



**VELUM**<sup>®</sup>  
PRIME

# The evolution in nematode control



Product guide



## SOLVE THE PROBLEM AT THE ROOT

For too long, plant parasitic nematodes have gone mostly unnoticed. Yet they remain one of the most problematic pests, as they attack nearly every crop around the world. VELUM® Prime introduces a revolutionary nematicide solution that puts roots back under the grower's control.

By offering an innovative safety profile, VELUM Prime allows you to focus once again on what is really important: a sustainable future for your crops.

## VELUM PRIME SETS NEW STANDARDS

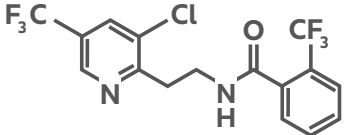
VELUM Prime shows strong and long-lasting efficacy against root-knot nematode and root lesion nematode, combined with an excellent safety profile. The active ingredient of VELUM Prime, fluopyram, belongs to the pyridinyl ethyl benzamide chemical class. Through its low application rate, and its high intrinsic activity, it helps reduce the crop protection chemical load without compromising on efficacy.

VELUM Prime already has a wide range of MRLs and import tolerances established in order to facilitate produce marketability. VELUM Prime: the new cornerstone in integrated nematode management programs.

# THE ACTIVE INGREDIENT

VELUM Prime offers a new mode of action for nematode control

## Active Ingredient Identity

ISO common name:	Fluopyram
Chemical class:	Pyridinyl ethyl benzamide
MoA	Inhibition of the enzyme succinate dehydrogenase (SDH, complex II) within the nematode mitochondrial respiration chain
Structural formula:	
Water solubility	16 mg/L

# VELUM PRIME AT A GLANCE

Active ingredient	400 g/L fluopyram
Formulation	Suspension Concentrate
Mode of action	Group 7 fungicide Group N-3 nematicide
Use rate	625 mL/ha <b>OR</b> 1 L/ha – refer to product label
Crops	Root and tuber vegetables such as potatoes, sweet potatoes and carrots (excluding aquatic root and tuber vegetables)
Nematodes	Root-knot nematode ( <i>Meloidgyne</i> spp.) Root lesion nematode ( <i>Pratylenchus</i> spp.) – excluding potatoes and sweet potatoes
Maximum applications	1 application of VELUM Prime per year to the same cropping ground
Plant back intervals	Plant back intervals apply, see product label for details
Pack size	5 L

# INTRODUCING VELUM PRIME

## Key benefits

- » Fast, effective and long-term control of root-knot and root lesion nematode species
- » Improved crop marketability and higher economic returns
- » Soil-optimised formulation for greater retention in the root zone and long-lasting protection against nematode damage
- » Efficacy at low application rates

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# INTEGRATED NEMATODE MANAGEMENT

Integrated nematode management is required to minimise the damage done by plant parasitic nematodes. There is a need for a balanced combination of farm hygiene measures, monitoring of nematode populations, and selected crop rotations, all complemented with chemical/non-chemical control measures. A lot of work has been done to reduce dependency on chemical products to control nematodes, but while some progress has been made, using effective nematicides remains necessary to maintain the required level of productivity, especially in areas with severe nematode infestations.

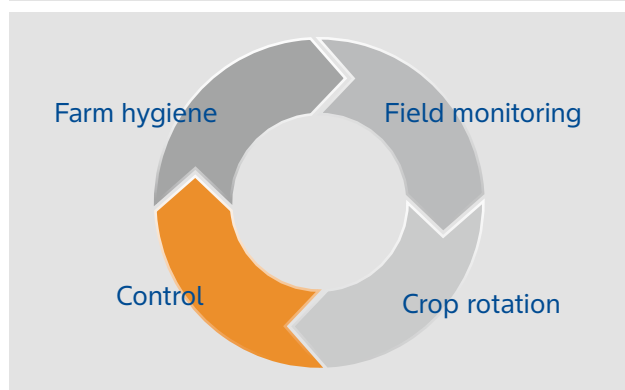
## Farm hygiene

It is important to work as cleanly as possible in the field and when moving between fields. This will lower the risk of the plant parasitic nematodes being spread in soil and on plant debris. Fighting specific weeds that can act as host plants for problematic nematode species is also part of good farm hygiene practice.

## Field monitoring

Knowledge of the type of nematodes and their populations is very important for the targeted control of the parasites. Soil and/or root sampling is needed to determine the type and the size of the population. Root inspection is also an important source of information, as it reveals the typical symptoms of many species.

### INTEGRATED NEMATODE MANAGEMENT



## Crop rotation

Crop rotation offers an additional opportunity to reduce the population of harmful nematode species. With knowledge of the extent of the infestation, the next crop and/or variety can be selected so that the population of specific, problematic nematode species does not increase or – ideally – is reduced.

## Control

However, these measures are generally not enough to limit damage by nematodes sufficiently. For the adequate reduction of nematode populations and the prevention of damage, there is still a need for reliable nematicides. With its high efficacy against plant parasitic nematodes, combined with its safety profile, VELUM Prime sets a new standard among the currently available nematicides. In locations with high infestation throughout the year, VELUM Prime should be part of a nematode management plan that can also include other nematode control products.

# THE PROBLEM

## NEMATODES

Nematodes (nema means 'thread' in Greek) are transparent, cylindrical representatives of the most numerous group of multicellular organisms on earth. Numbering more than 25,000 species, nematodes appear in almost every habitat that provides sufficient moisture for movement. Although the great majority are not parasitic on plants, there are still 4,000 species causing substantial yield and quality losses in many

important crops. Most plant parasitic nematodes favour light, sandy soils, but they also inhabit soil types such as silt, clay loams and highly organic soils. Thus, nematodes can affect a wide range of crops, and besides damaging roots, they can also transmit viruses and make plants more vulnerable to attack by bacterial and fungal pathogens in the soil.

## DID YOU KNOW

There are many different species of plant parasitic nematodes, but only about 10 different genera cause most of the problems in agriculture.



