



CROP SCIENCE SOCIETY OF S.A. INCORPORATED

C/- WAITE CAMPUS

P.M.B No 1, GLEN OSMOND, SOUTH AUSTRALIA 5064

INCORPORATING THE WEED SCIENCE SOCIETY

ABN: 68 746 893 290

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EDITOR – articles welcome; fax: (08) 8303 6735 Ph: 0408 816 533
email: cropssa@yahoo.com

TREASURER – Subscriptions
Correspondence

Susan Fuss
gsfuss@bigpond.com
Ph: 0407 900 055

SECRETARY –

Larn McMurray
PO Box 822
Clare 5453
Ph: (08) 8842 6265

Next Meeting

‘In Memory of Tony Rathjen (and
AGM)’

Venue

Richardson Theatre, Roseworthy
Campus

Date

WEDNESDAY 23rd JULY

Speakers

Jenny Davidson and Greg Baker: SARDI

‘Green Peach Aphid and Beet Western Yellows Virus in Canola’

This is not a talk to miss!! Find out all the latest and breaking information about this potentially devastating virus. It is your chance to have your questions answered by the experts!

James Edwards: AGT

‘Current Results’

James will talk on the work AGT has conducted into yellow leaf spot, fungicides and yield response. He will also tell us about some current weed competition work and growth regulator information.

AGM

Your chance to have a say about the next 12 months of Crop Science Society.

AN EXCITING MEETING THIS WEEK - DON'T MISS OUT!!

On July 1 2014, we farewelled our founding member and inaugural president of the Crop Science Society of SA, Tony Rathjen. Tony, together with Jim Silsbury founded CSS in 1975 and has been an active member ever since, missing only a few meetings in almost 40 years. This monthly newsletter has recently been quoted in the Stock Journal as a 'flagship publication' and 'an important resource for farmers in SA'. It has also been noted that Tony was an expert in hassling people to provide articles and help with the publishing: which as his daughter and surreptitiously recruited assistant editor, I fully experienced! We will certainly miss his enlightened approach to agriculture, as well his often interesting and challenging contributions to this newsletter – Judy Rathjen

Tony Rathjen 05 April, 1940, to 25 June, 2014.

Anthony John Rathjen, known to all as Tony, was born on the fifth of April 1940 to parents Victor and Lurline. His childhood played out on the family farm established by his German grandfather in 1872 near the Adelaide Hills town of Birdwood. The eldest of three children, he welcomed his twin brothers Jim and Geoff into the world in 1943. Birdwood, formerly known as Blumberg, is strongly shaped by Germanic Lutheran settlement, and Tony was a committed Lutheran his entire life. The farm provided important early influences; a lifelong love of agriculture but a disregard for sheep, not to mention an early interest in technology that would blossom many years later as he established his world-leading wheat breeding program at the Waite Institute near Adelaide. This last requires some explanation. For transport to school, Tony owned a rather cheeky pony named Mickey that delighted in scraping his rider off under low-hanging branches, leaving him bruised in the dust. A disgusted Tony saw which way the wind was blowing and bought a bicycle. His love for horses never recovered and this may have influenced his career choice of plant science. It was a choice which shaped his vocation of wheat breeder, which provided fascination and fulfilment through his life, and massive impact on Australian agriculture.

Tony excelled at school, initially at Birdwood High and then at Adelaide High. The first of his family to enter university, he completed a Bachelor of Agricultural Science at the University of Adelaide. During this time, he met the lovely Cynthia Gribble, who became his first wife and the mother of Peter, Anne, John, Jane, and Judy. Although not really similar people – Cynthia was gregarious whereas Tony somewhat shy, Tony rational to Cynthia's more instinctive style – they formed a loving partnership with many common interests, Cynthia supporting Tony's various passions and pursuits, notwithstanding her own projects. The union was a happy one and lasted more than 40 years until Cynthia's premature death from cancer in 2003.

Had Cynthia not understood the nascent branch of competitive Rathjenism invented by Tony, she could have been in no doubt after the boat trip to England, where Tony had won a Barr Smith Scholarship to study genetics at Cambridge University. Days were long on the voyage, and the young couple filled the time by engaging in deck games where Cynthia was soundly trounced by her super competitive husband, after which he would attend to her wounded spirit, ensuring another round of games in which he would whip her again. Cynthia always commented that they were lucky to still be married when they disembarked. Cambridge, or at least 1960s Britain, proved to be a challenge in itself as the story goes; the modest stipend extended only to a diet of bacon bones and swede turnips, and their flat so cold that they had to put the heater in the smallest room to prevent the toilet from freezing over. Nevertheless, Tony graduated with a PhD on the genetics of French beans, and the intent to pursue a career in plant genetics. On the journey home, he repeated his domination of Cynthia in deck quoits, darts and horseshoes.

