



Maize Association Chair report May 2018 - Bernie Walsh



Hello to all

At our AGM held in Toowoomba last November 2017 our Chair for last four years Harley Bligh retired from association. Harley confidently lead the Association for four years leaving it in a sound position to go

forward. Harley also was a strong driver in setting up the inaugural National Maize Yield Competition, and the transition to tele conferencing as a means of convening meetings of executive which has resulted in a financial savings and also enable more frequent meetings. Thanks again Harley on behalf of Association. Along with myself (Bernie Walsh) being elected as chair we also had some new additions on executive, they are Jason Scott (Pioneer Seeds) Andrew Pollard (Netafim) Anthony Furse (Robinson Grains) Johannes Roellgen (grower) Trevor Philp (Advanta Seeds).

Last November, I along with seven other maize growers from the local area (Murrumbidgee Irrigation Area, MIA) where shouted a trip up to the Pioneer seed cleaning and packaging facility at Narromine. We all enjoyed the experience and thank Pioneer Seeds, Manager of Leeton branch Yenda Producers, along with Chris Butler and Andrew Cogswell of Lachlan Commodities for the day up at Narromine starting with barbecue lunch, tour of the Pioneer seed cleaning facilities, dinner that night in Forbes and tour of Lachlan Commodities grain receivable, processing and packaging facilities the next day. I think we all learnt something new, especially regarding the detail in the preparation of our sowing seed and also the work that goes into preparing grain for end use customer.

Our maize harvest is pretty much done and dusted in our area this year. Weather has been very favourable for harvest. I haven't heard of anybody with high moisture grain in the region this year. Apparently there have been some problems with high Aflatoxin levels in some loads going into the pet food market, this could possibly be due to the high levels of heliothis damage to cobs this season. Aflatoxin is an ongoing issue that must be continually researched to find a solution as it has the potential to really hurt the industry from time to time.

Grit yields in the region were good, with the stand out being Pioneers P1756. However, popcorn yields were a bit disappointing across all varieties (both new & old), and from what I have heard down by around at least one tonne per hectare.

There has been a number of on-farm trials in the region this year regarding the application and timing of nitrogen to maximise yields of the new variety, P1756. There looks to be a definite increase in yield with increased N application.

This needs to be researched further but I think the Maize Yield Competition is a good way to see what results some growers can achieve from various rates and types of fertiliser inputs. Given the area criteria for competition can come down as small as 1/10 of hectare it is possible for growers to conduct small scale trials to evaluate various types and rates of fertiliser inputs to see exactly what they can achieve.

I encourage as many growers as possible to enter the yield competition. Looking on it as a chance to show case the high yielding crops of maize. From that we may all be able to pick up some key points which we can use to lift all crop yields across the country. Good luck & get on board please.

I have been a grower member on the Maize Association since 2011. Over those years it has always been a talking point as to the relevance of the association to our industry. I think still being here shows that we are relevant, when other summer grains associations have fallen by the wayside. Our current executive has identified & submitted to GRDC a list of issues that require research and funding. These issues include fertiliser management, Mycotoxin/Aflatoxin management, Management of common rust, an IPM system to aid in the control of Heliothis, and others including Maize growing in Tassie and Soil biology to lift maize yields. Hopefully we will be able to get some of these issues funded and researched using up to date science.

The Maize Association has moved away from being mainly financed by individual membership (opened up to free membership for growers as we currently have only 33 grower members), instead we are encouraging corporate and merchants to be members and targeting advertising in the COB. However, our best financial contributor to the association is the Summer Grains Conference, which is going to be held on the Gold Coast at the Royal Pines Resort in July 2019. We need to make this a huge success as our finances hinge on it, hence the executive is busily trying to find guest speakers that can talk and present on any facets of Maize industry. I would like to ask anybody that is associated with our industry if they have or know of anybody that would fit this criteria to come forward and send an email to the MAA EO Liz Mann or anybody on executive. (all our contact details can be found on website www.maizeaustralia.com.au).

I would encourage everybody out there that has something to do with maize industry, if they feel the need, to contact anybody on the executive with whatever issue they want to discuss so we can continue to assist to develop the industry in the future.

On a personal note my wife Liz & I have just recently sold our farms & are moving on so my tenure at the helm of Maize Association is going to be short lived. At this stage I am unsure as to how this will play out.

Look forward to your involvement in association or just networking together.

Bernie Walsh
Yanco

FREE
Membership
of the MAA
for growers

Please contact Liz Mann
to ensure you're on the
mailing list.

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Deadlines

The copy deadline for the Spring issue is:
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Contributions welcome. Manuscripts and photographs are handled with care; return of unsolicited material is not guaranteed. Copy preferred by email or on disc in text-only format.

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Mid-Season Corn Fits Southern Qld Farming System Perfectly

With a need to start watering his cotton before Christmas, Steve Little will only consider a high yielding mid-season corn variety to fit into his rotation.

Mr Little, who runs the family property 'Wynola' with his son Jacob at Brookstead in southern Queensland, irrigates around 180 hectares every year, rotating mainly between corn and cotton.

He started growing Pioneer® brand P1756 hybrid corn four years ago as it met the characteristics he was looking for to fit into his farming system.

"I don't like extremely long season corn, whereas P1756 is more a mid-season length, which means I can get my water finished on the corn by just before Christmas and then start watering the cotton," he explains. "Every year the area of P1756 we've grown increases because it's been probably our best yielder as a grit corn.

"There's other feed varieties out there that'll probably yield just as well, but you don't get that premium for the grit with the other varieties and they're a bit harder to market."

2016/17 was one of the first summers Mr Little says they've been able to plant their corn into

moisture, putting the crop in the ground on the 8th September 2016. The good moisture profile, followed by rain just on emergence meant the corn got away to a good start, which was just as well.

"The early corn actually got through just before the heatwave conditions came, so thankfully the irrigated corn hardly suffered at all," Mr Little explains.

Harvest, which took place at the end of February, went well with no lodging, and a 15.4 t/ha average yield with good quality meant the corn made gritting grade, going to Smiths for chips. The performance was consistent with the last three to four years of irrigated P1756 corn on 'Wynola'.

"I'm happy with what Pioneer is offering my corn program, they have the best corn varieties by a long way - last year I grew a competitor's variety and the experience prompted me to turn only to P1756 this year," Mr Little says.

"I've already ordered enough seed to plant half my corn program with P1756 next year, and the other half of the corn program will be the new variety, Pioneer® brand P1888 hybrid corn."



Steve and Jacob Little

P1756 Comes Out On Top In Extreme Southern Queensland Summer

The hot and dry 2016/17 summer was one of the most extreme David Bailey has seen in 30 years of farming on his property, 'Denby', in Southern Queensland.

The Brookstead grower says relentless heat took a toll on his cropping program, which is spread out over around 2,400 hectares of irrigation and dryland country. "We predominantly grow sorghum, wheat, chickpeas, corn, and sometimes mungbeans if the weather's right, and then in 2017 we've also got some cotton in," Mr Bailey explains.

"We did plant a fair bit of corn this year, we had some contracts with processors to supply them with gritting corn, but the way the season went with the heat and the dry, it was a very tough season for corn."

Mr Bailey has been growing Pioneer corn varieties for a number of years, and introduced Pioneer®

brand P1756 hybrid corn into his rotation as soon as it was commercially available. "We used to grow a lot of Pioneer® brand P1755, the predecessor to P1756, to supply the processing market, and we moved to P1756 as it was marketed as having a yield increase and better resilience to disease," Mr Bailey says. "We continued on the line because we'd had a good run and also the processors like that corn variety for grit to go into the mills for food-based products like corn chips or flour."

"Pioneer are pretty good with their variety selections. I went to a field day recently and they've got a couple of new ones coming through now that look pretty good, Pioneer are quite proactive in their breeding programs to make sure they're always getting the best varieties and having a grain the end users like for processing."

The 2016/17 season certainly put P1756 to the test in Southern Queensland, with Mr Bailey describing

the heat as 'relentless'. "I've never seen a summer like that, particularly the heat - we were getting up to ten days or more of heat wave temperatures, and there's not many crops that enjoy those sorts of conditions," he says.

"P1756 held its grain quality quite well, in a year that's been very tough, it's probably proven itself to be the pick of the varieties as far as keeping its grain quality." Mr Bailey says his P1756 irrigated corn yielded around 10 t/ha, while the dryland P1756 was quite variable, yielding between 3 and 6 t/ha.

"P1756 handled the conditions better than another corn variety I grew here, there's no doubt about that - if I'd had all P1756, rather than some of the other varieties, I would have been better off," he says.

David Hula Continues to Hold the Record for the Highest Maize Yield in the World (taken from 2017 NCYC guide.pdf)

DAVID HULA Charles City, VA **36.47 tonnes/ha** Pioneer P1197AM **Population: 51,900** **Harvester: John Deere S670**

In 2013, he stunned observers by setting a world record with a yield of 454 bu./acre in this class. Two years later, he upped the yield to 35.78 t/ha and established a new all-time high. In 2017 he grew another record crop at 36.47 t/ha. "It's a passion," Hula says of growing corn and participating in the yield contest. "God has blessed us with the tools. It's up to us to use them." This year, Hula planted Pioneer P1197AM, the same hybrid that propelled him to his 2015 world record. "The plant characteristics and genetics work in harmony with our management," he says. Plentiful solar radiation (sunlight) throughout the season was another key ingredient in the performance of this year's entry. "That's been the case in all of the years where we've had records," he says. "Wouldn't it be nice if we could put sunlight in a bottle?"