- » Most plant parasitic nematodes live hidden in the soil
- » A single hectare of arable land can harbor billions of nematodes
- » Arable land is often infested by multiple plant parasitic nematode species
- » First symptoms of nematode attack occur below ground
- » Above-ground symptoms are often unspecific and difficult to assign to a nematode problem

## NEMATODES DAMAGE CROP ROOTS

Plant parasitic nematodes feed mainly on crop roots. Nematodes have a specialised mouthpart, a so-called stylet, for penetrating cell walls and feeding on the cell contents. Feeding on crop roots causes abnormal root morphology and impairs the normal root function of taking up water and nutrients from the soil and ensuring a robust crop stand. In addition, nematode attack causes plant stress and increases susceptibility to diseases. As a result, damaged crops produce less yield and lower quality.



Most plant parasitic nematodes are much thinner than a human hair. (*Meloidogyne incognita* beside a human hair)

**Morphology of *Meloidogyne incognita*, one of the most important root knot nematodes.**

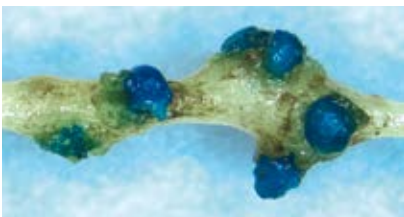


# NEMATODES CAN BE GROUPED INTO

## SEMENTARY ENDOPARASITIC NEMATODES



Typical root galling after infestation by *Meloidogyne* species



Root galls containing egg masses (stained) of *Meloidogyne incognita*

### Description:

Root knot nematodes are obligate plant parasites. Only neonate juvenile 2 larvae (J2) are infective and these can be found outside the root system for a short time before they become sedentary. J2 penetrate behind the root cap and continue their life cycle within the root. The establishment of a feeding site causes physiological disruption and the formation of galls. Female root knot nematodes can produce 30-80 eggs per day. Eggs are laid outside of the female's body and are protected by a gelatinous matrix.

### Genera:

*Meloidogyne* spp.

### Host crops include:

Tomato, cucumber, pepper, carrot, soybean, coffee

## MIGRATORY NEMATODES



Typical symptoms on carrots after infestation with *Pratylenchus penetrans*



### Description:

Migratory nematode species can live either as endo- or ecto-parasitic organisms. In contrast to root knot and cyst nematodes, migratory nematodes do not establish a permanent feeding site. Symptoms of feeding by these nematodes vary. Some species cause root lesions, necrosis of parasitised cells, root deformation, and deformation of other plant tissues.

### Genera:

*Pratylenchus* spp., *Radopholus* spp., *Helicotylenchus* spp., *Trichodorus* spp., *Tylenchulus* spp., *Belonolaimus* spp.

### Host crops include:

Carrot, banana, sugarcane, corn, cotton, grapes



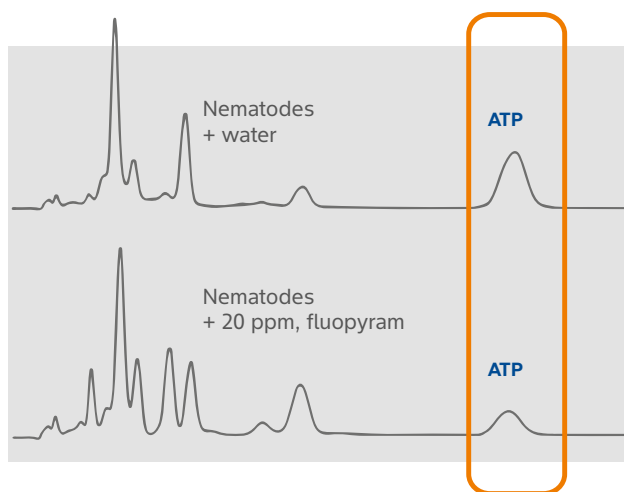
# THE SCIENCE BEHIND VELUM PRIME

## NEW MODE OF ACTION

VELUM Prime is the first nematicide with an active ingredient that acts via Complex II inhibition of the mitochondrial respiratory chain. Mitochondria are the essential power plants of cells and their inhibition causes fast and severe depletion of the cellular energy (ATP). Treated nematodes are quickly immobilised.

## EFFICACY AGAINST PLANT PARASITIC NEMATODES

The needle-like appearance of paralysed nematodes is a typical response to treatment with VELUM Prime. Affected nematodes remain in the soil and die.