Careers in Science even in those days were uncertain, and a suitable position in the pure science of genetics was not available in Adelaide. Instead, a one-year position in wheat breeding was advertised, and although Tony was initially somewhat disdainful of such an applied pursuit, he took the position at the Waite Institute. Interestingly, the position remained funded on an annual basis, and Tony was denied tenure until late in his career. The 1960s was a very exciting time at the Waite. The wheat breeding program was being revamped, enthusiastic and talented researchers created a fertile atmosphere for discovery, and the new “Green Revolution” varieties were becoming available. With his geneticist’s eye, and in context of the technological innovation occurring at Waite of which he was a key protagonist, Tony was able to revolutionise Australian wheat breeding. Breeding can be seen as a game of numbers – more new gene combinations (or genotypes) planted under the right environmental conditions will uncover the highest number of elite lines. Tony’s genius, working in the collaborative environment at Waite with other key scientists and technicians, was to radically increase the number of new wheat lines that could be screened, through mechanisation of the breeding program. This changed the numbers game in favour of the breeder. Some of these improvements included new machines to plant and harvest large numbers of genotypes, better statistics for data analysis, and the incorporation of computers to manage the breeding program and analyse data– the first such computerisation of plant breeding in the world. Most importantly, the number of trial sites, and the number of experimental plots within each site, could be expanded to cover the key environmental zones of South Australia.



(Tony on the release of ‘Molineux’ 1990)

Keen observational skills are essential to the breeder. It has been commented over and over again that Tony’s skills in this area were second to none. It has also been said that Tony could “smell” elite genotypes simply by walking up and down the rows in the trial plots. The significance is that many of the important variables in wheat production in the harsh South Australian conditions are simply unknown, and the chance to isolate and prove these

variables by experimentation lags the breeding process by decades. A breeder must continually watch the plants and their performance in different environments, and turn these observations over mentally until some sense can be made of them. Tony's restless intelligence was perfect for this style of work. In addition, he formed close relationships with many farmers throughout the state, who would act as further eyes and brains for extension and analysis of the data. These de facto research assistants were a crucial part of Tony's success, often forming strong friendships, and long hours on the telephone were spent probing their insights.

Another way to analyse the interaction between plant genotypes and their environment is through the use of statistical techniques. It is often said that Tony was rather less keen on this approach. In this light, the suggestion that his trial plots were often situated close to the state's better bakeries can be dismissed as a coincidence, with no statistical support.

Tony released or had a hand in releasing over 25 wheat varieties. One of the most important partnerships was with the Roseworthy Agricultural College wheat breeder, Gil Hollamby. These breeders had different styles that proved to be highly complementary. Some of the important innovations that came from the program included resistance to cereal cyst and *Pratylenchus* nematode pests, tolerance to high levels of the element boron in soils, adaptation to alkaline and saline soils, inclusion of resistance to rust diseases, improved grain quality traits for flour and biscuit making, and of course the top three priorities of wheat growers everywhere; yield, yield, and yield. South Australian varieties dominated Australian wheat production during this period.

It goes without saying that all of these innovations were achieved in collaboration with talented scientists both within Tony's team, and in research groups from Waite and external institutions.



The turn of the century brought significant challenges to Tony's personal and professional life. Cynthia suffered a relapse of breast cancer that ushered in her last years. Australian agriculture was overtaken by a Thatcherite revolution that still resonates today, with creation of plant variety rights that heralded a new era of privatisation and a diminution of the agricultural commons. Tony was strongly opposed to this and pointed out that farmers would now pay twice for new varieties; through both the grower's levy and end point royalty charged at the silo. Devastatingly, Tony's bread wheat program was sold by his employer. Perhaps the kindest way to describe the return to Tony from this sale is that his intellectual property was gifted without first obtaining his permission. This must have been a traumatic and miserable time for him, but his priority lay with nursing Cynthia, and he was able to increase his focus on breeding durum wheats for pasta making, with strong support from the local manufacturer San Remo, and once again, remarkable success in the development of new varieties. On the personal front, eventually he met and subsequently married Lois Paior,

which opened a new chapter of love and partnership that supported and enriched the latter chapter of his life.

