Australian Government

Australian Pesticides and Veterinary Medicines Authority

Public Release Summary

on the evaluation of the new active 1-aminocyclopropane-1-carboxylic acid in the product Accede Plant Growth Regulator

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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:

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

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

Making a submission

In accordance with sections 12 and 13 of the Agvet Code, the APVMA invites any person to submit a relevant written submission as to whether the application for registration of Accede Plant Growth Regulator 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 21 April 2026 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:

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

Please note: submissions will be published on the APVMA 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:

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Further information

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

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 *Accede Plant Growth Regulator*, and approval of the new active constituent, 1-aminocyclopropane-1-carboxylic acid.

Applicant

VALENT BIOSCIENCES A DIV OF SUMITOMO CHEMICAL AUSTRALIA.

Purpose of application

Valent BioSciences LLC has applied to the APVMA for registration of the new product Accede Plant Growth Regulator, containing 400 g/kg as a water-soluble granule (SG) formulation of the new active constituent 1-aminocyclopropane-1-carboxylic acid.

This publication provides a summary of the data reviewed and an outline of the regulatory considerations for the proposed registration of the product Accede Plant Growth Regulator, and approval of the new active constituent 1-aminocyclopropane-1-carboxylic acid.

Proposed claims and use pattern

For crop thinning in Apples, Nectarines, Peaches and Plums.

Mode of action

1-aminocyclopropane-1-carboxylic acid is a naturally occurring aliphatic amino acid and plant growth regulator, which is the precursor to the plant hormone ethylene. It acts as an ethylene releasing substance, thereby affecting the growth and development processes of plant, including fruit abscission, fruit colouring and fruit ripening.

The product is currently registered in USA, Canada and Brazil as 400 g/kg water-soluble granule (SG formulation) as well as a 100 g/kg liquid formulation in USA.

Chemistry and manufacture

Active constituent

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

1-aminocyclopropane-1-carboxylic acid is a white to off-white fine powdered solid that decomposes at 160 °C. It is soluble in water (68 g/L) but is more soluble in methanol (3500 g/L). It is practically insoluble in hexane, dichloromethane and ethyl acetate. 1-aminocyclopropane-1-carboxylic acid has a low vapour pressure of 3.64×10^{-5} Pa at 25 °C, suggesting that it has low volatility. Given a Henry's law constant of 2.65×10^{-8} Pa-m^3/mol at 25 °C, volatilisation from water is not a significant route of dissipation for 1-aminocyclopropane-1-carboxylic acid. The octanol/water partition coefficient (Log P_{ow}) is -2.9 at 20 °C, indicating that 1-aminocyclopropane-1-carboxylic acid is unlikely to be bioacumulative. The active ingredient is not surface-active. There are no safety properties (e.g. flammability, explosive, and/or oxidizing) of concern regarding 1-aminocyclopropane-1-carboxylic acid. 1-aminocyclopropane-1-carboxylic acid is expected to be stable for at least one year storage under normal conditions.

Table 1: Nomenclature and structural formula of the active constituent 1-aminocyclopropane-1-carboxylic acid

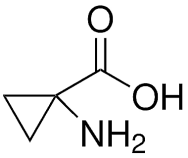
Common name (ISO):	1-aminocyclopropane-1-carboxylic acid
IUPAC name:	1-aminocyclopropane-1-carboxylic acid
CAS registry number:	22059-21-8
Molecular formula:	$C_4H_7NO_2$
Molecular weight:	101.1 g/mol
Structural formula:	

Table 2: Key physicochemical properties of the active constituent 1-aminocyclopropane-1-carboxylic acid

Physical form:	Solid
Colour:	White to off-white crystalline powder with some agglomerates
Melting point:	160°C
Boiling point:	Not determined as decomposes on melting
Relative density	1.26 g/cm^3 at 20 °C
Stability:	At ambient temperature, 1-aminocyclopropane-1-carboxylic acid was shown to be stable during storage for at least one year. At elevated temperatures, no changes in the active were observed after two weeks storage at 54 ºC. No adverse reactions with iron, aluminium, zinc or iron acetate, aluminium acetate and zinc acetate were observed following storage at 54 ºC for 2 weeks. Technical 1-aminocyclopropane-1-carboxylic acid is therefore expected to be stable on storage for at least two years under normal conditions.
Safety properties:	Not considered flammable. Not explosive. Not auto-flammable. Except for photochemical degradation in atmospheric oxidation, the 1-aminocyclopropane-1-carboxylic acid technical does not show any chemical incompatibility with oxidising and reducing agents.
Solubility in water:	68 g/L at 20 ºC
Organic solvent solubility:	Hexane: < 0.2 mg/L Xylene: < 0.2 mg/L Dichloromethane: < 0.2 mg/L Ethyl acetate: < 1 mg/L Acetone: 300 mg/L Methanol: 3500 g/L
Dissociation constant (PK$_a$):	pKa = 8.8
PH:	pH 5.6 at a 1% dilution in pure water at 20 ºC
Octanol/water partition coefficient (Log K$_{ow}$/K$_{OW}$):	Log P$_{ow}$ = -2.9, pH 7.0 at 20 °C
Vapour pressure:	3.64 × 10^{-5} Pa at 25 °C
Henry's law constant:	2.65 × 10^{-8} Pa-m^3/mol at 25 °C
UV/VIS absorption spectra:	ε = 14.75 L.mol^{-1}.cm^{-1}(λ = 203 nm) (acidic solution) no maxima recorded (λ = 217 nm) (basic solution) and(λ = 2 40 nm) (neutral solution)
Photochemical oxidative degradation:	The estimated half-life of sample for reaction with average daily air concentration of hydroxyl radicals (12-hour day; 1.5x10^{-6} OH radicals/cm^3) is 5.95 hours based on the 2nd order rate constant (Atkinson method).

Formulated product

The product Accede Plant Growth Regulator will be manufactured overseas. Tables 3 and 4 outline some key aspects of the formulation and physicochemical properties of the product.

Accede Plant Growth Regulator consists of off-white granules with no discernible odour. It contains 400 g/kg 1-aminocyclopropane-1-carboxylic acid as a water-soluble granule (SG) formulation. There are no safety properties (e.g. flash point, corrosion, explosive, and/or oxidizing) of concern regarding Accede Plant Growth Regulator. The product is expected to be stable for at least two years storage under normal conditions

Accede Plant Growth Regulator will be available in 500 g to 50 kg HDPE (high density polyethylene) containers.