Untreated control



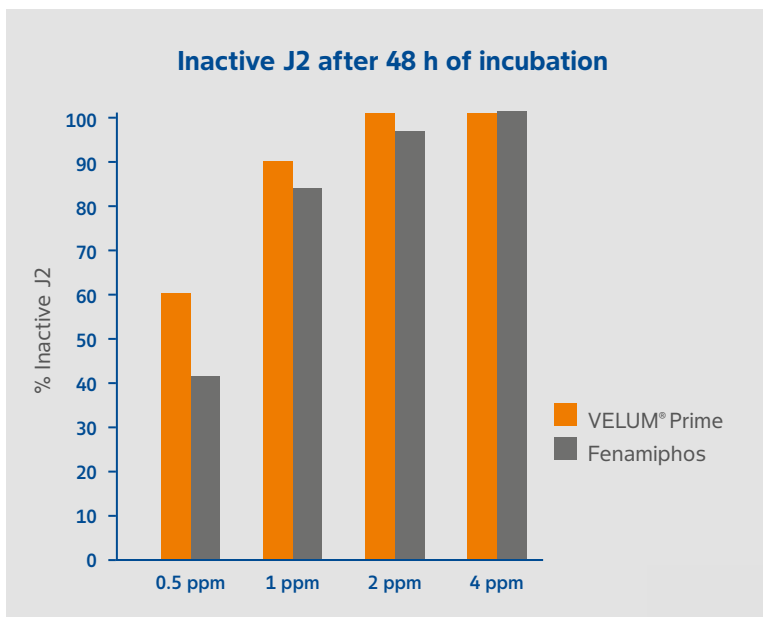
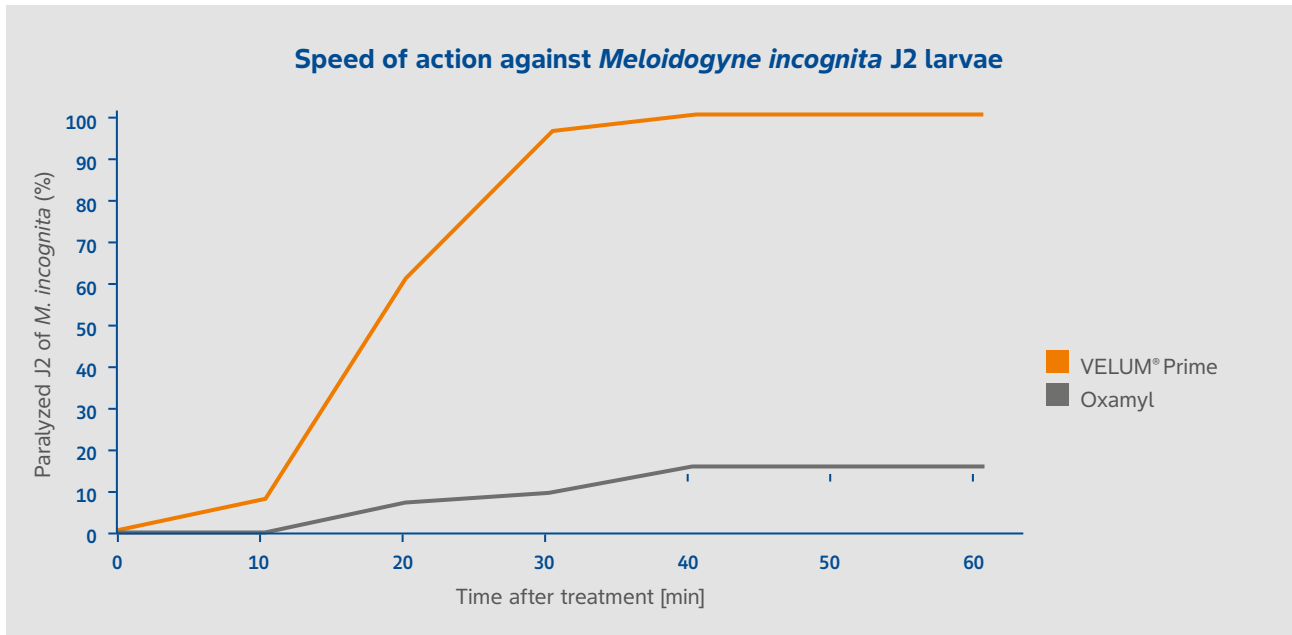
Treatment with 20 ppm fluopyram



Example: untreated + fluopyram treated juvenile stage 2 larvae (J2) of *Meloidogyne incognita*. *In vitro* assay, incubation with 20 ppm fluopyram for 2h.

# VELUM PRIME RAPIDLY INACTIVATES NEMATODES

VELUM Prime rapidly inactivates J2 of the root knot nematode *Meloidogyne incognita*. J2 were incubated with fluopyram (tested concentration (31.25ppm)). Tests were replicated four times using two independent nematode populations, *in vitro* assay.



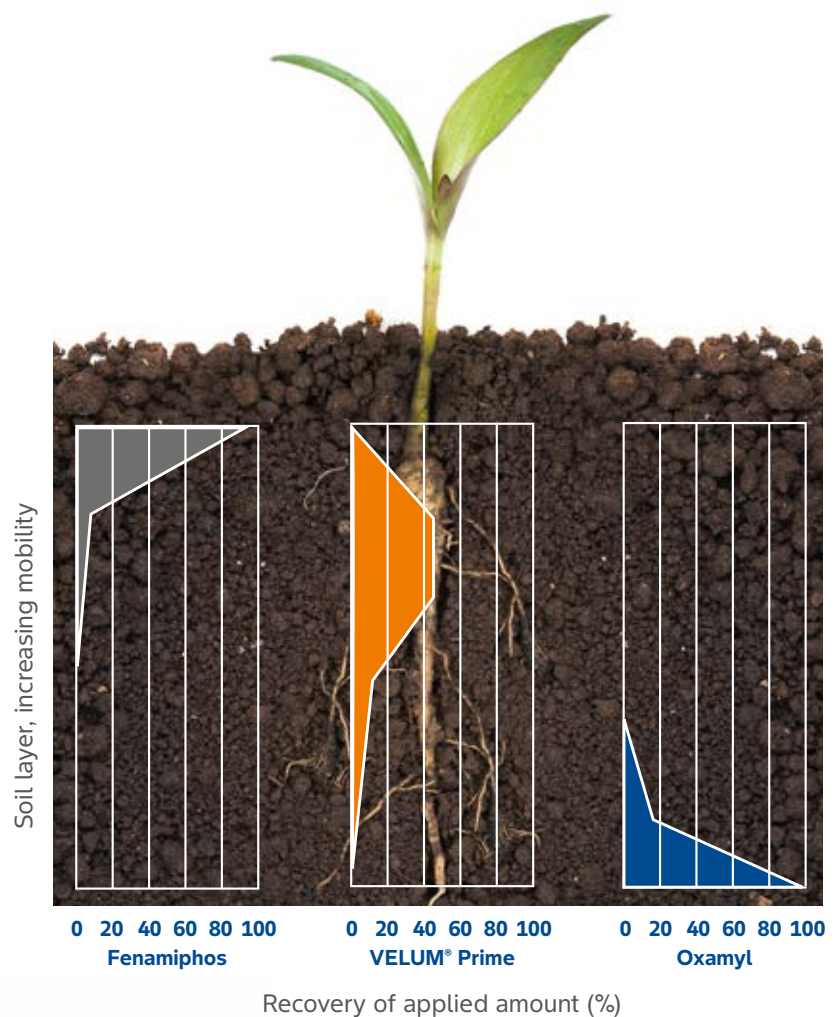
Study conducted under laboratory conditions not field conditions.