Prior to planting, seed was treated with Invigor 8 and zinc, along with Poncho 1250/VOTIVO (for protection from early season pests). "Seed is the basic building block for what we're trying to accomplish," he says. "We do whatever we can to protect it."

At planting, Hula placed a starter fertilizer that included a 2:1 nitrogen to phosphorus ratio, along with sulphur, boron and zinc, three inches to the side and two inches below the seed. He also added a home brew that he calls "Relay" in the furrow. It consists of fertilizer and acids, and energy and plant growth stimulants. "Feeding the living organisms in the soil by having a nutritionally balanced fertilizer readily available when the plant needs it is a major challenge," he adds.

Throughout the season, Hula utilized over the-top applications, side-dressing with Y-drops and fertigating to make multiple applications of micronutrients, biologicals, nitrogen, potash, sulphur and boron. At silking, and then again three weeks later, he flew on Genesis Ag's Cryptomyte with a helicopter. "It picks up plant health and maximizes grain fill," he says.

Being in the contest has given Hula the chance to network with other top-notch corn growers from all over the country. "You learn about the challenges they have and how they meet those challenges," he says. "And it's very personally satisfying when you hear from other growers that the information and experiences you shared may have helped them

meet their yield goals."

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Eliminate Obstacles To Higher Yields Challenge: Keep plants and soil active throughout the season

Solution: Fine-tune application amounts and timing of nutrients and biologicals to best serve plant/soil needs

Corn a Profitable Crop With High Yielding Hybrid

The improved genetics of a leading corn hybrid has made the crop a very profitable option on the property of Rodney Foster, of Coleambally, in the Riverina district of New South Wales.

Mr Foster said he had been growing corn many years and initially had hybrids that produced top-end yields of around 12 tonnes per hectare. "If you got twelve and a half tonnes you were very happy," he said.

In recent years he switched to the Pioneer® hybrid P1756 and now has whole blocks which average in excess of 17 tonnes per hectare.

"If you look after P1756 you won't have any drama getting 17 tonnes per hectare," Mr Foster said. "I'm now trying to get 18 tonnes. I've had some do that in parts but not the whole paddock as yet." He said the improved yields were mainly down to the breeding of P1756 compared to other corn hybrids available on the market.

Last season Mr Foster put a hectare of another hybrid to compare with P1756 in the same paddock and asked the header driver to provide yields for both. "The P1756 went a bit over 17 tonnes per hectare and the other stuff went 12.5 tonnes per hectare," he said. "That tells you about the genetics of P1756. It is so far ahead of everything else."

He said he grew a small amount of P1756 the first year it was released and that has been the only hybrid he has wanted since that time.

"People wonder why I haven't gone to cotton and that is why," he said. "I've been thinking about growing cotton but if I can get 16 tonnes per hectare from corn, there is no need."

Rice is also grown on the property and compares favourably with the high yielding corn crop in terms of gross margin and water use. "I can grow rice on 13 megalitres per hectare and corn on about 9 megalitres per hectare," Mr Foster said. "It's all about dollars return. If I can strip 15 tonnes of corn compared to 12 tonnes of rice I'm better off and I'm saving 4 megalitres."

He said a great advantage of P1756 was its suitability for the processing market. Most of the corn is grown under contract for human consumption with surplus grain used in the dog food industry or sold as feed to dairy farmers. "I really like growing grit as it can go into any market," Mr Foster said.

P1756 produces grain of high quality and regularly achieves weights around 79 kilograms per hectolitre.

In a normal season corn on the property is planted in late September or early October although last season the wet conditions delayed sowing and the last block didn't go in until November 20. It was a hot dry season with the corn yielding well in spite of the challenging conditions.

Mr Foster said it was important to keep the water up to the plant throughout the year and not go into holiday mode through Christmas. "You don't want to stress it."

He said after harvest the corn stubble is rolled and burnt and then wheat is drilled directly into the paddocks. After the wheat crop is harvested at the end of the year the area is fallowed through until the corn plant in the spring.

Manure is used pre-plant and the crop is fertilised well to target the high yields available from P1756.

Mr Foster said the corn / wheat rotation worked well with the residual herbicides used in the summer crop able to keep grassy weeds out of the winter option.



Rodney Foster, of Coleambally, NSW, inspecting P1756 corn which has yielded particularly well over a number of seasons.

Understanding Soil Properties and the Relationship to Maize Yield Variability

by Liz Mann Maize Association of Australia. Nick O'Halloran, Department of Economic Development, Jobs, Transport and Resources
Supported by Goulburn Broken CMA's Beyond Soilcare Program thanks to funding from the Australian Government's National Landcare Program

Aim

This project aimed to understand the relationship between maize yield and soil chemical, physical or biology properties.

Method

Two different properties, shown in Figure 1 were used for this study, one being Hamono's and the other Kennedy's. Soil was collected in December 2016 from the 0-10cm range and then from the 10-30cm range at both farms. Each sample consisted of 25 sample points which were composited and subsampled.



Figure 1: Location of the two properties

At the Hamono site 10 soil sample points were determined, with the selection based on the yield map data from the previous maize crop (summer 2015/16). These points were selected to represent 4 sections of the pivot which were low yielding, 4 sections that were high yielding, and 2 areas in the mid-yield range. The distribution of these points is shown in Figure 2. Average maize yield was calculated for a radius of 30, 50 and 70 meters around each sample point.

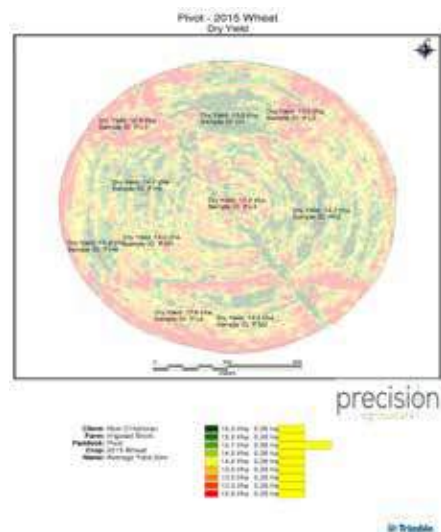


Figure 2: Maize yield map

As yield data was not available for the Kennedy site the points were selected based on the NDVI data available from CSIRO, NDVI data was from (20/2/16) for the maize crop grown in summer 2015/16. Average NDVI value was taken from the 4 closest 30 m NDVI pixels to each sample point.

Points were then selected based on 4 points with the highest (H) NDVI, 4 points with a medium-high (A) NDVI, 4 with a medium (M) NDVI value and 2 with a low (L) NDVI value. The distribution of these points is shown in figure 3.

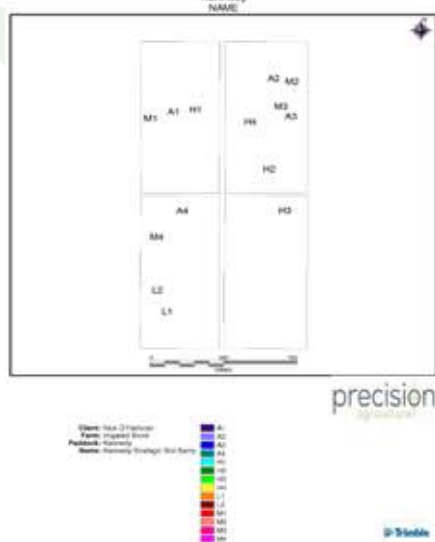


Figure 3: Location of sampling points based on NDVI

Soil was sent to the APAL lab for full chemical analysis. Soil from the 0-10cm depth at the Hamono site was also sent to Melbourne University for DNA extraction. Bacterial and fungal sequences were then targeted with primers designed for the 27F and 519R regions of the 16S rRNA subunit.

Penetrometer resistance was also measure at each site to a depth of 45 cm using a cone penetrometer. Nine cone penetrometers readings were taken at each previously determined sampling point.

Results

Data for 0-10cm range for Hamono was plotted against the average yield within 70m of each sample point. A regression line was added to each graph to determine potential relationship between each of the soil properties and yield. As the R^2 values become closer to 1.0, the better fit of the regression line. That is, the closer the line passes through all of the points. At Hamano's the strongest relationship was found between Soil Organic Carbon and average 70m yield (Figure 4).

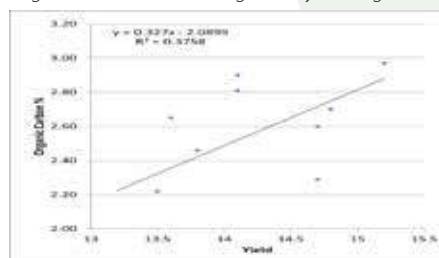


Figure 4: Organic Carbon and Yield at Hamono

Data for 0-10cm range for Kennedy was plotted against NDVI at each sample point. A regression line was added to each graph to determine potential relationships of soil properties to yield. As the R^2 values become closer to 1.0, the better fit of the regression line. That is, the closer the line passes through all of the points. At Kennedy's the strongest relationship was found between Colwell P and NDVI value (Figure 5).