The other hat that an academic wears is that of teacher. Tony was an enthusiastic teacher; in fact, more than that, a central philosophy for him is that young people should be given opportunities and responsibilities early in life. As an undergraduate teacher, his style was reportedly informal; one ex-student reports that he would turn up to class without teaching aids, sit backwards on a chair, and regale the class with anecdotes from the frontline of breeding. It is doubtful if this method could fulfil the learning, student experience or quality control outcomes that would satisfy modern Vice-Chancellors. Despite this, students responded enthusiastically to his didactic style and ability to connect and challenge individuals within the class. His interest in fostering and teaching undergraduates increased throughout his career. A second Tony philosophy is that the best instructional settings are outside of the classroom or the laboratory in the real agricultural world. With this in mind he re-instigated undergraduate agricultural tours, leading epic trips to Queensland and India. Remarkably, the great and good of the CIMMYT board were astonished when Tony turned up with a bunch of aggies at their board meeting in India, and the students repaid Tony's enthusiasm by engaging the board at a high level.

At the postgraduate level, Tony supervised a large number of PhD and Masters students, many of whom are now important breeders nationally or internationally, or hold other important positions in agriculture.

Tony had a wide range of interests. Typically these would be pursued with vigour and by co-opting family, colleagues, and innocent bystanders to the fray, and many will be familiar with being handed a list of "*just a few jobs*" to complete as Tony disappeared on a trip somewhere. Family was an important part of his life; remarkably all five children achieved Ph.D degrees, and latterly he enjoyed his grandchildren, exposing them to new environments and challenges, and was not beyond bundling sleepy-eyed adolescents into cars at dawn and making them drive him to random destinations! Other longer term interests included the Church, where he served as an Elder at Blackwood and in this congregation; Orienteering, where he contributed heavily to the Wallaringa club, terrain mapping and organisation of major events; and the Crop Science Society, which he instigated along with its famous newsletter. He was a member of the Aboriginal Ministry South Australia committee, and edited their newsletter too. He was able to support these three great passions, agriculture, education, and aboriginal culture, together in the Yitpi Foundation, which makes grants to support crop science research, agricultural education and studies of the linguistics and culture of Australian Aboriginal people. The foundation is funded from royalties from the highly successful bread wheat variety, Yitpi. It was utterly characteristic of him to put this money that he could have used personally to work for other people, and it was further characteristic that some of these grants support overseas travel for undergraduates. He was delighted to be in the fortunate position to be so generous.



Lois writes: “He loved teaching others, including me, and I loved the huge expansion of my world offered through his teaching me about geography, history, geology, agriculture and the interconnectedness of these. He enthused me with his passion for country South Australia, particularly the Outback, Flinders Ranges and Eyre's Peninsula. He imparted his knowledge and respect for indigenous culture. He introduced me to indigenous friends, orienteering, seed collecting, mass tree planting, long bush walks, and using contours and sun position (with fingers crossed) to find the car again.

A recent highlight of our life together was the service at Bethlehem where combined central Australian choirs sang. I saw Tony's indomitable spirit at work, despite his illness, to set many of the processes in motion for the choir's visit to Adelaide to happen.

Tony had very high expectations of others, but he understood the disempowering effects of some circumstances. He has helped many people, a number from this congregation, through having a listening ear and giving practical help, for example transport, a little extra cash and for some, he found paid employment. As, Will, my son has said, "He helped me find myself."”

Tony was an enormous personality with a brilliant mind. He was incapable of driving from point A to point B without formulating at least three new theories connecting the things he saw along the way. His children will remember being vigorously encouraged to derive these same theories from first principles during the trip, and will forever flinch from the order to THINK! He was a straight shooter, always sceptical of conventional wisdom, and perhaps because of these traits, did not develop effective political skills. Interestingly and to the frustration of Cynthia, he also never developed the ability for small talk, but this was rarely a problem because there were so many interesting and important things to discuss, and in any case he was unafraid of silence. He was anti-materialistic to the Nth degree, you could usually see the road through the floors of his awful old cars, he hated gardening (which he called a “Bus driver’s holiday”) and eschewed house maintenance, values which perhaps were not shared by all on Californian Crescent, Glenalta. Whatever the opposite of self-promotion is called, Tony perfected it, despite his Oxbridge background. He didn't like university administrators or molecular biologists, but held his tongue when his first son became the former and the second the latter. He delighted in teaching his grandchildren to drive on the Angas Valley property share-farmed with the McGorman family, and introduced many to orienteering. Tony loved art and classical music, was a keen sportsman who played rugby, football, cricket and tennis and an early convert to soccer, now played by almost all of his descendants. He had a horrible singing voice. He travelled widely and where possible, with members of his family. Throughout his life, he exhibited a fundamental kindness and generosity that became ever more visible as he aged.

