
Contents

Preface	1
About this document	1
Making a submission	1
Further information	2
Introduction	3
Applicant	3
Purpose of application	3
Proposed claims and use pattern	3
Mode of action	3
Overseas registrations	3
Chemistry and manufacture	4
Active constituent	4
Formulated product Maya Herbicide	6
Recommendations	7
Toxicological assessment	8
Evaluation of toxicology	8
Health-based guidance values and poisons scheduling	10
Recommendations	10
Residues assessment	11
Metabolism	11
Analytical methods and storage stability	11
Residue definition	11
Residues in food and animal feeds	11
Crop rotation	12
Residues in animal commodities	12
Spray drift	12
Dietary risk assessment	13
Recommendations	13
Assessment of overseas trade aspects of residues in food	14
Work health and safety assessment	15
Health hazards	15
Occupational exposure	15
Public exposure	15

Recommendations	15
<hr/>	
Environmental assessment	17
Fate and behaviour in the environment	17
Effects and associated risks to non-target species	19
Recommendations	21
<hr/>	
Efficacy and safety assessment	22
Proposed product use pattern	22
Efficacy and target crop/animal safety	22
Recommendations	23
<hr/>	
Labelling requirements	24
Abbreviations	30
Glossary	33
References	34

List of tables

Table 1: Nomenclature and structural formula of bromoxynil butyrate active constituent	4
Table 2: Key physicochemical properties of the active constituent bromoxynil butyrate	5
Table 3: Key aspects of the formulation of the product Maya Herbicide	7
Table 4: Physicochemical properties of the product Maya Herbicide	7
Table 5: Amendments to the APVMA MRL Standard	13

Submissions must be received by the APVMA by close of business on 4 May 2021 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:

Executive Director Registration Management
Australian Pesticides and Veterinary Medicines Authority
GPO Box 3262
Sydney NSW 2001

Phone: +61 2 6770 2300

Email: enquiries@apvma.gov.au

Further information

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

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

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

Table 2: Key physicochemical properties of the active constituent bromoxynil butyrate

Physical form:	Powder	
Colour:	Light beige to brown	
Melting point:	81–84°C for the bromoxynil butanoate technical grade active ingredient (TGAI) 86°C for the bromoxynil butanoate pure active ingredient (PAI)	
Boiling point:	325°C (TGAI) 353–356°C (PAI)	
Relative density	$D_{4}^{20} = 1.75$	
Stability:	Bromoxynil butyrate is expected to remain in compliance with its specifications for at least 2 years storage under normal conditions, and it is unlikely to be adversely affected by the presence of metals or metal ions.	
Safety properties:	Bromoxynil butyrate is not flammable, not auto-flammable, not explosive and has no oxidising properties	
Solubility in water:	5.4 mg/L at 20°C	
Organic solvent solubility:	Solvent	Solubility at 20°C (g/L)
	<i>n</i> -Heptane	23
	Ethanol	~ 70
	Toluene	> 600
	Dichloromethane	> 600
	Acetone	> 600
	Ethyl acetate	> 600
	Dimethyl sulphoxide	> 600
Octanol/water partition coefficient:	Log $P_{ow} = 3.86$ at 40°C	
Vapour pressure:	2.8×10^{-4} Pa at 20°C and 6.7×10^{-4} Pa at 25°C for the bromoxynil butanoate pure active substance	
Henry's law constant:	$K = 1.80 \times 10^{-2}$ Pa m ³ mol ⁻¹ at 20°C	

UV/VIS absorption spectra:

In methanol:

Wavelength	ϵ (L mol ⁻¹ cm ⁻¹)
213 nm	48122
283 nm	723
294 nm	633

In methanol / HCl 0.1 M (90/10):

Wavelength	ϵ (L mol ⁻¹ cm ⁻¹)
213 nm	47730
285 nm	783
294 nm	715

In methanol / NaOH 0.1 M (90/10):

Wavelength	ϵ (L mol ⁻¹ cm ⁻¹)
222 nm	25217
287 nm	17812
294 nm	17343

For the bromoxynil butanoate pure active ingredient (PAI)

Formulated product Maya Herbicide

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

Maya Herbicide is a water based suspension concentrate (SC) formulation, and it is not expected to have significant safety-related issues during transportation, storage or usage. It should remain within specifications for at least 2 years when stored under normal conditions.

