CROP SCIENCE SOCIETY OF S.A. INCORPORATED

C/- WAITE CAMPUS
P.M.B No 1, GLEN OSMOND, SOUTH AUSTRALIA 5064

AABN: 68 746 893 290

NEWSLETTER No. 321 AUGSUST, 2018

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Next Meeting

Venue **Richardson Theatre, Roseworthy Campus**

Date **22nd August 2018**

Time **7.30 pm**

Speakers

Darren Ray Bureau of Meteorology. Current season and seasonal outlook.

Anastasia Volkova (via a web hook up). Flurostat.
Remote sensing and modelling - from University R & D to start up business.

Coming up…..

September 3rd Meeting with Lowbanks Ag Bureau

Great speakers and night!

See flier at the end of the newsletter

Use of drones to non-destructively assess wheat varieties in field trials

Rhiannon Kate Schilling[1], Glenn McDonald[1], Ramesh Raja Segaran[2]
[1]School of Agriculture, Food & Wine, The Waite Institute, The University of Adelaide
[2]Unmanned Research Aircraft Facility, School of Biological Sciences, The University of Adelaide

Key Messages

- High-throughput and non-destructive phenotyping methods are needed to assess the performance of wheat varieties in large-scale field trials without influencing grain yield
- SAGIT-funded projects (UA217 and UA318) are investigating whether drones fitted with red-green-blue (RGB) and multispectral cameras can accurately measure plant traits compared to handheld devices/destructive plot measurements
- Use of the images from RGB cameras was more reliable than multispectral images because they were unaffected by weather conditions
- Preliminary results suggest values derived for height and biomass from drone images of field trial plots correlate to estimates from destructive plot measurements

Introduction

Each year field trials are conducted to evaluate new wheat varieties and plant breeding lines at many sites around Australia. The performance of crop varieties is assessed based on grain yield and quality traits along with visual scoring of disease resistance and phenology traits (such as flowering time), plot measurements using handheld devices (such as a GreenSeeker) and destructive plot measurements (such as biomass cuts). However, visual scoring and handheld devices/destructive measurements of large field trials (>1000 plots) is a time consuming and labour-intensive process that is often limited to a single time-point in the growing season. Current destructive measurements for shoot biomass also reduce plot grain yields and values are often not representative of the entire plot. The development of non-destructive phenotyping methods that are high-throughput and accurately measure plant traits in a large number of plots without influencing grain yield could improve data acquisition and the overall evaluation of variety performance in field trials.

One way to non-destructively phenotype field trials is to use unmanned aerial vehicles (UAVs), also known as drones, fitted with red-green-blue (RGB), thermal and multispectral cameras to record digital images of each plot. Drones are easily portable to different field trial locations, can be used to image large trial sites in a relatively fast manner and are able to fly at low altitudes for suitable image resolution. Currently, drones are used to record images and videos of field trials and cropping paddocks. However, to date, there has been limited use of deriving data from recorded images to improve cropping systems or field trials and there has been little evaluation of whether values derived from drone images correlate to values obtained from handheld devices or destructive plot measurements. To increase the value of imaging trial plots and cropping paddocks using drones, methods to accurately measure plant biomass, plant growth rates and leaf greenness are needed.

The South Australian Grains Industry Trust (SAGIT) have funded two research projects UA217 (1 year, 2017) and UA318 (1 year, 2018) focused on the use of drones to assess the performance of wheat varieties in field trials. The main aim of this research is to

develop methods for quantifying plot biomass, plant greenness and the growth rate of bread wheat varieties using non-destructive drone imaging.

Methods

In 2017, field trials at Mallala and Roseworthy, SA were imaged using drones fitted with RGB and multispectral (MicaSense) cameras at two-time points (stem elongation and anthesis). Both trials had 41 bread and durum wheat varieties with four replicate plots, a trial of Mace sown at 45, 90 and 180 plants/m^2 with four replicate plots and a destructive trial of 12 varieties (Bremer, Condo, Corack, Emu Rock, Gladius, Gregory, Janz, Mace, Magenta, Scout, Sunco and Wallup) with three replicate plots.

3DR Iris + quadcopters were fitted with a Sony RX100 III (20 megapixel) RGB camera and a MicaSense multispectral camera to collect images of each trial plot. Flights were conducted 20 m above ground level for an image resolution of approximately 0.5 cm. Fixed reference plates, known as ground control points (GCPs), were positioned at each site to link images obtained across time-points. Drone images were processed using Pix4D Mapper Pro and ArcGIS software packages. Pix4D Mapper software uses a photogrammetry algorithm called Structure from Motion (SfM), to overlap a series of drone images from each field site to generate a point cloud and three-dimensional models of the trial plots. For each plot, a value for plot canopy biomass and canopy height were derived from the drone images. The SUM value was computed based on the total of plant heights in the plot and was used as a preliminary estimate of plot biomass.

At the time of drone imaging, handheld measurements of leaf greenness using a GreenSeeker™, plant height using a ruler, canopy temperature using an InfraRed thermometer and multispectral information using a FieldSpec™ (including NDVI and water stress indices) were recorded for each plot. Shoot biomass cuts (2× 50 cm rows) were collected on the day of drone imaging from each plot in the destructive trial at both imaging time-points.

Results & Discussion

Variation between varieties for plot biomass, plant greenness, plant height and multispectral shoot wavelength values was detected at both sites in the drone images (Figure 1). Imaging using the RGB camera was found to be more reliable than the multispectral camera due to the variable weather (wind, rain) in the growing season influencing image quality.

Results suggest that values derived from drone images correlate with handheld measurements for plant height and biomass (Figure 2). At Mallala, plant height measured using a ruler was related to plant height values obtained from the drone RGB images across both time-points of stem elongation and anthesis with an $R^2 = 0.60$ (Figure 2a). Although this correlation between the ruler and drone plant height values tended to be better at stem elongation than anthesis. The absolute values obtained from the drone RGB images tended to be shorter on average than the absolute height values measured using a ruler, which is an established observation in the literature using similar methods. Alternative analysis techniques are currently being investigated to minimise these apparent differences.

The fresh weight of biomass cuts collected from the destructive plots were correlated to the SUM values derived from the whole plot at stem elongation and anthesis from the drone RGB images with an $R^2 = 0.75$ (Figure 2b). However, further work to investigate the influence of bare soil within the plot images on the estimates of mean plant height and biomass derived for each drone plot image is needed. There is also further statistical analysis required as biomass was estimated from only 0.25 m^2 of a plot with a total area of 7.5 m^2; linking the plot SUM values from the drone image with the actual biomass within the quadrant may improve the relationship. Promisingly, changes in plant height and plot biomass between the two-imaging time-points for different varieties can be measured using the drone images. With more time-points, drone imaging can be used to assess shoot growth rates of wheat in field trials and variation in these growth rates within environments containing stresses, such as sodicity, could be used in the future to identify varieties or breeding lines that are more tolerant or sensitive than others.