# BALANCED SOIL MOBILITY IN THE ROOT ZONE

## Product features for improved nematicidal use and soil applications

- » VELUM Prime shows a distinctive pattern of mobility in the soil. The active ingredient is steadily distributed within the upper soil layers of the tested soil type (silty sand). In contrast, in this soil type competitor actives were either not translocated to deeper levels or, at the other extreme, moved with the water front away from the root zone.
- » The soil optimised formulation of VELUM Prime stays in the desired root zone for efficient and long-lasting protection against nematodes.



## FLUOPYRAM SAFETY DATA

Fluopyram's toxicology profile is completely different from that of other nematicides.

- » Low acute oral, dermal and inhalation toxicity
- » Neither a skin irritant, nor a skin sensitiser. May irritate the eyes
- » Not mutagenic or clastogenic
- » Not a reproductive or developmental toxicant
- » Not a neurotoxin
- » Not an immunotoxin

Fluopyram also has a very favorable eco-toxicological profile, e.g.

- » Birds and mammals: low acute toxicity
- » Aquatic organisms<sup>1</sup>: low toxicity to aquatic organisms
- » Bees: non-hazardous to bees when used as directed
- » Low toxicity to Non-Target Arthropods
- » Soil / terrestrial organisms: acceptable risk to earthworms (acute and chronic), negligible risk to soil microflora



A photograph showing several golden-brown potatoes resting on a pile of dark, rich soil. The word "POTATO" is printed in large, white, bold, sans-serif capital letters in the upper right corner of the image.

# POTATO

## BEST PRACTICE

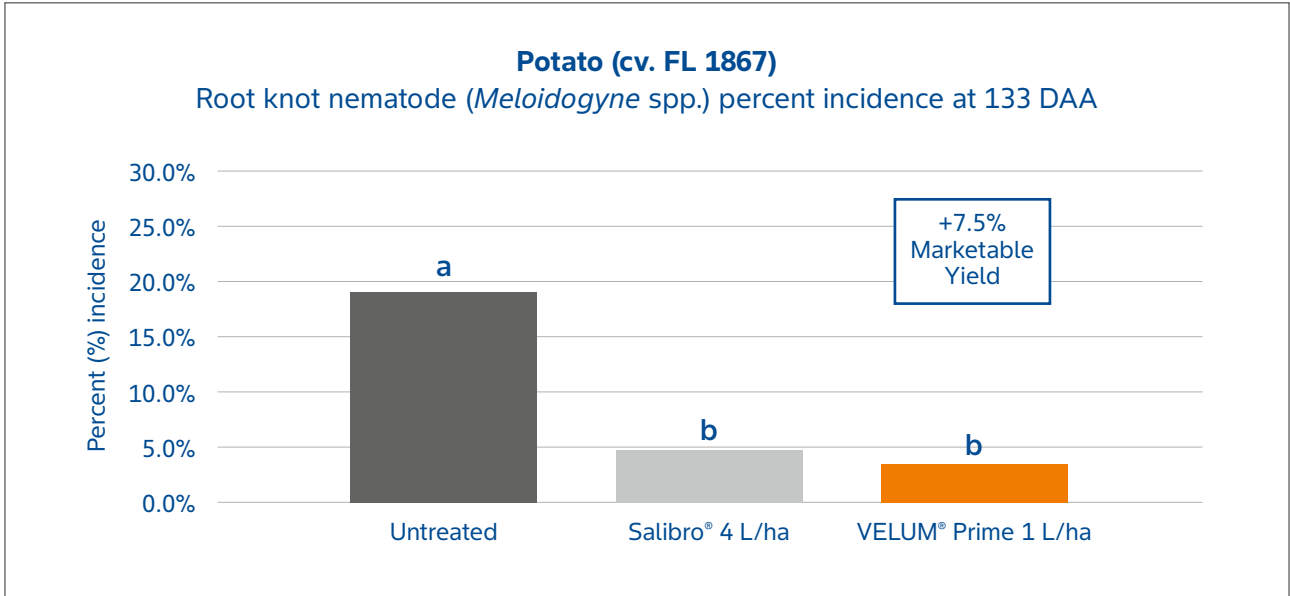
- » Apply VELUM Prime as an in-furrow application at planting.
  - Spray nozzle attached to planter to apply a 15 – 20 cm banded application just before seed is covered; or
  - Use 2-nozzle system spraying the furrow prior to seed drop and just prior to covering.
- » Apply VELUM Prime in 1 – 3 L of water/100 m of row.
- » Product rate per 100 m row for common row spacing:

Product application rate	Row spacing		
	75 cm	80 cm	90 cm
625 mL/ha	4.6 mL/100 m row	5.0 mL/100 m row	5.6 mL/100 m row
1 L/ha	7.5 mL/100 m row	8.0 mL/100 m row	9.0 mL/100 m row

- » As per label recommendations, **only apply 625 mL/ha of VELUM Prime** in the following situations:
  - Tolerance may be higher for tuber damage such as processing potatoes; or
  - Under circumstances where nematode incidence is known to be lower.
  - Where VELUM Prime is used in a nematicide control program with other nematicides with different MOA.
- » Avoid excessive irrigation after application to prevent movement of VELUM Prime below the root zone and area of protection from nematode populations.