Table 3: Key aspects of the formulation of the product Accede Plant Growth Regulator

Distinguishing name:	Accede Plant Growth Regulator
Formulation type:	Water-soluble granule (SG)
Active constituent concentration:	400 g/kg 1-aminocyclopropane-1-carboxylic acid

Table 4: Physicochemical properties of the product Accede Plant Growth Regulator

Physical form:	Off-white granules
PH:	5.2 ± 0.5 (1% w/v aqueous dilution)
Bulk density:	Pour density 0.45 ± 0.1 g/mL; tap density 0.50 ± 0.1 g/mL
Wettability:	< 1 second
Persistent foaming:	16 mL foam in 0.25 g/L after 1 minute 26 mL foam in 1.5 g/L after 1 minute
Degree of dispersion:	0.22% w/w residue after 5 minutes 0.004% w/w residue after 24 hours
Pourability:	Pour residue = 3.1%; rinsed residue = 0.14%
Dustiness:	Nearly dust free
Safety properties:	No flash point below boiling point. Not classified as a flammable 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 two (2) years when stored under normal conditions

Recommendations

The APVMA Chemistry section has evaluated the chemistry of the active constituent 1-aminocyclopropane-1-carboxylic acid and associated product Accede Plant Growth Regulator, including the 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 chemical product Accede Plant Growth Regulator and active constituent 1-aminocyclopropane-1-carboxylic acid were both found to meet the chemistry aspects of the safety criteria defined in the *Agricultural and Veterinary Chemicals Code Act 1994*. The registration of Accede Plant Growth Regulator, and approval of the active constituent 1-aminocyclopropane-1-carboxylic acid, are supported from a chemistry perspective.

Toxicological assessment

A toxicological assessment was undertaken from submitted studies on 1-aminocyclopropane-1-carboxylic acid (ACC) and the findings/conclusions of US EPA (2021) and Health Canada (2023) assessment reports. No significant inconsistencies were found between APVMA conclusions and these international assessments. Acute oral toxicity, acute dermal toxicity, primary eye irritation, acute inhalation toxicity, primary dermal irritation and dermal sensitisation data requirements for ACC were addressed with OECD guideline studies provided by the applicant.

Evaluation of toxicology

Chemical class

AAC is a naturally occurring non-protein amino acid produced by many plants and microorganisms. It is a potent plant growth regulator and is a precursor for ethylene production in plant tissues. Ethylene is a phytohormone which regulates plant vegetative and developmental processes such as flower development, fruit set, fruit maturation, fruit ripening, and fruit abscission.

Pharmacokinetics

The oral bioavailability of ACC in rats was 83% to 86% from single dose study. Mean faecal and urine recoveries of 6.3 ± 7.2% and 82.5 ± 7.3%, respectively of oral dose up to 168 hours. Mean bile recovery of 1.3 ± 0.3%. Mean expired air recovery of 0.21% up to 48 hours.

An *in vitro* study carried out on human skin indicates that dermal absorption is <1%.

The predominant component (96%) in plasma was unchanged parent chemical. No metabolites were detected in plasma or urine. ACC was widely distributed across all tissues with highest exposure in kidneys followed by pancreas. The $\log K_{ow}$ value for ACC is –2.78, indicating a low potential for bioconcentration in fatty tissues.

Acute toxicity (active constituent)

ACC was of low acute oral, dermal, and inhalation toxicity, is considered slightly irritating to the eyes and skin, but is not a dermal sensitiser.

Acute toxicity (product)

Accede Plant Growth Regulator has low toxicity following oral, dermal or inhalational exposure and is neither an eye or skin irritant nor a skin sensitiser in the Murine LLNA.

Repeat-dose toxicity

No target organ toxicity was observed in rodents in short-term and sub-chronic oral (dietary) studies with ACC up to doses ~1000 mg/kg bw/d.

In a 28-day dermal toxicity study with ACC in rats, the NOAEL was 1054 mg/kg bw/d for both male and females.

No LOAELs were determined in any study.

Chronic toxicity and carcinogenicity

Chronic and/or carcinogenicity studies were not carried out with ACC, which is consistent with the APVMA policy for non-genotoxic biological chemicals of low repeat dose sub-chronic toxicity.

Genotoxicity

In vitro studies with ACC were negative in bacterial reverse mutation assay (S. typhimurium TA98, TA100, TA1535, TA1537 & Escherichia coli WP2uvrA); chromosome aberration assay (Chinese hamster ovary K-1 (CHO K-1) cells) and human lymphocyte micronucleus assay.

No *in vivo* studies were available.

Reproductive and developmental toxicity

There was no evidence of reproductive toxicity in a one-generation dietary reproductive study in rats with NOAELs >270 mg ACC/kg bw/d for parental toxicity, significantly lower than NOAELs for reproductive performance (>700 mg ACC/kg bw/d) and neonatal toxicity (<735 mg ACC/kg bw/d).

Similarly, there was no evidence of developmental toxicity in rats at doses > 980 mg ACC/kg bw/d.

Neurotoxicity/immunotoxicity

No neurological effects were seen in FOB parameters and motor activity at 1035 mg ACC/kg bw/d in 28-d dose range finding study in rats. No changes in FOB parameters were seen at >790 mg ACC/kg bw/d in 90-d oral study in rats.

In the one-generation dietary reproductive study there were no ACC-related effects on mean absolute counts of total T cells, T helper cells, T cytotoxic cells, B cells, NK cells, and on NK-T cells in F1 generation animals, after potential exposure in utero, nursing, lactation or after feeding on an ACC containing diet after weaning, until PND 91.

Endocrine effects

In the one-generation reproductive study, there were no ACC-related effects on serum levels of T3 (triiodothyronine), T4 (thyroxine), or TSH (thyroid stimulating hormone) in F0 or F1 animals. There were no test substance-related effects on serum levels of T3 (triiodothyronine), T4 (thyroxine), or TSH (thyroid stimulating hormone) in F1 pups on PND 21.

An *in vitro* study was carried out to evaluate the ability of ACC to affect the endocrine system by inhibiting the catalytic activity of aromatase (CYP19). The average lowest point on the dose response curve was > 75% of controls and therefore ACC was classified as a non-inhibitor in the aromatase assay.

Mode of action (toxicology)

While ACC is a precursor to ethylene in plants, humans do not possess the ACC oxidase enzyme necessary to convert ACC into ethylene. Although, unrelated to effects seen in animal studies with ACC, a number of animal studies have demonstrated that ACC has agonist and antagonist activity on N-methyl-D-aspartate (NDMA) receptors within the mammalian central nervous system (CNS). Potential CNS effects were not addressed in the evaluations of ACC conducted by the US EPA (2021) and Health Canada (2023). No data is available regarding its potential use as a human therapeutic agent or dietary supplement.