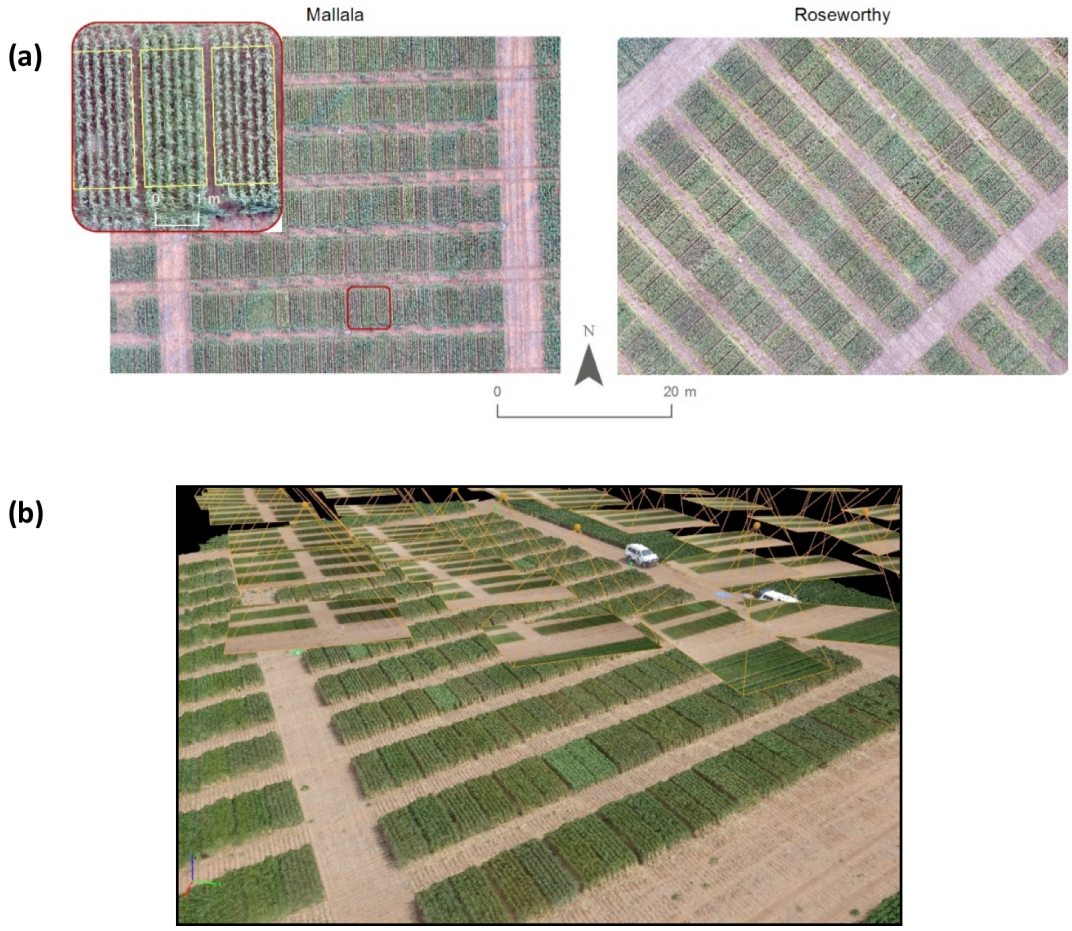


Figure 1: Example of field trial images obtained from a drone fitted with an RGB camera (a) The raw images from an RGB camera fixed to a drone at Mallala and Roseworthy, SA in 2017. The red insert at Mallala is an example of three plots showing visual differences in plant biomass detected using the drone and (b) A 3D model of Roseworthy, SA in 2017 from the RGB camera images and showing the point cloud above the trial plots.

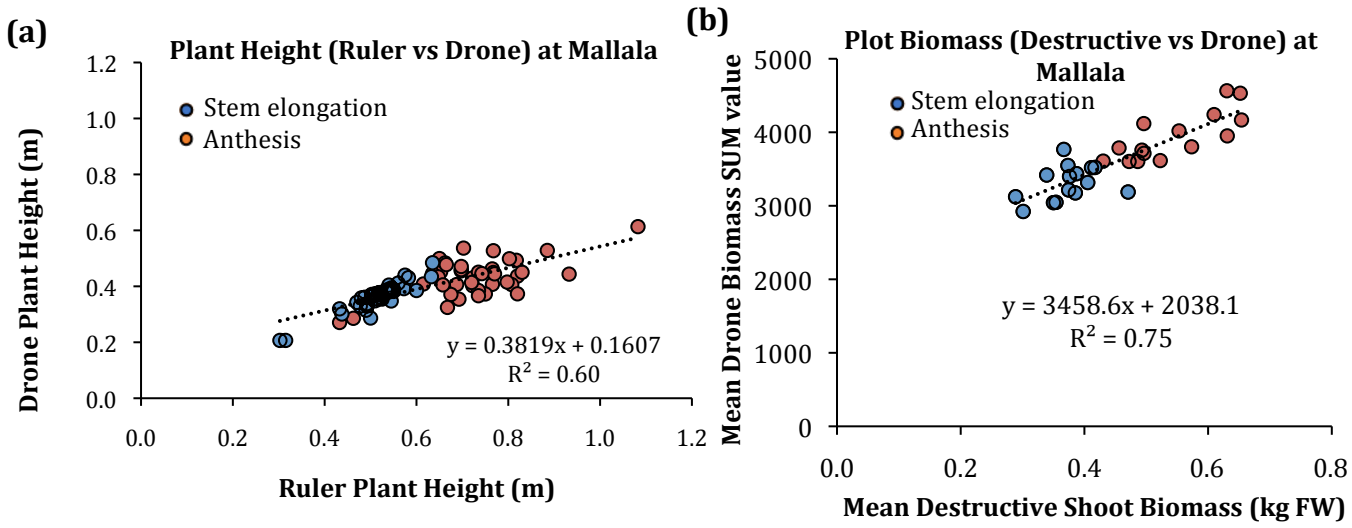


Figure 2: Correlations between handheld and drone measurements at Mallala in 2017 (a) Mean plant height measured using a ruler compared to the mean plant height measured using values derived from drone RGB images and (b) Mean shoot biomass from destructive plot measurements compared to mean SUM value representing the biomass of the plot obtained from drone RGB images. Both graphs are for bread and durum wheat varieties at stem elongation (blue) and anthesis (orange). Equations for the line of best fit are shown including the R^2 value.

