FOURTH EDITION

suSCon maxi

iNTel Intelligent Technology

TECHNICAL MANUAL

Nufarm

Grow a better tomorrow

suSCon maxi

iNTel Intelligent Technology

Have you heard the latest intel? We've set the bar even higher.

CONTENTS

History of suSCon product development in sugarcane

1981	Field trials conducted assessing controlled release options for canegrub control to replace persistent organochlorines
1985	Commercial launch of suSCon Blue (140g/kg chlorpyrifos) 1992 - Trials commenced investigating alternative actives for improved greyback grub control
2001	Release of suSCon Plus for control of canegrubs in higher pH soils
2004	suSCon maxi (50g/kg imidacloprid) registered for 2yr Greyback canegrub control
2007	3yr control of Childers and negatoria canegrubs
2011	3yr control of southern one-year canegrub & release of minimum till data
2012	Depth of placement trials complete & 4yr control of Childers grub
2015	Registration of suSCon maxi Intel (50g/kg imidacloprid) for 3yr greyback canegrub control, 4 year control of southern one-year canegrub whilst maintaining all other suSCon maxi registration claims.
2018	4 year control of Greyback and French's canegrubs. 2 year control of Rhopaea canegrub.

4 years protection against greyback canegrub in sugarcane

For many years, Nufarm has worked closely with the industry's Sugar Research Australia (SRA) and the former BSES Limited to extend the period of control provided by the company's patented controlled - release suSCon technology.

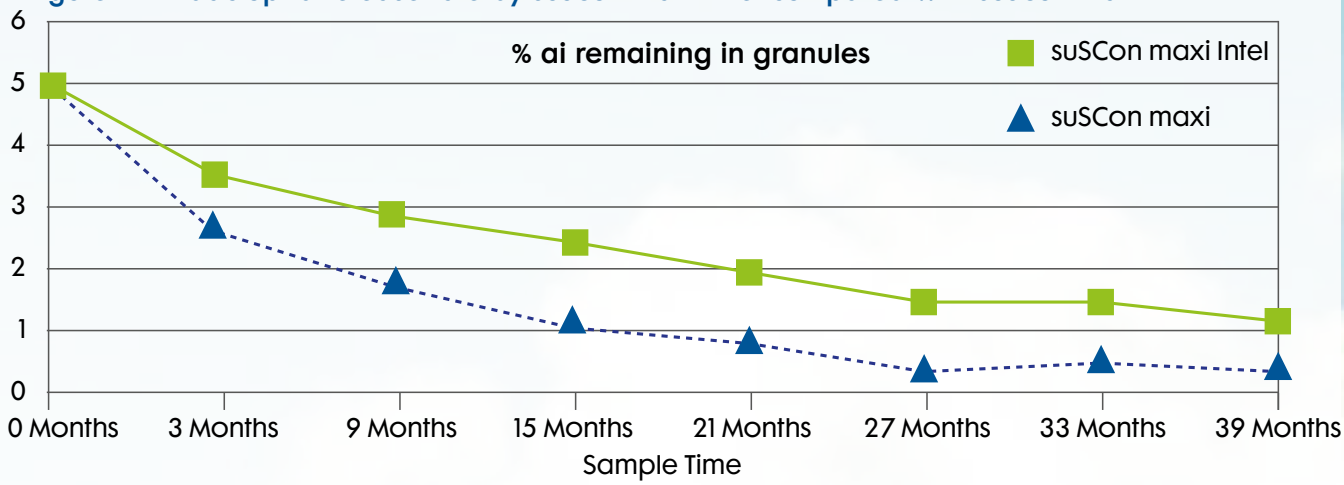
Since 2005, this long-term collaborative research has been trialling alternative controlled-release formulations of suSCon in northern, central and southern Queensland. This work aimed to extend the period of protection, broaden the spectrum of grub species controlled, and develop a formulation that is more cost-effective to apply.

Many formulations have been developed and screened against a range of canegrub species. suSCon maxi Intel demonstrated the most desirable efficacy and the most prolonged release.

suSCon maxi Intel has been developed with a more controlled release of imidacloprid than its predecessor suSCon maxi (Figure 1). This has resulted in a more prolonged release of imidacloprid to control target pests and therefore extended protection compared with suSCon maxi (figure 2).