Toxicity of metabolites and/or impurities

No impurities of toxicological concern were identified in the 5-batch analysis of ACC TGAC. No metabolites were identified in the ADME *in vivo* study in male rats. None of the metabolites or degradates found in product treated plants were considered to be of toxicological concern. In its conversion to ethylene, the carboxyl group of ACC yields CO_2 and HCN. HCN is detoxified primarily by the enzyme β-cyanoalanine synthase (β-CAS) converting free cyanide into asparagine. Although the β-CAS pathway is the major route for cyanide removal, the enzyme rhodanese reportedly contributes to detoxification in some cyanogenic plants. It has been demonstrated that plant tissues have ample capacity to detoxify HCN formed during ethylene biosynthesis with concentrations of HCN in plant tissues being low.

Reports related to human toxicity

No reports of adverse human effects from exposure to ACC were available. Due to its low acute and repeat dose toxicity in animal studies no toxicity in humans is considered likely. ACC is also a naturally occurring chemical found in plant-derived foods.

Health-based guidance values and poisons scheduling

Poisons Standard (the SUSMP)

Pursuant to regulation 42ZCZU of the Regulations, the Delegate of the Secretary of TGA made a final decision (1 October 2025) to amend the current Poisons Standard in relation to 1-aminocyclopropane-1-carboxylic acid as follows:

Schedule 5 - CAUTION

1-AMINOCYCLOPROPANE-1-CARBOXYLIC ACID except in plant growth preparations containing 40% or less of 1-aminocyclopropane-1-carboxylic acid.

Health-based guidance values

Although there is potential for dietary exposure resulting from the proposed use of Accede Plant Growth Regulator, the human health risk is anticipated to be negligible due to its low toxicity, infrequent application and rapid degradation once applied to the crop. In addition, ACC is a naturally occurring compound in plant tissues and part of the normal human diet.

As such, the establishment of an acceptable daily intake (ADI) or acute reference dose (ARfD) for ACC is not considered necessary. ACC is in Table 5 of the MRL Standard for Residues of Chemical Products.

Recommendations

APVMA has no objections on human health grounds to the approval of 1-aminocyclopropane-1-carboxylic acid (ACC) as a new active constituent.

There are no objections on human health grounds to the registration of the product Accede Plant Growth Regulator, containing 400 g/kg of ACC when used in accordance with the directions for use (DFU) and adhering to the recommended safety directions

Residues assessment

As part of the residues assessment of 1-aminocyclpropane-1-carboxylic acid (ACC), publications on plant metabolism, supervised residue trial data for apples and stone fruit, fate in storage and residues and trade information were considered.

Metabolism

The applicant provided a literature search/review relating to the natural occurrence of 1-aminocyclopropane-1-carboxylic acid (ACC) and the metabolic pathway in plants and the impact of physical phenomena (e.g. light, temperature or stress) on the ACC levels in plants and consequent ethylene production. It was concluded that ACC is the direct precursor of the plant hormone ethylene and is identified as naturally occurring in all higher plants.

The occurrence and metabolism of ACC has been widely studied in plants covering different crop groups (fruit crops, leafy crops, pulses and oilseeds, cereals and root crops). The main routes of metabolism of ACC are oxidative ring opening to form ethylene, and malonyl conjugation to form N-malonyl-ACC (MACC).[1]

The United States Environmental Protection Agency noted in their evaluation that ACC is a natural non-protein amino acid found in all plants to which humans have been exposed through fruit and vegetable consumption; and residues of the pesticide may be indistinguishable from naturally occurring background levels of ACC.

Further data on the metabolism of ACC in plants or target animals is not required.

Analytical methods and storage stability

The analytical procedure used for determination of residues in Australian Good Laboratory Practice (GLP) study samples was titled GM184 – Determination of amino-cyclopropane carboxylic acid residues in fruits, vegetables and other plant matrices using liquid chromatography with tandem mass spectrometry (LCMS/MS). The method is summarised as follows:

Sample homogenate was weighed into a centrifuge tube and surrogate standard added. Methanol and milli-Q water was added, and the tube shaken. The extract was centrifuged, and an aliquot of supernatant was taken and added to a centrifuge tube. A methanol solution was added, and the sample tube was shaken then centrifuged.

An aliquot was taken from the centrifuged tube and the extract was analysed using an Agilent 1290 liquid chromatograph (LC) with 6460C mass spectrometer (MS/MS).

[1] Dorling, S. J.; McManus, M. T.; The Fate of ACC in Higher Plants; *Annual Plant Reviews* (2012), 44, 83-115.

The Limit of Quantitation (LOQ) was 0.05 mg/kg for apple and 0.02 mg/kg for peach, plum and nectarine. The Limit of Detection (LOD) was 0.04 mg/kg for apple and 0.01 mg/kg for peach, plum and nectarine.

Recoveries from fortified control samples were within acceptable limits.

Similar analytical methods were used in North American residue trials provided by the applicant (LOQ = 0.03 mg/kg, LOD = 0.01 mg/kg), noting that a description of the analytical method was not provided for non-GLP trials conducted in New Zealand (LOQ = 0.04 mg/kg) and South Africa (LOQ = 0.01 mg/kg).

Stability of residues in stored analytical samples

Storage stability studies have been provided to show that ACC is stable in apples when stored frozen for a least 6 months (the longest interval tested) and in grapes for at least 3.8 months. In the residue trials submitted, all samples were maintained under freezer conditions, (i.e.–18 ^{o}C) prior to analysis and tested within 3 - 8 months of collection for the GLP trials and within 8 - 19 months for the non-GLP trials. This is acceptable for the purposes of the current application, noting that the non-GLP trials are supportive but not critical to the assessment.

Residue definition

A residue definition is not required for this naturally occurring compound, noting that a Table 5 entry (i.e. Maximum Residue Limits (MRLs) not required) has been recommended below as levels of ACC in fruit at harvest from treated trees are indistinguishable from naturally occurring background levels.

Residues in food and animal feeds

Apples

The critical Good Agricultural Practice (GAP) for apples is for 2 applications at up to 30 g ai/100 L applied between 80% flowering and 25 mm fruitlet size. The proposed withholding period is ‘Not required when used as directed’.

Two Australian GLP residue trials on apples are supported by 4 North American GLP trials and non-GLP trials from New Zealand (5) and South Africa (3). Two formulation types were used in the residue trials (WG or SL). The formulation used in the Australian trials was recorded as a water-dispersible granule (WG). This is considered to be similar from a residues perspective to the proposed product which is recorded as a water-soluble granule (SG). The spray solution used in the trials included a surfactant as recommended on the draft label.