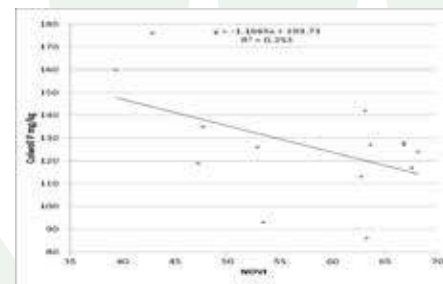


Figure 5: Colwell P and NDVI at Kennedy

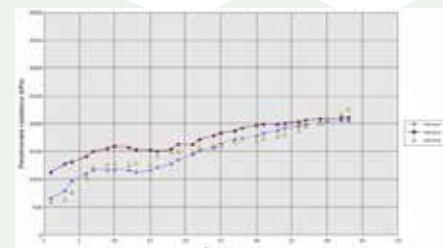


Figure 6: Soil Penetrometer Results from Hamono

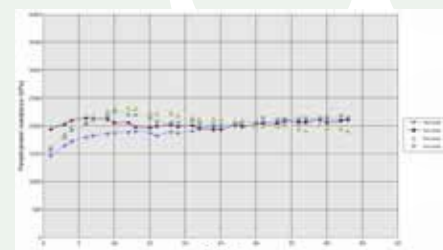


Figure 7: Soil Penetrometer Results from Kennedy

Soil fungi was classified into 7 fungal phyla and presented as the percentages.

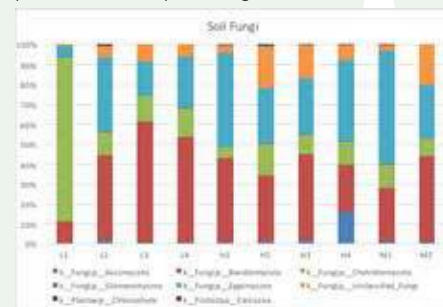


Figure 8: Fungi Composition of the Soil from Hamono

Soil fungi data for 0-10cm range for Hamono was

plotted against the 70 m average yield at each sample point. A regression line was added to each graph to determine potential relationships of soil properties to yield. As the R^2 values become closer to 1.0, the better fit of the regression line. That is, the closer the line passes through all of the points. The strongest relationship was evident for *Chlorophyta* (Figure 9).

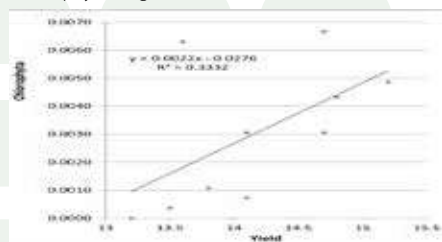


Figure 9: Soil Fungi: Chlorophyta and Yield from Hamono

Soil Bacteria was classified to 23 phyla, and 345 genera.

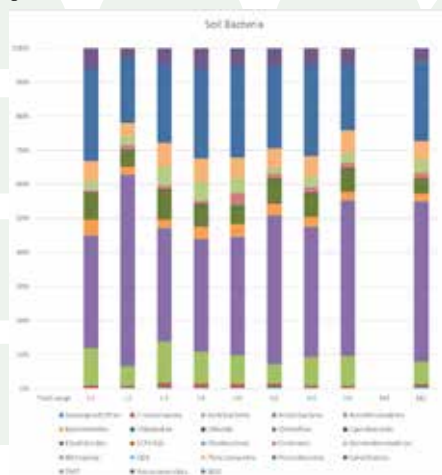


Figure 10: Bacteria Composition of Soil from Hamono

Soil bacterial data for 0-10cm range for Hamono was plotted against the yield for the 70m plots at each sample point. A regression line was added to each graph to determine potential relationships of soil properties to yield. As the R^2 values become closer to 1.0, the better fit of the regression line. That is, the closer the line passes through all of the points. The strongest relationship was evident for the phyla *Firmicutes* (Figure 11).

This phyla; *Firmicutes* was then further broken down to 16 different classifications, with some to the genera level, and others to family only. The regression analysis was also conducted with the strongest relationship was evident for the following:

- Phyla: *Firmicutes*; class: Bacilli; order: Bacillales; family: Bacillaceae; genera: Bacillus (Figure 12)
- Phyla: *Firmicutes*; class: Clostridia; order: Clostridiales; family: Peptostreptococcaceae; phyla Firmicutes (Figure 13)

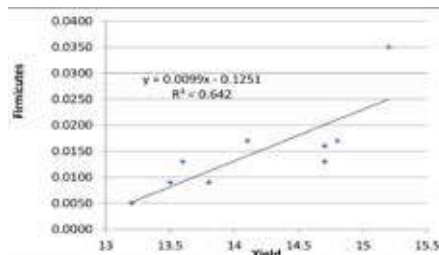


Figure 11: Soil Bacteria: Firmicutes and Yield from Hamono

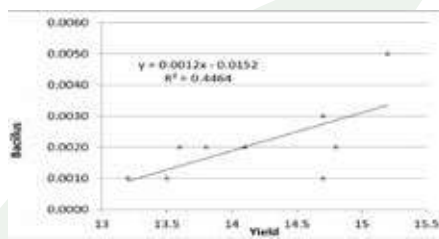


Figure 12: Soil Bacteria: genera Bacillus and Yield from Hamono

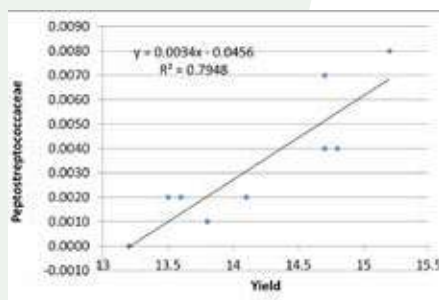


Figure 13: Soil Bacteria family Peptostreptococcaceae and Yield from Hamono

Discussion

Very little correlation was found between soil chemistry properties at the 10-30cm level and yield or NDVI, hence all analysis was focused on the 0-10cm depth. Based on this the strongest relationship at the Hamono site was with the Organic Carbon levels, with yield shown to increase as the level of organic carbon increased ($R^2=0.3758$) (Figure 4).

Soil Carbon is involved in binding soil particles together into larger aggregates. Aggregation is important for good soil structure, aeration, water infiltration and resistance to erosion and crusting. Soil carbon is also an important source of nutrition for the crop. These relationship between maize yield and soil organic carbon at Hamono's is not surprising given that Research by Zhang et al (2008) has indicated that both wheat and corn grain yields were significantly correlated with soil organic carbon, total and available nitrogen and phosphorus.

At the Kennedy site the strongest relationship was with the Colwell Phosphorus levels, with NDVI shown to decrease as the level of Colwell P increased ($R^2=0.253$) (Figure 5). This is the reverse of what might be expected with phosphorus being essential for plant growth and involved in photosynthesis, respiration and other metabolic processes, including energy metabolism within the

plant (Salisbury & Ross, 1992).

A cone penetrometer was used to measure soil strength and gives an indication of how hard plant roots have to work to explore the soil. As penetrometer resistance increases, measured in kilopascals, the soil is becoming stronger and more difficult of root to grow through. Penetrometer resistance is influenced by soil water content, soil type and management practices.

Soil strength were measured at both sites, with results shown in Figure 6 and 7. There was no significant variation between any of the treatments for soil strength. In general, crop root growth starts to be restricted when the penetration resistance exceeds 1500 kPa and is severely restricted at 2500 kPa or more (Cotching and Davies). Based on this, and the results shown in Figure 7, it is possible that maize root growth may have been impeded at depths at Kennedy's site across all NDVI levels. At the Hamono site there appears to be variation in soil strength between the high, medium and low yielding areas, with the low yielding region hitting 1500kPa at the 5-10cm depth, the medium yielding region at the 15-20cm depth and the high yielding area at the 20-25cm depth.

The strongest relationship between yield and soil fungi was evident for *Chlorophyta*, $R^2=0.3332$ (Figure 9). *Chlorophyta* are also known as green algae, and may occur in damp soil. Green algae have been found to form water-stable soil aggregates that have important ecological roles in nutrient cycling, water retention, and stabilization of soils (Evans and Johansen, 1999)

The strongest relationship between yield and soil bacteria was evident for the phyla *Firmicutes* (Figure 11). The regression analysis showed the strongest relationship was evident for the following:

- Phyla: *Firmicutes*; class: Bacilli; order: Bacillales; family: Bacillaceae; genera: Bacillus $R^2=0.4464$ (Figure 12)
- Phyla: *Firmicutes*; class: Clostridia; order: Clostridiales; family: Peptostreptococcaceae $R^2=0.7948$ (Figure 13)

Bacillus spores are very resistant to many adverse conditions and may be Gram-positive, or Gram-positive only in early stages of growth, or Gram-negative (Schleifer, 2009). Research by Paton and Innes (1991) has shown that there are some symbiotic associations between L-form *Bacillus* bacteria and plants.

Peptostreptococcaceae are non-spore-forming obligately anaerobic Gram-stain-positive cocci. The optimum temperature for growth is 37°C, and they are involved in the metabolism of peptone and amino acids to acetic, butyric, isobutyric, caproic, and isocaproic acid (Holdeman et al., 1986). *Peptostreptococcaceae* is also common bacteria in cattle manure or livestock waste. They are typically in higher abundances in organically managed plots (Hartman et al 2018).

Soil samples were taken over 8 months after the crop for which we had yield maps. Hence the soil had been cultivated for the summer crop

which had already been planted when the soil testing was conducted. Therefore, some of the soil properties that may have impacted on yield in the previous season may have been ameliorated through management (i.e. cultivation and addition of lime and fertiliser).

Conclusion

Unfortunately yield maps were not available for the Kennedy location, hence it was not possible to determine if there was a relationship between NDVI and yield.

Based on the soil penetrometer results from the Hamono site there appears to be a relationship between soil compaction and maize yield. Hence soil practices that reduce compaction may result in increased yield.

Soil organic carbon and phosphorus were found to correlate with crop yield (Hamono) and NDVI or plant growth (Kennedy).