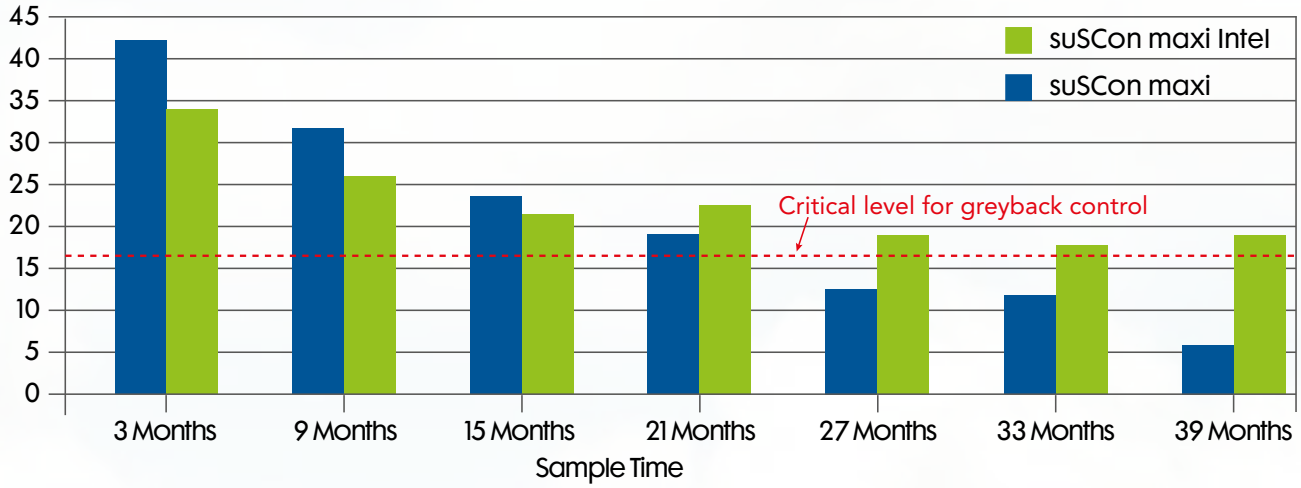
Have you got the latest intel?

Figure 1 - Imidacloprid release rate by suSCon maxi Intel compared with suSCon maxi



% a.i. remaining in soil. Av. 20 Northern and Central trials. 2009-2013 planted.

Figure 2 - Imidacloprid a.i. per granule in the soil over time- suSCon maxi Intel v suSCon maxi



µg ai/granule in soil. Av. 20 Northern and Central trials. 2009-2013 planted.

Trials have demonstrated

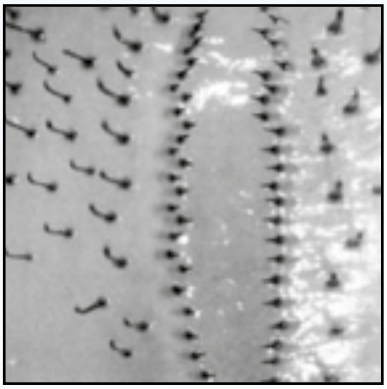
- suSCon maxi Intel provided significant reduction in greyback canegrub numbers in sugarcane in the plant, first, second and third ratoon crops when applied into the furrow of conventionally-planted cane at drill fill-in.
- Control of greyback canegrubs with suSCon maxi Intel resulted in increased sugarcane yield the plant, first, second and third ratoon crops. Compared with untreated plots, cane yield was 9-10 tonnes/ha greater.
- The release of active ingredient from suSCon maxi Intel granules is more controlled than from suSCon maxi, resulting in a more prolonged release of imidacloprid for optimal control of target pests and therefore extended protection compared with suSCon maxi.

Know which canegrub species are being targeted:

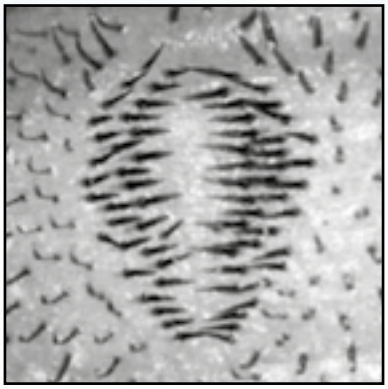
Canegrub species differ in their habit and feeding zone within the row profile. Correct identification of the species being targeted is crucial to ensure the suSCon maxi Intel granules are positioned in the correct location within the soil for maximum efficacy. Planting depth will also influence the correct placement of the suSCon maxi Intel granule band in relation to cane setts.

Canegrub identification

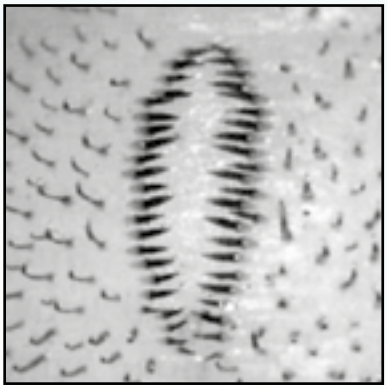
Canegrub species are identified by their "anal hair" (raster) patterns which differ between the species.



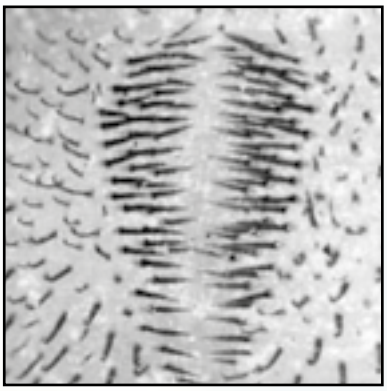
1 Greyback
Two almost straight rows of 20-28 short hairs.



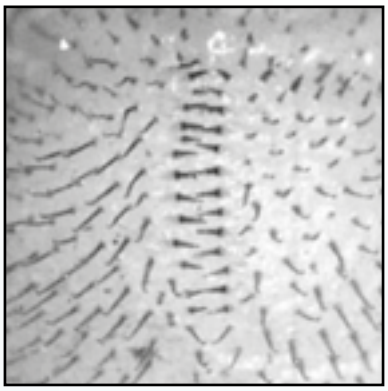
2 Childers
Oval-shaped, about 35 long hairs each side (volcanic – heavy alluvial soil).