Table 3: Key aspects of the formulation of the product Maya Herbicide

Distinguishing name:	Maya Herbicide
Formulation type:	Suspension concentrate (SC)
Active constituent concentration/s:	<p>A total of 402 g/L bromoxynil active equivalents, including:</p> <ul style="list-style-type: none"> • 385.5 g/L bromoxynil present as 482.9 g/L of bromoxynil butyrate ester • 9.7 g/L bromoxynil present as 14.1 g/L of bromoxynil octanoate • 6.8 g/L bromoxynil present as 6.8 g/L of the bromoxynil phenol.

Table 4: Physicochemical properties of the product Maya Herbicide

Physical form:	Light beige coloured viscous opaque liquid with butyric odour
PH (undiluted):	4.44
Density:	1.235 g/cm ³ at 20°C
Kinematic viscosity at 20 °C:	<p>Non-newtonian fluid:</p> <p>1824 mPa.s @ 2 s⁻¹;</p> <p>77 mPa.s @ 200 s⁻¹</p>
Pourability:	<p>Residue: 2.9% w/w</p> <p>Rinsed residue: 1st rinse: 0.29% w/w; 2nd rinse: 0.07% w/w</p>
Sponetaneity of dispersion:	0.5% v/v in CIPAC water D: 86.6% at 20°C
Suspensibility:	<p>0.50% v/v in CIPAC water D: 87.5% at 20°C</p> <p>0.25% v/v in CIPAC water D: 77.6% at 20°C</p>
Safety properties:	Maya Herbicide is not flammable, auto-flammable or explosive and has no oxidising properties. It does not adversely impact the integrity of the proposed packaging (5, 10 and 20 L HDPE containers).
Storage stability:	Maya Herbicide should remain within specifications for at least 2 years when stored under normal conditions.

Recommendations

The APVMA has evaluated the chemistry of the active constituent bromoxynil butyrate and associated product Maya Herbicide, including the manufacturing process, quality control procedures, physicochemical properties, 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 Maya Herbicide, and approval of the active constituent bromoxynil butyrate, are supported from a chemistry perspective.

Acute toxicity (product)

Maya Herbicide was of low to moderate acute oral toxicity (>300 to <2000 mg/kg bw), low acute dermal toxicity, and low to moderate acute inhalation toxicity. It was not irritant to rabbit skin, but was a moderate eye irritant in rabbits, and a sensitiser in the guinea pig maximisation test.

Repeat-dose toxicity

Data from a 28-day dermal toxicity study with a number of formulations of bromoxynil butyrate (suspension concentration and emulsifiable concentrate), as well as an emulsifiable concentrate formulation containing bromoxynil octanoate, was examined. As doses of up to 100 mg/kg bw/day, no signs of systemic or local toxicity were displayed, and no indication of absorption differences between formulations was observed.

Following oral dosing with bromoxynil or its esters, the key effects observed were changes in haematological and biochemical parameters, and liver effects.

Chronic toxicity and carcinogenicity

Following long term dietary administration in mice, liver effects including hyperplasia were seen at doses of 1.5 mg/kg bw/day. In rats, reduced body weight was noted, with a no observed adverse effect level seen at 2.6 mg/kg bw/day. In dogs, reduced body weight gain, biochemical changes and increased liver weight were observed at 1.5 mg/kg bw/day, with a no observed adverse effect level of 0.3 mg/kg bw/day.

Reproductive and developmental toxicity

Multi-generation, reproductive toxicity studies in rats showed decreases in parental bodyweight, along with reduced pup numbers, and pup bodyweight. No effects were noted on overall fertility, gestation length, or litter size, and a NOAEL of 1.5 mg/kg bw/day was established in a 3-generation study.

Developmental toxicity studies in rats using doses that resulted in decreased maternal body weight, decreased numbers of live foetuses, decreased foetal weight and increased late uterine deaths were observed. A NOAEL of 5 mg/kg bw/day was established. In rabbits, no effects on foetal development were observed, even at doses producing maternal toxicity.

