



# TOMATO TOPICS



Know-how for Horticulture™

NEWS and INFORMATION  
FOR THE PROCESSING TOMATO INDUSTRY

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## 6<sup>th</sup> World Congress on the Processing Tomato & 9<sup>th</sup> ISHS Symposium on the Processing Tomato

After 2 years of planning the 6<sup>th</sup> World Congress on the Processing Tomato & 9<sup>th</sup> ISHS Symposium on the Processing Tomato was held in Melbourne from the 15<sup>th</sup>-18<sup>th</sup> November. Over 250 delegates and approximately 50 partners participated in the event. The majority of these people travelled a long distance to attend the congress. The organising committee must thank all delegates for making the effort to come to Australia to make the event a success.

A comment was made by an overseas delegate saying "We knew the Aussies could do it, but we didn't expect it this well put together!" A number of other comments have been received since delegates have returned home. In general the comments have said that the event was very enjoyable and informative and the opportunity to meet representatives from the processing tomato industry worldwide was invaluable.

Following the formal proceedings in Melbourne a post congress tour was conducted, with approximately 60 delegates spending 1 or 2 nights in Echuca. Once again it appears that all delegates thoroughly enjoyed this part of the tour and found the program very informative.

During the past 2 years considerable sponsorship and support was received from a number of companies. Initial funding for the event was provided by the Australian Processing Tomato Growers and Horticulture Australia Ltd. The principal sponsor was Visy. The Wednesday night dinner held at Werribee Mansion was sponsored by the Australian processing tomato companies (Heinz, SPC Ardmona Ltd., Cedenco, and Unilever). Supporting partners of the event included: Victorian State Government, Tomato News, RioBravo, Scholle, Heinz Tomato Seed, Scalzo, Ray Tec, Morning Star, Entapack, Netafim, Protec, Ingomar, Food News, FMC Food Tech, SIG, Cryovac, FBR-ELPO, Odenberg, Rapak, Merko and Manildra. Thanks must go to all these companies for providing their support to ensure this

event was a success.

The new chair of the World Processing Tomato Council is John Mumford of Canada, replacing Duncan Blake of Turkey. Juan Jose Amezaga from Spain and Louis Chirnside are the new Vice Chairman.

The 7<sup>th</sup> World Congress on the Processing Tomato and 10<sup>th</sup> ISHS Symposium on the Processing Tomato will be held in Tunisia in 2006. A number of industry members have already expressed their interest in attending this event. If you are interested in participating in an industry tour in conjunction with attending the 7<sup>th</sup> World Congress please notify the Industry Development Manager (Liz Mann).

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## Where are Your Research Dollars Being Spent this Season

### Processing Tomato Cultivar Evaluation Trials

#### ***EARLY*** **Victoria**

Boort (Chirnside) transplanted 22/9  
Boort (Lehmann) Seeded 30/9

#### **NSW**

Griffith (Amaro) Seeded 21/9  
Darlington Pt (Kooba) Seeded 8/10

#### ***Anticipated Harvest***

End Jan/1<sup>st</sup> week of Feb  
Mid Feb

1<sup>st</sup> week of Feb  
3<sup>rd</sup> week of Feb (full row)

#### ***MID PASTE***

#### **Victoria\***

Strathallan (Moon) Transplanted 25/11  
Undera (Gugliotti) Transplanting 10/12

#### **NSW**

Jerilderie (Cardillo) Seeded 3/11

Last week March  
Mid April (full row)

3<sup>rd</sup> week March

#### ***MID WHOLEPEEL***

#### **Victoria**

Boort (Hosking) Seeded 26/10  
Undera (Selwood) Transplanted 8/11  
Colbinabbin (Pike) Seeded 2/12

#### **NSW**

Jerilderie (Rorato) Seeded 27/10

3<sup>rd</sup> week March

Mid March

Mid April (full row)

2<sup>nd</sup> week March

\*Note one site lost in Victoria

**Replicated cultivars** (/ denotes alternative lines planted at some sites):

<b>Early:</b>	<b>Midseason Paste</b>	<b>Midseason Wholepeel</b>
ENP 113	Heinz 9035	Falcorosso
CXD 204	Davo	TOP 3929
Heinz 8704	NDM 553	Heinz 9614
Heinz 3002	U941	Heinz 3402
TSH 4	Heinz 4001	RG 15/TS 8
TSH 18	TOP 2193/U 729	RG 31
TOP 2312	Heinz 3402	FG 9936/ES 96-100
C250/Sun 642	NDM 2267/Sun 642	TOP 2320
FG00119/Hz 9280	NDM 0098	Hypeel 696