Green algae is considered to be important in nutrient cycling, water retention, and stabilization of soils (Evans and Johansen, 1999) Further studies on *Chlorophyta* should be conducted to determine if their presence does in fact increase crop yield.

The strongest relationship between yield and soil fungi was evident for the phyla *Firmicutes*, in particular Phyla: *Firmicutes*; class: *Bacilli*; order: *Bacillales*; family: *Bacillaceae*; genera: *Bacillus*

and Phyla: *Firmicutes*; class: *Clostridia*; order: *Clostridiales*; family: *Peptostreptococcaceae*. As *Bacillus* has been associated with plants in a symbiotic relationship some species of this bacteria are already commercially available. Further research is required through to determine if applying these bacteria result in increased crop yield.

As previous research has suggested that manure application to soil may introduce beneficial bacterial from the family *Peptostreptococcaceae* to the root microbiome (Hartman et al. 2018). Hence, the introduction of microbes from manure and their influence on maize yield should be further investigated.

References

- Cotching, B and Stephen Davies, S. <http://soilquality.org.au/factsheets/soil-compaction-tas>
- Evans, R.D. and Johansen, J.R. (1999) Microbiotic crusts and ecosystem processes. *Crit. Rev. Plant Sci.* 18: 183–225
- Hartman, K., van der Heijden, M.G.A., Wittwer, R.A., Banerjee, S., Walsler, J., and Schlaeppi, K., (2018). Cropping practices manipulate abundance patterns of root and soil microbiome members paving the way to smart farming, *Microbiome* (2018) 6:14

Holdeman, L.V., J.L. Johnson and W.E.C. Moore. 1986. Genus *Peptostreptococcus* Kluver and van Neil 1936, 401AL. In Sneath, Mair and Holt (Editors), *Bergey's Manual of Systematic Bacteriology*, Vol. 2. The Williams & Wilkins Co., Baltimore, pp. 1083–1092.

Paton, A.M. and C.M.J. Innes. 1991. Methods for the establishment of intracellular associations of L-forms with higher plants. *J. Appl. Bacteriol.* 71: 59–64.

Salisbury, F.B. & Ross, C.W., (1992). *Plant Physiology*, 4ed, Wadsworth Publishing Company. California, USA.

Schleifer, K., (2009) Phylum XIII. *Firmicutes* Gibbons and Murray 1978, 5 (*Firmacutes* [sic] Gibbons and Murray 1978, 5) *Bergey's Manual® of Systematic Bacteriology*

Zhang, W., Xu, M., Wang, B., Wang, X. (2008). Soil organic carbon, total nitrogen and grain yields under long-term fertilizations in the upland red soil of southern China. *Nutr Cycl Agroecosyst* (2009) 84:59–69



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Irrigation Scheduling Of Field Corn Under Institutional Constraints

by Dr. Freddie R. Lamm, Professor and Research Irrigation Engineer, Kansas State University, flamm@ksu.edu (Proceedings of the 2016 Irrigation Association Technical Conference, Las Vegas, Nevada, December 5-9, Available from the Irrigation Association, Fairfax, Virginia)

Abstract

Two pre-anthesis (pre-silking) and two post-anthesis (post-silking) deficit sprinkler irrigation strategies for four corn hybrids where total irrigation was constrained to 11.5 inches against a fully irrigated control were compared in terms of grain yield and yield components, water use, and crop water productivity. This study was in response to a voluntary agreement of producers in a region of northwest Kansas (USA) where they agreed to reduce irrigation water application to 55 inches over a 5 year period. This study attempted to determine the best irrigation strategy for these limited applications. Results indicated full irrigation was still relatively efficient but used 30 to 36% more water. When corn prices are greater, managing at the full irrigation level and reducing irrigated land area may be more profitable. Pre-anthesis water stress was more detrimental to grain yield than similar levels of post-anthesis stress because of reductions in kernels/ear. When water is greatly restricted, a 50% reduction in irrigation post-anthesis might fare reasonably well by relying on stored soil water and precipitation for grain filling. These results might not repeat on less productive soils or under harsher environmental conditions.

Introduction

In the semi-arid Central Great Plains and particularly northwest Kansas, soils are generally productive deep silt loam soils but precipitation is limited and sporadic with mean annual precipitation ranging from 16 to 20 inches across the region, which is only 60-80% of the seasonal water use for corn. Irrigation is often used to mitigate these water stress effects but at the expense of the continued decline of the Ogallala Aquifer.

In 2012, the Kansas legislature passed new water laws that allowed creation of a new water management structure known as a Locally Enhanced Management Area (LEMA). It allows stakeholder groups of various sizes to locally come together and design a management strategy to reduce overdraft of the Ogallala Aquifer in their area subject to approval by the Kansas Division of Water Resources. The first LEMA to be approved known as Sheridan High Priority Area 6 became a reality within Sheridan and Thomas Counties in northwest Kansas in 2013. The stakeholders in a 100 square mile area voluntarily agreed to reduce their average water right to 11 inches/year for the next 5 year period. This area is centered approximately 30 miles east of the KSU Northwest Research-Extension Center at Colby, Kansas. In Kansas, annual rainfall decreases approximately 1 inch for every 18 miles moving east to west and greatest annual rainfall in western Kansas is in the months of May, June, and July, so a similar appropriate restriction at Colby to the Sheridan HPA #6 LEMA might be approximately 12 inches instead of 11 inches. Corn is the major irrigated crop in the region and producers in this LEMA would prefer to continue growing corn due to the availability of good local markets that include

two large cattle feeding operations as well as a nearby dairy. The LEMA reduction of water right to 11 inches represents about a 27% reduction in water from the 80% chance Net Irrigation Requirement for Sheridan County (15 inches). The producers within the LEMA have the flexibility to apply their 5-year allocation of water as they so determine, but could benefit from research that determines when water can be restricted without large corn yield penalty.

ET-based irrigation scheduling has been promoted in the Central Great Plains for many years (Rogers, 1995). As producers move to deficit irrigation strategies this method of scheduling can still be useful in alerting the producer to soil water conditions and can help the producer decide when to allocate their limited supply (Lamm and Rogers, 2015). Management Allowable Depletion (MAD) values have been established as a means of helping producers know when to irrigate, but these established values have been questioned as too harsh for modern corn production (Lamm and Aboukheira, 2011; 2012).

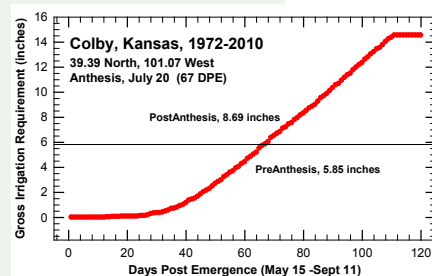


Figure 1. Seasonal gross irrigation requirements for field corn at Colby, Kansas.

Sprinkler irrigation does not allow for large amounts of water to be timed to a specific growth stage without incurring runoff, so strategies must be employed that can slowly restrict or slowly increase water available to the crop and to soil water storage for later usage. Preliminary computer simulation indicated that on average, approximately 40% of the seasonal irrigation amount is required prior to anthesis (Figure 1), so an imposed reduction of 50% during the pre-anthesis period might be acceptable most years, yet not be excessive in the drier years. However, this does not fully reflect the ability of the soil profile to be a "bank", so examining a higher irrigation regime is also warranted.

A 4-year field study was conducted to examine restriction of irrigation to approximately 50 or 75% of the ET-Rain value for either the pre-anthesis period or during the post-anthesis period. Since grain filling (post-anthesis) is important, intuitively, one might surmise that those strategies restricting water during the pre-anthesis stages would always be preferable, but the pre-anthesis period is also when the number of kernels/acre is being potentially set and also the soil water storage allows for "banked" water to be used later by a deep rooted

crop such as corn. These deficit strategies were compared to a fully-irrigated control treatment.

Procedures

Four different commercial corn hybrids (two specifically marketed as drought tolerant) were compared under five different irrigation regimes in a three year (2013-2015) field study at the KSU Northwest Research-Extension Center at Colby, Kansas. For brevity only the average data from the four hybrids will be discussed here. The irrigation regimes were: 1) Full irrigation (100% ET) with no restriction on total irrigation; 2) Irrigation restricted pre-anthesis to 50% of ET, 100% of ET thereafter with 11.5 inches total restriction; 3) Irrigation restricted pre-anthesis to 75% of ET, 100% of ET thereafter with 11.5 inches total restriction; 4) Irrigation restricted post-anthesis to 50% of ET with 11.5 inches total restriction; and 5) Irrigation restricted post-anthesis to 75% of ET with 11.5 inches total restriction. Irrigation amounts of 1 inch/event were scheduled according to water budget weather-based irrigation scheduling procedures only as needed subject to the specific treatment limitations. As an example, during the pre-anthesis stage Irrigation Trt 3 would only receive 75% ET, but after anthesis would receive irrigation at 100% until such time that the total irrigation is 11.5 inches. Soil water was monitored periodically (approximately 2 to 3 times/month) to a depth of 8 ft. in 1 ft. increments with neutron moderation techniques. This data was used to assess MAD values as well as to determine total water use throughout the season. Corn yield and yield components were determined through hand harvesting a representative sample at physiological maturity. Crop water productivity was calculated as grain yield/crop water use. The 5 irrigation treatments (whole plot, 6 reps) were in a RCB design with irrigation applied using a lateral move sprinkler and the 4 corn hybrid treatments superimposed as split plots. The data were analyzed using standard PC-SAS procedures.