Genotoxicity

In bacterial mutation assays, bromoxynil butyrate was not mutagenic, with or without metabolic activation.

Reports related to human toxicity

An occupational exposure study investigated exposure to, and absorption of bromoxynil during handling, transferring, mixing, and application. This study demonstrated that personal protective equipment and the use of closed cabs on tractors were effective at reducing overall exposure to bromoxynil.

Health-based guidance values and poisons scheduling

Poisons Standard

Bromoxynil is listed in Schedule 6 of the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP). The entry includes bromoxynil butyrate and its salts and derivatives.

Health-based guidance values

Acceptable daily intake

The acceptable daily intake (ADI) for bromoxynil has been established at 0.003 mg/kg bw/d, based on a NOAEL of 0.3 mg/kg bw/d for reduced bodyweight gain at the next higher dose in a 1-year dietary dog study. There are no separate ADIs for the esters of bromoxynil. They are rapidly metabolised to bromoxynil in mammalian systems, and toxicity is a function of the parent, bromoxynil. The current ADI therefore applies to all esters, including bromoxynil butyrate, expressed as bromoxynil (bromoxynil phenol) equivalent.

Acute reference dose

An acute reference dose (ARfD) has not been previously established for bromoxynil. Based on the developmental effects observed in rats from oral dosing with bromoxynil (and dermal dosing with bromoxynil or bromoxynil octanoate), which may be attributable to a single dose via dietary exposure, an ARfD of 0.05 mg/kg bw is proposed. This is based on a NOAEL of 5 mg/kg bw, which is based on decreased numbers of live foetuses at doses of 15 mg/kg bw/day in a rat developmental study in the presence of maternal toxicity. This ARfD only applies to women of child-bearing age, and an ARfD for the general population is considered unnecessary.

Recommendations

There are no objections on human health grounds to the approval of bromoxynil butyrate (BXB), manufactured at the proposed site.

There are no objections on human health grounds to the registration of the product, Maya Herbicide, containing 385.5 g/L of bromoxynil butyrate (BXB), 9.7 g/L bromoxynil octanoate (BXO) and 6.8 g/L bromoxynil phenol (BXP), when used in accordance with the directions for use (DFU) and adhering to the recommended safety directions.

Dietary risk assessment

The chronic dietary exposure to bromoxynil is estimated by the National Estimated Daily Intake (NEDI) calculation, which encompasses 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 the dietary exposure to chemical residues in food. The NEDI for bromoxynil is equivalent to <75% of the ADI. It is concluded that the chronic dietary exposure value for bromoxynil is acceptable.

Acute dietary exposure is estimated by the National Estimated Short Term Intake (NESTI) calculation. NESTI calculations are made in accordance with the deterministic method used by the JMPR, including 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 has not been considered by the APVMA, OCS or JMPR, therefore a NESTI calculation is not required.

Recommendations

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

Table 5: Amendments to the APVMA MRL Standard

Amendments to Table 1		
Compound	Food	MRL (mg/kg)
Delete:		
Bromoxynil		
VA 0385	Onion, bulb	T*0.01
Add:		
Bromoxynil		
VA 0385	Onion, bulb	*0.01

First aid instructions

If poisoning occurs, contact a doctor or Poisons Information Centre. Phone Australia 131126; New Zealand 0800 764 766

Safety directions

Harmful if inhaled or swallowed. Will irritate the eyes, nose and throat. Repeated exposure may cause allergic disorder. Avoid contact with eyes and skin. Do not inhale vapour or spray mist. When opening the container and preparing the spray, wear cotton overalls buttoned to neck and wrist and a washable hat, elbow length chemical resistant gloves and face shield or goggles. If applying by open cab boomspray equipment, wear protective waterproof clothing and a disposable mist mask covering mouth and nose. If product is in eyes, wash out immediately with water. Wash hands after use. After each day's use, wash gloves, face shield or goggles and contaminated clothing.

Precautionary (warning) statements

DO NOT harvest crop by hand. The crop is to be seed grown and mechanically harvested only.

