphnia magna* and an assessment factor of 10.

For protection of pollinator areas, the RAL was set at 16333 g ae/ha based on the contact LD50 >98 g ae/ha for *Apis mellifera* and a conversion factor of LOC 0.4/ExpE 2.4 * 1000.

For protection of vegetation areas, the RAL was set at 0.28 g ae/ha based on the HR5 0.28 g ae/ha based on the SSD of post-emergent ER50 values for 10 crop species and an assessment factor of 1.

Table 8, were incorporated into the Method 240 SL Herbicide label spray drift instructions (see below).

Labelling requirements

Label name: Method 240 SL herbicide

Active constituent: 240 g/L aminocyclopyrachlor present as the potassium salt

Mode of action indicator: Group 4 herbicide

Statement of claims: For control of woody weeds and broadleaf weeds in various situations as per the directions for use.

Net contents: 100 mL to 1000 L

Directions for use

Restraints:

DO NOT apply by aircraft.

Spray drift restraints:

Specific definitions for terms used in this section of the label can be found at apvma.gov.au/spraydrift.

DO NOT allow bystanders to come into contact with the spray cloud.

DO NOT apply in a manner that may cause an unacceptable impact to native vegetation, agricultural crops, landscaped gardens and aquaculture production, or cause contamination of plant or livestock commodities, outside the application site from spray drift. The buffer zones in the relevant buffer zone table/s below provide guidance but may not be sufficient in all situations. Wherever possible, correctly use application equipment designed to reduce spray drift and apply when the wind direction is away from these sensitive areas.

DO NOT apply unless the wind speed is between 3 and 20 kilometres per hour at the application site during the time of application.

DO NOT apply if there are hazardous surface temperature inversion conditions present at the application site during the time of application. Surface temperature inversion conditions exist most evenings one to 2 hours before sunset and persist until one to 2 hours after sunrise.

Boom sprayers

DO NOT apply by a boom sprayer unless the following requirements are met:

- spray droplets not smaller than a coarse spray droplet size category
- minimum distances between the application site and downwind sensitive areas (see 'Mandatory buffer zones' section of the following table titled 'Buffer zones for boom sprayers') are observed.

Buffer zones for boom sprayers:

Application rate	Boom height above the target canopy	Mandatory downwind buffer zones				
		Bystander areas	Natural aquatic areas	Pollinator areas	Vegetation areas	Livestock areas
1.3 L/ha or lower	0.5 m or lower	0 m	0 m	0 m	170 m	0 m
650 mL/ha or lower	0.5 m or lower	0 m	0 m	0 m	70 m	0 m
	1.0 m or lower	0 m	0 m	0 m	230 m	0 m

Directions for use:

Situation	Weeds controlled	Method of application	Rate	Critical comments
Broadcast applications				
Bare ground situations (post-emergent) including but not limited to railways including rail, crossings, rail yards; utility sites including generating facilities, electrical substations and pumping stations	Acacia, Bell vine (*Ipomoea plebeia*). Broadleaf weeds – refer to Weeds Controlled in the General Instructions.	Ground	500 mL to 1.3 L/ha	Use the higher rate for difficult to control weeds and/or for longer residual control. Apply at 100 to 400 L/ha of spray solution. Apply in a tank mixture with another product registered for use on bare ground sites. Consult the manufacturers' labels for specific rates, weeds controlled and use restrictions.
Individual Plant Treatments				
Native conservation areas, pastoral grazing land, industrial sites such as railways, roadways and utility rights-of-way	Refer to the Woody Weeds table and the Broadleaf Weeds, Vines and other Herbaceous Plants table in the Weeds Controlled section of the General Instructions.	Spot spraying	200 mL to 500 mL/100 L water	Apply the higher rate for difficult to control weeds. Apply with handgun, or a hand-held or backpack sprayer. Use sufficient spray volume to thoroughly and uniformly wet target weed or brush foliage. Spray the vegetation starting at top and covering sides. Avoid spraying to point of run off as injuries to desirable species or ground cover may occur.
	Eucalypts	Cut stump and stem treatment	5 to 10 L per 100 L basal oil adjuvant or water and 10% methylated seed oil	Apply with a knapsack or backpack sprayer using low pressure and solid cone or flat fan nozzles. Spray the cut surface soon after cutting, thoroughly wetting the cambium layer next to the bark. On larger trees, treat only the outer 5 to 7.5 cm of the stump. On trees 7.5 cm or less in diameter, treat the entire cut surface. In addition to the cut surface, treat the sides of the stump/stem and the root collar area to prevent re-sprouting.
	Green cestrum African Olive	Basal bark treatment	5 to 10 L per 100 L basal oil adjuvant or water and 10% methylated seed oil	Apply with a sprayer using low pressure and solid cone or flat fan nozzles. Make applications to susceptible brush or tree species with stems less than 15 cm in basal diameter. Thoroughly wet the lower 30 to 50 cm of the trunk or stem (from ground line). Treat until run off at the ground line is noticeable. Brush or trees with old or rough bark will