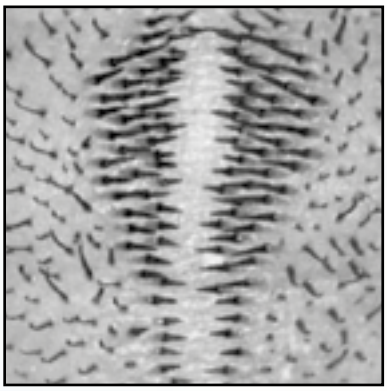
3 Southern 1 year
Two curved rows of 19-31 thick hairs (sandy forest soils).



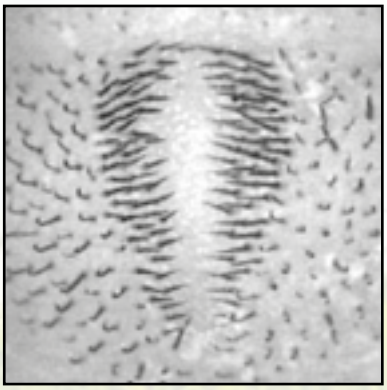
4 Negatoria
Pear-shaped, about 50 long hairs each side (clay-loam).



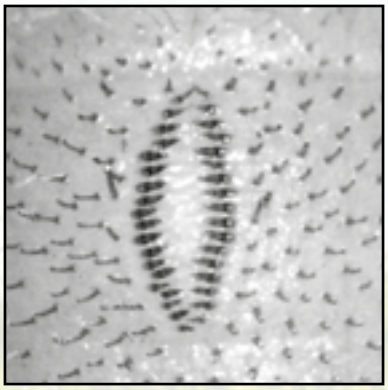
5 Bundaberg
Two parallel rows close together, about 15 short hairs each side.



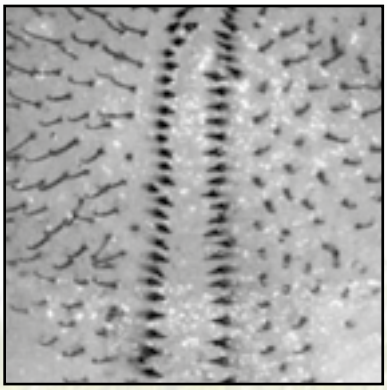
6 Consobrina
Pear-shaped and continuing forward as single lines of 5-8 hairs, about 50 long hairs each side.



7 French's
Pear-shaped, about 50 long hairs each side.



8 Grata
Two slightly curved rows of 18-26 thick hairs, hairs in each row close together compared with greyback.



9 Squamulata
Two straight rows of 28-40 short thick hairs, wider gap at front (poor sand).

SRA INFORMATION IS13094

Canegrub species lifecycles

One year lifecycle canegrub species larvae (summarised in table 1) generally do not descend below the top 35cm in the soil, even in the 3rd instar stage. suSCon maxi Intel granules therefore need to be placed above or through the major root mass when targeting one year canegrub species. When deep planting occurs and greyback canegrubs are the predominant species being targeted, the suSCon granules need to be placed well above the sett, best achieved by application at drill fill-in.

Table 1 - One year lifecycle canegrub species:

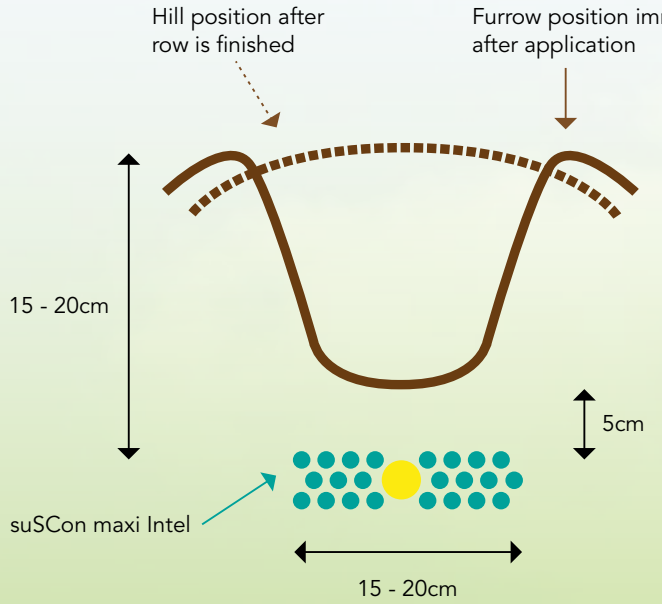
Canegrub species	Cane growing areas affected	Preferred soil type
Greyback *Dermolepida albohirtum*	Mossman to Mackay	Red volcanic clay loams, alluvium
Consobrina *Lepidiota consobrina*	Mossman to Bundaberg	Sandy loams
Grata *Lepidiota grata*	Ingham to Bundaberg	Sands
Squamulata *Lepidiota squamulata*	Ingham to Bundaberg	Sands
Southern one-year *Antitrogus consanguineus*	Bundaberg and Maryborough	Sandy alluvium, yellow podsols
Nambour *Antitrogus rugulosus*	Nambour to Northern NSW	Sandy soils
Rhopaea *Rhopaea magnicornis*	Beenleigh to Northern NSW	Alluvium

Two year lifecycle canegrub species (summarised in table 2) generally feed during the first year as 1st or 2nd instar larvae where they inflict minor damage before descending deep within the soil profile to 40-60cm to moult and/or overwinter. The following Spring, 3rd instar larvae move up through the profile to feed on cane roots, causing extensive damage to root systems of young plant and ratoon crops. suSCon maxi Intel granules therefore need to be placed below or through the major root mass when targeting two year canegrub species, best achieved by application at planting.