# POTATO FIELD TRIAL OVERVIEW

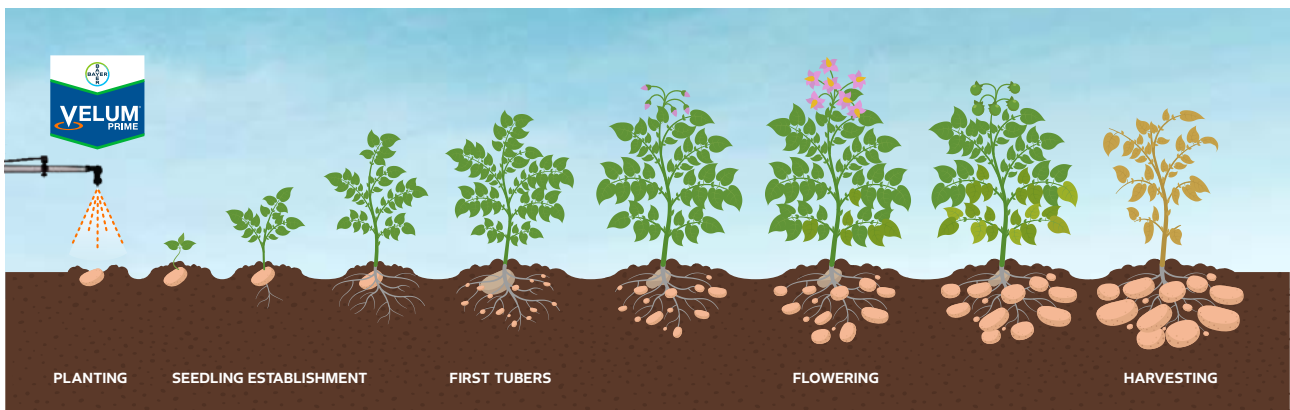
(QA08 - Calavos, Qld 2023)



Means followed by the same letter or symbol do not significantly differ (P=.05, Duncan's New MRT)  
 Note: Not all treatments from the trial are displayed

## VELUM PRIME USE RECOMMENDATION - POTATO

Crop	Pest	Application rates	Application method	No. of applications per crop	Maximum application rate [g a.i./ha] per year
Potatoes	Root-knot nematodes ( <i>Meloidogyne</i> spp.)	625 mL/ha OR 1 L/ha	In-furrow application at planting	1	400



## POTATO – LABEL INFORMATION

CROP	PEST	RATE	CRITICAL COMMENTS
Potatoes and sweet potatoes	Root knot nematode ( <i>Meloidogyne</i> spp.)	625 mL/ha or 1 L/ha	<p>VELUM Prime should be applied as part of an integrated nematode management program which includes cultural practices and alternating with nematicides from different mode of action groups.</p> <p>Uniform incorporation of VELUM Prime into the soil profile to the depth of the root zone is required to achieve maximum protection against nematodes.</p> <p>Only use the 625 mL/ha rate under circumstances where tolerance may be higher for tuber damage such as processing potatoes, under circumstances where nematode incidence is known to be lower or where VELUM Prime is used in a nematicide control program with a nematicide from another mode of action group.</p> <p>Apply a maximum of 1 application of VELUM Prime per year to the same cropping ground. Do not apply more than 400 g fluopyram/ha per year to the same cropping ground.</p> <p>Potato: Apply in-furrow at planting. Mount the spray nozzle so the spray is directed into the furrow at the seed as a 15-20 cm band applied just before seed is covered. Alternatively use a 2-nozzle system spraying the furrow prior to seed drop and after it as dropped just prior to covering. Apply VELUM Prime in 1-3 L of water /100 m of row.</p> <p>To reduce the potential for seed piece breakdown, strictly follow label instructions regarding water volume and follow industry recommended seed piece handling and planting practices.</p> <p>Do not use VELUM Prime on potato cultivars that will be harvested within 60 days of planting.</p>

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

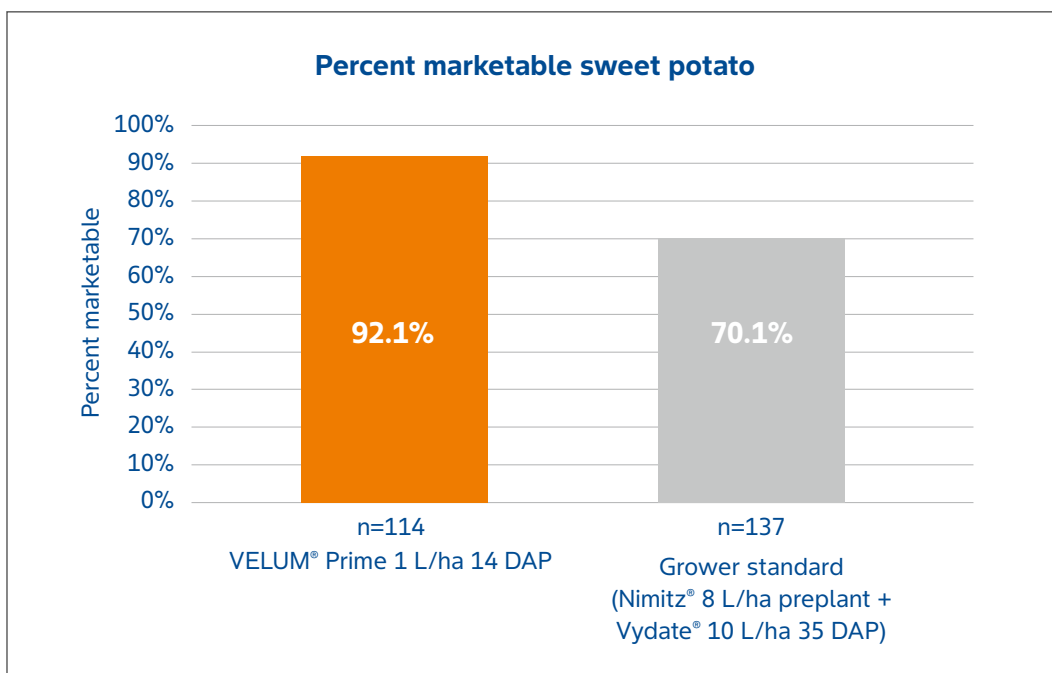
# SWEET POTATO

## BEST PRACTICE

- » Application
- » Crop- Sweet potatoes
- » Pest – Root knot nematode (*Meloidogyne* spp.)
- » Label rate: 1 application of 625 mL/ha or 1 L/ha
- » Do not apply more the 1 L/ha of VELUM Prime per year to any one field
- » Apply through trickle irrigation within 14 days (ideally within 1 – 10 days) of planting to protect developing tubers from nematode damage. Ensure ground is moist prior to incorporation of VELUM Prime into trickle irrigation and utilize enough water to adequately flush VELUM Prime through the lines and into the soil profile and sweet potato root zone.
- » Can be applied up to 4 months after planting.