In 2018, SAGIT project UA318 will continue to focus on evaluating the accuracy of plant traits obtained from drone images and the necessary analyses to measure plant traits, particularly to assess variety growth rates. A field trial at Mallala, SA with a large number of destructive plots will be imaged and handheld measurements collected at four time-points throughout the growing season. Overall, methods to non-destructively assess plant growth rates or plant indices correlated to grain yield have the potential to fast-track the selection of breeding lines in field trial sites. Any methods developed using drones to assess the performance of wheat varieties in these SAGIT projects can also be used by growers with access to drone technology to non-destructively assess their cropping paddocks.

Further Information

For more information on the SAGIT-funded drone projects (UA217 and UA318) contact Rhiannon Schilling (rhiannon.schilling@adelaide.edu.au). The Unmanned Research Aircraft Facility (URAF) at The University of Adelaide provides a Remote Pilot Licence Course (RePL) and training for software analysis of images collected using drones. For further details visit https://www.adelaide.edu.au/environment/uraf/RePL/ or contact Ramesh Segaran (ramesh.segaran@adelaide.edu.au).

Acknowledgements

We wish to thank the South Australian Grains Industry Trust for funding research projects UA217 and UA318, the Unmanned Research Aircraft Facility for use of drones, the Grains Research and Development Corporation (GRDC) project UA00159 for the field trials at Mallala and Roseworthy, the University of Adelaide Durum Wheat Breeding team for field trial management, Lucy Cunningham for technical assistance and the grain growers who provided access to their land for our field trials.

Foliar Fungicides in pulse crops

Jenny Davidson: SARDI Urrbrae

Christine Walela: SARDI Clare

Sarah Noack: Hart Field Site Group

Foliar Fungicides in pulse crops

Registered products

- Carbendazim (fb,l, cp)
- Procymidone (fb, l)
- Chlorothalonil (fb, l, cp)
- Mancozeb (all 4 pulses)
- Copper (fb)
- Metiram (fb, cp, fp)
- AviatorXPro (cp, l, fp, fb) – pre-flowering

Current Permits

- Veritas (all 4 pulses)
- Tebuconazole (fb)
- Captan (l, cp)
- Boscalid (l)

Expired permits

- Prosaro (prothioconazole+tebuconazole)
- Cyprodinil (eg Solaris)
- Propiconazole
- Azoxystrobin + cyproconazole
- Azoxystrobin/AmistarXtra
- Procymidone (cp)
- Boscalid (cp)

- EFFICACY?

(cp=chickpea, fb = faba bean, fp=field pea, l=lentil)

Foliar fungicide AB Hart 2017 Sarah Noack

PPT in all treatments except nil

Fortnightly chlorothalonil
- Started 22 June

Mid-veg spray
- 2nd Aug

Flowering spray
- 31 Aug

All products significantly reduced disease below untreated

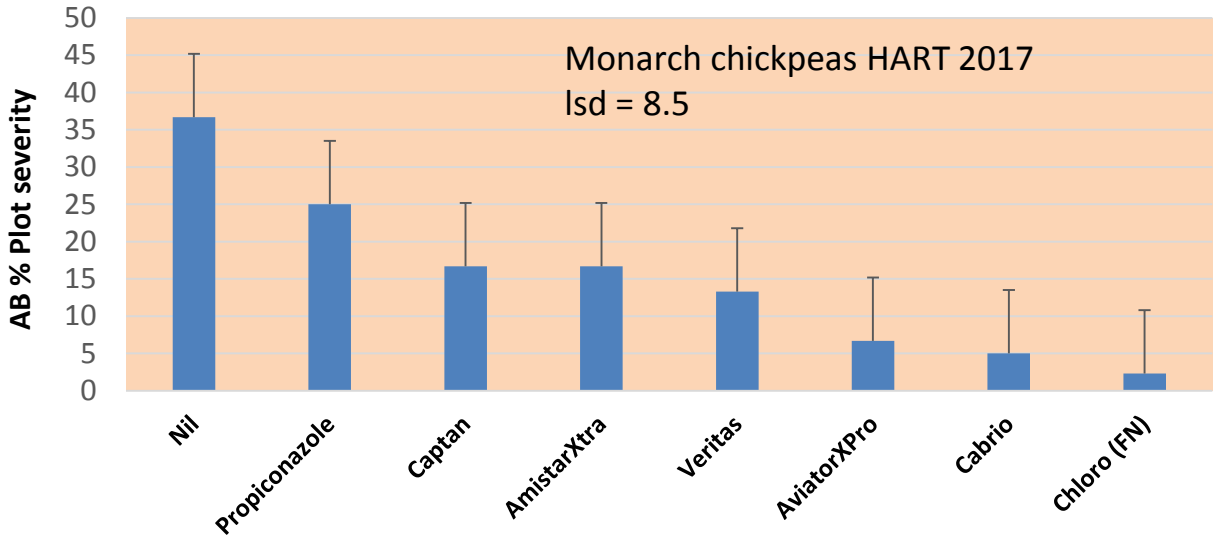
Yield correlated with AB disease scores

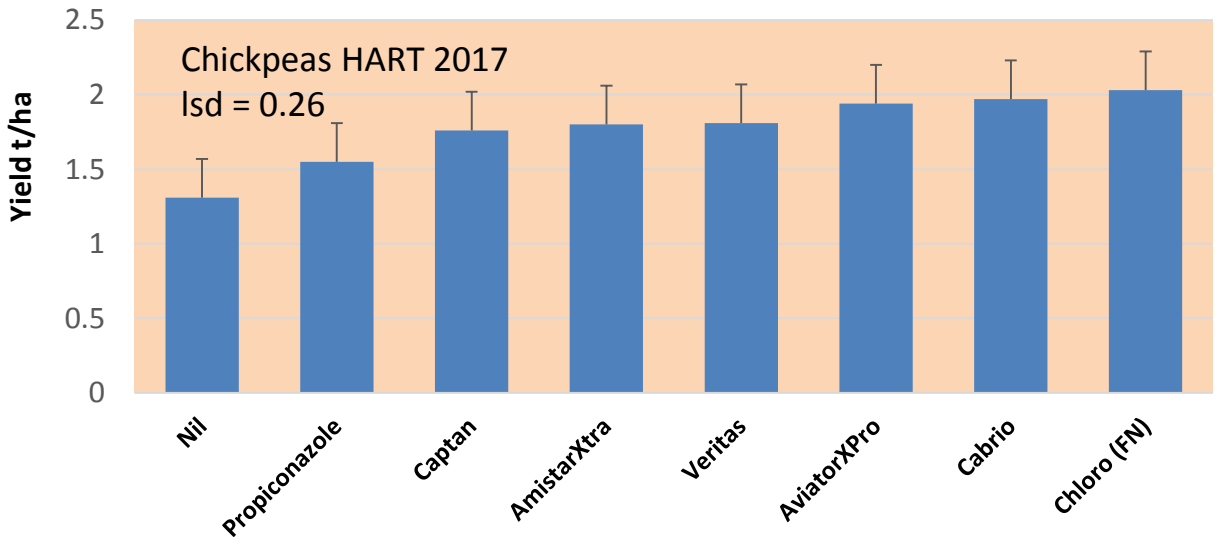
Chickpea best performers
- AviatorXPro ($863)*
- Cabrio** ($823)
- Veritas ($818)