ACC residues had dropped to below the LOD (0.04 mg/kg) prior to harvest in two Australian trials representative of the proposed use pattern (2 applications at 30 – 40 g ai/100 L, 1 – 1.3× proposed, last application when fruit was 20 mm diameter).

ACC residues were also <LOQ (0.03 mg/kg) in immature fruit by 45 days after application at approximately 1 kg ai/ha (when fruit were 20 mm in diameter) in 4 North American trials. Low residues below the LOD (0.01

mg/kg) were also reported in untreated control samples in these trials. The proposed use pattern would correspond to 450 g ai/ha for a typical spray volume of 1500 L/ha for pome fruit, so the US trials would be approximately double that proposed for a single application.

In 5 non-GLP trials on apples conducted in New Zealand, residues in apples were all <LOQ (0.04 mg/kg) at 37 – 151 days after application between 90% flowering to fruit 23 mm at 25 – 50 g ai/100 L (1.2 – 1.7× proposed).

In 3 non-GLP trials on apples conducted in South Africa, residues in apples were all <LOQ (0.01 mg/kg) by 21 – 48 days after a single application at BBCH[2] 72 (15 – 20 mm fruit) at 44.8 g ai/100 L (1.5× proposed for a single application).

Given that the available residue trials all show that ACC residues in apples from the proposed use should drop to below the LOQ by harvest and that any low-level residue remaining will be indistinguishable from naturally occurring ACC, the proposed use on apples in suitable for a Table 5 entry in the MRL standard, i.e. MRLs are not required.

Nectarines, peaches, plums

The critical GAP for nectarines, peaches and plums is for a single application at 60-90% flowering at 35 g ai/100 L (for nectarines and peaches) and 20 g ai/100 L (for plums).

Five Australia GLP residue trials on nectarines, peaches and plums are supported by 3 non-GLP trials on peaches conducted in South Africa. Two formulation types were used in the residue trials (WG or SL). The formulation used in the Australian trials was recorded as a water-dispersible granule (WG). This is considered to be similar from a residues perspective to the proposed product which is recorded as a water-soluble granule (SG). The spray solution used in the trials included a surfactant as recommended on the draft label.

In Australian GLP trials on nectarines (1), peaches (2) and plums (2), residues of ACC were <LOD (0.01 mg/kg) at 35 – 188 days after 1-2 applications at 25 – 50 g ai/100 L (0.7 – 1.4× proposed rate for nectarines and peaches, 1.3 – 2.5× proposed rate for plums). The application timing (or latest application timing in the trials with 2 applications) was BBCH 65 (full bloom).

In three non-GLP trials conducted on peaches in South Africa, residues were <LOQ (0.01 mg/kg) by 42 days after a single treatment at 44.8 g ai/100 L (1.3× proposed rate for peaches and nectarines). The treatment was made at 71 (8 – 10 mm fruit diameter). It is also noted that residues in untreated control samples of peaches from these trials ranged from 0.03 – 0.06 mg/kg.

Given that the available residue trials all show that ACC residues in nectarines, peaches and plums from the proposed use should drop to below the LOQ by harvest and that any low-level residue remaining will be

[2] The abbreviation BBCH derives from Biologische Bundesanstalt, Bundessortenamt and CHemical industry. The BBCH-scale is used to identify the phenological development stages of plants.

indistinguishable from naturally occurring ACC, the proposed use on nectarines, peaches and plums in suitable for a Table 5 entry in the MRL standard, i.e. MRLs are not required.

It is noted that ACC is exempt from the requirement of a tolerance in the USA in or on apple and stone fruit when applied in accordance with good agricultural practices.

The following Table 5 entry for ACC is appropriate to cover the proposed uses on apples, nectarines, peaches and plums:

1-aminocyclopropane-1-carboxylic acid: Plant growth regulator when used on fruit crops

Crop rotation

Apples, nectarines, peaches and plums are not commonly grown in rotation with other crops. Consideration of ACC residues in following crops is not required, noting also that at Table 5 entry has been recommended to cover the uses on the primary crops, i.e. MRLs are not required.

Residues in animal commodities

Any low-level ACC residues in apples, nectarines, peaches and plums from the proposed use will be indistinguishable from naturally occurring ACC. Animal transfer studies and animal commodity MRLs for ACC are not required.

Dietary risk assessment

The APVMA Human Health Risk Assessment Technical Report indicated that although there is potential for dietary exposure resulting from the proposed use of Accede Plant Growth Regulator, the human health risk is anticipated to be negligible due to its low toxicity, infrequent application and rapid degradation once applied to the crop. In addition, ACC is a naturally occurring compound in plant tissues and part of the normal human diet.

As such, the establishment of an acceptable daily intake (ADI) or acute reference dose (ARfD) for ACC is not considered necessary. A dietary risk assessment for ACC is therefore 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 5	
Substance	**Use**
Add:	
1-aminocyclopropane-1-carboxylic acid	Plant growth regulator when used on fruit crops

Assessment of overseas trade aspects of residues in food

Any low-level ACC residues in apples, nectarines, peaches and plums from the proposed use will be indistinguishable from naturally occurring ACC. A Table 5 entry has been recommended to cover the proposed use, i.e. MRLs are not required, which is in line with recommendations in the USA. The risk to trade from the proposed uses is considered to be low.

Work health and safety assessment

Accede Plant Growth Regulator, containing 400 g/kg 1-aminocyclopropane-1-carboxylic acid (ACC), as a new active constituent, in a water-soluble granule (SG) formulation, is proposed for use as a plant growth regulator (PGR) to induce thinning in apples, nectarines, peaches and plums.

The product is intended for professional use to be applied as a foliar spray by orchard airblast and ground boom spraying. Application rates range from 37 to 88 g/100L water (15-35 g ACC/100 L), equivalent to a maximum rate of 0.88 kg product/ha.

The use of a non-ionic surfactant at 50 mL/100L with Accede is recommended on the label.

Health hazards

The results of the acute studies indicate that Accede Plant Growth Regulator has low toxicity following oral, dermal or inhalational exposure and is neither an eye or skin irritant nor a skin sensitiser in the Murine LLNA.

Occupational exposure

Exposure during use

No worker exposure data was submitted. Although the applicant carried out an appropriate worker health and safety assessment, this was not required, as a quantitative risk assessment was not considered necessary based on no effects observed in a dermal 28-day limit study NOAEL (>1000 mg/kg bw/d). Additionally, both the product and spray dilution show very low propensity for dermal absorption. Inhalation exposure is also likely to be low as ACC has a vapour pressure of 3.6 x 10-5 Pa (at 25℃).