Results And Discussion

Weather Conditions and Irrigation Requirements

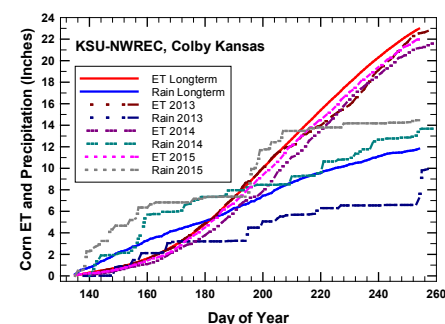


Figure 2. Cumulative calculated crop ET and precipitation during the growing season for Colby, Kansas, 2013 to 2015.

Overall weather conditions for the three years were favorable for excellent corn production during the study. Calculated crop ET for 2013 through 2015 was slightly lower than long term values and seasonal precipitation was 2 to 3 inches greater than normal in 2014 and 2015 and 2 inches less than normal in 2013 (Figure 2).

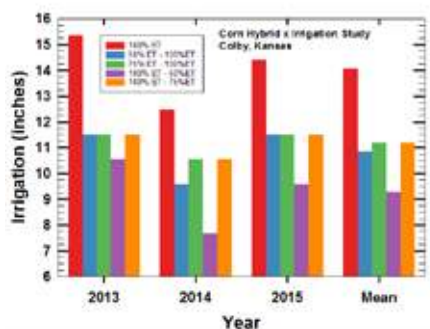


Figure 3. Irrigation amounts for the five irrigated corn treatments during the three years of the study.

Full irrigation amounts varied from 12.48 inches in 2014 to 15.36 inches in 2013 (Figure 3 and Table 1). The treatments with pre-anthesis water restrictions (Trt 2, 50% ET pre-anthesis and Trt 3, 75% ET pre-anthesis) reached their water limitation (11.5 inches) in two of the three years (2013 and 2015)

as did the post anthesis deficit irrigated treatment that was irrigated with 75% of ET during the post anthesis period. The irrigation treatment using the least amount of water during the three years of the study was the treatment where irrigation was restricted to 50% of ET during post-anthesis period (Trt 4).

Crop Yield and Water Use Parameters

Corn grain yield was greatest in 2014 and was lowest in 2013, the year with the greatest irrigation need (Figure 4 and Table 1). Fully irrigated corn grain yields ranged annually from 241 to 251 bushels/acre with the deficit-irrigated lowest yields ranging from 215 to 237 bushels/acre. Corn yield was greatest for unrestricted irrigation (Trt 1) but required 30 to 36% more irrigation, but was still very efficient with only a 2 to 4% reduction in water productivity (WP) (Figure 4 and 5 and Table 1). Lower yields occurred for pre-anthesis water restrictions (Trt 2 and 3) than for similar post-anthesis restrictions (Trt 4 and 5). These results suggests that obtaining sufficient kernel set was more important than saving irrigation for grain filling in this study. When irrigation is greatly restricted, a 50% reduction post-anthesis appears as a promising alternative, relying more heavily on stored soil water and precipitation for grain filling.

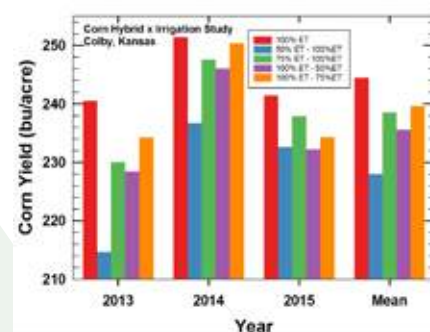
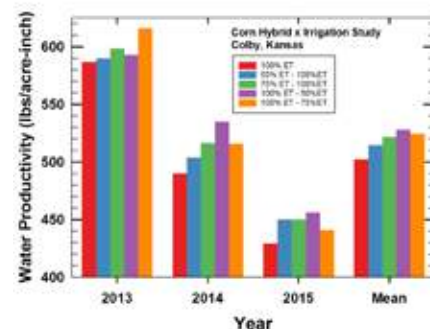


Figure 5. Water productivity for the five irrigation treatments during the three years of the study.

Table 1. Corn yield, yield component, and water use parameters in an irrigated corn study at Colby, Kansas, 2013-2015.

Irr Trt.	Irr. Amount	Yield, bu/a	Plant density, p/a	Ears/plant	Kernels/ear	Kernel mass, mg	Water use, inches	WP, lbs/acre-in
Year 2013								
1. 100% ET	15.36	241	A	32452	A	1.00	A	542
2. 50/100% ET	11.52	215	C	32779	A	0.99	A	483
3. 75/100% ET	11.52	230	B	32634	A	0.99	A	522
4. 100/50 % ET	10.56	228	B	32561	A	0.99	A	524
5. 100/75% ET	11.52	234	B	32561	A	1.00	A	527
Prob > F		<0.0001		0.8328		0.3872		<0.0001
Year 2014								
1. 100% ET	12.48	251	A	33215	A	1.00	A	566
2. 50/100% ET	9.60	237	B	33360	A	1.00	A	539
3. 75/100% ET	10.56	248	A	33251	A	1.01	A	557
4. 100/50 % ET	7.68	246	A	33069	A	1.00	A	558
5. 100/75% ET	10.56	250	A	33215	A	1.00	A	566
Prob > F		0.0010		0.6060		0.1034		0.0059
Year 2015								
1. 100% ET	14.40	241	A	32380	A	1.00	A	575
2. 50/100% ET	11.52	233	A	32525	A	1.00	A	563
3. 75/100% ET	11.52	238	A	32597	A	1.00	A	574
4. 100/50 % ET	9.60	232	A	32452	A	0.99	A	574
5. 100/75% ET	11.52	234	A	32670	A	0.99	A	573
Prob > F		0.0786		0.6613		0.0900		0.8987
All Years								
1. 100% ET	14.08	244	A	32682	A	1.00	A	561
2. 50/100% ET	10.88	228	C	32888	A	1.00	A	529
3. 75/100% ET	11.20	239	B	32827	A	1.00	A	551
4. 100/50 % ET	9.28	236	B	32694	A	1.00	A	552
5. 100/75% ET	11.20	240	B	32815	A	1.00	A	556
Prob > F		<0.0001		0.5298		0.3079		<0.0001

Examination of Yield Components

Yield can be calculated as:

$$\text{Yield} = \frac{\text{Plants}}{\text{Area}} \times \frac{\text{Ears}}{\text{Plant}} \times \frac{\text{Kernels}}{\text{Ear}} \times \frac{\text{Mass}}{\text{Kernel}}$$

Eq. 1.

The first two terms are typically determined by the cropping practices and generally are not affected by irrigation practices later in the season. Water stresses during the mid-vegetative period through about 2 weeks after anthesis can greatly reduce kernels/ear. Kernel mass, through greater grain filling, can partially compensate when insufficient kernels/ear are set, but may be limited by late season water stress or hastened senescence caused by weather conditions.

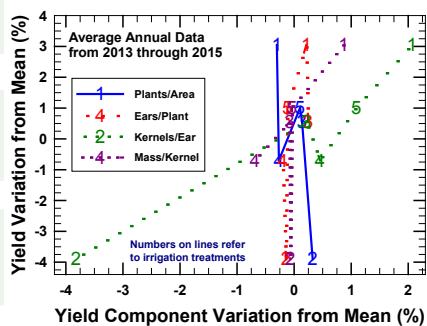


Figure 6. Yield variation as affected by variation in the yield components for the 5 different irrigation treatments.

In this study, the yield component most strongly affected (as much as 6% corn yield variation) by irrigation practices was kernels/ear and was significantly affected ($P < 0.05$) in two years and also for the average of all years (Table 1 and Figure 6). Full irrigation (Trt 1) had the greatest number of kernels/ear while the 50% ET pre-anthesis treatment (Trt 2) consistently had the smallest value. These results suggest that pre-anthesis water stresses must be limited so that sufficient kernels/ear (i.e. sinks) can be set for modern corn hybrids.

Because all the yields components combine directly through multiplication to calculate yield, their effect on yield can be easily compared in Figure 6. The numbers on the lines refer to the 5 irrigation trts and the lines just connect similar data (i.e., the lines are not showing any pattern of results from one trt. to the next). A variation of 1% in any

yield component would affect yield by the same 1%. It can be observed that there is much greater horizontal dispersion for kernels/ear than for all the other yield components which vary less than approximately 1%. Thus, irrigation treatment had a much greater effect on kernels/ear and the fully irrigated 100%ET, Trt 1 and the pre-anthesis 50% ET, Trt 2 were affected the greatest.

Although Trt 4 (50% ET post-anthesis) averaged using 1.6 inches less irrigation than Trt 2 (50% ET pre-anthesis), its average corn yield was 8 bushels/acre greater (Table 1). Treatment 4 also had the greatest water productivity of all five treatments although all water productivities were respectable. It can be seen in Figure 6 that the major difference between Trt 4 and 2 is that Trt 4 was able to set a kernels/ear value much closer to the mean value than Trt 2.