Table 2 - Two year lifecycle canegrub species:

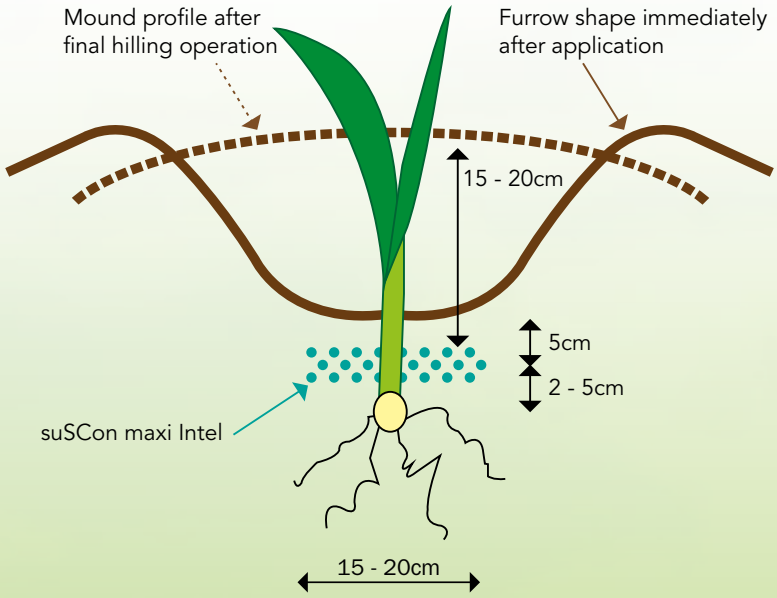
Canegrub Species	Cane growing areas affected	Preferred soil type
French's *Lepidiota frenchi*	Mossman to Bundaberg	Red volcanic clay loams, red schist, alluvium, sandy loams
Caudata *Lepidiota caudata*	Babinda to Tully	Red volcanic clay loams, alluvium
Negatoria *Lepidiota negatoria*	Proserpine to Beenleigh	Sandy loams, coarse alluvium
Consobrina 2 year race *Lepidiota consobrina*	Mossman to Bundaberg	Sandy loams
Bundaberg *Lepidiota crinita*	Bundaberg	Sandy loams, sands
Noxia *Lepidiota noxia*	Bundaberg to Nambour	Sandy clay loams, coarse alluvium
Picticollis *Lepidiota picticollis*	Bundaberg	Sands
Childers *Antitrogus parvulus*	Bundaberg, Childers	Red volcanic clays, clay loams

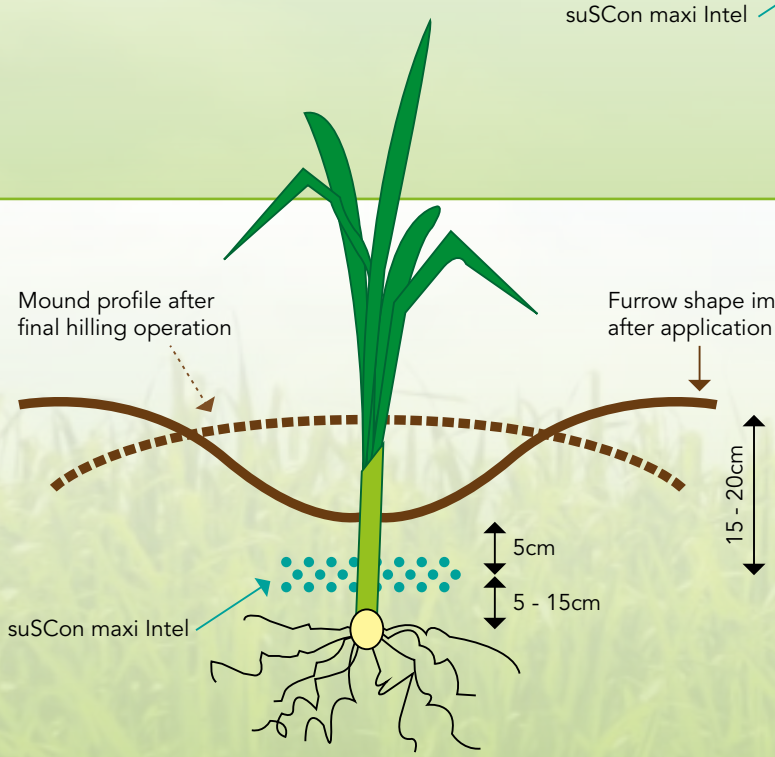
Placement recommendations for suSCon maxi Intel



Placement at planting
Most suitable for 2 year life cycle canegrubs (eg. Childers and negatoria canegrubs) or where very shallow planting (10-15cm) occurs.