Situation	Weeds controlled	Method of application	Rate	Critical comments
				require more spray solution than smooth young bark.
	Refer to the Woody Weeds table in the Weeds Controlled section of the General Instructions.	Trunk injection	0.5 mL (undiluted) per cut	Inject or use a hatchet, machetes, or similar equipment to make downward cuts into the cambium (inner bark) of the stem in such a way as to make a “pocket” large enough to retain the applied solution. Cuts/injections may be made at a height convenient to the applicator. Make one cut/injection for every 5 cm of diameter at breast height (DBH) on the target stem. For example, a 20 cm DBH stem would require 4 cuts. Cuts should be made at equal intervals around the tree.

Not to be used for any purpose or in any manner contrary to this label unless authorised under appropriate legislation.

Withholding period

Grazing: Nil

Trade advice

Livestock destined for export markets:

The grazing withholding period only applies to stock slaughtered for the domestic market. Some export markets apply different standards. To meet these standards, ensure that in addition to complying with the grazing withholding period, the Export Slaughter Interval is observed before stock are sold or slaughtered.

Export slaughter interval (ESI) 12 days. Livestock that has been grazed on or fed treated crops should be placed on clean feed for 12 days prior to slaughter.

When this product is used as directed and the above withholding periods and/or export intervals are observed, treated grain and livestock commodities are considered acceptable for export. However, export requirements are subject to change. Consult your exporter for updated information about specific market requirements.

General instructions

Method 240 SL Herbicide is a soluble concentrate that is mixed in water and applied by ground-based methods for control of woody and broadleaf weeds in native conservation areas, pastoral grazing land, industrial sites such as railways, roadways, utility sites and rights-of-way. Method 240 SL Herbicide can be used for the release or restoration of native perennial grasses.

Method 240 SL Herbicide can be applied at any time of the year. Best results are obtained when the product is applied to actively growing weeds. Thorough coverage of target weeds is necessary for optimum control.

Method 240 SL Herbicide provides control of a range of woody weeds, brush weeds, broadleaf weeds and vines. For best performance, a methylated seed oil (MSO) adjuvant should be included in the spray solution. Refer to Tank mixtures. Excessive wetting of the target plant is not necessary but good spray coverage of the target plant is needed for best results. Weeds hardened off by cold weather or drought stress may not be controlled.

Method 240 SL Herbicide is non-corrosive to spray equipment, non-flammable and non-volatile.

Biological activity

Method 240 SL Herbicide is quickly taken up by the leaves, stems and roots of plants. The effects of Method 240 SL Herbicide may be seen on plants from within a few hours to a few days. The most noticeable symptom is a bending and twisting of stems and leaves. Other advanced symptoms include severe necrosis, stem thickening, growth stunting, leaf crinkling, calloused stems and leaf veins, leaf-cupping and enlarged roots. Death of treated broadleaf plants may require several more weeks and up to several months for some woody plant species. Method 240 SL Herbicide is rain-fast at 1 hour after application.

Crop safety

Exposure to Method 240 SL Herbicide may injure or kill most crops and may injure or kill desirable vegetation. Injury may be more severe when the crops or desirable vegetation are irrigated. Certain species may be susceptible to damage or plant death from low doses of Method 240 SL Herbicide including, but not limited to, beech species, conifers (Douglas fir, Pinus species, Kauri), Eucalypt species, Acacia species, legumes (clovers, lucerne, lupins), Manuka, ornamental shrubs, Poplar species, silver birch and willow species.