The following re-entry intervals (number of days after spraying) are required for the specified crop maintenance activities in bulb onions:

Scouting		Day 1
Hand weeding	(minimum foliage)	Day 1
Hand set irrigation		Day 4
Hand weeding	(full foliage)	Day 11

For all other activities DO NOT enter treated areas until the spray has dried, unless wearing cotton overalls buttoned to the neck and wrist (or equivalent clothing) and chemical resistant gloves. Clothing must be laundered after each days use.

under natural sunlight, numerous major photoproducts were formed depending on the precursor (M03³ and M11⁴ for butyrate; M06⁵ and M09⁶ for octanoate; M12⁷ and M13⁸ for bromoxynil).

In dark water/sediment systems, bromoxynil and its esters tend to remain in the water phase and are not persistent (geomean DT₅₀ 0.67 days for esters and 9.1 days for bromoxynil in the whole system). The major metabolites M01 (max 27% AR), M03 (max 12% AR) and M06 (max 33% AR) also tend to stay in the water phase. After 60 to 100 days, mineralisation and bound residues reached 55% to 65% AR and 15% to 25% AR, respectively.

Air

Based on their vapour pressures and Henry's law constants, bromoxynil butyrate, bromoxynil octanoate and bromoxynil are considered to be semi-volatile substances and have potential for volatilization from soil and plant surfaces. Volatilisation increases with increasing temperature and dryness. Laboratory studies indicated <3% and <0.5% of applied bromoxynil octanoate volatilised from soil and plant surfaces, respectively. Up to 7.7% and 16% of applied bromoxynil phenol volatilised from soil and plant surfaces, respectively. No data was submitted regarding the potential for volatilisation of the bromoxynil butyrate from soil and plant surfaces. It is therefore recommended to reduce the potential for volatilisation of bromoxynil butyrate from sprayed plants and soil surfaces by restricting application to temperatures not exceeding 20°C.

Based on the predicted rate of degradation in air, bromoxynil octanoate (DT₅₀ 1.4 days for reaction with hydroxyl radicals) and bromoxynil phenol (DT₅₀ 0.070 days for reaction with nitrate radicals) are not expected to be found in any significant concentration in the air. However, predicted rates of reaction of bromoxynil butyrate with hydroxyl or nitrate radicals exceed POP criterion for persistence in air (DT₅₀ >2 days). Consequently, the potential for long-range transport of bromoxynil butyrate cannot be excluded. Wet deposition is expected to be an important removal process of bromoxynil butyrate from air (i.e. via precipitation).

Despite the potential for long-range transport, risks of bromoxynil butyrate to the atmosphere and environment were concluded to be acceptable. Risks of global warming, ozone depletion, photochemical smog formation, acidification and eutrophication due to bromoxynil butyrate are considered either low, or no greater than those of bromoxynil phenol. Any residues potentially deposited in remote environments are expected to represent only a very small fraction of the overall applied rate. Therefore, the in-field and edge-of-field risk assessments (including short-range vapour drift) are considered protective of non-target species in remote regions.

³ 3-bromo-4-hydroxybenzotrile

⁴ 2-bromo-4-cyanophenyl butyrate

⁵ 4-hydroxybenzotrile

⁶ 2-bromo-4-cyanophenyl octanoate

⁷ 3-bromo-4,5-dihydroxybenzotrile

⁸ 3,4-dihydroxybenzotrile

Effects and associated risks to non-target species

Terrestrial vertebrates

The new active constituent bromoxynil butyrate is moderately toxic to mammals (LD₅₀ 116 mg ae/kg bw, *Rattus norvegicus*) and birds (geomean LD₅₀ 448 mg ae/kg bw, *Colinus virginianus*). Its toxicity is relatively equivalent to other bromoxynil esters (octanoate and heptanoate), and the lowest LD₅₀ values for acute toxicity of bromoxynil esters to birds and mammals were selected for risk assessment purposes.

The residues assessment determined that bromoxynil is the relevant residue of bromoxynil esters applied to plants. Bromoxynil is moderately toxic to mammals (geomean LD₅₀ 126 mg ae/kg bw, *Rattus norvegicus*) and birds (LD₅₀ 217 mg ae/kg bw, *Colinus virginianus*). In reproductive toxicity tests, reduced pup body weights were observed in mammals at doses as low as 18 mg ae/kg bw/d (NOAEL 3.4 mg ae/kg bw/d, *Rattus norvegicus*) and a reduction in eggs laid per bird was observed at doses as low as 38 mg ae/kg bw/d (NOAEL 11 mg ae/kg bw/d, *Anas platyrhynchos*).

