

Growing cotton in southern NSW

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Background

Cotton was first grown in the Riverina in the 1960's. A cotton gin was established at Darlington Point in 1964 and the CSIRO conducted a cotton breeding program for many years at Griffith. Cotton was the first row crop grown on Ravensworth Station at Hay and Kooba Station at Darlington Point. The cotton industry did not continue to expand mainly due to the lack of true short season varieties and seasonal rains during autumn which would have been detrimental for cotton harvest. Ironically it was George Commins who started growing maize, replacing cotton as a row crop in the mid sixties at Kooba Station. George is the father of 2nd year Murrumbidgee cotton growers Roger and Tim Commins who are now growing cotton in 2007/2008.

Cotton returned to Southern NSW in the mid eighties (1986/87 - 325ha) when it was grown at Hillston by the Maillor family who continue to grow cotton today. The growing of cotton was confined to the Lachlan River valley at Hillston and then expanded into the Murrumbidgee valley in 1999 with a trial area of 400ha at Twynam's property Gundaline Station and cotton was also being trialled at Lake Marimley north of Balranald at the same time. The maximum area for the southern region was approximately 16,000 ha in 2000/01 with the majority of this area being grown in the Lachlan (Hillston).

The largest area for the Murrumbidgee was 6700ha in 2003/04 yet all of this cotton was grown around Hay and not in the Murrumbidgee Area (MIA) nearer Griffith. This compared to approximately 6000ha for the Lachlan valley for the same season. This season (2007/08), due to reduced river allocations, the combined area for the Lachlan and the Murrumbidgee was 3250ha (Lachlan 2450ha & Murrumbidgee (800ha). This was all grown using irrigation bores. Table 1 summarises cotton production figures in southern NSW for the past five seasons

Table 1: Cotton production figures in southern NSW 2003-2008.

Year	Area (ha)		Cotton Bales		Yield (bales/ha)	
	Hillston	MIA	Hillston	MIA	Hillston	MIA
2003/2004	5,904	6,661	41,434	40,013	7.02	6.01
2004/2005	4,158	3,252	36,998	22,792	8.9	7.01
2005/2006	3,751	3,003	38,354	28,951	10.23	9.64
2006/2007	2,784	2,276	33,384	23,816	11.99	10.46
2007/2008	2,784	775	27,105	8,467	10.86	11.36

Why Southern irrigation farmers are looking at cotton?

Dollars/megalitre

Reducing water allocations are driving farmers to look at improving their return per megalitre. Some of the southern irrigation farmers see cotton as an attractive option at \$400.00 per bale, especially when seed price is factored in. Obviously the drought is driving this market as growers are able to achieve an extra \$120 / bale for cotton seed due to the drought market. The yields have been very high in the last couple of seasons across both valleys and the returns at 12 bales/ha compare well to other summer crops. Table 2 shows various yields for rice, corn and cotton. It is only a guide as there are so many variables to consider with input costs such as chemical, fertilizer and diesel changing daily. In addition, the cotton price used in the table is a price where some growers would have contracts..

Table 2: Gross margins & \$/meg comparisons of main summer crop options.

Crop	Price/t/bale	Yield t/ or bale /ha	Income (\$)	Variable Costs /ha	Gross margin /ha	Megs used/ha	\$/meg
Cotton	420	10	4200	3200	1000	11	
Coton seed	400	2.5	1000				
Total Cotton			5200		2000		182
Cotton	420	12	5040	3200	1840	12	
Coton seed	400	2.5	1000				
Total Cotton			6040		2840		237
Corn	400	10.5	4200	1805	2395	11	218
Rice	550	10	5500	1430	4070	16	254

Table 2 illustrates the comparably low input cost of rice when compared to the higher costs associated with cotton. If growers are able to forward sell when the market spikes and lock in a high seed price due to the drought driven market, cottons returns are comparable.