Placement at first working
Most suitable when greyback and 2 year life cycle canegrubs occur together and where planting depth is 17-20cm.





Placement at drill fill-in
Most suitable in the Burdekin and other regions when greyback is the target canegrub together with moderate to deep planting (20-30cm).

suSCon Product Recommendations: Years of control

Canegrub species	suSCon maxi Intel
	50g/kg Imidacloprid 10-15kg/ha
Bundaberg	✔ ✔ ✔
Childers	✔ ✔ ✔ ✔
Consobrina	✔ ✔ ✔
French's	✔ ✔ ✔ ✔
Greyback	✔ ✔ ✔ ✔
Negatoria	✔ ✔ ✔
Rhopaea	✔ ✔
Southern one-year	✔ ✔ ✔ ✔

suSCon® maxi

iNTel® Intelligent Technology

suSCon application equipment

suSCon maxi Intel must be applied directly to the plant row through a precision granule applicator. Applicators must have a positive displacement mechanism which can deliver an accurate dose of the granules without causing damage to the granules.

There are a number of brands of granule applicators which are utilised in the sugarcane industry to apply suSCon products. The three predominant applicators utilised include:

1. **The Microband® Granule Applicator - Agricultural Requirements**
2. **The Bonel Brothers Granule Applicator**
3. **The Cane Country Engineering Granule Applicator**

There are two basic mechanisms to deliver the product in a measured dose from the hopper to the delivery tubes, including:

1. **Rotating rotor or flute mechanism**
2. **Worm (auger mechanism)**

The Microband® Granule Applicator and the Bonel Brothers Granule Applicator both have a fluted rotor mechanism, whilst the Cane Country Engineering Granule Applicator utilises a worm mechanism.

All three can be driven from the planting mechanism or a land wheel for later applications. The delivery mechanism must ensure an even band of granules which is 15-25cm wide. This can be achieved by:

1. Two delivery tubes dropping granules into the drill behind the planter boards so that they mix with the incoming soil to form a layer 2-3cm deep. Planter boards must be wide enough apart to ensure a minimum band width of 15cm. The granules may safely touch the sett as they will not burn the eyes of the sett or the young cane roots. Further soil cover must then be brought in by discs behind the planting boot.
2. Application into the bottom of the furrow at first working. The normal "scratchers" can be used to work the granules into the base of the furrow and bring in more soil cover. In this case if the furrow base is too narrow (less than 15cm) after planting, a cutaway operation is recommended before application of suSCon maxi Intel.
3. Application into the furrow at the half-open drill stage after commencement of tillering. In this case granules are dropped into the furrow and mixed with soil to form a band 15-20cm wide and 2-3cm deep during the drill fill-in operation.

In scenarios 2 and 3, suSCon maxi Intel should not be applied behind tynes or cut-away discs. Application behind these implements often results in narrow bands of granules which will not provide satisfactory control of canegrubs.

Irrespective of the method utilised to apply suSCon maxi Intel, growers should carefully check that the desired placement (as detailed above) is being achieved. Placement should be checked at several positions in the field soon after application has commenced and monitored at regular intervals in the field throughout the entire application process. Changes in soil type may affect equipment operation and therefore granule placement.

suSCon maxi Intel granules

Calibration of application equipment

Calibration of application equipment

The recommended rates of application for suSCon maxi Intel have been determined from a large number of trials and have been found to be the most cost effective for the individual canegrub species being targeted. It is therefore important to apply the recommended rate as accurately as possible.

There are a number of suitable methods for calibration of suSCon application equipment.

Critical information required to calculate the output of an applicator and therefore the rate of application includes:

1. Row spacing, and
2. Grams of suSCon maxi Intel delivered from the applicator over a measured distance while working in the field under operating conditions.

Row spacing

Throughout the sugarcane growing areas there is some variation in row spacing used, which will influence the number of metres of row in a hectare of sugarcane.

To calculate the metres of row in a hectare of sugarcane, the row spacing (in metres) should be divided into 10,000.

Example: If row spacing is 1.525m (5 feet) then the metres of row/ha equals 6,557.

(ie 10,000/1.525 = 6557m of row/ha.)

The table below provides some conversions for various row spacings.

Row spacing feet & inches	Row spacing metres	No. of metres of row/ha
4′ 9″	1.449	6,901
4′ 10″	1.472	6,793
5′	1.525	6,557
5′ 2″	1.576	6,345
5′ 4″	1.627	6,146

Grams of granules per metre of row

In order to determine output of the applicator it should be set up and operated in the field under normal working conditions. This investigation should not be conducted on a flat road surface under no load, because wheel slip will not be accounted for.

Once set up, a plastic bag should be placed and held over the delivery tubes and the granules collected over a distance of 100m operating in the field. The granules collected should then be weighed on an accurate balance (scales).

The rate of application per hectare can then be simply calculated by the following formula.

Rate (kg/ha) =

$$\frac{\textit{Grams/100m row}}{\textit{1000}} \times \frac{\textit{No. of m of row/ha}}{\textit{100}}$$

Example:
If row spacing is 1.525m (5 feet) and there has been 160g of granules collected in the bag over the 100m of row.

$$\textbf{Rate (kg/ha)} = \frac{\textit{160}}{\textit{1000}} \times \frac{\textit{6557}}{\textit{100}} = 10.5 \text{ kg}$$

If more or less than the required rate is obtained in the plastic bag, then adjustments to the applicator drive will need to be made by changing gears (cogs) or pulleys.