[Untreated ($523)]

* Net return

**No registration or permit (pyraclostrobin)





Fortnightly chlorothalonil
- Started late July

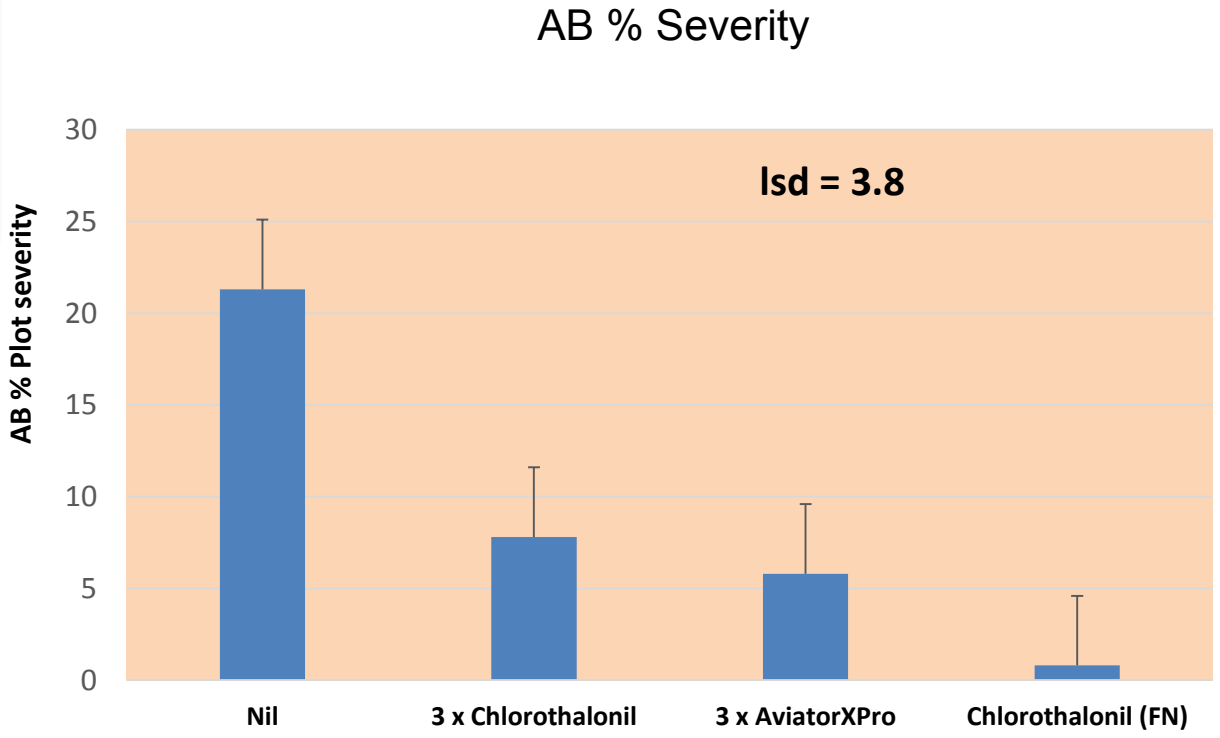
Three sprays
- 6 weeks after sowing
- Early flowering
- Podding

Chickpea AB

AviatorXPro equivalent to Chlorothalonil

Foliar fungicide Chickpea AB Kingsford 2017

Christine Walela, Jenny Davidson SARDI



PPT in all treatments except nil

Fortnightly chlorothalonil
- Started 22 June

Mid-veg spray
- 2nd Aug

Flowering spray
- 31 Aug

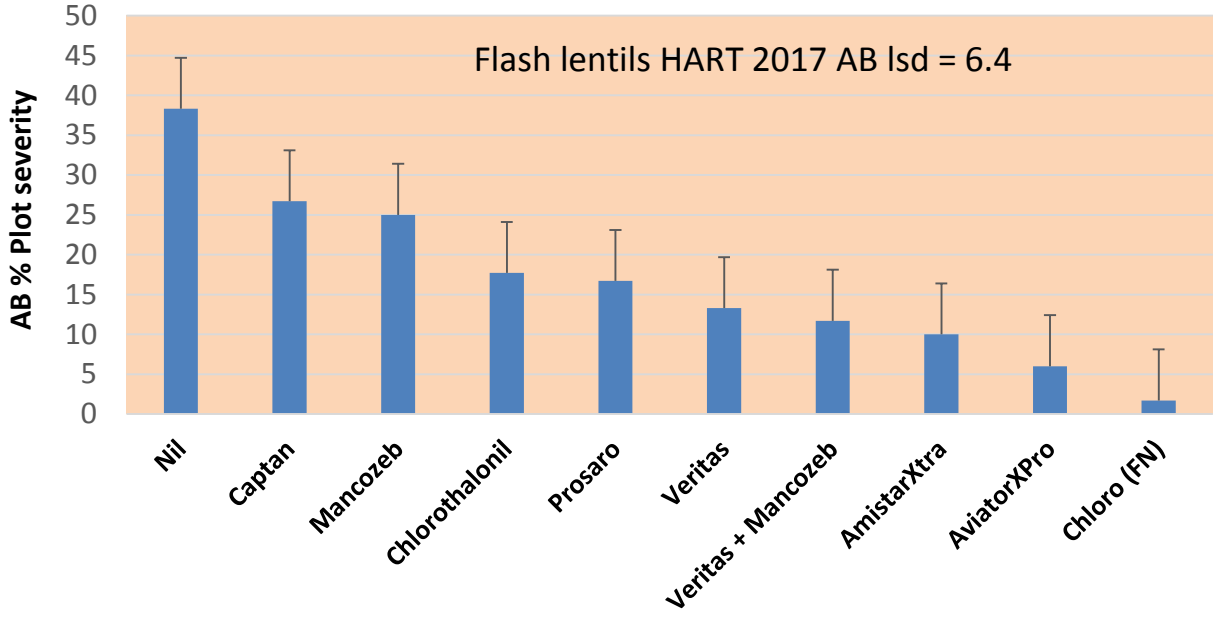
All products significantly reduced disease below untreated