Marketing

Growers like the fact that cotton can be sold on the futures market three years in advance. The full complexity of marketing is something that will take time for new growers to fully appreciate and the ability to lock in a price that they are comfortable with before the bale price drops. This is very different to all of the other summer cropping options which either offer an indicative price or a price for the particular growing season.

Another Crop

Cotton is simply seen as another irrigation crop. The majority of last season's cotton crop grown by new growers was grown using bankless channels. Cotton has a good fit as it is a summer broadleaf crop which is glyphosate tolerant (Roundup Ready®) and can be farmed with the exception of harvest using their conventional row crop equipment. Barnyard grass is a major weed in the MIA so cotton has a great fit with growers using grass selective herbicides in addition to the glyphosate.

Why can cotton be grown successfully now in the south?

Varieties.

The main reason cotton growers are achieving both excellent yields and early maturity is due to the fantastic work the seed breeders have done producing new varieties. The new growers in the region have sown the majority of their area with shorter season varieties including CSD's Sicot 43 and Sicot 60. The varieties are well suited to the area which ensures growers are able to allow crops to mature and meet their full yield potential. Sicot 70BRF and Sicot 71BR were the standout varieties in the variety trial ran by CSD in Hillston. Growers in the MIA have gone with the shorter season varieties as a management tool to ensure earliness. This season even in the MIA area 2 of the 2nd year cotton growers have achieved yields over 13 bales /ha with Sicot 43BRF. These results are shown in Table 3.

Table 3: Data from CSD 2007/08 variety trials.
Matt Mitchell, "Yilgah" Great Southern, Hillston

Variety	Yield (bales/ha)	Turnout	Length (decimal)	Length (imperial)	Micronaire	Strength
Sicot 70BRF	12.18	36.90	1.19	38.00	3.80	30.60
Sicot 71BR	12.06	37.43	1.17	37.00	4.10	31.50
Sicala 60BRF	11.71	36.27	1.21	39.00	3.90	31.90
Sicot 43BRF	11.61	36.13	1.17	37.00	4.00	33.00
DPX04X403DF	10.80	34.53	1.20	38.00	3.70	30.50
DPX 09Q961DF	10.02	31.02	1.15	37.00	3.50	27.80
DPX 09Q916DF	9.85	32.57	1.18	38.00	3.40	28.80
Delta 12BRF	9.59	33.91	1.14	37.00	3.90	28.50

Transgenic Cotton Varieties

Another factor that has put cotton on the radar as a potential summer crop for Murrumbidgee Irrigation farmers is the introduction of transgenic cotton varieties. New growers see Bollgard II® and Roundup Ready® technology as being one of the features that has attracted them to cotton. Previously growers did not think that the high dependence on insecticide sprays and therefore the application issues would have had a fit in the Riverina. The reason for this was due to the large areas of vineyards and horticulture including vegetables, fruit and nuts that is spread throughout the area. Ironically, many of these industries were using and continue to use the same products that the cotton industry was using prior to transgenic varieties.

The transgenic varieties have resulted in high fruit retention combined with reduced tipping which in combination with variety improvement and excellent management has meant very impressive yields. This high fruit retention combined with the reduction in tipping has also resulted in earliness which is vital for cotton to succeed in the south.

Change in season

Without entering into the debate surrounding climate change there certainly has been a seasonal change with recent seasons becoming hotter and drier. The last three years average Day degrees (DD) has been considerably higher than the average (see table 4 & 5) and there has not been the traditional autumn break meaning that it is staying dryer for longer. This is

one of the reasons yields have increased, as a lot more top crop is being finished and the majority of harvest has not been affected by any significant rain events.

Table 4. Temperatures and Day Degrees (DD) at Whitton (Murrumbidgee Valley)

Season	DD 1/10 - 31/3	Average DD	No. of Hot shock	Average Hot day	No. of Cold shock days	Average Cold shock
04/05	1896	1843	38	29.4	51	53.2
05/06	2106.2	1843	49	29.4	42	53.2
06/07	2172.2	1843	54	29.4	40	53.2
07/08	2086	1843	41	29.4	31	53.2

Table 5: Temperature and Day Degrees (DD) at Hillston (Lachlan Valley).