The ratio of teeth (or pully diameter) on the delivery mechanism (applicator) to the drive mechanism (chopper mechanism on the planter or land wheel) determines the adjustment(s) required. If an alteration to the gear (pulley) ratios is required to achieve the recommended rate, the rate of application should be checked again in the field before commercial application is commenced. When applying suSCon maxi Intel it is not advisable to use the rear wheel of the tractor to drive the granule applicator because any wheel slip will alter the rate of application.

A calibration worksheet is provided In Appendix 1.

Benefits of suSCon maxi Intel

- Long term control
- Only one application is required for up to 4 years control - convenience, reduced labour inputs, peace of mind
- Desirable plant populations are maintained
- Increased sugarcane plant vigour and yield potential
- Reduced stool tipping
- Stronger ratoons and increased ratooning life
- Lower environmental hazard compared with alternative insecticide options
- Ease of monitoring application to ensure correct placement of the insecticide for optimal control of the canegrub species targeted

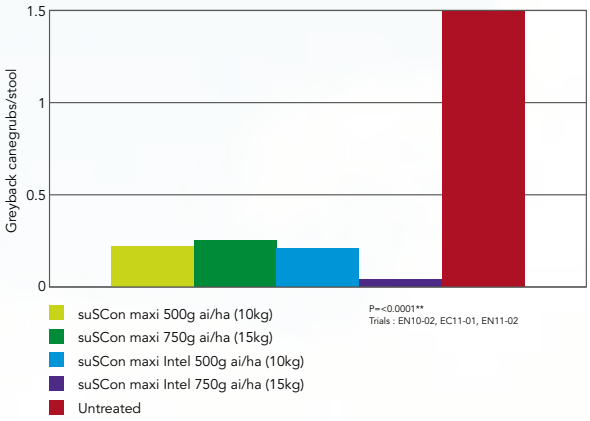
suSCon® maxi

iNTel® Intelligent Technology

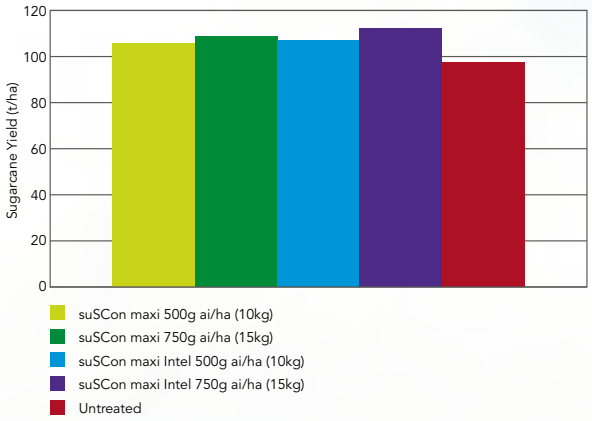
Trial results

The registered rate range for suSCon maxi Intel is 10-15kg/ha. Ongoing trial results have demonstrated improved efficacy against greyback canegrub in 3rd ratoon and under heavy pressure situations when the higher rate (15kg/ha) is utilised.

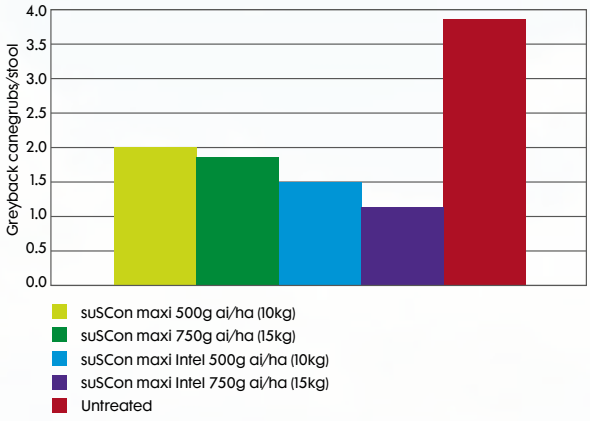
Greyback canegrub control in plant crops combined analysis of 3 trials



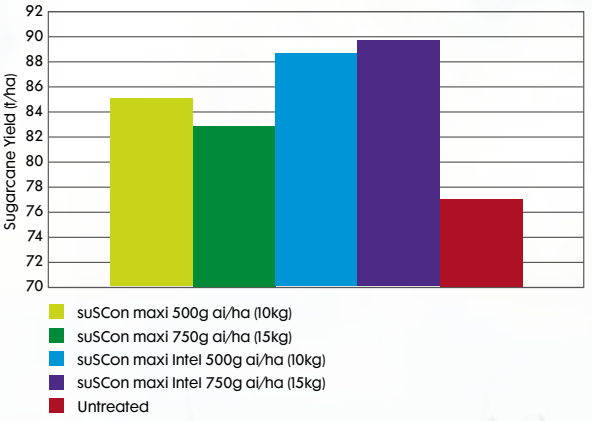
Sugarcane yield in plant crops combined analysis of 3 trials