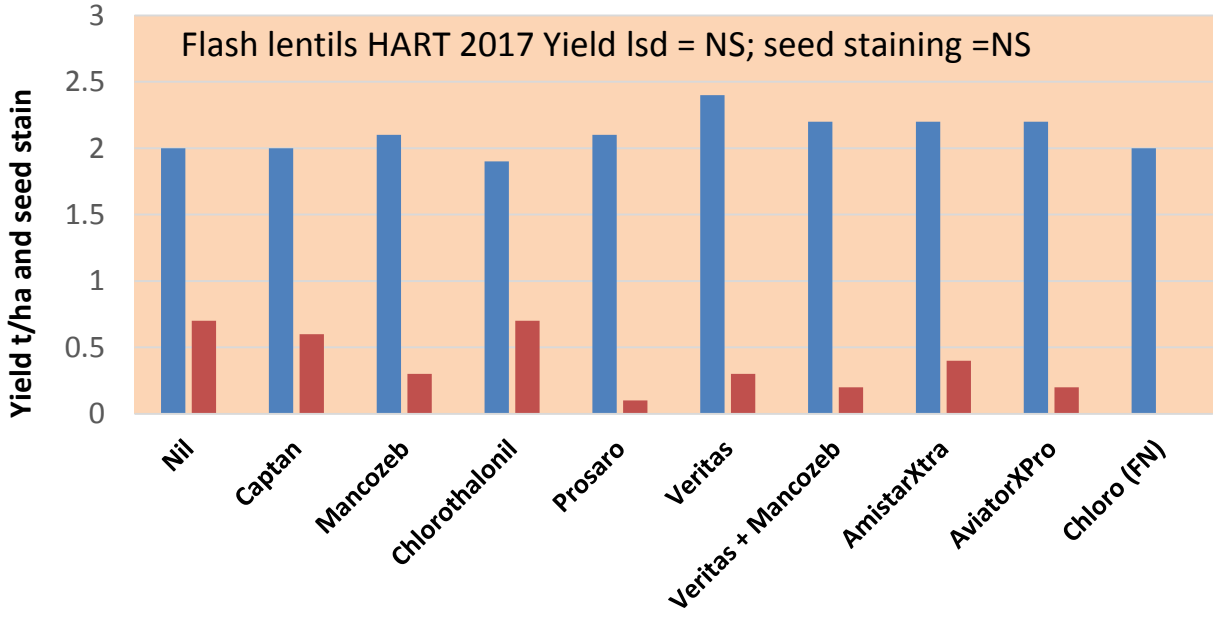
Lentils best perfomers
- AviatorXPro
- AmistarXtra*
- Veritas + Manc
- Veritas

*No registration or permit

NO significant effect on yield
LOW level of seed staining

Foliar fungicide AB lentils Hart 2017 Sarah Noack





Field pea fungicides: Christine Walela, Jenny Davidson SARDI & Larn McMurray

PPT in all treatments except nil

Sprays at 4-6 WAS and EF

Yield gains over nil

(Previous trials Manc = 15% yield increase)

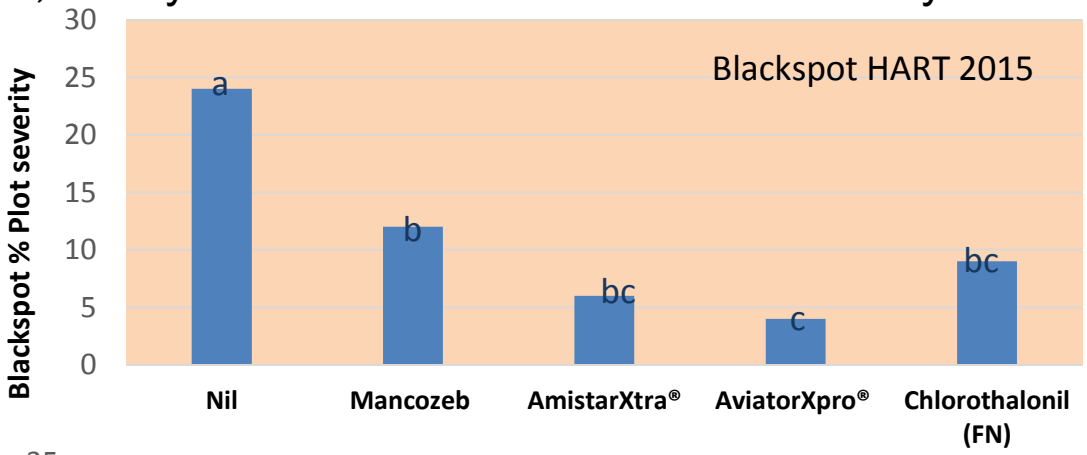
	ave t/ha
Nil	2.78 a
Mancozeb	2.89 a
AmistarXtra	3.20 b
AviatorXPro	3.36 b
Chloro (FN)	3.84 c