Season	DD 1/10 - 31/3	Average DD	Hot	Average Hot day	No. of Cold shock days	Average Cold shock
04/05	2018.4	2015	46	39	45	38.7
05/06	2243.6	2015	60	39	38	38.7
06/07	2211.2	2015	55	39	42	38.7
07/08	2174.2	2015	56	39	29	38.7

Issues or challenges faced

Planting and Crop emergence for earliness

Planting can be quite a challenge in the southern area due to the cold air masses that can feed in from the south right through summer. It is vital that the crop has an even plant stand, as the cotton plant in the south does not always have the same ability to compensate as in the warmer areas. A couple of the growers in the MIA pre irrigated this season as a management tool to help achieve an even stand. The time interval between irrigation and planting allows the soil to heat up and therefore the seed is planted into a warm moist soil. There is reduced water logging as the seed is not submerged when watering up and therefore potential for more even germination as the field, depending on size, may be planted in one day. This compares to watering up which may take a few days. There will be a good germination of weeds, therefore creating an opportunity to spray out prior to emergence. Wireworm control will be more effective as the main chemical used to treat wireworm is quite soluble, meaning that under dry conditions the product can be taken away from the seed when watering up, thereby reducing efficacy.

The challenges of pre irrigating are that different soils dry at different rates making it difficult to plant into even moisture across the block. The hills can dry too fast, therefore requiring the seed to be planted deeper to chase the moisture. If the seed is sown too deep it is risky to flush as the seeds may not have enough energy to push out of the ground. One advantage of the bankless channel system was revealed this season when planting into moisture. The crop was sown into marginal moisture due to the cold southerly winds drying the hills out, yet the bankless system allowed the block to be flushed 5 days after planting. The bankless system enabled the 40ha block to be watered in 24 hours allowing the water to re-sub the hills as the level could be controlled. This is different to a syphon system where, depending on soil type, it can be impossible to re-flush as the water just runs out of the furrow without subbing the top of the hill where the seed is.

Defoliation

It is vital that the crops are cut out on time so that earliness can be achieved. This year crops were treated with mepiquat chloride growth regulator as early as mid January without any perceivable yield penalty. It is also essential that growers allow the fruit to mature fully to avoid low micronaire which can be an issue even when crops are managed well. The crops need to be set up so that defoliation can capitalise on the last of the warm weather.

Picking

Cotton harvest equipment has always been promoted as an issue, yet in the drought reduced seasons contract machines have been available. A couple of new growers have bought second hand equipment with some very low priced machines on the market due to the drought. These growers have had no issues with picking the crop and like the fact that they have got machines on farm as soon as the cotton is ready to harvest.

Water availability

Another issue that is slowing down the expansion of the industry is the low water allocations. Last season is the first one where there was no allocation for general security water on the Murrumbidgee River. All of the 2007- 2008 season was grown using groundwater.

Competition from other commodities

This coming season rice, the traditional MIA crop, is worth up to \$550.00/t and maize is worth approximately \$400.00/t. Therefore cotton needs to be priced well (at around \$450.00/bale) to compete and be attractive as an alternative to the traditional summer crops. Table 6 below lists the summer crop areas for the 07/08 season. The rice area historically has been as high as 55,000 to 60,000ha. Whilst the drought continues and allocations are low there will be quite a lot of demand for food based commodities and stock feed which will keep pressure on these markets and result in higher prices. This is illustrated in Table 2.

Table 6. Summer crop areas for the south for 2007/08

Crop	Area
Maize	5620ha
Rice	1308ha
Cotton	3250ha

Crop Nutrition

The crop nutrition is not that different to other regions. Fertilizer rates and types would be determined more by soil type and cropping history. There are a couple of growers trialling alternative fertilisers including manures to try and improve the health of the soil and therefore the nutrient availability.