## SWEET POTATO FIELD TRIAL OVERVIEW

Demonstration trial, Bundaberg, Qld 2024



DAP – Days after planting



# ROOT KNOT NEMATODE POPULATION - SOIL SAMPLE RESULTS

Bundaberg, Qld 2024

	Root knot nematode ( <i>Meloidogyne</i> spp.)/200 mL soil*	
	Pre-application	At harvest (126 DAP)
Grower standard (Nimitz® 8 L/ha preplant + Vydate® 10 L/ha 35 DAP)	0	2205
VELUM Prime 1 L/ha 14 DAP	0	645

\*Assessment conducted by QDAF

Two soil samples were taken from the trial site. Soil from each sample (200 mL) was set up in a Whitehead tray over three days. The solutions were then sieved with a 38 µm sieve and examined under a microscope for the presence of nematodes.

## HARVEST ASSESSMENT

Bundaberg, Qld 2024 (representative only from one replicate)



Grower standard  
(Nimitz® 8 L/ha preplant + Vydate® 10 L/ha 35 DAP)



VELUM Prime 1 L/ha applied at 14 DAP

## SWEET POTATO – LABEL INFORMATION

CROP	PEST	RATE	CRITICAL COMMENTS
Potatoes and sweet potatoes	Root knot nematode ( <i>Meloidogyne</i> spp.)	625 mL/ha or 1 L/ha	<p>VELUM Prime should be applied as part of an integrated nematode management program which includes cultural practices and alternating with nematicides from different mode of action groups.</p> <p>Uniform incorporation of VELUM Prime into the soil profile to the depth of the root zone is required to achieve maximum protection against nematodes.</p> <p>Only use the 625 mL/ha rate under circumstances where tolerance may be higher for tuber damage such as processing potatoes, under circumstances where nematode incidence is known to be lower or where VELUM Prime is used in a nematicide control program with a nematicide from another mode of action group.</p> <p>Apply a maximum of 1 application of VELUM Prime per year to the same cropping ground. Do not apply more than 400 g fluopyram/ha per year to the same cropping ground.</p> <p>Sweet potato: Apply through trickle or drip irrigation only within 14 days (ideally within 1-10 days) of planting or transplanting to protect the developing tubers from nematode damage. Alternatively, VELUM Prime can be applied as part of a nematicide control program later in the season, but only after an earlier application or applications with nematicides from a different mode of action group to avoid early damage from nematodes. Do not apply later than 4 months after planting.</p> <p>Ensure ground is moist prior to incorporation of VELUM Prime into trickle irrigation and utilise enough water to adequately flush VELUM Prime through the lines and into the soil profile.</p> <p>Do not use VELUM Prime on cultivars grown for the consumption of its leaves.</p>

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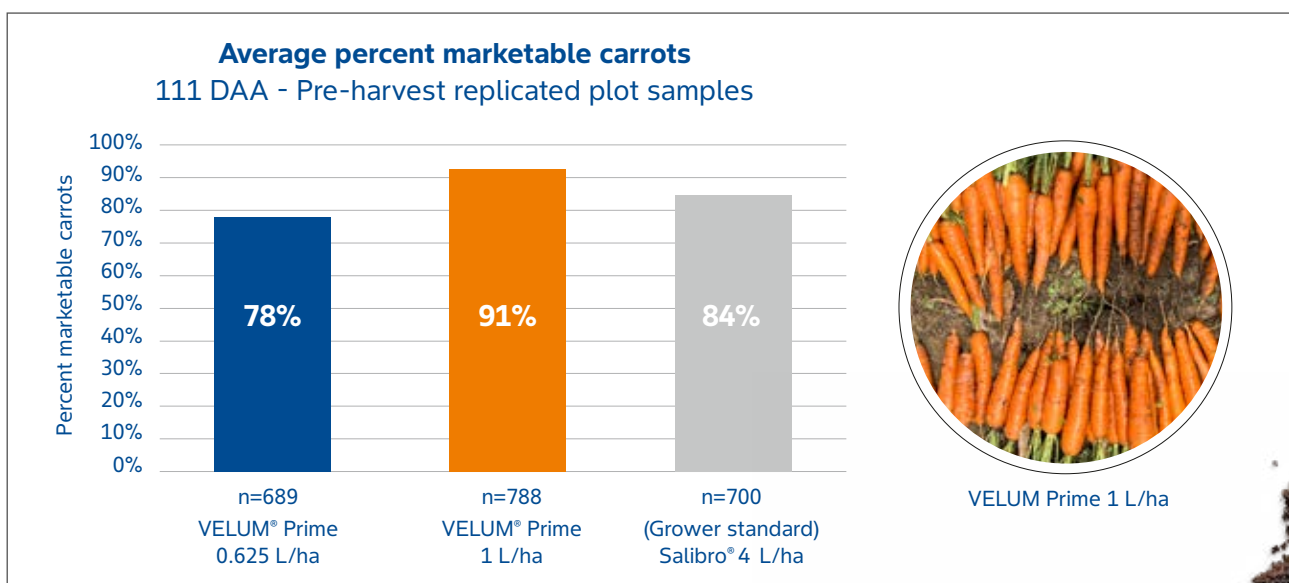
# CARROTS (ROOT VEGETABLES)

## BEST PRACTICE

- » Vital to have **moist** soil prior to application
- » Ensure a uniform application and incorporation of VELUM Prime into the soil profile to root zone depth.
  - Mechanical incorporation 0-3 days prior to sowing; or
  - Apply within one week of sowing and **irrigate immediately into the soil**.
- » Broadcast apply VELUM Prime in a **minimum of 300 L/ha water volume**, and use only a medium droplet size.
- » Avoid excessive undecomposed organic matter on soil surface to maximise product penetration into the soil profile.
- » Avoid excessive irrigation after application to prevent movement of VELUM Prime below the root zone and area of protection from nematode populations.