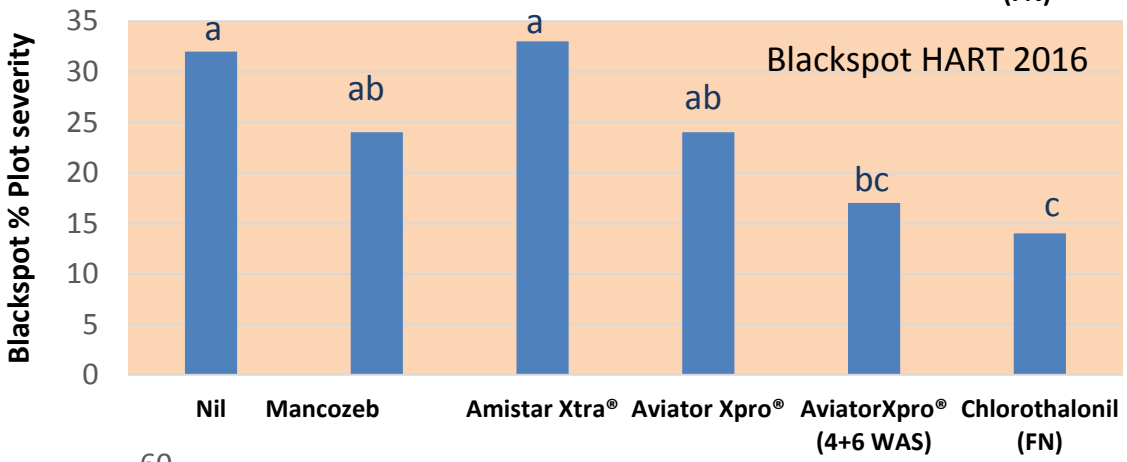
AviatorXpro® and AmistarXtra®

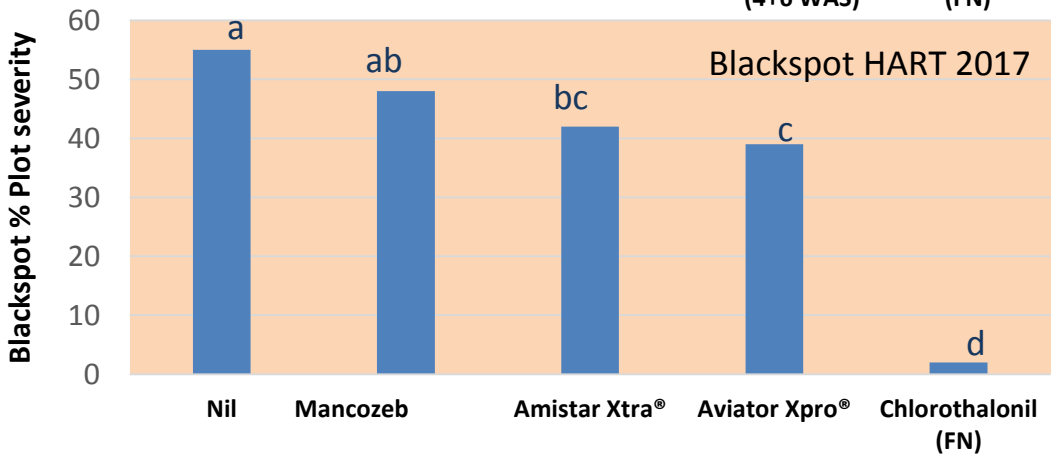
- have similar efficacy
- better than mancozeb
- economic in 2 of 3 trials

CONCLUSIONS

- Mancozeb unreliable
- AmistarXtra unregistered*
  (Veritas in trials this year)
- AviatorXPro costly







Sclerotinia

- Lentils, lupins, chickpea and canola (also hosted by faba beans and field peas)

Sclerotinia - a problem in wet seasons eg. 2016

- Influenced by rain, not by temperature
- Tight pulse rotations especially lentils on YP
- Rotations of pulse and canola (EP)

- Sclerotes germinate under wet conditions
- Produce apothecia which release airborne spores
- Airborne spores infect canola petals
- Petals lodge in stem branches and infect plants

OR

- Sclerotes grow mycelia (fungal threads) across or in soil and these directly infect plant stems (basal infection)

Apothecia from sclerotes in culture

Sclerotinia in lentils YP 2016

Sclerotinia

Lentils

- Boscalid (permit) for sclerotinia
- Procymidone registered for BGM
- BGM resistant cultivars may have increased sclerotinia due to fewer fungicides? (eg. PBA Jumbo2)

Canola

- Sumisclex (Procymidone), Prosaro and Rovral are registered in canola: Apply at 20% bloom if high risk
- High risk in canola (research by DPI NSW) =
  - high humidity at start of flowering (petal infection)
  - Canopy closure & wet soils (humid microclimate)
  - Rain during flowering (infection of stem)
  - Recent sclerotinia in paddock/canola-pulse rotations

Unknowns

- Require research on conditions for sclerotinia outbreaks on pulses and canola in SA
- Fungicide strategies for pulses?
- Cultivar reactions?

Sclerotinia in canola Riverton 2016

Sclerotes in lentil crop YP 2016
Photo S Blake

CropWatch and ExtensionAUS

http://pir.sa.gov.au/research/services/reports_and_newsletters/crop_watch

CROP WATCH

August 2017
Volume 14, Number 3

SFNB resists Systiva

Following DNA sequencing at Curtin University a mutation in a sample of the spot form net blotch (SFNB) fungus has been identified that has been reported to provide 'moderate' resistance to SDHI fungicides in Europe. The sample came from a crop of Spartacus barley near Ungarra on the Lower Eyre Peninsula. This result likely explains the rather unusual lesions that lack the typical yellow halo surrounding the dark spot observed in this and several other crops treated with Systiva® across SA this season. Samples from other regions are currently being tested to determine the distribution of the resistant population.

Growers are advised that any barley crops that require fungicide spraying should avoid using a foliar spray that incorporates an SDHI fungicide.

There is no evidence yet for fungicide resistance in the net form net blotch pathogen in SA.

Ascochyta on the move

Ascochyta blight has been found in chickpeas on upper Yorke Peninsula and in the Upper North region of SA.
Growers are reminded to be vigilant in applying prophylactic fungicide sprays on all chickpea crops as all cultivars are now susceptible or moderately susceptible. Sprays should be applied ahead of rainfronts as this disease is spread by rainsplash. Please send samples of Ascochyta on pulse crops to Liz Farquharson (**liz.farquharson@sa.gov.au**) at SARDI.

eXtensionAUS – crop diseases

https://communities.grdc.com.au/field-crop-diseases/

Nitrogen the key to maximising yields in hybrid canola
Paul Jenke – Pioneer Seeds

Trials in South Australia over the past two seasons have demonstrated the importance of early nitrogen applications to maximise yields from hybrid canola.
Pioneer Seeds South Australian Area Manager, Paul Jenke, said Pioneer canola hybrids had greater yield potential than is being realised by growers.
"The challenge we've seen with many hybrid crops is they are not reaching their full potential because of a lack of nutrition," he said. "We are consistently seeing hybrid canola crops showing symptoms of nitrogen deficiency. Recent research has shown a need for 70 to 80 Units of Nitrogen for every expected tonne of yield, but many crops aren't getting this."
Over the past two seasons, Pioneer undertook trials to determine if there were any economic benefits from increased applications of nitrogen at earlier than normal stages of the season.
"We conducted trials at Cummins on the Eyre Peninsula in 2016 and 2017 and also at Tarlee in the lower mid north region in 2017. Applications of nitrogen were applied at the two leaf (GS12) and eight leaf (GS18) stages." The early timing of the Nitrogen applications was important to get the crop established strongly, setting it up for maximum potential yield.
In 2016 Pioneer® hybrid 45Y91 CL was sown and in 2017 it was the Pioneer® hybrid 44Y90 CL.
The results in all three trials demonstrated the role nitrogen had in helping farmers achieve the yield potential of Pioneer hybrid canola.
Mr Jenke said the Tarlee site last season had six treatments ranging from a strip which just had starter fertiliser at sowing through to a strip that received 210 units of N per hectare at each of the two timings as well as fungicide applications.
"We also had strips that had two applications of 70 units per hectare of N (one with and one without fungicide) and strips that had two applications of 140 units per hectare of N (one with and one without fungicide)," he said. "All plots were sown with an MAP product containing 12 units of Nitrogen."
"The visual and yield response was amazing, even with high mineral Nitrogen levels in the paddock prior to sowing."
A yield of 2.72 tonnes per hectare was recorded from the strip that didn't receive any post sowing fertiliser or fungicide.
In comparison, the strip with two applications of 210 units per hectare of N and two fungicide sprays yielded 4.73 tonnes per hectare.
"Each of the strips demonstrated increases in yield as the level of nitrogen application went up," Mr Jenke said. "There were also incremental increases in yield with the use of fungicides, however these were not significant."
"The Tarlee site really demonstrated the incredible yield responses achieved with the use of nitrogen under favourable seasonal conditions," Mr Jenke said.
"We demonstrated a similar result in the 2016 Cummins trial with a yield range of 3.17 tonnes per hectare with the untreated strip through to 4.81 tonnes per hectare with the highest inputs."
The 2017 trial at Cummins was significant due to below average rainfall in the months leading up to planting and during the season.