Applications made where runoff water flows onto agricultural land may injure or kill crops such as, but not limited to, canola, potatoes, tomatoes, legume crops (e.g. pulses, lucerne, lupins), grapes, fruit trees and vegetables.

Caution is advised when using this product in areas where loss of desirable conifer or deciduous trees and/or shrubs, as well as other broadleaf plants, including but not limited to legumes and wildflowers, cannot be tolerated. Without prior experience, it is necessary that small areas containing these plants be tested for tolerance to Method 240 SL Herbicide and its soil residues before any large-scale spraying occurs.

Injury or loss of desirable trees or vegetation may result if Method 240 SL Herbicide is applied on or near desirable trees or vegetation, on areas where their roots extend, or in locations where the treated soil may be washed or moved into contact with their roots. Consider site-specific characteristics and conditions that could contribute to unintended root zone exposure to desirable trees or vegetation. Root zone areas of desirable trees or vegetation are affected by local conditions and can extend beyond the tree canopy. Treatment set-back distance should be 2.5 times the canopy dripline width of adjacent desirable non-target vegetation. For example, if a nearby desirable non-target tree has a canopy dripline width of 3 meters, the set-back from the tree should be 7.5 meters. If further information is needed regarding root zone area, consult your local Bayer representative, distributor, professional consultant or other qualified authority.

In non-crop areas adjacent to desirable vegetation, avoid overlapping spray applications and shut off spray to the spray boom while starting, turning, slowing, or stopping to avoid injury to desirable vegetation.

Leave treated soil undisturbed to reduce the potential for Method 240 SL Herbicide movement by soil erosion due to wind or water.

In the case of suspected off-site movement of Method 240 SL Herbicide to cropland, soil samples should be quantitatively analysed for Method 240 SL Herbicide, or any other herbicide which could be having an adverse effect on the crop, in addition to conducting the field bioassay.

Method 240 SL Herbicide may suppress or severely injure certain established grasses, especially when the grass plants are stressed by adverse environmental conditions. Areas that contain these grass plants should recover as environmental conditions for good grass growth occur.

Equipment

Spray equipment must be thoroughly cleaned before Method 240 SL Herbicide is sprayed. Follow the clean-up procedures specified on the labels of the previously applied products. Apply using accurately calibrated and maintained equipment. Thoroughly clean spray equipment after use. Refer to Sprayer Clean-Up.

Low rates of Method 240 SL Herbicide can kill or severely injure most crops. Following a Method 240 SL Herbicide application, the use of spray equipment to apply other pesticides to crops on which Method 240 SL Herbicide is not registered may result in their damage. The most effective way to reduce this crop damage potential is to use dedicated mixing and application equipment.

Mixing

Ensure the concentrate is thoroughly mixed. Shake before use. Add the required amount of METHOD 240 SL HERBICIDE to a partly filled spray tank with the agitation system operating. Add the remaining water and any tank mixture partners. Maintain agitation until spraying is complete. Do not allow spray mixture to stand overnight. Flush equipment with clean water after use.

Application

Broadcast application: Apply 100 L to 400 L of spray per ha. Apply with the spray boom or nozzle height as low as possible.

Individual plant treatments: Apply using foliar, cut stump, stem, basal bark and trunk injection application methods to target individual weed species. Refer to Directions for Use table.

Tank Mixtures:

A methylated seed oil (MSO) or vegetable oil adjuvant may provide increased leaf absorption of Method 240 SL Herbicide. For broadcast applications and spot spraying, include the MSO or vegetable oil adjuvant at 1% v/v (1 L per 100 L spray solution). A non-ionic surfactant at a minimum rate of 0.25% w/w may also be used. For cut stump, stem and basal bark applications, include the MSO or vegetable oil adjuvant at 10% v/v (10 L per 100 L spray solution).

Method 240 SL Herbicide is compatible with other herbicides which are registered for the situations of use, methods of applications and timings as specified on this label. Refer to the tank mix product label for any additional instructions or use restrictions. As the formulations of other manufacturers' products are beyond the control of Bayer CropScience Pty Ltd, all mixtures should be tested prior to mixing commercial quantities. Some basal oils may be incompatible with Method 240 SL Herbicide causing a precipitate to form. If unsure, a jar test is recommended to determine physical compatibility. Test for compatibility by adding Method 240 SL Herbicide to a small quantity of desired basal oil at the proper ratio, allow to stand for 30 minutes and check for physical incompatibility or precipitates. The addition of an emulsifier may be needed to ensure compatibility. With any mixture, constantly agitate prior to and during application.