## GROWER DEMONSTRATION TRIAL

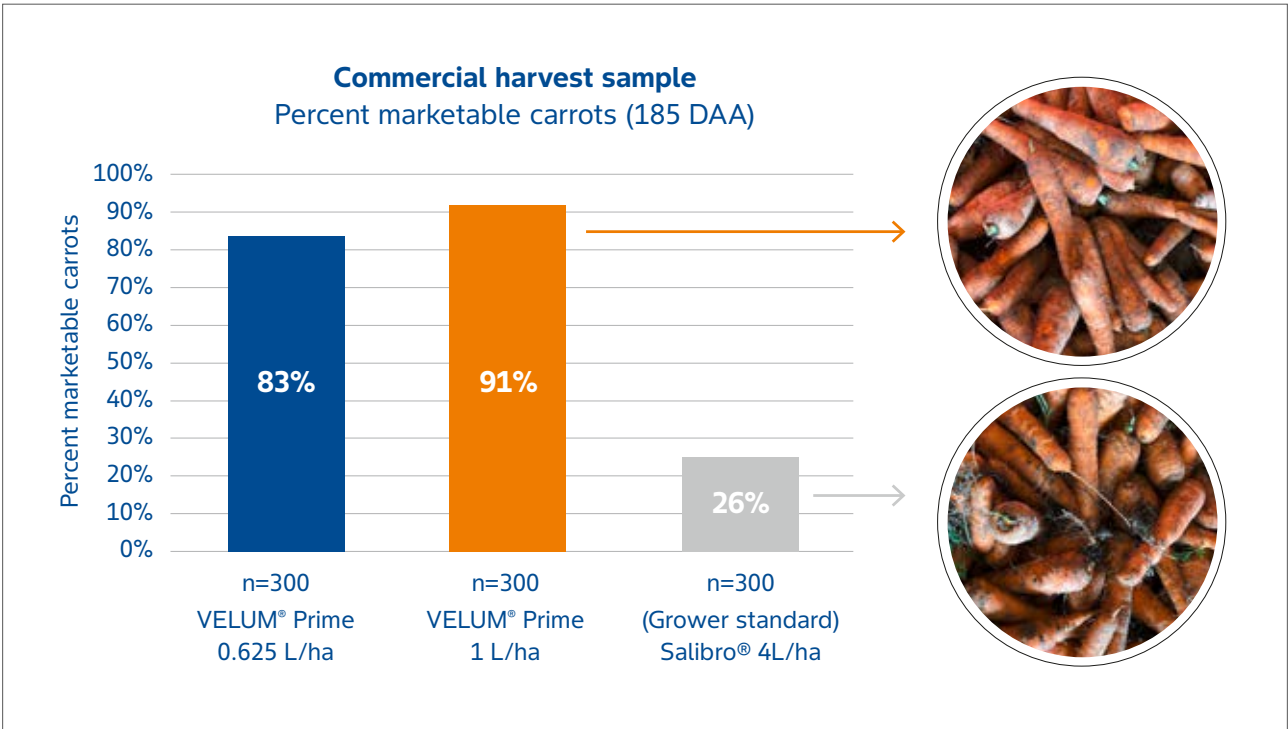
Myalup, WA 2024



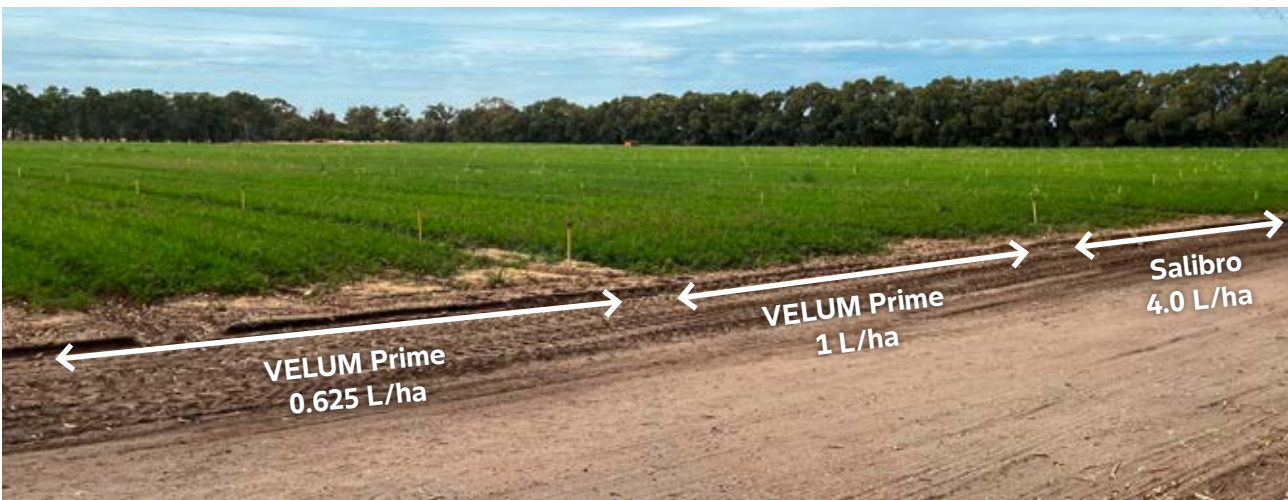
DAA – Days after application

# GROWER DEMONSTRATION TRIAL

Myalup, WA 2024



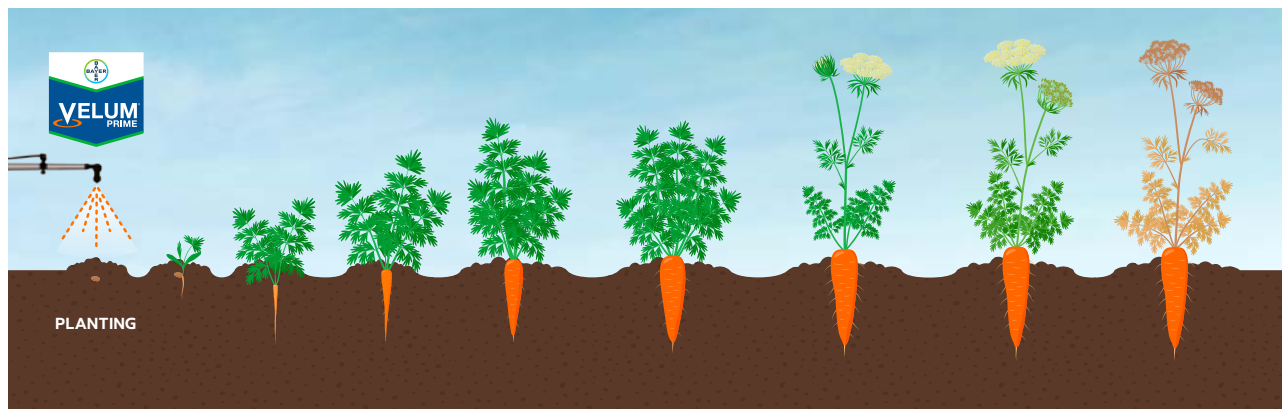
DAA – Days after application



## VELUM USE RECOMMENDATION - CARROTS

Crop	Pest	Application rates	Application method	No. of applications per crop	Maximum application rate [g a.i./ha] per year
Carrots	Root-knot nematodes ( <i>Meloidogyne</i> spp.) Root lesion nematodes ( <i>Pratylenchus</i> spp.)	625 mL/ha or 1 L/ha	Broadcast soil apply 0-3 days before sowing (mechanically incorporate) or Broadcast soil apply within 1 week after sowing (irrigate immediately thereafter)	1	400

Do not use VELUM Prime on cultivars that will be harvested within 60 days of planting.



## CARROTS – LABEL INFORMATION

CROP	PEST	RATE	CRITICAL COMMENTS
Root and tuber vegetables other than potatoes, sweet potatoes and aquatic root and tuber vegetables	Root knot nematode ( <i>Meloidogyne</i> spp.), root lesion nematode ( <i>Pratylenchus</i> spp.)	625 mL/ha or 1 L/ha	<p>Uniform incorporation of VELUM Prime into the soil profile to the depth of the root zone is required to achieve maximum protection against nematodes. This can be done mechanically prior to sowing, or via irrigation immediately post sowing.</p> <p>Apply VELUM Prime as a broadcast application 0-3 days before sowing and mechanically incorporate into the soil or apply within 1 week of sowing and irrigate immediately into the soil. Do not apply later than 7 days after sowing. Apply in a minimum of 300 L/ha water volume to achieve uniform coverage of soil.</p> <p>Moist soil prior to either application technique is vital to achieve the maximum efficacy from VELUM Prime. Ensure soil is moist prior to application.</p> <p>Only use the 625 mL/ha rate under circumstances where tolerance may be higher for nematode damage such as processing carrots and beetroot, or where VELUM Prime is used in a nematicide control program with a nematicide from another mode of action group.</p> <p>Apply a maximum of 1 application of VELUM Prime per year to the same cropping ground. Do not apply more than 400 g fluopyram/ha per year to the same cropping ground.</p> <p>Do not use VELUM Prime on root and tuber vegetable cultivars that will be harvested within 60 days of planting, e.g. baby carrots and baby parsnips. Do not use VELUM Prime on root and tuber vegetables grown for consumption of its leaves.</p>