Greyback canegrub control in third ratoon crops combined analysis of 6 trials



Sugarcane yield in third ratoon crops combined analysis of 6 trials



Directions for use in sugarcane (plant cane only)

PEST	RATE		CRITICAL COMMENTS
	per ha	per 100m row or bed	
Greyback canegrub *(Dermolepida albohirtum)* French's canegrub *(Lepidiota frenchi)*	10-15kg for up to 4 years protection from root damage	150-225g for up to 4 years protection from root damage	**CONVENTIONAL PLANTING IN SINGLE ROWS** (Planters with planting boards that result in wide planting furrows in single rows.) suSCon maxi Intel should be applied directly to the soil through a precision granule applicator. Use the higher rate (15kg/ha or 225g/100m row) where heavy greyback or French's canegrub pressure is expected and especially for improved protection in second and third ratoon crops. Apply granules in a band 15-20cm wide across the centre of the row by one of the methods listed below. **Cover granules with at least 5cm of compacted soil or 10cm of loose soil at the time of application.** DO NOT remove soil or disturb granules in subsequent cultivation. Bring in further covering soil as cane growth allows. **Granules should be covered by 15-20cm of compacted soil once the row is finished and hilled up.** This placement can be achieved by one of the application methods shown for Conventional Planting under **GENERAL INSTRUCTIONS.**
Childers canegrub *(Antitrogus parvulus)* Southern one-year canegrub *(Antitrogus consanguinies)*	10kg for up to 4 years protection from root damage	150g for up to 4 years protection from root damage	
Negatoria canegrub *(Lepidiota negatoria)* Bundaberg canegrub *(Lepidiota crinita)* Consobrina canegrub (2 year race) *(Lepidiota consobrina)*	10kg for up to 3 years protection from root damage	150g for up to 3 years protection from root damage	
Rhopaea canegrub *(Rhopaea magnicornis)*	10kg for up to 2 years protection from root damage	150g for up to 2 years protection from root damage	
Greyback canegrub *(Dermolepida albohirtum)*		225g for up to 3 years protection from root damage	**CONVENTIONAL PLANTING IN DUAL ROWS** (Cane planted in dual rows in beds up to 2.1m apart) Apply suSCon maxi Intel with a precision granule applicator, so that granules are placed in bands 15-20cm wide in each planting row. Similar amounts of product should be applied in each band (112.5g/100m row). **Cover granules with at least 5cm of compacted soil or 10cm of loose soil at the time of application.** DO NOT remove soil or disturb granules in subsequent cultivation. If row/bed completion requires, bring in further covering soil as cane growth allows. **Granules should be covered by 15-20cm of compacted soil once the row is finished and hilled up.** This placement can be achieved by one of the application methods shown for Conventional Planting under **GENERAL INSTRUCTIONS.**
Childers canegrub *(Antitrogus parvulus)*		225g for up to 4 years protection from root damage	
Greyback canegrub *(Dermolepida albohirtum)*		225g for up to 2 years protection from root damage	**DOUBLE DISC OPENER PLANTER** (Cane planted with minimum-tillage planters eg. double disc opener planters, in single or dual rows.) Apply suSCon maxi Intel with a precision granule applicator, so that granules are placed in even bands at least 7cm wide in each planting row. In the case of dual rows, similar amounts of product should be applied in each band (112.5g/100m row). **Granules should be covered by 10-15cm of soil when planting is completed.** DO NOT remove soil or disturb granules in subsequent cultivation. Refer to Double disc opener planters application recommendations under **GENERAL INSTRUCTIONS** for further detail.