Closing Thoughts And Conclusions

- Full irrigation was still relatively efficient but used 30 to 36% more water.**
When irrigation is not severely restricted, corn prices are greater, and/or irrigation costs are lower, managing irrigation at this level and reducing irrigated land area may be more profitable.
- Pre-anthesis water stress was more detrimental to grain yield than similar levels of post-anthesis water stress because of reductions in kernels/ear.**
This result is somewhat counter to typical older guidelines which indicated that moderate stress during the vegetative stage for corn may not be detrimental. This may be indicating that kernel set on modern hybrids is a greater factor in determining final yields.
- When water is greatly restricted, a 50% reduction post-anthesis might fare reasonably well by relying on stored soil water and precipitation for grain filling.**
The rationale behind this comment is that it is important to establish a sufficient number of kernels/ear (i.e., sinks) that potentially can be filled if soil water and weather conditions permit.
- These results might not repeat on less productive soils or under harsher environmental conditions.**
On coarser soils (e.g. sandy soils), stored soil

water and sporadic precipitation might not be sufficient to “carry” the crop through the post-anthesis period as well as in this study. However, it can be noted that the 50% ET post anthesis treatment (Trt 4) still performed better than the 50% pre-anthesis treatment (Trt 2) in 2013, the year with the greatest irrigation need.

Acknowledgements

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References

- Lamm, F. R. and A. A. Aboukheira. 2012. Effect of late season water stress on corn in northwest Kansas. ASABE paper no. 121337206. Available from ASABE, St. Joseph, MI. 10 pp.
- Lamm, F. R. and A. A. Aboukheira. 2011. Effect of early season water stress on corn in northwest Kansas. ASABE paper no. 1111338. Available from ASABE, St. Joseph, MI. 11 pp.
- Lamm, F. R. and D. H. Rogers. 2015. The importance of irrigation scheduling for marginal capacity systems growing corn. Applied Engineering in Agric. 31(2): 261-265.
- Rogers, D. H. 1995. Using Evapotranspiration Reports for Center Pivot Irrigation Scheduling. KSU Coop. Extension Service, Manhattan, Kansas, Irrigation Management Series L-915. 6 pp

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2019 Australian Summer Grains Conference

Enduring Farm Profitability

2018: The Year of Data, Shrinking Stocks. Filled with Limitless Road Bumps and Opportunity

by Luke Swenson
(luke@themoneyfarm.com)

2018 has come onto us with fireworks. When January showed up on calendars the world was expecting a glut of soybeans, which would likely clog the market with wheat and corn, especially when the 2018 growing season kicked off for the Northern Hemisphere and Australia's winter crop. Then the rains turned off in Argentina. Then Trump started tweeting about Chinese trade. Then China stood up on sorghum. Then it snowed in the corn belt until almost May. Then it was getting dry in Brazil's Safrinha corn area... All those headlines came and went before we started planting our 2018 crops!

2018 is shaping up to be potentially the most exciting season since 2012. Politics, world stocks, growing demand, trade war threats, and weather; those are the 'starting 5' competing for the most important headline this year. We will divulge our thoughts on the changing landscape of farms over the past decade, as well as address our thoughts on the coming marketing year and which interference we need to heed the most.

The Old vs The Data:

While there are capital crunches happening to farms across North and South America, they took a couple years longer than we expected to ripple through the market. This winter appeared to be the first real 'shake out' of inefficient and unprofitable operations in over a decade. This winter was filled with farm auctions, and bankers forcing producers to re-leverage ground for working capital. This post 2007 commodities run, and subsequent 2012-2014 period of high profitability have really exasperated the run up on almost all asset and liability prices in agriculture. This has finally pushed the transformation of farmers mindsets. We have really felt the change towards a much more business-like oversight from what we have ever seen in agriculture before. The big catalyst in this has been data aggregation of the likes we have never seen before.

There is a tech hotbed in our home town that is full of companies launching all sorts of software. The difference between us and the West Coast of the US is that this region has been dumping hundreds of millions into purely agriculture focused software. From our new 100% placement technology, to full farm management and oversight in real time, to elevators/bulk handlers having 100% cloud-based contract/scale tickets/hedges/etc. We now can see where there are holes in our individual operations, and how to fix them. The downside to this is that it really will separate the 'haves' from the 'have nots' regarding cost of production.

There have been customers of ours within spitting distance of each other's farms and the cross section between them looks as far as East is from West. We can discreetly see that while everything appears



the same; from debt, to equity, to style of farming, the cost of production can range from \$50-100 per acre difference. This is all due to people willing to adapt and adjust to what the market provides and executing on the data provided.

Much like manufacturing and other industries; those that have the ability to digest and disseminate the data about their operation will flourish over those that don't. While equity has some effects on nullifying this; the over arching change will likely favor those that can adapt.

2018 and the Vanishing Stocks:

Early in 2018 expectations for a monster crop from both Argentina and Brazil were on every headline. Within a few short weeks we became aware that Argentina wasn't going to live up to its hype. In the short months that have followed the USDA has reduced the expectation of Argentina's soybean crop by 17 million tonnes. While increases in Brazil will absorb some of this, it was too late and trader's anticipations for bigger soybean stocks in 2018 began to dwindle.

Despite 6 months of nonstop market chatter and anticipation of huge soybean acre increases across North and South America; markets just can't give up. Futures continue to hold near highs while awaiting the final acres results from US planting intentions. What was earlier anticipated as 92 million soybeans, and 88 million acres of corn is now a complete question mark. This is now showing as volatility is returning to futures, and the premium in options prices continues to increase. We haven't had a scenario like this since early 2012.

We anticipate a big soybean acre number; but can that weigh down all markets? We think not. The increased demand from China, even amid trade war talks is overweighing any 'risk' that traders are worried about. This shows right into the corn market as well with futures sitting on highs right into May when planting kicked off (2 weeks late), to help cement enough acres to really diminish the risk of a supply shortage.

This is the first year in a long time we are going into the marketing year that could show a significant reduction to ending stocks for corn. Looking at The HighTower chart below you can see how tight stocks are getting in corn this year. The forecast reduction from just under 200 million metric tonnes to 153mmt is a huge reduction. The scenarios that us and other analysts are seeing this year have the possibility for some significant volatility for futures markets.



The US Corn stocks/use number could potentially wind up as the 3rd tightest since the year 2000. This could happen without the yield falling more than a few bushels. If we fell below 165 bushels per acre the story starts to look similar to 2012. There is also another potential loaded gun in Brazil with the already delayed Safrinha corn crop feeling pressure from lack of moisture in its 2nd largest state; Parana.

Wheat is riding the same uncertainty at the moment. The winter wheat markets in the Southern Plains of the US have been under pressure all winter. Months without moisture pushed Kansas City futures to multi year highs and helped support spring wheat futures back near \$6.50/bushel as well. On the coattails of the winter wheat rally, it helped secure bigger spring wheat acres across the northern plains. Stats Canada has the Canadian crop up 13% across all acres this year. The US story is similar. The dryness in Australia at the end of April is also keeping traders in Chicago on their toes about the coming years crop. While wheat stocks have been habitually high, we are seeing the market step in and pay premiums for quality, which with increased drought issues across the globe in the past 12 months we may have a harder time sourcing in mid-2018.

When Twitter can instigate trade wars:

Who would have thought that a president of the US could send agricultural markets onto a roller coaster ride with a twitter account? We certainly weren't expecting it to happen, but alas this spring taught us that just like Mother Nature; we can't control a president and social media. The rhetoric has continued to grow through the past 2 months but has been largely shrugged off by traders. After the recent Sorghum tariff against the US, Australian grain handlers have been running around trying to pry loose any grain they can find. Bids have risen over \$400AUD/ton delivered in April. That is a 30% increase due to an argument started on twitter that had all of the agricultural world holding its breath.

While the rhetoric has grown; we currently encouraged our North American customers that there is a minimal chance of a fallout. When we were pegged to answer the risk behind the trade talk we put it as follows; 60% markets unchanged, 30% the US comes out with more export sales, 10% there are negative repercussions. Talks across grain conferences seem to be much more anxious than we are though.

This is going to be a very interesting year that could potentially alter, open or close trade routes for the next decade. We are optimistic that there will be lots of good coming out of this. The appetite of the Chinese is growing annually, and any country that can improve their position on the export order will be the greatest benefactor for years to come. Australia is positioned perfectly. Any jitters to

current trading partners in the Americas will likely have immediate advantageous effect on Aussie grain markets; as the Sorghum fiasco has shown. Those with the best handle of their grain through storage will be able to reap some amazing profits when these squabbles escalate.

“Worry about things you can control and manage the factors you can’t”:

2018 is shaping up to be a very profitable year, with some large opportunities. Don't let the dissonance of politics and 'what ifs' take hold of your decision-making process. The biggest risk to many farms profitability is their natural ability to get caught flat footed when the market presents opportunities. We spend the majority of our time acting as a counselor working customers through the risk/reward of sales, more so than even making

recommendations. If you can step back and look at decisions to sell 10% of your corn here, or 20% of wheat there... it makes your decision-making process much more fundamentally sound, which will remove a lot of the subjective second guessing that plagues many of us.

If you want more of our insights on markets and the perspective with which we help producers sell, don't hesitate to check out our website, or email us to get setup on a trial of our Newsletter, or ask about our other services.

Know Your Compost

Using compost on farm; a subject of increasing interest to farmers everywhere.

Interest in compost and composting comes from farmers wanting to improve soils, manage waste and reduce reliance on purchased fertilisers. On-farm composting or purchased compost products can provide a way to transform organic 'waste' materials into a product that can be applied to crops and pastures returning valuable nutrients and organic matter back to the soil. But what is compost and what is in it? What can it do? What do you need to look out for?

The ins and outs of compost

Compost is organic matter that has been through a controlled process of natural aerobic decomposition. A range of waste materials are sourced to compost, including manure, spoiled hay, animal bedding, council waste collection, wood chips, rice hulls and abattoir waste (eg rumen content and blood and bone). Under aerobic conditions, microbes and other organisms decompose the degradable organic material to produce a smaller volume of stabilised product with a texture that is easier to handle.