Similarly, quantitative health risk assessments were not carried out by US EPA (2021) or Health Canada (2023).

Exposure during re-entry

The lack of dermal effects in the 28-day dermal study indicates that there are negligible risks from re-entry. A standard re-entry statement is recommended for the label (see below).

Public exposure

The applicant has stated that the product is intended for professional use only. Therefore, risks from use are not relevant for the general public.

Application of Accede Plant Growth Regulator by airblast or ground boom methods may lead to unintended bystander exposure via chemical spray drift. Bystander risk from spraying activities is typically estimated using the APVMA Spray Drift Risk Assessment Tool. However, as the RAD is significantly higher than the application rate, no specific bystander buffer zones are required.

A similar conclusion was reached by US EPA (2021) and Health Canada (2023).

Recommendations

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

First aid instructions

First aid is not generally required. If in doubt, contact a Poisons Information Centre (phone Australia 13 11 26; New Zealand 0800 764 766) or a doctor.

Safety directions

When using together with other products, consult their label safety directions. When using the product wear cotton overalls buttoned to the neck and wrist (or equivalent clothing). Wash hands after use. After each day's use wash contaminated clothing.

Precautionary statements (restraints/restrictions)

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

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

- • spray is not directed above the target canopy
- • the outside of the sprayer is turned off when turning at the end of rows and when spraying the outer row on each side of the application site

DO NOT apply product through any type of irrigation system.

Re-entry Statement

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

Environmental assessment

Fate and behaviour in the environment

ACC is a readily biodegradable substance that has low persistence in soil (geomean DT_{50} 2.3 days in four laboratory soils) and low sorption (geomean Koc 29 mL/g in five soils). In aquatic systems, ACC remains in the water phase. It is not susceptible to hydrolysis or photolysis; rather, ACC is degraded very rapidly via microbially mediated mechanisms (DT_{50} <1 day in three aquatic systems). Its major metabolite 2-ketyobuytric acid reached maxima of 18% AR in soil and 25% in water but not detected in sediment and was transient in all systems. ACC is not volatile and will not be subject to long-range transport.

Effects and associated risks to non-target species

A maximum single rate of 87.5 g/100 L was assessed for the risk assessment. Assuming a default spray volume of 1500 L/ha, the maximum application rate is equivalent to 1.3 L/ha (525 g ac/ha).

The risk assessment also considered cumulative exposure of non-target species to two applications at 75 g/100 L and a minimum retreatment interval of 21 days. Assuming a default spray volume of 1500 L/ha, each application is equivalent to 1.1 L/ha (450 g ac/ha).

Terrestrial vertebrates

ACC has low toxicity to mammals (LD_{50} >5000 mg ac/kg bw, *Rattus norvegicus*) and birds (LD_{50} 343 mg ac/kg bw, *Colinus virginianus*). Following dietary exposure in reproductive toxicity tests, decreased parental body weight gain of mammals was observed at 543 mg ac/kg bw/d (NOAEL 271 mg ac/kg bw/d, *Rattus norvegicus*) and reductions in the number of eggs laid, viable embryos, hatchlings and 14-day old survivors as percentages of eggs set were observed at 22 mg ac/kg bw/d in birds (NOEL 8.6 mg ac/kg bw/d, *Colinus virginianus*).

The acute assessment assumes 100% of food items are obtained from the treatment area on the last day of application, while the chronic assessment assumes 50% of food items are obtained from the treatment area for the first 21 day after the last application. A tiered approach was used beginning with assessment of an indicator species that is protective of all food guilds. Acceptable risks could be concluded at the first level of assessment. No protection measures are therefore considered necessary for terrestrial vertebrates.

Aquatic species

ACC has low toxicity to fish (LC_{50} >117 mg ac/L, *Oncorhynchus mykiss*) and aquatic invertebrates (EC_{50} >105 mg ac/L, *Daphnia magna*), and moderate toxicity to algae (E_rC_{50} 0.21 mg ac/L, *Pseuokirchneriella subcapitata*; E_rC_{50} 0.10 mg ac/L, *Anabaena flos-aquae*) and aquatic plants (E_rC50 3.7 mg ac/L, *Lemna gibba*). Clear effects on plant shoots and roots of rooted aquatic macrophytes was observed at relatively low concentrations (lowest E_rC_{10} 0.074 mg ac/L, *Myriophyllum spicatum*). Following long-term exposure, the reproduction of aquatic invertebrates was reduced in a dose-dependent manner (EC_{10} 20 mg ac/L, *Daphnia magna*). Based on E_rC_{50} values <1 mg/L for algae, the following hazard statement is triggered for ACC product labels.

> Very toxic to aquatic life.

A screening level runoff assessment of ACC was conducted which represents the worst-case scenario (direct application at the highest seasonal rate to bare soil) under Australian conditions. Acceptable risks could be concluded at the screening level. Because the assessment assumes a runoff event occurs three days after application, the following restraints are advised.

> To protect aquatic species from runoff, DO NOT apply if heavy rains or storms are forecast within 3 days. DO NOT irrigate to the point of water runoff from the treatment area for at least 3 days after application.

Bees and other non-target arthropods

ACC has low toxicity to adult bees by contact exposure (LD_{50} >125 µg ac/bee, *Apis mellifera*) and oral exposure (LD_{50} >263 µg ac/bee, *Apis mellifera*), and low toxicity to bee larvae (LD_{50} >126 µg ac/bee, *Apis mellifera*). The representative SG 400 g/kg formulation similarly demonstrated low acute toxicity to adult bees. Following chronic dietary exposure to ACC, mortality of adult bees was observed in a dose-dependent manner (LDD_{10} 22 µg ac/bee/d).

Risks to bees were determined to be acceptable under the worst-case scenario of a direct overspray of blooming plants. Therefore, no protection measures are considered necessary for bees.

An SL 100 g/L formulation of ACC had low toxicity under laboratory conditions (glass plates) to the indicator species of predatory arthropods (LR_{50} >1000 g ac/ha, *Typhlodromus pyri*) and parasitic arthropods (LR_{50} >1000 g ac/ha, *Aphidius rhopalosiphi*).

Risks to predatory and parasitic arthropods were determined to be acceptable under the worst-case scenario of direct exposure to fresh-dried residues immediately after the last application. Therefore, no protection measures are considered necessary for predatory or parasitic arthropods.

Soil organisms

Following long-term exposure to ACC, reduced reproduction of earthworms was observed in a dose-dependent manner (EC_{10} 63 mg ac/kg dry soil, *Eisenia fetida*). ACC did not affect soil processes such as nitrate formation at exaggerated soil concentrations (NOEC 12 mg ac/kg dry soil).