Rest in peace, Tony. Perhaps you are watching us, patiently, as you wait for each of us to fulfil our unique genetic potential, perhaps from a heavenly trial site located somewhere close to a bakery, with a list of “*just a few jobs*” in your hand.



For Crop Science Society

By Allan Mayfield

Tony Rathjen's role in the formation and early days of the Crop Science Society

I expect the idea of forming a Crop Science Society arose from discussions in the Agronomy Dept. tea room between Tony Rathjen, Jim Silsbury (Univ of Adelaide) and others. A steering Committee of Tony Rathjen, Jim Silsbury, Jack Harris (CSIRO), Ted Higgs (SA Dept. Agriculture) and Glynn Webber (SA Dept. of Agriculture) developed the concept further and an inaugural meeting was held on the 14th of October 1975. This was attended by 54 people, with apologies from another 12.

The officers elected were

President – Tony Rathjen

Secretary – Jack Harris

Treasurer – Gil Hollamby

Committee - Trevor Greenslade, Bruce Hall (A&W Fertilisers), Jim Silsbury, Geoff Treasure and Glynn Webber

Typical of Tony, this meeting got down to business from day 1.

Speakers at this first meeting were

- Terry Heard (SA Dept. of Agriculture) – The Australian wheat industry today
- Gil Hollamby – Overseas developments of influence to the Australian wheat industry
- Duke Acton (AWB) – The requirements of the wheat market
- Jack Harris – Soil nutrient resources and wheat yield

Also discussed were a field day for late October and the type and venue for future meetings. Interestingly the Crop Science Society was formed, not as a result of a major issue (which may have seen it with a limited life), but a general desire to have a regular, science based forum to progress broadacre agriculture in SA. I think key reasons for its longevity and success are that it was a good mix of researchers, advisers, farmers and the industry. Also the concept of having several speakers rather than one has worked well. Typically, this mix gives a greater perspective of issues – from scientific through to practical aspects.

The field trips, which coincided with the Melbourne Cup, were also very successful in fostering good communication between these groups. I remember on one such trip in the Cooke Plains area being in a barley crop with classic boron toxicity symptoms. At the time we were still not sure of the cause but knew that it was not caused by a fungal infection. I mentioned to Robin Graham and Trevor Dillon that it could be due to boron toxicity (based on a study done in by Christensen in the 1920s) but needed a way of testing for this. Robin mentioned that Brian Cartwright (CSIRO) had just acquired a machine to readily do nutrient analyses of tissue. Trevor Dillon collected samples (with and without spotting) from Balgowan and by the end of the week we had the answer. A lot of scientific work followed including Tony's classic boron tolerance wheat breeding. Years later Brian Cartwright thanked us for giving him a life line. At that time Brian was about to be shifted to CSIRO Canberra but preferred to stay in Adelaide, which he did to do detailed studies on boron toxicity.

Other interesting points about the first meeting were that four meetings a year were proposed and that the annual subscription be \$4.

The first field tour went ahead on Tuesday 4th November with visits to the Mallala and Georgetown districts. This was to look at and discuss new legume crops, cereal diseases and

pasture seed production. An interesting comment was that there were large contrasts in crop production that year.

The following year the first few meetings were in February (oilseed crops), May (tillage) and July (barley and the AGM). Topics since then have covered many aspects of broadacre agriculture. It is of interest that many areas, such as tillage, nutrition and diseases had been revisited many times, showing how important it is to keep up-to-date.

The listed aims of the Crop Science Society, proposed at the first meeting were “To provide a forum for all those who are interested in the science and practice of growing better crops; and to promote the maximum opportunity for its members to exchange ideas and report their results. The membership is open to anyone interested in the subject, and in particular we welcome those people involved in extension, industry, farming and research roles who are keen to contribute to a better understanding of the conditions which influence crop growth and production.”

This is as relevant today as it was in October 1975.

We are all grateful for this vision of Tony Rathjen and his dedication and work for the Society.

Green peach aphid and beet western yellows virus

Prepared by SARDI Entomology and Pathology staff, 15 July 2014.

A high incidence of Beet Western Yellows Virus (BWYV) associated with severe crop damage has been confirmed in canola crops in South Australia. This follows widespread infestations of green peach aphid (GPA) (*Myzus persicae*), the principal vector of BWYV, in canola crops during autumn and early winter.