*Bill Ashcroft, DPI Tatura (03 58 335 253) Tony Napier, NSW DPI, Yanco (02 69 512 796)*

### **Fusarium in Victoria**

Some people involved in the processing tomato industry may be aware that plant samples were collected from a paddock last season and sent for analysis. Upon initial analysis *Fusarium* was isolated from the affected tissue, with morphological characteristics closely fitting with

those of *Fusarium oxysporum*. This was then submitted for further analysis to determine if the fungus was in fact *Fusarium oxysporum* f.sp. *Lycopersici*, and what race.

With this further analysis the sample was found to be a non-pathogenic *Fusarium oxysporum*. Hence symptoms present in the infected crop may have been due to other *Fusarium* spp.

## Soluble Solids – Evaluation of nitrogen sources

by Serve-Ag and co-operators

The replicated nitrogen source trial at Mooroopna, Phillippe Mei's property, Hz9614, was planted on the 19/11/04 on a virgin block of land. Each plot has its own fertigation unit feeding into the subsurface drip line system. There are six treatments and four replicates per treatment. The base fertiliser of Pivot Super Potash 3&1 at 500kg/ha at planting (Table 1) has selected according to the pre-plant soil test result. The N-check test showed 50kg NO<sub>3</sub>-N/ha allowing the omission of N in the base fertiliser.

Nutrient	N%	P%	K%	S%	Ca%
%	0	6.6	12.7	8.2	14.9
kg/ha	0	33	63.5	41	74.5

Table 1 - Pre-plant fertiliser application

The trial fertigation rates have been calculated using nutrient uptake figures produced by Matt Steward during his Honours project. The weekly rates have been adjusted to plant growth rates with higher rates during early fruit growth. Table 2 lists treatments and total application rates.

Treatment No.	Product	Nutrient content				Nutrient (kg/ha)
		N%	P%	K%	Ca%	
1	Urea drip	46.0				300 N
2	Easy-N®	42.5				300 N
3	Easy-N® plus	42.5				196 N
	Balance N® weeks 7-9	12.2			18.3	104 N 156 Ca
4	Nitro-Humus® 323TM	32		3		300
5	Urea plus					300
	MKP (mono-potassium phosphate)		22.5	28		39 P 48 K
6	Easy-N® plus					300
	MKP (mono-potassium phosphate)		22.5	28		39 P 48 K

Table 2 - Replicated Nitrogen Trial Treatment List

At week 7, there will be one application of a full trace element mix, even though soil levels appear satisfactory (Table 3).

Nutrient	N	Fe	Zn	Mn	Co	B	S	Mo
%	5%	3%	3%	2%	1%	0.77%	4.60%	0.05%
kg/ha	0.25	0.15	0.15	0.1	0.05	0.0385	0.23	0.0025

Table 3 - Week 7 application of trace elements (Agrichem SupaTrace at 5 L/ha or 10mL per plot)

Plants will be tested regularly for nutrient uptake levels. If serious deficiencies are found, the fertiliser program will be adjusted accordingly, apart from nitrogen. The first NU-test sample was taken on the 8/11/04 and all levels are in the desirable range, apart from sap brix levels, which are slightly low (3.8). We expect the trial to be harvested about mid to end February.

Ron Cunha, Ag-reserves at Kooba Station, Darligton Point, has set up a commercial scale nitrogen trial. The trial compares urea, Easy-N and Nitrohumus 323 in two blocks each.

We thank Agrichem for supplying free fertiliser for the trials. Incitec-Pivot also offered to supply fertiliser, but unfortunately we had already bought it. We gratefully acknowledge the offer.

### Crop monitoring

All growers that monitor their crops through their agronomists can organise for the brix testing of first pink fruit at no charge as part of the project. If first pink fruit brix are low, corrective action may be possible.

Growers who have suggestions or questions regarding the 2004/05 programs on soluble solids should contact Doris 03-6427 0800.