Risks of bromoxynil and its esters to terrestrial vertebrates were determined to be acceptable assuming direct dietary within the treatment area at the maximum exposure rate.

The partition coefficients of bromoxynil esters indicate a potential for bioaccumulation. However, bromoxynil is not fat-soluble, and toxicokinetic studies in mammals have demonstrated that bromoxynil esters are rapidly hydrolysed to bromoxynil and almost completely eliminated from the body within 7 days. Based on predicted rapid degradation of esters in the terrestrial environment, rapid metabolism and elimination by animals, the potential for esters to bioconcentrate and biomagnify in birds and mammals is considered low.

Aquatic species

The new active constituent bromoxynil butyrate is very toxic to fish (LC₅₀ 0.026 mg ae/L without sediment, LC₅₀ 0.068 mg ae/L with sediment, *Oncorhynchus mykiss*), aquatic invertebrates (EC₅₀ 0.17 mg ae/L, *Daphnia magna*), algae (E_rC₅₀ 0.60 mg ae/L, *Navicula pelliculosa*) and aquatic plants (E_rC₅₀ 0.10 mg ae/L, *Lemna gibba*). Its toxicity is relatively equivalent to other bromoxynil esters (octanoate and heptanoate), and the lowest EC₅₀ values for acute toxicity of bromoxynil esters to aquatic species were selected for risk assessment purposes (geomean EC₅₀ 0.038 mg ae/L was determined in the case of aquatic invertebrates).

Because bromoxynil esters rapidly degrade in water, bromoxynil is the residue most relevant to water. Bromoxynil is less toxic to fish (lowest LC₅₀ 23 mg ae/L, *Oncorhynchus mykiss*) and aquatic invertebrates (EC₅₀ 12 mg ae/L, *Daphnia magna*), but still very toxic to algae (lowest E_rC₅₀ >0.68 mg ae/L, *Navicula pelliculosa*), and aquatic plants (E_rC₅₀ 0.12 mg ae/L, *Lemna gibba*). The difference in toxicity to fish and aquatic invertebrates is attributed to esters having higher lipophilic tendency and greater ability to diffuse across biological membranes. Based on the high toxicity of bromoxynil and its esters to aquatic species, a protection statement is required on the label to identify the hazard.

Spray drift risks are driven by the high toxicity of bromoxynil esters to aquatic invertebrates. Mandatory buffer zones for the protection of natural aquatic areas were determined to be 10 to 35 metres for boom sprayers, depending on the boom height. Risks of vapour deposition by itself were determined to be acceptable, and is

expected to result in a negligible increase in risk when buffer zones are observed for the mitigation of spray drift.

Runoff risks of bromoxynil to aquatic species were determined to be acceptable under realistic worst-case conditions. However, the product should not be applied when a runoff event can be expected soon after application (i.e. due to storms or irrigation). General runoff restraints are advised to mitigate this risk.

Bees and other non-target arthropods

Maya Herbicide has low toxicity to adult bees by contact exposure (LD₅₀ 202 µg ae/bee, *Apis mellifera*) and moderate toxicity by oral exposure (LD₅₀ 78 µg ae/bee, *Apis mellifera*). The toxicity of bromoxynil and its esters (butyrate, octanoate, heptanoate) to bees are relatively equivalent, and the lowest available toxicity values were selected for risk assessment purposes (for adult bees: contact LD₅₀ 150 µg ae/bee, oral LD₅₀ 11 µg ae/bee). Bromoxynil has moderate toxicity to bee larvae (LD₅₀ 41 µg ae/bee). Following long-term dietary exposure of adult bees, no impact on mortality was observed at the highest dose tested (NOED 3.5 µg ae/bee). Adverse effects on bees that might be foraging on blooming weeds or plants in the vicinity of the treatment area could not be excluded based on the available data. Therefore, protection statements are advised to mitigate this risk.