“There was well below average rainfall in the period from February to June,” Mr Jenke said.
“July to September rainfall was above average and October was below average so we were concerned that the application of nitrogen would not have the desired effect.”
At harvest the untreated area produced a yield of 2.33 tonnes per hectare while the highest yield at 4.14 tonnes per hectare came from the high rates of nitrogen with fungicide applications.
The trial mirrored the other sites in that yield increases occurred as the amount of N fertiliser and fungicide applications were stepped up.
Mr Jenke said the trials demonstrated the role nitrogen had in increasing the yield of Pioneer hybrid canola.
“This program clearly demonstrated the greater profitability that could be achieved with the strategic use of nitrogen early in the season.”
Gross margins across the three trials ranged from $622/ha - $1576/ha. The lowest gross margin was the low input treatment, averaging $870/ha. The highest gross margins were achieved in the high input treatment, averaging $1450/ha.
Mr Jenke said the fact that there were good yield responses in the 2017 Cummins trials despite the poorer rainfall was also very encouraging.
“While many growers reduced Nitrogen inputs after such a poor start, this trial highlights the benefit of actually doing the opposite – feeding the crop more to encourage rapid growth and get the crop back on track.”
“Pioneer canola genetics have a very high yield potential and early in-crop fertiliser applications can certainly help growers maximise their potential.”
“At the very least I would encourage growers to “double-up” their Nitrogen rates in a section of the paddock to assess the value for their own gross margin.”
More trials will be conducted this season to determine the effect of nitrogen application in conditions that include lower rainfall zones.
ENDS

Photo caption
Trials of in-crop nitrogen applications at the 2017 Tarlee, SA site where the highest yield recorded was 4.73 tonnes per hectare.

Photo caption
Growers and agronomists at the Tarlee site inspecting nitrogen trials.

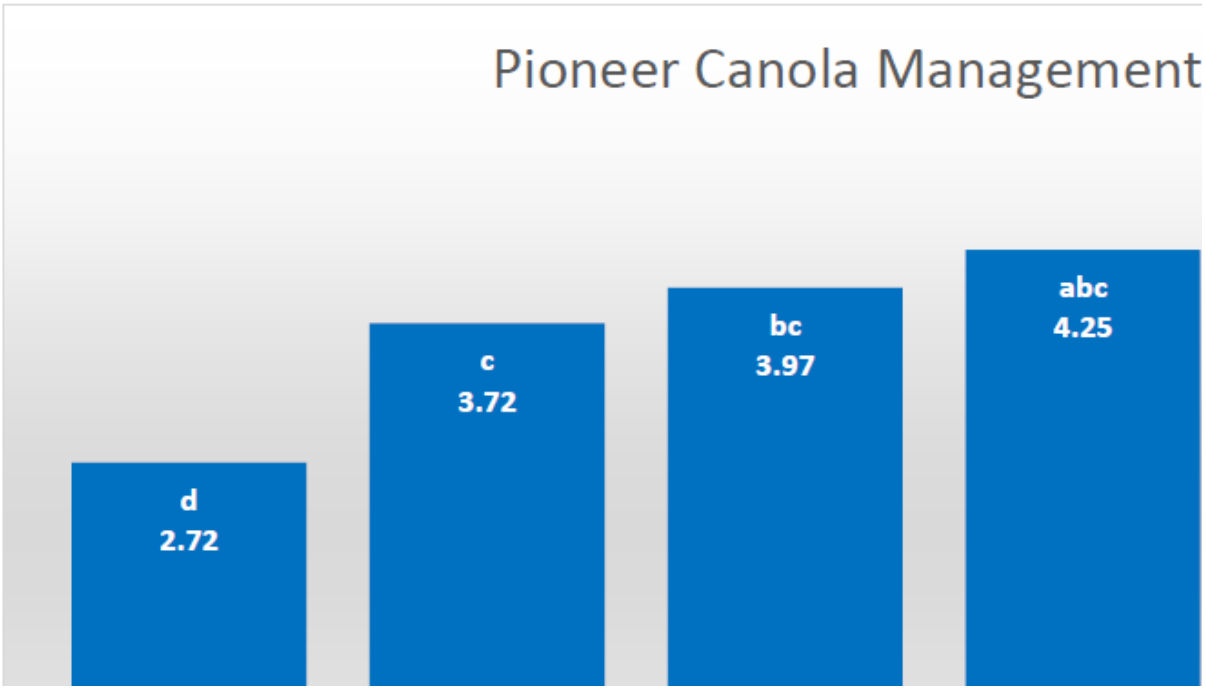
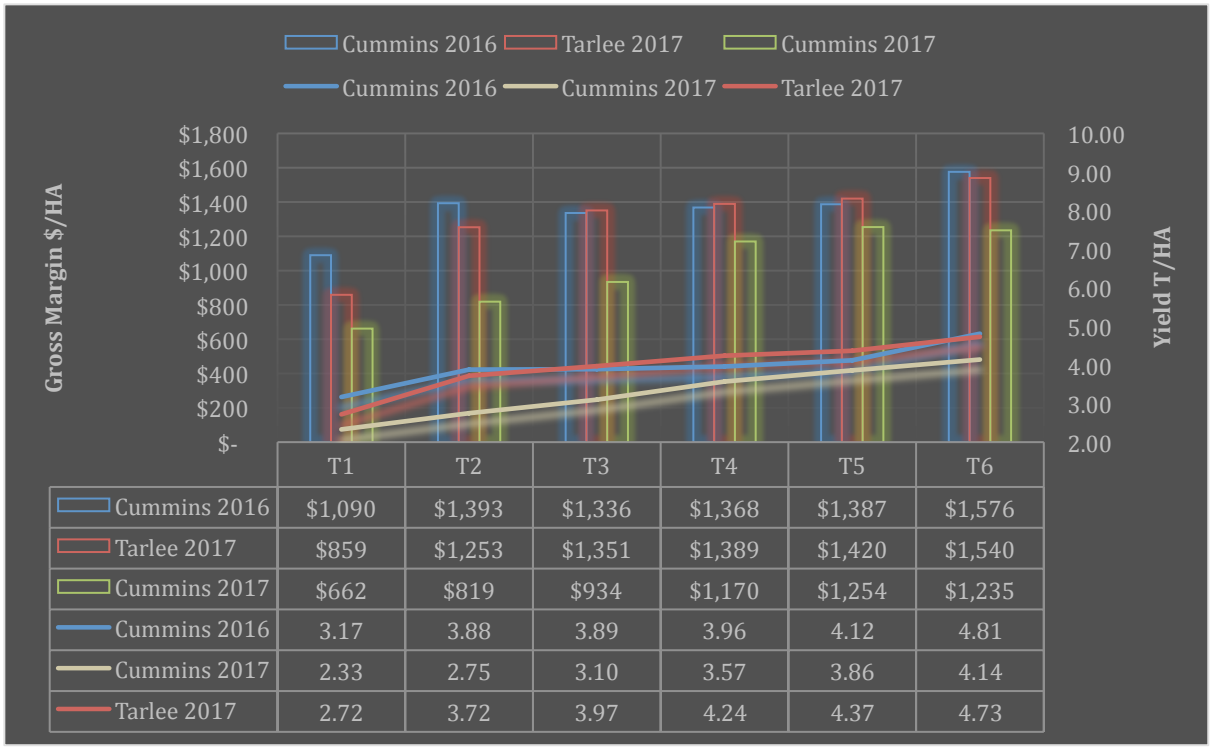