## Robocrop Utilised in Processing Tomato Crops in NSW and Victoria

Malcolm Taylor Robocrop Australia Pty. Ltd.

Robotic weeding is now a reality for processing tomato growers after a number of successful demonstrations in October and November 2004 of the Robocrop precision guided hoe.

Weed management is always a significant issue for tomato growers. Furrow irrigated crops tend to be grown on wide rotations with opportunities to deplete soil weed seedbanks. Drip irrigated fields tend to be managed more intensively with back to back summer crops leading to intense weed (and disease) challenges that tempt growers to resort to banding of metham sodium along the drill or planting row. Selective in-crop herbicides such as rimsulfuron, metribuzin, napropamide and trifluralin are often banded along the crop row, whilst inter-rows are managed with tillage or guarded glyphosate application.

Chipping costs often range from \$50-300/ha depending upon the weed challenge, thus accuracy of guidance during inter-row tillage is important in minimising this laborious and expensive task

GPS guidance has in many instances aided in accurate hilling, placement of drip tape and planting, however it has not proven capable of reliably guiding inter-row cultivations in narrow row crops. At the high levels of precision and consistency demanded during tillage, it makes little sense to be looking hundreds of kilometres into the sky for a measurement, when if one looks down the crop is less than 1m from your cultivator bar !

Vision guidance of cultivation has been under development in the UK, Denmark and the USA for over 15 years. Recent commercialisation of the British developed Robocrop system has enabled adoption of precise and rapid tillage in a range of high value crops. Developed at the Silsoe Research Institute in the late 1990's commercial units have been commissioned in a range of row crops in Europe over the past three years including maize, sugar beet, onions, peas, lettuce and winter cereals.

Robocrop uses a colour video camera to scan ahead of the tillage bar. Images are analysed for green pixelation and peaks matched to a pre-determined grid pattern based upon the crop row spacing. Signals are relayed back to electro-hydraulic valves that control a sideshift used to position the tillage bar in relation to the crop rows. No satellite signals are used, just a real-time video image of the crop ahead. Multiple rows and discontinuity of the row are no problem. Robocrop will follow curves, thus it will correct for GPS errors or follow contours (in dryland crops). Models up to 12m wide for any crop row configuration are available.

Parallelograms are fitted across the bar to enable accurate depth control, thus preventing root damage or excessive moisture loss from cultivating too deeply. Even soil flow also occurs when knives are suspended off parallelograms, thus clearances can be minimised and intra-row weeds can often be buried. Robocrop cultivators are designed for very

shallow tillage, thus draft requirements are low, tractor horsepower needs are minimised and fuel conserved.

For the recent tomato demonstrations a 6m Robocrop precision guided hoe was fitted with bean knives and ridging units (Alabama sweeps). At Kooba Station near Darlington Point direct seeded tomatoes grown in twin rows (14" on 72" beds were cultivated at growth stages varying from 1<sup>st</sup> true leaf until 4" tall. At the smallest growth stages tracking was achieved, however crop guards were necessary to prevent burial of the crop row. Speeds of 10km/hr were appropriate amongst larger plants without resorting to crop guards to control excessive soil flow. Speeds of up to 18 km/hr were achieved without a loss of guidance, however crop burial was excessive at this speed.



Figure 1: Robocrop precision tillage bar cultivating at 10km/hr in direct seeded processing tomatoes

Ground engagement was effective at Kooba using bean knives, although crescent knives would have improved results on the bed shoulders. Significantly when using Robocrop a labourer was not required to sit for long periods in dust and vibration whilst attempting to concentrate on accurately guiding a cultivator bar. A night demonstration also confirmed that the Robocrop guidance system is equally effective at night under normal incandescent work lamps.



Figure 2: Operation proved equally effective at night, enabling 24 hour operation at critical times in crop development.