Tier 2 extended laboratory testing with Maya Herbicide on natural substrates (leaves/plants) demonstrated continued sensitivity of the predatory mite (LR₅₀ 48 g ae/ha, ER₅₀ >80 g ae/ha, *Typhlodromus pyri*), while the parasitic wasp was not sensitive (both LR₅₀ and ER₅₀ >402 g ae/ha, *Aphidius rhopalosiphii*). Testing of additional species is available with the EC octanoate formulation which demonstrated low sensitivity of ground beetles on inert substrate (both LR₅₀ and ER₅₀ >450 g ae/ha, *Poecilus cupreus*) and green lacewing on natural substrate (both LR₅₀ and ER₅₀ >450 g ae/ha, *Chrysoperla carnea*). Other species of parasitic arthropods were more sensitive, such as the rove beetle (ER₅₀ 450 g ae/ha, *Aleochara bilineata*) and another species of parasitic wasp (78% reduction in parasitism at 399 g ae/ha, *Trichogramma cacoeciae*). An aged residues study with the most sensitive species indicates residues can be expected to be safe within 7 days after the last application. A protection statement is therefore recommended to advise on the potential impacts of Maya Herbicide on integrated pest management programs utilising beneficial arthropods.

Soil organisms

The new active constituent bromoxynil butyrate is moderately toxic to soil macro-organisms such as earthworms (LC_{50corr} 70 mg ae/kg dry soil, *Eisenia fetida*). Following long-term exposure, no adverse effects were observed in springtails (NOEC 100 mg ae/kg dry soil, *Folsomia candida*) or soil mites (NOEC 150 mg ae/kg dry soil, *Hypoaspis aculeifer*). However, Maya Herbicide adversely affected the reproduction of earthworms in a dose-dependent manner (EC_{10corr} 2.3 mg ae/kg dry soil, *Eisenia fetida*). Maya Herbicide did not adversely affect soil processes such as nitrogen turnover or carbon mineralisation at the highest test concentration (NOEC 2.7 mg ae/kg dry soil). The toxicity of bromoxynil butyrate is relatively equivalent to bromoxynil and other esters (octanoate and heptanoate), and the lowest toxicity values were selected for risk assessment purposes (LC_{50corr} 10 mg ae/kg dry soil in the case of acute toxicity to soil macro-organisms). Risks of bromoxynil and its esters to soil organisms were determined to be acceptable within the treatment area at the maximum exposure rate.

Non-target terrestrial plants

The effects of Maya Herbicide was tested on 10 crop species following pre-emergent (seedling emergence) and post-emergent (vegetative vigour) exposure. The most sensitive species following pre-emergent exposure was lettuce (ER₂₅ 211 g ae/ha, ER₅₀ 292 g e/ha, *Lactuca sativa*) and turnip was the most sensitive species following post-emergent exposure (ER₂₅ 6.4 g ae/ha, ER₅₀ 8.4 g ae/ha, *Raphanus sativus*). Mandatory buffer zones for the protection of vegetation areas were determined to be 45 to 140 metres for boom sprayers, depending on the boom height. Risks of vapour deposition by itself were determined to be acceptable, and is expected to result in a negligible increase in risk when buffer zones are observed for the mitigation of spray drift.

Recommendations

Based on assessment of the environmental data, the proposed use of Maya Herbicide is not, or would not be, likely to have an unintended effect that is harmful to animals, plants or things or to the environment following use in accordance with label instructions. To reduce the potential for volatilisation of bromoxynil butyrate from sprayed plants and soil surfaces, the product should not be applied when temperatures exceeding 20°C can be expected. Buffer zones of 10 to 35 metres are advised for the protection of natural aquatic areas and 45 to 140 metres for the protection of vegetation areas. Spray drift to flowering plants and non-crop areas should also be minimised for the protection of bees and other non-target arthropods. Standard runoff restraints are also advised to avoid a runoff event occurring soon after application (i.e. due to storms or irrigation).

For all other activities **DO NOT** enter treated areas until the spray has dried, unless wearing cotton overalls buttoned to the neck and wrist (or equivalent clothing) and chemical resistant gloves. Clothing must be laundered after each day's use.

INTEGRATED PEST MANAGEMENT

Toxic to beneficial arthropods. In-crop residues are expected to be safe for beneficial arthropods within 7 days after the last application. Minimise spray drift to reduce harmful effects on beneficial arthropods in non-crop areas.