Although pasteurised mulch can be made in a 3-4 week period with the right amount of moisture and aeration, it typically take more than 8 weeks to produce a compost product. As a general rule the older the compost, the more stable, biologically diverse and beneficial it will be. The level of stability however will depend on the quality of the process used to make it. Good quality compost products are dark in colour with a sweet, natural 'earthy' or 'forest floor' smell. They are available commercially or can be made on farm.

Composts - what they can and can't do

Composts typically contain soil-conditioning organic matter and hummus, beneficial micro-organisms or biota, organic carbon and some immediate and slow release nutrients. Composts will enhance fertility but they generally have a low nutrient content and should be considered as a

slow-release biofertiliser and soil conditioner rather than a conventional fertiliser.

Typically only 5 to 10% of the total nitrogen content in compost is available for uptake by the plant in the year of application, with a portion of the remainder becoming available in following years. While the nutrient content of compost will vary depending on the components added and your management of the composting process, it is clear that compost cannot replace fertiliser-supplied nitrogen inputs.

Composting does enable high carbon-low nitrogen (high C:N ratio) wastes such as spoiled hay or bedding to be recycled back to land without tying up soil nitrogen. However, direct application of low carbon-high nitrogen (low C:N ratio) wastes such as manure and pond sludge is usually an effective and cheaper option than composting the material first and, if incorporated, will avoid the loss of valuable nitrogen that occurs during the composting process.

Making compost on farm - getting the recipe right

You must be prepared to put in the time and effort to manage the process to produce good quality compost on farm. Specific parameters that must be managed include the carbon to nitrogen (C:N) ratio, moisture level and aeration. Composting will require water be added to the piles and regular turning. A useful rule of thumb recipe for starting with the correct C:N ratio is one third liquid manure, one third waste hay, silage, or bedding, and one third manure.

An important point for those interested in making their own compost - be aware that location of the compost pile or windrow must be chosen to avoid runoff leaving the site.

Purchasing compost products - know what you are buying

As there is increasing pressure for organic wastes to not be sent to landfill, a number of commercial composting operations have become established

and are looking to sell compost to agricultural enterprises as a fertiliser and/or soil conditioner. Before purchasing a compost product, you will need to assess its value to your enterprise. For example a soil conditioner may be of little benefit if your existing organic matter levels are already high - this is likely to be the case for a permanent dairy pasture. Have you identified your nutrient budget requirements and looked at the total and estimated available nutrient concentrations in the compost? Are you buying the compost on a volume or weight basis and what is its moisture content?

It is vital to understand what is in the product as purchased compost can be made from a broad range of domestic, commercial and industrial waste organic materials. Issues such as process quality assurance, compost maturity, level of contaminants, heavy metal concentrations, biosecurity risks, and herbicide residues all need to be considered.

Dairy Australia has recently release two factsheets that will assist you to better understand if composting, or purchasing compost, is right for your situation:

- "Making compost on dairy farms", and
- "Understanding purchased compost products"

Both factsheets can be found at <http://www.dairyingfortomorrow.com/index.php?id=85> or search for 'dairying for tomorrow' and 'compost'.

Article edited by Scott Birchall¹ and Helen Murdoch² based on factsheets produced by Graeme Ward¹ for Dairy Australia and DEDJTR for the Australian Government". ¹Dairy Australia Consultants, ²GBCMA. The factsheets and information used in this article were developed with funding from Dairy Australia and the Australian Government.

What is Carryover & Parking? by Wendy Bartels, Ruralco Water, wbartels@ruralcowater.com.au

Carryover is a term used for the ability to hold allocation water on certain water licence types from one irrigation season to the next.

Parking is the term used for storing allocation water on another owners water licence. The owner agrees to carryover water on their water licence into the new season on your behalf. This can be in your licence region, or another water region and/or state subject to trading restrictions at the time.

Carryover parking is a tool to enable water licence holders the ability to hold unused water or purchase additional allocation water for use in the into the new water season at nominal costs.

Carryover volume percentage is limited with some water licences and different trading rules apply based on the region and water licence type.

In Victoria carryover is maximum 100% of Entitlement for both High Reliability and Low Reliability. There is a 5% storage and evaporation loss on the volume returned to licences in the new season. Access to carryover water in the new season is dependent on spill risk out of Hume Dam for Murray licences and Eildon Dam for Goulburn licences. The spill risk is determined and announced by the Victorian Water Resources Manager.

In NSW Murray, carryover of up to 50% on General Security Licences is permitted. Unlike Victoria, there are no storage or evaporation losses and a combined carryover and allocation of a maximum 110% is allowed in the new season.

A NSW Murrumbidgee general security licence holder can carryover up to 30% of entitlement volume, which is available for use at the commencement of the new season. The maximum volume of allocation carried over and allocated in a season is 100% of the entitlement.

South Australia carryover volumes and timing are announced by the SA Water Minister on an annual

basis and at the time of writing had not yet been determined for the 2018/2019 season.

Maximum carryover capacity is calculated as a percentage of the total licence volume.

The table below outlines the maximum allowed carryover for each region, subject to allocation announcements.

Are there risks?

Anything to do with water trading asserts some form of risk and carryover/parking is no exception. Irrigators considering parking on another water licence need to understand the risks and costs associated including those dependent on the season, the water licence type, region and allocations.

Climatic risks are associated with all carryover licence types. Above average rainfall can cause spill risks in Victoria and NSW.

Increased allocation volumes throughout the season can affect Victorian Low Reliability & NSW General Security entitlement holders.

Victorian Murray spill risk is related to Hume Dam, either or both physical spill over the dam wall (16/17 season) and internal spill above Vic's 50% share of Hume dam space, which occurred in the 17/18 season. Parking on Victorian Murray High Reliability licences has a higher risk than parking on Low Reliability Licences and therefore there is also a pricing difference from around \$15/ML for High Reliability to \$40/ML for Low Reliability.

Victorian Goulburn spill risk is based on Eildon Dam and is a physical spill measurement.

NSW Murray risk is based solely on allocation increase and maximum 110% allocation per licence. Therefore based on maximum 50% carryover, can get to 60% allocation before any water is lost.

For NSW Murrumbidgee if carryover is maximised at 30% and new season allocations reach above 70%, all additional water is socialised to other users in this valley.

In South Australia, the risk is associated when the SA Minister makes a decision to allow carryover and the rules associated at that time. There is a little more uncertainty to SA carryover from season to season compared to other water zones as the rules have recently changed with the updated SA Water Action Plan.

Carryover and Carryover parking allows licence holders to carryover water from one season to the next to minimise and average allocation costs to their respective requirements.

Carryover parking provides opportunity for water users to carryover water on another licence holder's account, which also could be in other water zones.

The water market is continuously developing to provide additional services to water users to minimise their allocation risk. Carryover, while has been available for a number of years in some water zones is still very much a misunderstood opportunity due to the complexities.

Carryover parking is becoming a more popular tool as the knowledge and understanding of the product increases and has become a regular component of irrigator's water strategies in the short and long term.

Ruralco Water currently has carryover opportunities in Victoria, NSW Murray and NSW Murrumbidgee.

As always, we suggest it advisable that you discuss all the options with your Ruralco Water broker, who will provide up to date market knowledge and product information suitable for your water strategy.

SA Murray Delivery	NA
Vic Delivery (Goulburn) LR & HR	100%
Vic Delivery (Murray Zone 6) LR & HR	100%
Vic Delivery (Murray Zone 7) LR & HR	100%
NSW Delivery (Murray Zone 10) GS	50%
NSW Delivery (Murray Zone 11) GS	50%
NSW Delivery (Murrumbidgee) GS	30%

Tips to Help Make Corn Silage by Trevor School, Technical Services Manager, Lallemand Animal Nutrition.

The first rule of silage: what goes in dictates what comes out. Variety selection, pre-harvest management and harvest timing are major determinants of the potential quality of the resulting silage. Cutting and chopping, inoculant selection, filling and packing, covering and feedout management are all also important to the quantity of corn silage available to feed and the ultimate quality of the forage fed.

Forages can typically make up 40 to 60 percent of the ration on a dry matter (DM) basis. All other ingredients in the ration should then be determined based on the quality of this main component. It's much easier, cheaper and more effective to balance rations when producers start with high-quality corn silage in the first place.

A solid game plan and checklist can help producers make the most of this critical harvest period. Key factors to include are:

1) Harvest timing

- Harvest at the optimal stage of maturity
- Harvest at the optimum plant moisture level – 66-68%

2) Cutting and chopping

- Choose the correct cutting height depending on quality of the fibre component desired
- Select the optimum theoretical length of chop (TLC)
- Remember corn harvested for silage should be processed to maximise starch utilisation by the animal

3) Inoculant

- Select an inoculant proven to deliver the results you need, specifically fermentation enhancement and/or aerobic stability
- Store inoculant correctly (see product label) and follow recommended mixing and application instructions
- Consider using a low-volume applicator with an insulated tank, if appropriate
- Be sure to sanitise and correctly calibrate the applicator
- Keep the inoculant cool after rehydration

4) Filling and packing

- Fill quickly
- Use progressive wedges in bunkers and stacks, with maximum 6-inch fill layers
- Ensure the packing weight is adequate for the delivery rate. A rule of thumb is: delivery rate (tonnes per hour) times 400 divided by 1000 equals packing weight required in tonnes
- Calculate packing time required with the machinery available
- Target packing density of at least 750 kgs of fresh weight per cubic metre
- Seal the silo quickly and effectively



Trevor School

Correct inoculant selection allows producers to address specific challenges they may have experienced in the past. For example, using the lactic acid bacteria *Pediococcus pentosaceus* 12455 —fueled by sugars generated by high activity enzymes — promotes a fast, efficient front-end fermentation. Promoting a fast pH drop can also reduce initial yeast growth, and yeasts are the major cause of silage heating.