Sprayer clean-up

To avoid subsequent injury to sensitive crops, immediately after spraying thoroughly remove all traces of METHOD 240 SL HERBICIDE from mixing and spray equipment by rinsing and decontamination as follows:

Rinsing

Empty the spray tank completely and drain the whole system. Thoroughly wash inside the unit using a pressure hose. Drain spray unit and clean any filters in the tank, pump, lines, hoses and nozzles. After

cleaning the spray unit as above, quarter fill with clean water and circulate the water through the pump, lines, hoses and nozzles. Drain and repeat the rinsing procedure twice. Discard rinse water on land already sprayed or on wasteland away from desirable plants and water sources.

Decontamination

Quarter-fill the tank and add a standard alkali-based laundry detergent at 500 g (or mL)/100 L water and circulate throughout the system for at least 15 minutes. If using a concentrated laundry detergent use 250 g (or mL)/100 L water. Do not use chlorine-based cleaners. Drain the whole system. Remove filters and nozzles and clean them separately. Finally, flush the system with clean water and allow to drain.

Cleaning water should be discharged onto a designated disposal area, or onto unused land away from desirable plants and water sources.

Weeds controlled

Woody weeds	
Common name	Scientific name
Acacia	*Acacia* spp.
African boxthorn	*Lycium ferocissimum*
African Olive	*Olea europaea* L.
Bitter bark	*Alstonia constricta*
Blackberry	*Rubus fruticosus*
Box elder maple	*Acer negundo*
Broad-leafed tea tree	*Melaleuca viridiflora*
Broom	*Cytisus scoparius*
Buddha wood, false sandalwood	*Eremophila mitchellii*
Cordwood wattle	*Vachellia bidwillii*
Corymbia	*Corymbia* spp.
Eucalyptus	*Eucalyptus* spp.
Gorse	*Ulex europaeus*
Hawthorn	*Crataegus monogyna*
Lantana	*Lantana camara*
Mesquite	*Prosopis glandulosa x P. velutina*
Native boxthorn	*Bursaria spinosa; B. incana*

Woody weeds	
Prickly acacia	*Vachellia nilotica*
Radiata pine	*Pinus radiata*
Rough-barked apple	*Angophora floribunda*
Scrub leopardwood	*Flindersia dissosperma*
Sifton bush	*Cassinia arcuata*
Swamp box; Swamp mahogany	*Tristania suaveolens; Lophostemon suaveolens*
Wild tobacco	*Solanum mauritianum*

Broadleaf weeds, vines and other herbaceous plants	
Common name	Scientific name
Agapanthus	*Agapanthus africanus*
Asparagus fern	*Asparagus sprengeri*
Bell vine	*Ipomoea plebeia*
Black thistle	*Cirsium vulgare*
Canadian fleabane	*Conyza canadensis, Erigeron canadensis*
Capeweed	*Arctotheca calendula*
Creeping tickfoil	*Desmodium triflorum*
Fat Hen	*Chenopodium album*
Fireweed	*Senecio madagascariensis*
Flax Fleabane	*Erigeron bonariensis*
Galvanised burr	*Sclerolaena birchii*
Green cestrum	*Cestrum parqui*
Horehound	*Marrubium vulgare*
Litchi tomato	*Solanum sisymbriifolium*
Medic	*Medicago* sp.
Onion weed	*Asphodelus fistulosus*
Phyllanthus	*Phyllanthus* spp.
Plantain	*Plantago* spp.

Woody weeds	
Saffron thistle	*Carthamus lanatus*
Singapore daisy	*Sphagneticola tribolata*
Slender bluebell	*Wahlenbergia gracilis*
Slender celery	*Cyclospermum leptophyllum*
Spotted spurge	*Chamaesyce maculata, Euphorbia maculata*
St Johnswort	*Hypericum perforatum*
Subterranean clover	*Trifolium subterraneum*
Wandering jew	*Tradescantia albifloria, Hypochaeris albiflora*
Zygophyllum simplex	*Zygophyllum simplex*

Resistant weeds warning

Group 4 herbicide:

Method 240 SL Herbicide is a Group 4 herbicide (pyridine carboxylic acids) and has the disruptor of plant cell growth (auxin mimic) mode of action. For weed resistance management Method 240 SL Herbicide is a Group 4 herbicide. Some naturally occurring weed biotypes resistant to Method and other Group 4 herbicides, may exist through normal genetic variability in any weed population. These resistant individuals can eventually dominate the weed population if these herbicides are used repeatedly. These resistant weeds will not be controlled by Method or other Group 4 herbicides. DO NOT rely exclusively on Method 240 SL Herbicide for weed control. Use as part of an integrated weed management program involving herbicides with other modes of action and non-chemical methods of control. Since occurrence of resistant weeds is difficult to detect prior to use Bayer CropScience Pty Ltd accepts no liability for any losses that may result from the failure of Method 240 SL Herbicide to control resistant weeds.

Integrated pest management:

Toxic to beneficial arthropods. Not compatible with integrated pest management (IPM) programs utilising beneficial arthropods. Minimise spray drift to reduce harmful effects on beneficial arthropods outside the treatment area.

Protection of crops, natives and other non-target plants:

DO NOT apply or drain or flush equipment on or near native or non-target trees or other plants or on areas where their roots may extend or in locations where the chemical may be washed or moved into contact with their roots.

DO NOT apply Method 240 SL Herbicide within the root zone of desirable trees and/or shrubs unless injury or loss can be tolerated. Root zones of desirable trees/shrubs may extend beyond the tree canopy.

DO NOT apply this product if site-specific characteristics and conditions exist that could contribute to movement and unintended root zone exposure to desirable trees or vegetation unless injury or loss can be tolerated.

DO NOT apply Method 240 SL Herbicide to highways/roadsides or other non-crop areas during periods of intense rainfall or where prevailing soils are either saturated with water or of a type through which rainfall will not readily penetrate, as this may result in off-site movement.

DO NOT apply in or on dry or water-containing irrigation ditches or canals including their outer banks.

DO NOT apply through any type of irrigation system.

DO NOT contaminate water intended for irrigation. To avoid injury to crops or other desirable vegetation, do not treat or allow spray drift or run-off to fall onto banks or bottoms of irrigation ditches, either dry or containing water, or other channels that carry water that may be used for irrigation purposes.

DO NOT apply Method 240 SL Herbicide when powdery dry soil or light or sandy soils are known to be prevalent in the area to be treated. Treatment of powdery dry soil and light sandy soils, when there is little likelihood of rainfall soon after treatment, may result in off-target movement and possible damage to susceptible crops and desirable vegetation when soil particles are moved by wind or water. Injury to crops or desirable vegetation may result if treated soil is washed, blown, or moved onto land used to produce crops or land containing desirable vegetation.

DO NOT use on turf, lawns, walks, paved driveways, tennis courts, or similar areas.

DO NOT apply more than 1.3 litres product per broadcast ha per year as a result of broadcast, spot, or repeat applications.

DO NOT use plant material treated with this product for mulch or compost. See Management Of Residues In Compost, Mulches And Animal Waste.

DO NOT plant the treated sites for at least one year after the Method 240 SL Herbicide application if non-crop sites treated with Method 240 SL Herbicide are to be converted to a food, feed, or fiber agricultural crop, or to a horticultural crop. A field bioassay must then be completed before planting the desired crop.

Field bioassay:

DO NOT plant treated sites for at least one year after application if these sites are to be converted to a food, feed or fibre crop. A field bioassay should be completed before planting the desired crop. To conduct a field bioassay, grow to maturity test strips of the crop you plan to grow the following year.

Select a representative area or areas of the field previously treated with Method 240 SL Herbicide to plant your bioassay crop(s). Be sure to consider factors such as size of field, soil texture, drainage and headlands when selecting the site(s) that are most representative of the soil conditions in the field. On large fields, more than one site may be needed in order to obtain reliable results.

Prepare a seed bed and plant the crops and varieties you want the option of growing the following year. It is important to use the same planting time, conditions, techniques and cultural practices you normally use to plant and grow the bioassay crop(s). Also plant into an adjacent area not treated with Method Herbicide to use as a comparison.

Plant the test strips perpendicular to the direction in which the field was sprayed. The strips should be long enough to cross the width of several spray swaths. Large test strip areas are more reliable than small ones.