Risks to soil organisms were determined to be acceptable under the worst-case scenario of incorporation into the top 5-cm soil at the highest seasonal rate. Therefore, no protection measures are considered necessary for soil organisms.

Non-target terrestrial plants

An SL 100 g/L formulation of ACC had low toxicity to non-target terrestrial plants following post-emergent exposure (ER_{25} >600 g ac/ha, ten species tested). Toxicity following pre-emergent exposure was also low (ER_{25} >600 g ac/ha) in nine of the test species. In tomato, both shoot length and dry weight were significantly inhibited with the lowest ER_{50} estimated to be 39 g ac/ha by linear two-point interpolation.

Recommendations

The following protection statements are recommended based on the outcome of the risk assessment.

> Very toxic to aquatic life. To protect aquatic species from runoff, DO NOT apply if heavy rains or storms are forecast within 3 days. DO NOT irrigate to the point of water runoff from the treatment area for at least 3 days after application.

Efficacy and safety assessment

Proposed product use pattern

For thinning in Apples, Peaches, Nectarines, and Plums.

Efficacy and target crop safety

Data collected from 36 replicated and commercial demonstration field trials were provided in support of efficacy and crop safety of Accede Plant Growth Regulator.

The trials were randomised complete block designs and provided broad geographic coverage (Queensland, New South Wales, Victoria, and Tasmania) representative of climatic conditions in Australia. The trials were all conducted in commercial orchards and in several cases used commercial application equipment with product testing included in commercial production process.

Efficacy

Accede Plant Growth Regulator provided effective thinning of peaches, nectarines, plums when applied at 75 - 87.5 g/100 L with non-ionic surfactant. The trials also showed the product was effective in thinning plums (variety Queen Garnett) when applied at 37.5 - 50 g/100 L with non-ionic surfactant. Applications in stone fruit demonstrated efficacy when applied at 60% to 90% flowering stages.

Crop safety

The trials demonstrated safety on most stone fruits tested and for apples. However transient phytotoxicity was observed in some situations for apple trees though no results indicated negative phytotoxicity effects on fruit quality and yield.

Recommendations

Accede Plant Growth Regulator -ACC provides effective thinning of stonefruit (peaches, nectarines, plums) subject to proposed label restrictions. Similarly, it is effective in the thinning of apples across a wide growth window, and subject to geographical (climatic factors) location.

Spray drift assessment

Regulatory Acceptable Levels (RALs) were established using the APVMA Spray Drift Assessment Tool (SDRAT), or Spray Drift Management Tool (SDMT), by each risk area, in order to calculate the appropriate spray drift buffer zones for Accede Plant Growth Regulator.

Human health

Based on available repeat-dose dermal toxicity study for ACC, no adverse effects were observed at the limit dose of 1000 mg/kg bw/d. Thus, no specific bystander buffer zones are required.

Residues and trade

An animal transfer study for ACC has not been provided. However, ACC occurs naturally in all higher plants and a Table 5 entry has been recommended for the proposed use. Livestock already consume naturally occurring ACC in their diet and animal commodity MRLs are not required. A spray drift assessment and buffer zones for protection of livestock areas with respect to trade are therefore not required.

Environment

The RAL 10 µg ac/L for the protection of natural aquatic areas is based on the E_rC_{50} 100 µg ac/L for toxicity of ACC to *Anabaena flos-aquae* and an assessment factor of 10.

The RAL 20,333 g ac/ha for the protection of pollinator areas is based on the contact LD_{50} >125 µg ac/bee for toxicity of ACC to *Apis mellifera*, an assessment factor of 2.5, and a conversion factor of 1000 / ExpE 2.4 to account for the surface area of a bee.

The RAL 3.9 g ac/ha for the protection of vegetation areas is based on the pre-emergent ER_{50} >39 g ac/ha for ten plant species and an assessment factor of 10.

Table 6: Summary of RALs for Accede Plant Growth Regulator

Sensitive area	Regulatory Acceptable Level	
	Level of active	Units
Bystander	N/A	g/ha
Livestock	N/A	ppm
Aquatic	10	µg/L
Pollinator	20,833	g/ha
Vegetation	3.9	g/ha

The following buffer zones were calculated by the SDRAT, using the above RALs for vertical sprayers, and were incorporated into the Accede Plant Growth Regulator label spray drift instructions. (see *Labelling requirements* below).

Buffer zones for vertical sprayers

Type of target canopy and dilute water rate	Mandatory buffer zones				
	Bystander areas	Natural aquatic areas	Pollinator areas	Vegetation areas	Livestock areas
2 m tall and shorter, maximum dilute water rate of 1000 L/ha	0 m	5 m	0 m	10 m	0 m
Taller than 2 m (not fully-foliated), maximum dilute water rate of 1000 L/ha	0 m	20 m	0 m	35 m	0 m
Taller than 2 m (fully-foliated), maximum dilute water rate of 1000 L/ha	0 m	15 m	0 m	25 m	0 m

Labelling requirements

Company Name: VALENT BIOSCIENCES A DIV OF SUMITOMO CHEMICAL AUSTRALIA
Product Name: Accede Plant Growth Regulator
APVMA Approval No: 94490 / 142575

Label Name:	Accede Plant Growth Regulator

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

Constituent Statements:	400 g/kg 1-AMINOCYCLOPROPANE-1-CARBOXYLIC ACID

Mode of Action:	

Statement of Claims:	For crop thinning in Apples, Nectarines, Peaches and Plums as per Directions for Use table.

Net Contents:	500g - 50kg

Restraints:	This section contains file attachment. File Name: RESTRAINTS.docx File Size: 17671 bytes

Directions for Use:	This section contains file attachment. File Name: DIRECTIONS FOR USE.docx File Size: 19067 bytes

Other Limitations:	

Withholding Periods:	NOT REQUIRED WHEN USED AS DIRECTED.

Trade Advice:	

General Instructions:	This section contains file attachment. File Name: GENERAL INSTRUCTIONS.docx File Size: 260401 bytes

Resistance Warning:	

Precautions:	RE-ENTRY DO NOT enter treated areas until the spray has settled and 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.

Protections:	PROTECTION OF WILDLIFE, FISH, CRUSTACEANS AND ENVIRONMENT Very toxic to aquatic life. DO NOT apply directly to water or to areas where surface water is present. DO NOT contaminate wetlands or watercourses with this product or used containers.

Storage and Disposal:	Store in a locked room or place away from children, animals, food, feedstuffs, seed and fertilizers. 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.

Safety Directions:	When using together with other products, consult their label safety directions. When using the product wear cotton overalls buttoned to the neck and wrist (or equivalent clothing). Wash hands after use. After each day's use wash contaminated clothing.