In subsequent demonstrations on the properties of Louis and Geraldine Chirnside and Dennis Moon a 6m Robocrop was retooled for single row 60" beds. At both properties a metham band was used to act as a pre-emergence herbicide

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**UPCOMING EVENTS**

**Discussion Group Meetings**

Doris Blaesing will be present to discuss the latest research project on soluble solids and nutrition

Tuesday 18<sup>th</sup> January, 2005 7:30pm - Commercial Hotel, Boort

Wednesday 19<sup>th</sup> January, 2005 Criterion Hotel, Rochester

1:00pm - Field staff and support service personnel meeting

7:30pm - Criterion Hotel, Rochester

Thursday 20<sup>th</sup> January, 2005 7:30pm MIA - DALCROM office, Darlington Point

**Annual Preharvest Function**

Friday 21<sup>st</sup> January, 2005

7:30pm La Porchetta, Echuca

*RSVP Essential to Liz Mann by Wed 19th Jan, 2005*

**Outlook Conference**

1<sup>st</sup> -2<sup>nd</sup> March 2005

National Convention Centre, Canberra

[www.abareconomics.com/outlook](http://www.abareconomics.com/outlook)

**Annual Processing Tomato R & D Forum**

Late May, date and venue to be confirmed

Currently proposing to hold an industry golf day after the forum.

**Proposed Industry Study Tour**

An overseas study tour program is currently being compiled to include a visit to the processing tomato industry in Chile, Argentina, Brazil and China. The proposed itinerary is outlined below. If you are interested in taking part please contact Liz Mann by the 30<sup>th</sup> January to express your interest in taking part. You will then be notified of proposed cost.

Mon	18 July 05	Melbourne	Santiago (Chile)
Tue	19 July 05	Visit fields	
Wed	20 July 05	Santiago	Mendoza (Argentina)
Thu	21 July 05	Visit fields	
Fri	22 July 05	Mendoza	Rio (Brazil)
Sat	23 July 05	Free time	
Sun	24 July 05	Rio	Goiania (Brazil)
Mon	25 July 05	Visit fields	
Tue	26 July 05	Visit fields nth	
Wed	27 July 05	Brazilia	London (UK)
Thu	28 July 05	London	Urumchi (China)
Fri	29 July 05	Visit fields	
Sat	30 July 05	Visit fields	
Sun	31 July 05	Urumchi	Beijing (China)
Mon	1 Aug 05	Free time	
Tue	2 Aug 05	Beijing	Singapore
		Singapore	Melbourne

**4<sup>th</sup> National Conference of EMS in Australian agriculture**

17<sup>th</sup> - 20<sup>th</sup> October 2005, Beechworth, North Eastern Victoria

For information email: [emsconf.vic2005@dpi.vic.gov.au](mailto:emsconf.vic2005@dpi.vic.gov.au)



## Late-season deficit irrigation: A reliable tool for soluble solids improvement in drip-irrigated processing tomatoes.

(Information obtained from a presentation at the 9<sup>th</sup> ISHS Symposium on the Processing Tomato by Tim Hartz, UC Davis, California)

To increase soluble solids growers have considered both irrigation cut off and deficit irrigation in the past. Results from irrigation cut off have been highly variable, it has been difficult to obtain an increase in soluble solids without a large drop in yield. In contrast deficit irrigation can be modified to the paddock conditions, resulting in maintenance of the crop vine and an increase in soluble solids.

The ideal time to impose a deficit irrigation is during the fruit ripening period which is also when the actual crop water usage also decreases. Hence the applied deficit irrigation must also account for the reduced water usage of the crop.

In 2000-2002 Tim was involved in a number of trials comparing three treatments.

**Control – full irrigation until cutoff 20 days preharvest**

**Early cutoff – full irrigation until cutoff at early fruit ripening (40-50 days preharvest)**

**Early cutback – full irrigation until early fruit ripening (40-50 days preharvest); cutback to 25% of ETc until cutoff at 20 days preharvest**

Irrigation treatment	Mkt. yield (Mg ha-1)	Fruit SS (° brix)	Brix yield (Mg ha-1)
Control	91.0 a	5.4 c	4.9 a
Early cutback	89.0 a	5.6 b	5.0 a
Early cutoff	78.4 b	5.8 a	4.6 b

These trials showed that the early cutback treatment resulted in a total yield and brix yield that was not significantly different to the control. In addition the soluble solids was significantly higher than the control.

During these trials Tim also collected a number of samples of fruit to determine the soluble solids of early red fruit and pink fruit after the commencement of deficit irrigation. The red fruit collected during this time was the early ripening fruit. Both red and pink fruit were collected from a similar position on the plant at each sampling stage. The soluble solids levels obtained from the pink and red fruit during this time showed that the soluble solids levels in red fruit are not influenced by irrigation cutback, whereas the soluble solids levels in the pink fruit increased during the cutback period. This would also explain why irrigation cut off late in the life of a crop does not greatly influence soluble solid levels, as only a small percentage of fruit is able to be influenced.