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## PLANT BACK INTERVALS

» The following plant back intervals (from the last date of treatment) are required for rotational crops.

Crop group	Plant back interval
Vegetables	None
Cereals, pulses, oil seed crops and pasture	7 months

## RESISTANCE MANAGEMENT

» For fungicide resistance management, fluopyram is a Group 7 fungicide. As such, VELUM Prime may be subject to specific resistance management strategies which should be considered. For further information on the latest resistance management strategies, refer to CropLife and FRAC.

- <https://www.frac.info/>
- <https://www.croplife.org.au/>

» CropLife strategy for target spot in potatoes and FRAC recommendation for SDHI fungicide use in multi-spray vegetable crops:

- If used solo, apply Group 7 fungicides in strict alternation with fungicides from a different cross resistance group. If fungicides containing Group 7 are used in mixture, apply a maximum of 2 consecutive applications.



*Meloidogyne incognita* J2 attacking a root



**VELUM**<sup>®</sup>  
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**For more information on getting the best out of VELUM Prime,  
visit [crop.bayer.com.au/velumprime](http://crop.bayer.com.au/velumprime) or talk to your local Bayer Crop Science representative.**

Bayer CropScience Pty Ltd, ABN 87 000 226 022, Level 4, 109 Burwood Rd, Hawthorn VIC 3122.  
Technical Enquiries 1800 804 479. [crop.bayer.com.au](http://crop.bayer.com.au)

Always consult the product label for detailed information. The information and recommendations set out in this brochure are based on tests and data believed to be reliable at the time of publication. Results may vary, as the use and application of the products is beyond our control and may be subject to climatic, geographical or biological variables, and/or developed resistance. Any product referred to in this brochure must be used strictly as directed, and in accordance with all instructions appearing on the label for that product and in other applicable reference material. So far as it is lawfully able to do so, Bayer CropScience Pty Ltd accepts no liability or responsibility for loss or damage arising from failure to follow such directions and instructions.

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