First Aid Instructions:	First aid is not generally required. If in doubt, contact a Poisons Information Centre (phone Australia 13 11 26; New Zealand 0800 764 766) or a doctor.

First Aid Warnings:	

RESTRAINTS

DO NOT apply by aircraft
DO NOT apply Accede through any type of irrigation system.
DO NOT apply if heavy rains or storms are forecast within 3 days.
DO NOT irrigate to the point of water runoff from the treatment area for at least 3 days after application.
DO NOT apply Accede if frost is expected or has occurred within 2 days, or daytime maximum temperature is expected to be less than 10°C. For best results apply when daily temperatures range is between 5°C and 25°C.
DO NOT apply Accede to injured or stressed plants or fruits e.g. drought/heat stress, waterlogging, freeze injury, girdled trees, etc.
DO NOT use overhead fans or irrigation equipment for at least 6 hours following Accede application.
DO NOT apply to wet foliage, for example, early in the morning after a dew or soon after rain.
DO NOT apply Accede if rain is expected within 6 hours of application. Light rain shortly after application may lead to rewetting and over thinning but heavy rain may lead to wash off and under thinning.
DO NOT apply Accede within 2 days of spraying oil-based products or foliar fertilisers as may cause phytotoxicity.
DO NOT apply to trees younger than 4 years planted in the orchard as may cause phytotoxicity.

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 two hours before sunset and persist until one to two hours after sunrise.

Vertical sprayers
DO NOT apply by a vertical sprayer unless the following requirements are met:
- spray is not directed above the target canopy
- the outside of the sprayer is turned off when turning at the end of rows and when spraying the outer row on each side of the application site
- for dilute water rates up to the maximum listed for each type of canopy specified, minimum distances between the application site and downwind sensitive areas (see ‘Mandatory buffer zones’ section of the following table titled ‘Buffer zones for vertical sprayers’) are observed.

Buffer zones for vertical sprayers

Type of target canopy and dilute water rate	Mandatory buffer zones				
	Bystander areas	Natural aquatic areas	Pollinator areas	Vegetation areas	Livestock areas
2 m tall and shorter, maximum dilute water rate of 1000 L/ha	0 m	5 m	0 m	10 m	0 m
Taller than 2 m (not fully-foliated), maximum dilute water rate of 1000 L/ha	0 m	20 m	0 m	35 m	0 m
Taller than 2 m (fully-foliated), maximum dilute water rate of 1000 L/ha	0 m	15 m	0 m	25 m	0 m

DIRECTIONS FOR USE:

Read the GENERAL INSTRUCTIONS section carefully before setting up to spray and deciding on a rate.

CROP	VARIETY	TIMING	RATE	CRITICAL COMMENTS
APPLES: **DO NOT** apply during the heat of the day for the second application on Apple fruitlets. For best results in hot conditions, apply Accede under slow drying conditions, e.g. early in the morning or at night in order to maximize absorption. **DO NOT** apply more than two applications of Accede in Apples (Primary and/or secondary thinning) per season.				
APPLE	Gala Royal Gala Jazz Envy and related varieties	Primary thinning at 80 – 100% flowering	**Lighter setting warmer regions:** 50 – 62.5 g/100 L (200 - 250 ppm) **Heavy setting cooler regions - like Huon valley Tasmania:** 62.5 – 75 g/100 L (250 – 300 ppm)	Accede will thin when applied at any stage between 80 % flowering and 25 mm fruitlet size so application timing can be adjusted to avoid poor weather. The rate to be used in primary thinning depends on how heavy the flowering is and the expected influence of factors affecting fruit set under GENERAL APPLICATION INSTUCTIONS. The rate to be used in secondary thinning depends on the level of primary thinning achieved, the target fruit load and weather conditions. Because Accede is active on larger sized fruitlets and primary thinning gives early size increase, wait until the effect of primary thinning is
		Secondary thinning at 15 – 25 mm fruitlet size		
	Pink lady Fuji	Primary thinning at 80 – 100% flowering	62.5 – 75 g/100 L (250 – 300 ppm)	
		Secondary thinning at 15 – 25 mm fruitlet size		
	Kanzi Golden delicious Granny Smith	Primary thinning at 80 – 100% flowering	50 - 62.5 g/100 L (200 – 250 ppm)	

	(only when thinning required)	Secondary thinning at 15 – 25 mm fruitlet size		clear before deciding on the rate and using Accede for secondary thinning. Use the higher rate for greater thinning effect. Generally, the later Accede is applied the greater the thinning effect for a given concentration. If Accede is used as a primary thinner this interval can vary from 3 - 4 weeks for Gala types to 5 – 6 weeks for Pink Lady. If shedding of large fruitlets is expected to cause damage to fruitlets lower in the tree, then the secondary thinner can be applied earlier - once fruitlets reach 15 mm. Application of Accede as a secondary thinner at rates greater than 62.5 g/100 L (250 ppm), particularly in warmer conditions, may result in minor leaf yellowing and drop but has no long-term impact on yield or quality. Consider reducing the concentration by 50 ppm or changing the day of application if temperatures are expected to exceed 30° on the day of application. A tree-fruit safe non-ionic surfactant such as Pomade* at 50 mL/100L should be used with all Accede applications.

CROP	VARIETY	TIMING	RATE	CRITICAL COMMENTS
NECTARINES, PEACHES AND PLUMS **DO NOT** apply Accede on Nectarines, Peaches and Plums that are light setting, set only at the tips of branches or biennial bearing (in an off year). **DO NOT** apply more than one application of Accede in Nectarines, Peaches and Plums per season.				
NECTARINE AND PEACH	Heavy setting varieties only	60 – 90% flowering	75 - 87.5 g/100 L (300 – 350 ppm)	Application at higher rates after leaf emergence may lead to significant leaf yellowing and drop, so only one application at flowering is possible. It is important to carefully consider all factors mentioned under GENERAL INSTRUCTIONS that may affect pollination and fruit set before deciding on the rate and using Accede. There are many varieties of Nectarines Peaches and Plums, so it is important that initial applications are done to small trial sections in a block over one or two seasons starting with the lower rate, to determine appropriate timing, rate and likely response before full block treatments are conducted. Plums require good pollination with bees to get good fruit set. If this is unlikely to occur, then a lower rate of Accede should be used. A tree-fruit safe non-ionic surfactant such as Pomade* at 50 mL/100L should be used with all Accede applications.
PLUM	Queen Garnett only		37.5 - 50 /100 L (150 – 200 ppm)	

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

GENERAL INSTRUCTIONS

Accede® Plant Growth Regulator contains 1-AMINOCYCLOPROPANE-1-CARBOXYLIC ACID (ACC), a natural compound responsible for the biosynthesis of ethylene production in tree fruits. It

is ideal for thinning Apples, Nectarines, Peaches and Plums, reducing the need for hand thinning labour and improving fruit quality.