Crop Rotations

Crop rotations vary yet most growers would grow irrigated wheat after the cotton crop followed by a fallow period and then cotton again. In the MIA alternatives based on market price would include maize (including waxy, feed, grit, seed), rice, seed crops and vegetable crops.

Diseases

Diseases in the southern area include black root rot, pythium and rhizoctonia which can be a real issue in cold seasons. Management tools include seed treatments and pre irrigating therefore sowing into moisture or ensuring there is a warm weather pattern following the water up irrigation. The seedling mortality survey this year revealed that seedling mortality was 48% for the Murrumbidgee (compared to 41% average) with black root rot presence at 17%. Seedling survival is totally dependent on timing with the weather patterns. Planting later is not always a guarantee as it is possible to get a frost even in November. In addition, if the crops are sown too late there may not be enough season length to finish them.

Insect pests

With the introduction of transgenics and Bollgard II®, *Helicoverpa spp.* is no longer the main insect pest for cotton. For the MIA the main pest affecting cotton would be the false wire worm. Due to years of returning stubble from summer crops (maize & rice) and winter crops (including cereals, faba beans etc) the number of false wire worm can be large and the result of their feeding can be serious. The problem is magnified by the slow growth due to the cold, therefore the plants are vulnerable for longer periods of time. Wireworms were one of the main reasons for attempting to pre irrigate and plant into moisture. This practice, as discussed previously, allows the granular insecticide product to be placed with the seed, therefore protecting the seedling.

The other main insect pests are mirids, yet with diligent checking can be controlled using the recommended insecticides. Growers are very conscious of what they spray to control secondary pests such as mirids, as many of the growers in the MIA grow seed crops which rely heavily on bees, making it essential to use selective chemistry where possible.

Mites can be another issue in the MIA especially as the maize crops dry off and become less attractive. For the last two seasons growers have monitored mite populations yet have not had to control them.

Other insects that have been an issue in the Hillston area include aphids and thrips yet so far they have not been an issue for new growers in the MIA.

Fifteen inch row spacing

Fifteen inch row spacing is full of complexities and is still being explored in southern NSW. The fifteen inch system has the potential for increasing yield and for earlier maturity. Whilst none of the new growers to date have tried growing fifteen inch cotton, established Murrumbidgee growers including Twynam and Ravensworth have. Twynam's property Gundaline has successfully continued to use fifteen inch for the last five seasons.

New growers have not tried fifteen inch mainly due to the lack of guaranteed harvest machinery and the fact that 1m or 0.9m row spacing fits in with their current practices. This year Rose Roche coordinated a fifteen inch versus 1m row spacing commercial area trial at Twynam's Merrowie so it will be interesting to see what the results reveal about the two systems. Information will relate to physiology, maturity, yield and costs will also be considered.

Conclusion

Cotton has been grown very successfully in southern NSW as demonstrated by the very high yields achieved in recent seasons.

Any industry expansion will be slow as it is obviously affected by water availability in combination with markets. Cotton is being treated just like any other crop by the MIA

growers that grew cotton this year. The price will be considered this coming season and depending on the approach to marketing there will be growers who may switch back to rice due to the high prices being offered. Like anything the higher the potential for return the higher the risk. Cotton is comparably high in growing cost when compared to maize and rice. In addition adverse weather conditions, particularly at the end of the season, could be more costly for cotton in terms of yield and quality compared to maize and rice.

Acknowledgements:

I would like to thank Ernie Silcock from the Australian Ginning Co, Hillston for providing yield information. I would also like to thank Craig Farlow of CSD for providing variety tables. All of the climatic data came from the BOM website and the budgets were based on updated figures from the NSW DPI website. Summer crop areas are provided by the NSW DPI. CRDC and NSW DPI provides funding for the regional cotton extension position in southern NSW as part of their contribution to the Cotton Catchment Communities CRC.