PROTECTION OF WILDLIFE, FISH, CRUSTACEANS AND ENVIRONMENT

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

PROTECTION OF HONEY BEES AND OTHER INSECT POLLINATORS

Harmful to bees. **DO NOT** allow spray drift to flowering weeds or flowering crops in the vicinity of the treatment area. Before spraying, notify beekeepers to move hives to a safe location with an untreated source of nectar and pollen, if there is potential for managed hives to be affected by the spray or spray drift.

STORAGE AND DISPOSAL

Store in the closed, original container in a dry, cool well-ventilated area out of direct sunlight. Protect from frost. 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.

SAFETY DIRECTIONS

Harmful if inhaled or swallowed. Will irritate the eyes, nose and throat. Repeated exposure may cause allergic disorders. Avoid contact with eyes and skin. **DO NOT** inhale vapour or spray mist. When opening the container and preparing the spray, wear cotton overalls buttoned to the neck and wrist and a washable hat, elbow-length chemical resistant gloves and face shield or goggles. If applying by open cab boomspray equipment, wear protective waterproof clothing and a disposable mist mask covering mouth and nose. If product in eyes, wash it out immediately with water. Wash hands after use. After each day's use, wash gloves and face shield.

FIRST AID INSTRUCTIONS

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

ADDITIONAL STATEMENTS (WHS REGULATIONS 2011)

Suspected of damaging fertility or the unborn child. Toxic if swallowed. May cause an allergic skin reaction.

Harmful if inhaled. Avoid inhaling spray. Use only outdoors or in a well-ventilated area. Wear protective gloves, clothing, eye and face protection. Contaminated work clothing should not be allowed out of the workplace. IF

SWALLOWED: Rinse mouth. Immediately call a Poison Centre or doctor. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse.

SAFETY DATA SHEET

For further information refer to the Safety Data Sheet (SDS), which can be obtained from your supplier or from the Nufarm website – nufarm.com.au

In case of emergency: Phone 1800 033 498. Ask for shift supervisor. Toll free 24 hours.

CONDITIONS OF SALE

"Any provisions or rights under the Competition and Consumer Act 2010 or relevant state legislation which cannot be excluded by those statutes or by law are not intended to be excluded by these conditions of sale. Subject to the foregoing, all warranties, conditions, rights and remedies, expressed or implied under common law, statute or otherwise, in relation to the sale, supply, use or application of this product, are excluded. Nufarm Australia Limited and/or its

affiliates (“Nufarm”) shall not accept any liability whatsoever (including consequential loss), or howsoever arising (including negligence) for any damage, injury or death connected with the sale, supply, use or application of this product except for liability which cannot be excluded by statute.”

© Maya is a registered trade mark of, or used under licence by, Nufarm Australia Limited.

APVMA Approval no. 88302/120826

Nufarm Australia Limited
ACN 004 377 780
103-105 Pipe Road
Laverton North Victoria 3026
Tel: (03) 9282 1000
nufarm.com.au

Shortened term	Full term
JMPR	Joint FAO/WHO Meeting on Pesticide Residues
kg	kilogram
K _{OC}	Organic carbon partitioning coefficient
L	litre
LC ₅₀	concentration that kills 50% of the test population of organisms
LD ₅₀	dosage of chemical that kills 50% of the test population of organisms
LOD	Limit of Detection—level at which residues can be detected
Log K _{OW}	Log to base 10 of octanol water partitioning co-efficient, synonym P _{OW}
LOQ	Limit of Quantitation—level at which residues can be quantified
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
PHI	Pre-Harvest Interval
ppb	parts per billion
ppm	parts per million
PSPE	Post-Sowing Pre-Emergent Application
RAL	Regulatory-Acceptable Level
s	second
SC	Suspension Concentrate
SDRAT	Spray Drift Risk Assessment Tool
SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons

Shortened term	Full term
TRR	Total Radioactive Residues
µg	microgram
WG	Water Dispersible Granule
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

References

APVMA 2020, [Spray Drift Management](#), Australian Pesticides and Veterinary Medicines Authority, APVMA Website.