In 2003 the impact of deficit irrigation on Brix in red and pink fruit was further evaluated. The Brix of pink stage fruit

was monitored over the ripening period, the early-ripening fruit was also marked, than recovered at harvest to show if brix levels had changed. These trials showed that when a moderate deficit was applied the early ripening fruit had a consistently lower brix level than the pink fruit. The final brix level at harvest was partway between that of the early red and pink fruit.

To further evaluate how stable soluble solids are in red fruit a late season irrigation was applied to 3 crops. Soluble solids were measured in the red fruit before and after the irrigation of between 40-100 mm of water. No decrease was observed in the recorded brix levels in red fruit from any of the 3 crops.

In 2004 a number of commercial trials were undertaken on grower properties with the aim of achieving 5 weeks of deficit irrigation, with 25-50% less water applied than the conventional irrigation. The grower paddocks covered different soil types and consisted of 4 different varieties. Once again the same trend was obtained, with the early ripening fruit recording a lower brix level than the pink fruit which ripened during the deficit irrigation phase. In all cases the total fruit yield at harvest was lower at harvest. The average deficit soluble solids for the commercial trials did slightly increase. No increase in rotten fruit was observed in any of the trials.

During 2004 the brix of early ripening fruit was measured in a number of crops. These measurements ranged from around 4.2 to 5.2. A similar range of brix levels was also recorded across the block in different sections. Hence when measuring brix levels it is necessary to take a composite sample from across the block. Soluble solids measurements from early ripening fruit may be utilised to determine the appropriate level of deficit irrigation required to raise the final soluble solids level at harvest to a desirable level.

### In summary :

- **Imposing moisture stress before the majority of fruit have ripened allows maximum control of fruit SSC**
- **Only modest soil moisture stress is required to raise fruit SSC**
- **Deficit irrigation can continue until harvest with no detrimental effects on fruit SSC**
- **Both soil moisture monitoring and brix sampling of 'pink' fruit can help guide deficit irrigation**

*If you are interested in conducting a deficit irrigation block on your farm this season and would like your early ripening fruit soluble solid levels accessed please contact Liz Mann.*

## TOM-CAST in Canada and Australia

(Information obtained from a presentation at the 9<sup>th</sup> ISHS Symposium on the Processing Tomato by Ron Pitblado, Canada and Liz Minchinton, Victoria)

TOM-CAST is a disease-forecasting model which predicts the occurrence of early blight, septoria leaf spot and anthracnose fruit rot. It is weather timed fungicide spray program from processing tomatoes.

Fungicides in Canada were applied using a calendar spraying program every 7-10 days prior to the development of TOM-CAST. TOM-CAST was able to provide an indication to growers on when to start and stop spraying in line with the build up of disease. The TOM-CAST model is based upon weather data, specifically hourly leaf wetness and temperature. These are combined to produce disease severity values (DSV), on a scale of 1 to 4 (high disease).

Disease severity values are calculated and reported on a daily basis to growers. If growers accumulated DSV's of 20 then they were recommended to apply a fungicide. Regions were initially separated by straight lines, but with the aid of GIS these regions have now been mapped according to the regions weather details, providing more accurate DSV's.

With the development of technology the Ontario Weather Network (OWN) was developed to enable growers to access DSV's for their own region, and sign up for specific information, with OWN keeping track of accumulated DSV's from when a grower last sprayed. It has been found that approximately 20% of the growers closely follow the OWN recommendations and another 60% use the OWN recommendations as a guideline to reinforce their on farm decisions.

In Australia the weather conditions are different to those experience in Canada, with the Australian growing region often experiencing high temperatures and rare long leaf wetness periods. From 1996 to 1998 the TOM-CAST model was evaluated in Australia. During these 2 seasons the DSV's for the monitored crops ranged from 9 to 24. The standard grower treatments on these trials was 1 to 4 sprays. No difference was seen in the incidence of septoria leaf spot, early blight or fruit anthracnose between the treatments. From these trials it was found that no fungicide applications were needed for these fungal diseases up to a DSV of 24.

The research work was then expanded to determine if Black Mould could be incorporated into the TOM-CAST model in Australia. It also appeared that Black Mould did not occur at DSV's also below 24.