IMPORTANT FACTORS AFFECTING THINNING AND FRUIT SET
Many factors can influence plant stress level, flowering, fruit set or fruit maturation during the course of the season and therefore response to chemical thinners. For example (elevation, sun exposure, soil texture), tree size, root stock, growing conditions (prevailing or anticipated weather patterns such as high or low temperature extremes, chilling, drought or flood conditions, nutrient levels) or production practices (e.g. crop load, pruning severity, trunk girdling, root pruning). So these must all be carefully considered prior to using Accede. Severe pruning which leaves mostly older wood to set fruit will be harder to thin with ACC. Hail nets may affect thinning effect due to reduction in solar radiation. Waterlogging in stone fruit triggers ethylene production in the tree which will cause fruit drop just as a late frost on fruitlets will do. Note that cool, overcast conditions after application will delay fruitlet growth and flower/fruitlet drop and so it may be necessary to wait an extra one or two weeks to see how much the Accede has reduced fruit set before hand thinning.A proportion of the fruitlets will stop developing and these are ones that will eventually drop or can be taken off during hand thinning. DO NOT apply fruit setting agents if using Accede at flowering time.

Accede is a precursor to ethylene and so varietal response may be different to other apple thinners such as NAA or 6BA. It is recommended that initial applications are on small trial sections in a block over one or two seasons to determine appropriate timing, rate and likely response before full block treatments are conducted.

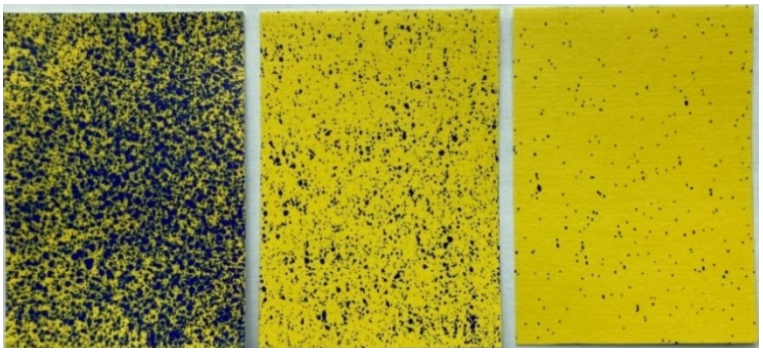
WATER VOLUME AND SPRAYER SET UP
The amount of water applied per hectare and coverage is as important as the concentration applied. On tree crops, apply Accede in just sufficient water to ensure that flowers and fruits, receive light to moderate coverage using calibrated spray equipment. Adjust water volumes based on plant size and spacing. It is not necessary to wet to the point of runoff. Since low water volumes can be used with Accede, concentrate spraying is not needed. Over wetting, leading to spray drift and drip can lead to overthinning - particularly in the bottom of vase shaped trees.

For higher density, single/dual leader, flat profile pruning systems and trees 2.5 - 4m in height; 500 – 750 L/ha is adequate at flowering; increasing to 750 – 1000 L/ha (apples only) when fruitlets are 20mm in size.
For larger vase shaped trees or Tatura trellis systems these rates can be increased by around 20% but then 80% of the spray should be directed into the upper 2/3rd of the tree canopy.

Accede only has a thinning effect on the parts of the tree sprayed. **DO NOT** apply to parts of the tree that do not require thinning.

SPRAY COVERAGE

The picture below shows potential spray coverage. Whilst the coverage on the left card below may be ideal for a fungicide, ideal coverage for Accede is shown on the middle card, with the coverage on the right card being too light.



Too high Ideal coverage Too low

MIXING

This product is suitable for application through conventional spray equipment calibrated to ensure thorough crop coverage.

DO NOT pre-mix Accede with water as a concentrate in a small container before adding to the spray tank, as this can cause crystallization.

Prepare spray solution by mixing the Accede and non-ionic surfactant with water in a clean, empty spray tank. First nearly fill the spray tank before adding the required amount of Accede and surfactant with the agitator running then complete filling the tank with water. Continue thorough agitation during spraying and after a stoppage.

Maintain the spray solution pH between 5 and 8.

Dispose of any unused spray material at the end of each day. **DO NOT** let prepared spray solution sit in spray tank overnight.

SURFACTANT

Use of a tree-fruit safe non-ionic surfactant such as Pomade* at 50 mL/100L is recommended with Accede.

DO NOT use higher rates of surfactant as this may increase the likelihood of phytotoxicity.

COMPATIBILITY WARNING

DO NOT tank mix Accede with other products unless physical and performance compatibility has been verified.

Acronyms and abbreviations

Shortened term	Full term
ACCS/ACMS	Advisory Committee for Chemicals Scheduling/Advisory Committee for Medicines Scheduling
ac	Active constituent
ACC	1-aminocyclpropane-1-carboxylic acid
ADI	Acceptable daily intake (for humans)
ai	Active ingredient
ARfD	Acute reference dose
BBA	Biologische Bundesanalstalt fur Land – und forstwirschaft
bw	Bodyweight
d	Day
DAT	Days after treatment
DT_{50}	Time taken for 50% of the concentration to dissipate
EA	Environment Australia
E_bC_{50}	Concentration at which the biomass of 50% of the test population is impacted
EC_{50}	Concentration at which 50% of the test population are immobilised
EEC	Estimated environmental concentration
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
GLP	Good Laboratory Practice
h	Hour
ha	Hectare
HPLC	High pressure liquid chromatography *or* high performance liquid chromatography

Shortened term	Full term
IPM	Integrated pest management
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
SDS	Safety Data Sheet
NEDI	National Estimated Daily Intake
NESTI	National Estimated Short-Term Intake
NHMRC	National Health and Medical Research Council
NOEC/NOEL	No observable effect concentration level
NOAEL	No observed adverse effect level
OC	Organic carbon
OM	Organic matter
po	Oral
ppb	Parts per billion
PPE	Personal protective equipment
ppm	Parts per million
RAL	Regulatory Acceptable Level
REI	Re-entry interval
s	Second

Shortened term	Full term
SDMT	Spray Drift Management Tool
SDRAT	Spray Drift Risk Assessment Tool
SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons
TGA	Therapeutic Goods Administration
TGAC	Technical grade active constituent
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
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
Toxicology	The study of the nature and effects of poisons

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