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

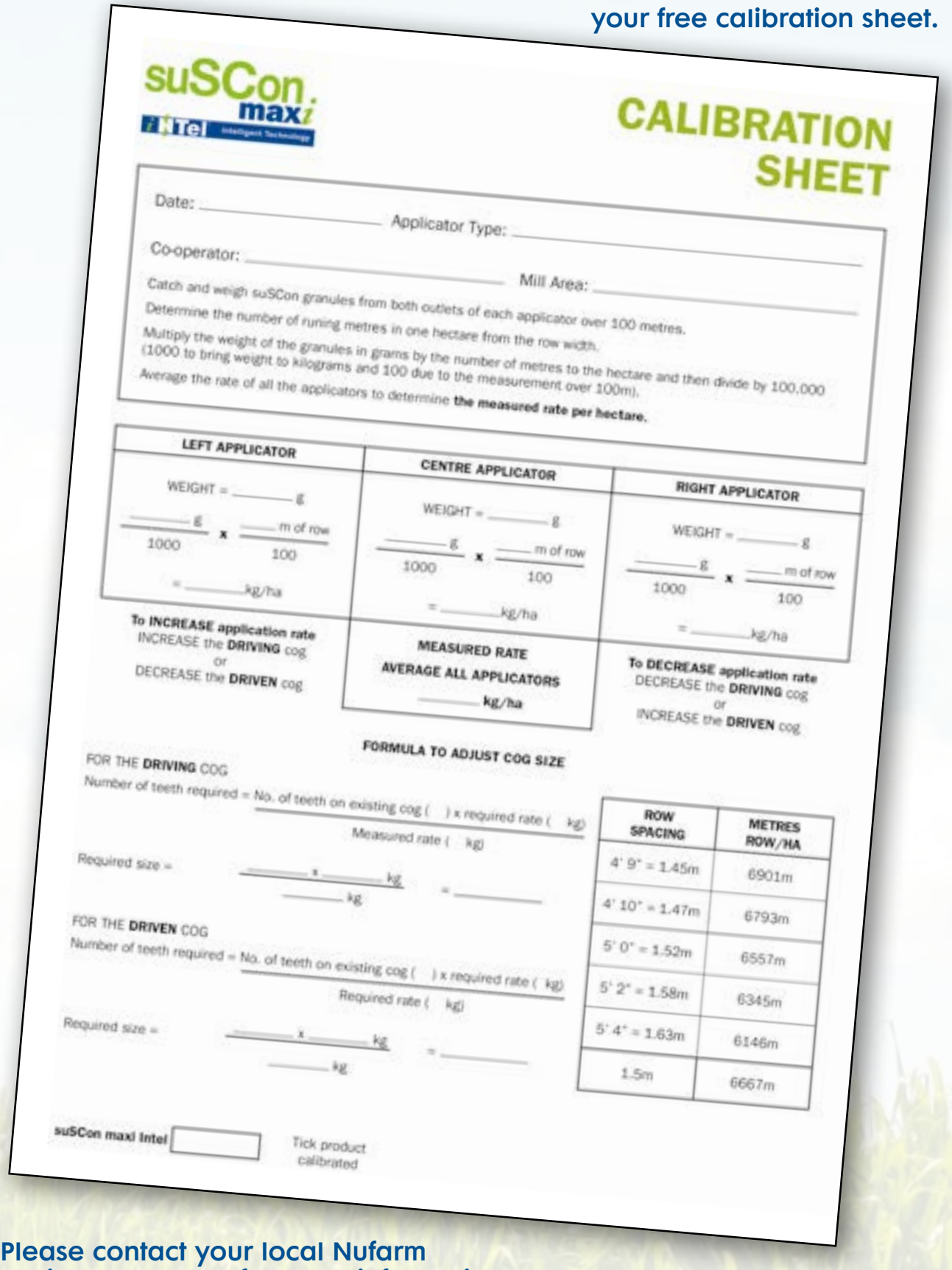
WITHHOLDING PERIODS

HARVEST: NOT REQUIRED WHEN USED AS DIRECTED.

GRAZING: DO NOT GRAZE OR CUT FOR STOCK-FOOD FOR 27 WEEKS AFTER APPLICATION.

Appendix 1

Go to www.nufarm.com.au to download your free calibration sheet.



suSCon maxi Intel

CALIBRATION SHEET

Date: _____ Applicator Type: _____

Co-operator: _____ Mill Area: _____

Catch and weigh suSCon granules from both outlets of each applicator over 100 metres.

Determine the number of runing metres in one hectare from the row width.

Multiply the weight of the granules in grams by the number of metres to the hectare and then divide by 100,000 (1000 to bring weight to kilograms and 100 due to the measurement over 100m).

Average the rate of all the applicators to determine **the measured rate per hectare.**

LEFT APPLICATOR	CENTRE APPLICATOR	RIGHT APPLICATOR
WEIGHT = _____ g _____ g / 1000 x _____ m of row / 100 = _____ kg/ha	WEIGHT = _____ g _____ g / 1000 x _____ m of row / 100 = _____ kg/ha	WEIGHT = _____ g _____ g / 1000 x _____ m of row / 100 = _____ kg/ha
To INCREASE application rate INCREASE the **DRIVING** cog or DECREASE the **DRIVEN** cog	**MEASURED RATE** **AVERAGE ALL APPLICATORS** _____ **kg/ha**	**To DECREASE application rate** DECREASE the **DRIVING** cog or INCREASE the **DRIVEN** cog

FORMULA TO ADJUST COG SIZE

FOR THE **DRIVING** COG

Number of teeth required = No. of teeth on existing cog ( ) x required rate (kg) / Measured rate (kg)

Required size = _____ x _____ kg / _____ kg = _____

FOR THE **DRIVEN** COG

Number of teeth required = No. of teeth on existing cog ( ) x required rate (kg) / Required rate (kg)

Required size = _____ x _____ kg / _____ kg = _____

ROW SPACING	METRES ROW/HA
4' 9" = 1.45m	6901m
4' 10" = 1.47m	6793m
5' 0" = 1.52m	6557m
5' 2" = 1.58m	6345m
5' 4" = 1.63m	6146m
1.5m	6667m

suSCon maxi Intel ☐ Tick product calibrated

Please contact your local Nufarm Territory Manager for more information.

nufarm.com.au

For more information on suSCon maxi Intel, contact your local Nufarm Territory Manager.

nufarm.com.au

This information is a guide only and no substitute for professional or expert advice. The product label should be consulted before use of any of the products referred to in this publication. To the maximum extent permitted by law, Nufarm Australia Limited disclaims all warranties of any kind, whether express or implied, including but not limited to any warranty that the information is up-to-date, complete, true, legally compliant, accurate, non-misleading or suitable.

© 2018 Nufarm Australia Ltd. All trade marks (®,™) are owned by Nufarm Australia Ltd or used under license.

Nufarm

Grow a better tomorrow