Specific inoculants can benefit producers with a history of spoilage losses too. With spoilage losses, the key is to prevent or delay the growth of yeasts that grow when oxygen gets into the silage at feedout. The high dose rate *Lactobacillus buchneri* 40788 is reviewed by the FDA and allowed to claim efficacy in preventing the growth of yeasts and molds in corn silages, corn earlage and High Moisture Corn.

For forages prone to spoilage producers should consider a combination of *P. pentosaceus* 12455 plus enzymes with the high level *L. buchneri* 40788 known as Lalsil HC. This offers the benefits of both a fast, efficient fermentation and less heating and spoilage at feedout.

It is important to invest time in planning and preparation for the silage season as it can pay off big time later with lower feed costs and higher performance. In silage production, there is no substitute for attention to the basics.

For more information on corn silage, contact Lallemand on (07) 5451 0125 or email QSSLan@lallemand.com

Lallemand Animal Nutrition is committed to optimising animal performance and well-being with specific natural microbial product and service solutions. Using sound science, proven results and knowledge, Lallemand Animal Nutrition develops, manufactures and markets high value yeast and bacteria products including probiotics, silage inoculants and yeast derivatives. Lallemand offers a higher level of expertise, leadership and industry commitment with long-term and profitable solutions to move our partners Forward. Lallemand Animal Nutrition is Specific for your success. For more information, please visit www.lallemandanimalnutrition.com.

Storing Corn How to Get the Results You Target by Peter Forster (peterandrewforster@me.com)

When storing on farm a corn grower aims to capture better pricing and to reduce additional costings. In doing so a grower is faced with several very important challenges.

This dilemma was faced by Andrew Freeman and Andrew James of Freeman Farms from Corop Vic. Having grown corn for several seasons knew these challenges all too well. This year after looking at all available options they decided to install a Superior Drying Silo controlled by Bin Manager.

Andrew Freeman stated that "Every season we had to make a decision how to manage and market our corn. Before we were running blind now we know exactly where we are at where we are heading. With this new system, we can save on expensive drying and handling costs, rehydrate low weight corn adding extra value, and tackle Insects in three ways with prevention from cooling, detection with the CO₂ sensors and elimination with fumigation in a sealed silo."

The Investment is a real winner for Freeman Farms. According to Andrew the outcomes of this decision have exceeded expectations and impacted the bottom line. He also can't wait to store and condition his wheat harvest with it later this year.

You can also contact Ian at Aghub regarding your Corn storage and Conditioning requirements at ian@aghub.com.au www.aghub.com.au or call 0418 695 933



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Are We Applying Enough Nitrogen to Achieve High Yields in Grit Corn? by Yenda Producers Co-operative (www.yendaprods.com.au)

Five rates of Big N were applied upfront to see if there was a yield response to increasing rates of nitrogen.

Trial details:

Location: Yanco

- Soil type: red clay loam
- Corn variety: P1756
- Row spacing: 36 inches
- On beds

Treatments:

Big N was applied at different nitrogen rates prior to sowing.

TREATMENT	NITROGEN (KG/HA)
1	200
2	250
3	300
4	350
5	400

Things to note:

- Infiltration in trial was issue, wouldn't sub all the way through the beds
- This impacted upon root growth and restricted yield

Take home message:

Increases in nitrogen resulted in an increase in yield. However, all other agronomy factors also need to be considered to achieve high yields.

All treatments had:

- Granulock Z @ 200kg/ha as starter
- Urea @ 250kg/ha over two waters before tassling

Results:

All treatments standardised to 14% moisture

TREATMENT	TOTAL N APPLIED (KG/HA)	YIELD (T/HA)
1	337	13.96
2	387	14.19
3	437	14.44
4	487	14.84
5	537	15.50



High Yields From Short-Season Corn at Kyabram

The high yields available from short-season corn hybrids have made them the preferred option for Richard Russell, at Kyabram, in the Goulburn Valley of northern Victoria.

Mr Russell has been growing corn since 1988 and, in more recent times, has moved to the shorter-season hybrids because of their versatility.

"We can grow an outstanding crop with a bit less water," he said. "I think a mid-season out-yielding a short-season is a myth."

The Pioneer® hybrid P0021 has been the main hybrid grown on the property but was replaced with the new Pioneer® hybrid P9911 last season.

"From what I've seen of it so far, it is very good," Mr Russell said.

Two pivots of P9911, consisting of 75 hectares, were planted after the wheat harvest at the end of 2016, with the last seed sown late on New Year's Eve.

The quicker maturity of the hybrid meant it was available for silage in late April and for grain in the month that followed.

While the shorter-season hybrid was the ideal option for the planting date, Mr Russell said he would still use it earlier in the season because of its high yields and water savings.

He said corn was a crop that he always intended to sell for silage but had the potential to be left for grain if it was boggy at harvest or if there wasn't any demand from local dairy farmers for chopped maize.

Richard Russell, of Kyabram, Vic, in the shorter-season P9911 corn which has produced high yields this season.



"Last year we had average silage yields of 23 dry tonnes per hectare. P9911 will do that easily. That would equate to more than 13 tonnes per hectare of grain."

Corn for grain is a good option on the property and likely to be preferred in the coming season with the same hybrid.

Mr Russell said P9911 grew a smaller core with larger sized kernels making up the cob for greater grain yields.

He said there was also a lot of stubble leftover from the grain harvest which could be incorporated into the ground to improve the soil structure.

"The amount of organic matter it produces is incredible."

Last season the crop was sown at between 96,000 and 100,000 seeds per hectare with a proportion of the fertiliser deep banded and the remainder placed up-front.

"Growing maize is like a recipe for a cake," Mr Russell said. "If you do things right it will reward you. It can be extremely satisfying."

MAA Executive

The executive of the Maize Association of Australia is elected by the Association's members to represent the maize industry and work on its behalf:

- To identify new opportunities for growers and marketers;
- To respond to issues affecting the industry, e.g. GMO and export standards; and to
- Liaise with R&D corporations to achieve the best outcomes from growers' R&D levies.

The table below lists the members of the current executive, along with their contact details. If you know of an issue about which the maize industry should be aware, or an issue on which the maize industry should develop a position, or could assist with the advancement of, please contact an executive member to discuss your thoughts.

MAA Executive Committee 2017-2018

Liz Mann	CEO - MAA	0427 857 578	lizmann.ag@gmail.com
Bernie Walsh (Chair)	Walsh Farms Pty Ltd	0427 478 227	walshfarms@bigpond.com.au
David Coddington	HSR Pty. Ltd.	0499 274 464	david.c@HSRseeds.com
Tony Cogswell	Lachlan Commodities	02 6851 2077	tony@lachlancommodities.com
Gino De Stefani	Yarranbrook Farms Pty. Ltd.	0409 914 439	ginodestefani@hotmail.com
Anthony Furse	Robinson Grain Trading		anthony@robinsongrain.com.au
Rob Johnston	Grower / Heritage Seeds	0427 427 577	rjohnston@heritageseeds.com.au
Trevor Philp	Advanta Seeds		trevor.philp@advantaseeds.com
Andrew Pollard	Grower / Netafim	0427 853 197	apollard@netafim.com.au
Johannes Roellgen	Tyunga Farms P/L		johannes.roellgen@bigpond.com
Jason Scott	Pioneer Seeds	0447 717 020	jason.scott@gentechseeds.com
Stephen Wilson	Pioneer Hi-Breed Aust.	0428 351 196	stephen.wilson@pioneer.com



The Maize Association of Australia will be undertaking a number of activities in Northern Victoria and Southern NSW over the coming season.

All members of the MAA will be invited to participate in events. If you would like to receive the field days notices or the COB please forward your email address to Liz Mann (lizmann.ag@gmail.com) or phone 0427 857 578

If you are not currently a member, but would like to join, the cost of membership (inc. GST) is:

Corporate member	\$1,500/year
Merchant company member	\$750/year
Research corporation member	\$220/year
Individual producer member	No Cost

Maize Association of Australia Incorporated ABN 1650 790 2551

Membership Application 2015/16 for membership based on the financial year ending June 30, 2016. Please accept my/our application for membership of the Maize Association of Australia (tick relevant box)

- Corporate members \$1,500.00 per year
- Merchant company members \$750 per year
- Research corporation members \$220.00 per year
- Individual/producer members No cost

Please make your cheque payable to Maize Association of Australia Membership fees inclusive of GST

Name.....

Company/Organisation.....

Address.....

Town/City.....State.....Postcode.....

Telephone.....Fax.....

Email.....

Please cut out this form and return it with your cheque to:

Maize Association of Australia,
PO Box 2293,
Shepparton Vic, 3632

The MAA will issue you with a tax invoice on receipt of your membership application and payment.

Direct Credit

Please enter your name and invoice number when paying by direct credit

Account name: Maize Association of Australia
BSB: 032 750
Bank: Westpac
Account: 25 7709
Branch: Banna Ave, Griffith

If you would like to receive the COB and be on the MAA mailing list, please send an email to lizmann.ag@gmail.com

Thank you for supporting the MAA -
YOUR industry association
www.maizeaustralia.com.au