Use standard cultivation and seeding equipment to plant the bioassay.

Crop response to the bioassay will indicate whether or not to plant the crop(s) grown in the test strips. If no crop injury (such as: poor germination/emergence, chlorosis, malformation or necrosis of the leaves) is evident from the crop(s) grown in the test strips, the intended crop may be planted. If herbicide symptoms or yield loss are observed, do not plant the crop(s).

Management of residues in compost, mulches and animal waste:

The following restrictions apply to all plant materials from areas treated with Method 240 SL Herbicide within the previous 18 months.

DO NOT use plant material as mulch or compost and do not apply directly on or around desirable plants.

Hay or forage made from grass which has been treated with Method 240 SL Herbicide within the previous 18 months, must only be used on-farm.

Plant material from the treated area is no longer subject to the above restrictions 18 months after treatment.

Manure management

Aminocyclopyrachlor, the active ingredient in Method 240 SL Herbicide, passes through an animal's digestive tract and is excreted in urine and manure at levels that may cause injury to susceptible plants. DO NOT transfer grazed animals from areas treated with Method 240 SL Herbicide to areas where sensitive crops occur without first allowing 3 days of grazing on untreated areas.

The following restrictions apply to manure from animals that have grazed forage or eaten hay from areas that have been treated with METHOD 240 SL HERBICIDE within the previous 18 months.

DO NOT apply manure to land used for growing susceptible crops.

Manure may only be applied on pastoral grazing land.

DO NOT use manure as mulch or compost and do not apply directly on or around desirable plants.

Manure must only be used on-farm.

After removing animals from grazing on treated areas or eating forage or hay from treated areas and waiting 3 days for treated material to clear the animal's digestive system, the animal’s manure is no longer subject to the above restrictions.

Protection of livestock:

Grazing, hay and forage-making – There are no grazing, hay or forage-making restrictions for non-lactating or lactating animals (including cattle, horses, sheep and goats) when using Method 240 SL Herbicide as directed. Grazing animals do not have to be moved off the pastoral grazing land before, during or after applying Method 240 SL Herbicide. See Manure management for additional information.

Poisonous plants may become more palatable after spraying and stock should be kept away from these plants until they have died down. Many plants remain poisonous after death and stock should not be allowed access, as there is a likelihood that they may graze the dead material. Such material should be burnt if possible.

Protection of wildlife, fish, crustaceans and environment:

DO NOT contaminate wetlands or watercourses with this product or used containers.

Storage and disposal:

Keep out of reach of children. 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. Add rinsings to spray tank. Do not dispose of undiluted chemicals on site. 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. DO NOT re-use empty container for any other purpose.

Acronyms and abbreviations

Shortened term	Full term
a.c.	Active constituent
ADI	Acceptable daily intake (for humans)
ae	Acid equivalent
ai	active ingredient
ARfD	Acute reference dose
bw	Bodyweight
d	Day
DT_{50}	Time taken for 50% of the concentration to dissipate
EC_{50}	concentration at which 50% of the test population are immobilised
E_rC_{50}	concentration at which the rate of growth of 50% of the test population is impacted
EI	Export interval
EGI	Export grazing interval
ESI	Export slaughter interval
g	Gram
GAP	Good agricultural practice
ha	Hectare
Hb	Haemoglobin
HPLC	High pressure liquid chromatography *or* high-performance liquid chromatography
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
kg	Kilogram
K_{OC}	Organic carbon partitioning coefficient
L	Litre
LC_{50}	concentration that kills 50% of the test population of organisms

Shortened term	Full term
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
LOQ	Limit of quantitation – level at which residues can be quantified
mg	Milligram
mL	Millilitre
MRL	Maximum residue limit
NEDI	National estimated daily intake
NESTI	National estimated short-term intake
ng	Nanogram
NOEC/NOEL	No observable effect concentration level
NOAEL	No observed adverse effect level
OC	Organic carbon
po	Oral
PPE	Personal protective equipment
ppm	parts per million
RAL	Regulatory acceptable level
RBC	Red blood cell count
sc	Subcutaneous
SC	Suspension concentrate
SSD	Species sensitivity distribution
SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons
TGA	Therapeutic Goods Administration
µg	Microgram
WHP	Withholding period

Glossary

Term	Description
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