Photo caption
A significant lift in yield with the addition of in-crop nitrogen applications for Pioneer canola hybrids.



	T1	T2	T3	T4	T5	T6
Cummins 2016	$1,090	$1,393	$1,336	$1,368	$1,387	$1,576
Tarlee 2017	$859	$1,253	$1,351	$1,389	$1,420	$1,540
Cummins 2017	$662	$819	$934	$1,170	$1,254	$1,235
Cummins 2016	3.17	3.88	3.89	3.96	4.12	4.81
Cummins 2017	2.33	2.75	3.10	3.57	3.86	4.14
Tarlee 2017	2.72	3.72	3.97	4.24	4.37	4.73

Photo caption

An increase in gross margin was demonstrated with the increase in fertiliser.

Crop Science Society of SA AGM 2018

Meeting held at Richardson Theatre Roseworthy, University of Adelaide on 18/7/2018.
Meeting opened: 7:40pm.

Apologies:
A Pfitzner, K Porker, D Peterson, B Munzberg, C Hazelton, P Cousins, M Nash, A Robinson, S Hollmann, M Bubner, D Sommerville.

Minutes of previous AGM accepted.

Moved: C Butler Seconded: P Smith Accepted

Business Arising from Previous Minute
None

Presidents Report (J Wilson)

The past 2 years have provided me with valuable experience in working with Crop Science and being able to listen to growers and consultants as to what is important issues affecting the South Australian farming community and finding speakers to help address and expand on topics that are relevant to our membership base.

While meeting attendance has been an ongoing roller coaster, topical issues are typically well attended.

In the past 2 years we have gone paperless for newsletters not only saving on costs but allowing a greater content of newsletters with more imagery and the scope for further enhancement with technological advances and interaction.
We have also undertaken and completed a review of the constitution that had not been amended since the inception of Crop Science Society.

The Twilight crop walk in October was a great success being able to view the trials around the campus and a big thanks also to AGT that spent a considerable time showing us through their trials, new machinery, glasshouses and the technology they are using for variety assessment. Anthony Violi from AV Weather gave a very different if not controversial presentation on weather and the forecasts and different view from the government bodies.

I would like to thank the members of Crop Science for electing me and providing me the opportunity to be present for the last 2 years.

Moved: J Wilson Seconded: R Wheeler Accepted

Secretaries Report (N Wittwer)

- No external correspondence received for the 12 months.
- The committee has drafted 2 letters on behalf of CSSSA to be sent to PIRSA regarding "Right to Farm" and "Good Science" to be approved by the general members before submission.

Moved: N Wittwer Seconded: T Robinson Accepted

Treasures Report (J Wilson on behalf of S Fuss)

CROP SCIENCE SOCIETY OF SA

TREASURERS REPORT END JUNE 2018

SUMMARY

- CSSA is showing a PROFIT for the year of **$2445.26**
  - as per profit and loss statement

- ANZ CASH MANAGEMENT ACCOUNT BALANCE END JUNE 2017 IS **$10,651.86**
- ANZ TERM DEPOSIT BALANCE AT END JUNE 2017 IS **$86,977.60**
- Subscription income received as below
  - 15/16 $165
  - 16/17 $759
  - 17/18 $7986

There are currently 365 members on the data base

- Free one-year subs were NOT issued to Uni Diploma of Ag Students- Did not receive their details.
- 5 New paid members.
- 18 members have been removed from the database. The majority of those had not paid subs for the previous 2 years. A few were removed at their request, for varying reasons.

Moved J Wilson Seconded D Shepard Accepted

Letters Drafted for PIRSA

The Committee has drafted two letters to be sent to PIRSA on behalf of CSSSA members

1. The need for a balanced view of science
2. The right to farm

Both letters were read for the general members for comment and the motion to send them to Hon. Tim Whetstone. & Hon. Stephan Knoll

Moved C Davis Seconded N Wittwer Accepted

Constitution Review

After a 12 month review process undertaken predominantly by P Smith, the updated constitution for CSSSA was completed in early 2018.
J Wilson thanked Peter for his efforts in getting this done.

Membership Cost

- The committee recommends the cost remains at $33.00

Moved C Butler Seconded P Smith Accepted

CSSSA to appoint an admin position

To ensure the CSSSA continues to function to the expectations of the members, the committee is proposing a paid admin role be established. A sub committee has been established to outline the roles of this position and gain quotes form potential service providers. Once the subcommittee has formulated an official proposal, it will be presented to the member for consideration before proceeding.

CSSSA Life memberships

Nominations:
- P Cousins
- J Both
- P Smith

Moved J Wilson Seconded C Davis Accepted

Crop Science Committee

Resignations
- R Bateman
- C Jeisman
- C Hazelton

J. Wilson thanked these members for their contribution to the CSSSA.

Call for nominations

- President: Craig Davis

Nominated T Robinson Seconded R Wheeler Accepted

- Vice Presents: Kenton Porker

Nominated C Davis Seconded J Wilson Accepted

- Secretary: Peter Smith

Nominated N Wittwer Seconded D Shepard Accepted

- Treasurer: Neil Wittwer

Nominated C Davis Seconded T Robinson Accepted

- Public Office: Peter Smith

Nominated N Wittwer Seconded J Wilson Accepted

- Committee Members to re stand
    - Judy Rathjen
    - Kenton Porker
    - Tom Robinson
    - Anthony Pfitzner
    - Ben Fleet

Nominated N Wittwer Seconded R Wheeler Accepted

- New Committee Members: Ben Munzberg and Dan Petersen

Nominated C Davis Seconded C Butler Accepted

Crop Science Society of SA Signatories.

- Signatories
  - Craig Davis (President)
  - Susan Fuss (Book keeper)
  - Anthony Pfitzner (Committee Member)

Meeting Closed

- 8:30pm

Crop Science Society Committee – 2018/19

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