During the time of these trials to evaluate TOM-CAST in

Australia the DSV's ranged between 5 and 24, whereas in Ontario the values may range from 95 to 142 in a season. Hence the trials were not able to determine when fungicide sprays were required in Australia, but it can be concluded that fungicide sprays are not required for early blight, septoria leaf spot, anthracnose fruit rot or black mould at DSV's below 24.

With the development of technology and the availability of more affordable weather stations the TOM-CAST model may be more efficiently utilised in Australia.



## Integrated Pest Management

(Information obtained from a presentation at the 9<sup>th</sup> ISHS Symposium on the Processing Tomato during the IPM Workshop)

According to the International Code of Conduct on the Distribution and Use of Pesticides, IPM is defined as:

“**Integrated Pest Management (IPM)** means the careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically justified and reduce or minimize risks to human health and the environment. IPM emphasizes the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms”.

Examples of IPM techniques applied to processing tomatoes include:

- Site selection, crop timing
- Use of pest resistant varieties
- Biological control (predators) - natural/releases
- Biological pesticides (pathogens)
- Pheromone disruption
- Humidity monitoring (Tom-Cast)
- Drip irrigation
- Mesh
- Better selection of pesticides, thresholds, scouting

Pest and pesticide management issues are an important consideration due to consumer concerns of food safety and the environment. In addition legal residue requirements are being tightened. In the past Maximum Residue Limits (MRLs) have been established for fresh crops, but now Codex is considering QXLs (MRLs) for processed food, which may involved tomato paste.

In Australia growers have implemented a number of aspects of IPM, but have not been able to utilize the new generation softer chemistries. The relative cost of these chemicals are currently prohibitive, although the cost of many of these products is likely to decrease in the future. In addition Australian growers currently lack effective softer chemicals for the control of disease vectors, although this is likely to change in the future.

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with varying levels of success. Normal practice on these properties is to use a manually guided hydraulic sideshift fitted with 13" discs cutting away from the crop row, then bean knives and crescent knives to sweep the balance of the bed. The full width of inter-row is disturbed to a depth of approximately four inches. Soil throw onto the metham band may be undesirable as this places untreated soil around the base of the tomatoes, however burial of intra-row weeds can provide effective control if done in a timely and accurate fashion.



Figure 3: Robocrop operating in transplanted tomatoes near Rochester, Victoria

Robocrop achieved this managed soil throw accurately through the combination of precise tracking and depth control using parallelogram wheeling units running on top of the beds each side of the crop row. Rootzone disturbance was notably reduced with Robocrop. Speed was again approximately double of that achievable using manual guidance. Addition of discs (a feature available ex factory) to the machine was considered desirable in circumstances where soil needs to be directed away from the crop row to avoid disturbing the metham band.

Robotic weeding proved unaffected by wind, enabling operations to continue when inter-row or overall spraying was un-

viable due to drift hazards. This is significant in the Riverina and northern Victoria as September to November are the windiest months of the year.

**Future developments**

Robocrop is likely to find widespread application in processing tomatoes as it presents an opportunity to speed inter-row tillage at higher levels of precision and less root injury than using manual guidance of heavy cultivators. This may assist in plants tapping nutrients and moisture from surface soil that is currently not available due to excessive disturbance by heavy cultivators. Guidance of hooded sprayers is another opportunity for the Robocrop technology in order to minimise glyphosate drift onto crop rows.

Operator fatigue is much reduced with Robocrop, enabling skilled operators to achieve more in greater comfort. Significantly the system works effectively at night under work lamps; permitting high levels of machine utilization when crop and soil conditions demand.

For further information contact Malcolm Taylor at Robocrop Australia Pty. Ltd. on 0358 722 892, email: malcolmc.taylor@bigpond.com.



**Chemical Registration Issues**

The APVMA has recently suspended Procymidone (Sumislex) The suspension is aimed at the removal of a number of existing approved uses and amending directions for use for others. **For tomatoes the registration for this chemical has been deleted.** The IDM is currently providing information to be considered during the review process to determine if the registration can be renewed with an extended withholding period.

**ACKNOWLEDGMENTS:**

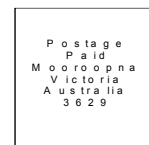
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