In the Lower North and Mid North regions of South Australia, up to 10 000 hectares of canola, particularly around **Tarlee**, **Riverton**, **Eudunda** and **Marrabel**, has suffered severe damage ([see images](#)) and a number of crops have had to be re-sown. Overall damage has exceeded the level of direct feeding damage that could be expected from the moderate (but widespread) aphid populations present in crops at the time. SARDI pathologist Jenny Davidson has organised for affected plants to be sent to Victorian DEPI virology lab for virus testing and to date, 60 canola crops from this region have been submitted to Frank Henry and colleagues at DEPI Victoria. In the Lower North, all crops tested had 90-100% BWYV infection. In the Mid North, eg. **Spalding**, test results were variable, with infection rates in some crops at 90-100%, some crops at low levels and others unaffected.

Virus-like symptoms have also been reported in isolated canola crops around **Booleeroo Centre** in the Upper North, **Lock** on Eyre Peninsula, **Kadina** and **Arthurton** on upper Yorke Peninsula and **Bordertown** in the South East. High GPA infestations and virus-like symptoms are being reported in the **South Australia Mallee**, and in the **Victorian Mallee**. Crop samples from these regions are currently being virus tested.

Beet Western Yellows Virus (Family Luteoviridae: genus *Polerovirus*) infects the phloem of plants and is persistently transmitted by aphid vectors. BWYV infection can result in significant losses in seed yield and oil content. Symptoms may initially resemble nutrient deficiencies, herbicide damage, physiological stress or other disorders. Leaves may turn yellow and purple, starting from the lower leaves. Other symptoms may include leaf mottling, leaves become thickened and cupping inwards, and premature bolting.

Brenda Coutts (Plant virologist, DAFWA) says that canola is most susceptible to BWYV at the rosette stage, when infection can lead to high yield losses. Generally, the yield consequences of BWYV decrease with infection at later stages of crop development. However, canola remains susceptible to yield losses from BWYV infection until approximately the mid-podding stage. Infection after this stage usually results in minimal yield loss but oil quality can still be affected.

Green peach aphid is the most important vector of BWYV (96% transmission efficiency) but cabbage aphid (*Brevicoryne brassicae*) can also transmit it (14% transmission efficiency) as can cowpea aphid (*Aphis craccivora*) and perhaps turnip aphid (*Lipaphis pseudobrassicae*). Certain strains of BWYV commonly infect pulse crops in south-western Australia, New South Wales and South Australia, while other strains are limited to canola only.

Why did this happen?

Heavy rainfall in cropping districts during February and March is likely to have created a green bridge (reservoir) of weed hosts of both BWYV and its most important vector, GPA. Host plants of BWYV include weeds, such as wild radish, wild melon, fleabane, stinkweed, blackberry nightshade, marshmallow, bedstraw, thistles and volunteer canola, and pastures including lucerne, medic and sub-clover. Green peach aphid itself is highly polyphagous and

its host plants include wild radish, volunteer canola and a wide range of other broadleaf plants. Systematic virus surveys are being planned to identify the extent of BWYV incidence and identify the most important weed sources.

Warm temperatures continuing through autumn and early winter then appear to have created ideal conditions for aphid population development. Higher population densities combined with warm temperatures are likely to have increased aphid flight activity, resulting in early and widespread colonisation of canola crops. Winged aphids carrying the virus from infected weed hosts will have transmitted the virus to young canola plants before spreading it to other healthy plants.

Where to from here?

Severe crop damage has already occurred. However, the onset of cold and wet weather conditions has now caused aphid populations to decline and GPA is largely inactive within crops. Minimum flight thresholds for aphids are typically around 16-17°C. There are likely to be few winged adults in the aphid population until numbers begin to build again with rising temperatures from late winter onwards. Consequently, we expect that the risk of further virus spread is currently very low in most districts, particularly those currently experiencing cold and wet conditions, and will remain so while these conditions persist.

Applying sprays to control aphids over the next few weeks will provide no benefit in preventing further virus spread.

However, there is a risk of further virus spread following build up and flights of winged aphids in late winter and early spring. Unaffected canola crops or areas of canola crops remain susceptible to yield loss from BWYV infection until approximately 50% podding (see above). Pulse crops may also be at risk in spring, depending on the BWYV strain involved (currently being identified), which could result in significant yield losses. An update on the identity of the virus strain involved in South Australia will be provided in the next Pest Facts issue.

Aphids are capable of long distance flights over many kilometres. Crops most at risk are those in regions currently affected by BWYV, particularly the Lower North and Mid North of South Australia, and crops adjacent to infected crops or weeds in other regions.

Agronomists may be asked to assist with further sampling and gathering of crop and paddock history associated with samples tested for virus and aphid insecticide resistance. More details will follow in the next issue of PestFacts.

Our advice

We are generally advising against spraying to control aphids while winter conditions persist. Insecticides may be necessary, later in winter or early spring, to limit virus spread in canola if winged aphids appear before 50% podding. Pulse crops may also need to be protected from aphids (currently being confirmed).

We suggest that growers and advisors in high risk areas should closely monitor for the first signs of winged aphids in the population and/or aphid flight activity, and be prepared to immediately apply appropriate insecticide treatments to protect susceptible crops. Unlike direct feeding damage, virus can be transmitted by relatively few aphids feeding or probing plants. We suggest using a number of yellow sticky traps, ideally placed in a transect from the edge to the middle of the paddock, and frequently checking for the presence / numbers of winged aphids on the traps. We recommend beginning within the next couple of weeks, while flight activity is low or absent, to 'get your eye' in. Check once per week now, but more

frequently when warmer weather occurs. Sticky traps are available from a range of outlets but locally from Biological Services, Loxton 08 8584 6977.

Insecticides: the importance of good decision-making

Biosecurity SA Rural Chemical Operations group Manager, Michael McManus, is asking producers and advisers to think very carefully about what could be at risk if poor decisions are made on chemical use in canola for aphid control. South Australia will produce about 400,000 tonnes of canola in 2014, with the majority being exported. It is vitally important to only use products registered for the crop and situation, to comply with the label directions for the application method, to not exceed application or frequency rates, and to follow all withholding periods.

This year, the impacts of GPA and BWYV have challenged producers and their chemical control strategies. Michael is reminding producers that along the supply chain there are a range of measures in place to detect the presence of chemical residues and/or any off-label use of chemicals that may have an impact on our export markets and clean and green premium food reputation, including:

- Potential on-farm regulatory audits of chemical use practices
- Vendor declarations required by the silo/receiving point - These vendor declarations require sign-off that "Chemicals have been applied in accordance with registered label and approved permit instructions"
- Residue sampling by Australia's National Residue Survey and by our bulk handler silo/receiving points
- Residue sampling in all our major export markets

If your canola crop results in a residue detection in a cell or shipment of canola, it will cost much more than just the value of the product. It could result in the loss of an important market, the loss of our premium food reputation, prosecution(s) and more stringent chemical use requirements for the future. For the sake of the industry, make sure only registered or permitted products are used and that they are used according to label instructions.



Photo: Jenny Davidson



Photo: Mick Faulkner



Photo: Jenny Davidson

Crop Science Society Committee - 2013/14

Position	Name	Email	Phone
President	Anthony Pfitzner	gwgfarm@bigpond.com	0429 811 984 8581 1985
Vice President/ Publicity Officer	Ben Fleet	benjamin.fleet@adelaide.edu.au	0417 976019
Immediate Past President	John Both	john.both@au.nufarm.com	0418 803 055
Secretary	Larn McMurray	larn.mcmurray@sa.gov.au	8842 6265 0417 898 803
Treasurer	Susan Fuss	gsfuss@bigpond.com	0407 900 055
Editor	Tony Rathjen	anthony.rathjen@adelaide.edu.au Crop Science Email Address cropsssa@yahoo.com	8313 7216 8313 6735 (fax) 0408 816 533
Co-Editor/IT & Web site coordinator	Judy Rathjen	juditrat@yahoo.com	0421 183 978
Committee Members	Paul Lush	lushy66@gmail.com	0417 865 257 8527 2452
	Chris Preston	christopher.preston@adelaide.edu.au	8313 7237 0488 404 120
	Tony Craddock	traddock@ruraldirections.com	8564 3300 0417 809 317
	Rob Wheeler	rob.wheeler@sa.gov.au	8303 9480 0401 148 935
	Peter Smith	peter.smith662@schools.sa.edu.au	0411 127 478
	Jamie Wilson	jamieandmeagan@bigpond.com	0407 796 202
	Tom Robinson	anashka.farms@gmail.com	0400 291 219
	Neil Wittwer	nwittwer@peracto.com	0422 057715
	Kenton Porker	kenton.porker@sa.gov.au	0403 617 501