Quality Cotton – A Living Industry
"Our Opportunities"
- An Overview -

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"A wise man will make more opportunities than he finds".
- Francis Bacon (1561-1626)

Introduction

Enter a modern market place; or visit a bustling shopping mall and the fruits and rewards of modern agriculture will greet you at every turn. A myriad of shops supply reliable and plentiful quantities of high quality food and fibre while others provide the trademark goods and services of a sophisticated, modern society. Most people in modern communities unlike their ancient forebears procure their food and fibre from shops and supermarkets enjoying the efforts of those who through the millennia of time have taken opportunities to select, breed and nurture new plant and livestock types. These opportunities are the fundamental building blocks of modern agriculture.

With no modern agriculture there could be no modern world! If agriculture had not emerged from the eras of hunting and gathering, shifting agriculture and extensive and demanding field labour then much of today's society would be preoccupied with the task of procuring its daily nourishment. Modern agriculture has unshackled our daily lives opening broad opportunities for modern society. Cotton is an excellent example of how an ancient wild plant can be transformed through careful effort and the realisation of opportunities into a most valuable and essential life commodity.

Modern society's dependence on agriculture to sustain very complex and sophisticated communities enjoying diversified lifestyles is amply demonstrated by Australia. Our nation is largely a coastal hugging one preoccupied with its attraction to the sea and urbanisation. It enjoys a high standard of living with access to perhaps the widest choice of foods and clothing of any country. It hosts widely diversified lifestyles and varied vocational pursuits. This nation is supported by an efficient agriculture sector that represents just 3% of Gross Domestic Product (GDP) yet provides some 20% of the national export income or approximately $30 Billion dollars annually. The Australian cotton industry is proudly part of Australia's world-class agricultural sector being a major contributor to both foreign income earnings and regional prosperity. It is an industry utilising opportunities in science, education and technology to build a secure future.

Reflecting back on the journey of the modern Australian cotton industry it is clear that innovative thinking combined with the ability to evolve and adopt new technologies are the industry's hallmark traits. Opportunity exists to move forward broadening out the areas where new initiatives and new actions should and must be taken. This is not only in the production, processing and marketing aspects, but at the community and political levels as well.

Dealing with all the opportunities of the industry would be a mammoth task indeed. This paper describes some of the challenges and opportunities that lie before the Australian cotton industry including the production, processing, and marketing sectors but also encompassing social, economic and environmental factors. Opportunities are bountiful and the future is truly exciting.

A history built on opportunities

Though cotton has been grown in Australia through the 1800s the modern cotton industry as it is often referred to, had its roots in the 1960s when regulated water for irrigation first became available to the vast fertile black soil plains of the Namoi Valley in northwest NSW. Prior to that the vagaries of the Australian climate inhibited significant investment in higher value crops in the region. The advent of more reliable water supplies saw a new breed of farmer emerging along the banks of the Namoi River. They were cotton farmers and the seeds they sowed started a journey of opportunity. Within four short decades their endeavours have bloomed into a significant world-class industry. Today Australia produces the highest cotton yields in the world. The quality rivals the best in the world. Australia is one of the largest cotton exporting nations in the world and in the 1990s Australia's cotton production exceeded that of wool - a projection that would have been difficult to imagine back in 1961 when Australia was still 'riding on the sheep's back'!

The key components of this journey of opportunity were not simply good land, good water and a favourable climate. The industry attracted people with vision and purpose. Ideas and information were freely shared and the industry actively encouraged and supported research and development (R & D). Opportunities emerged and the industry pursued and developed them.

Inevitably times change. Society's values often shift or are modified while business environments endlessly move about under the forces of productivity, efficiency and new technology. Agriculture like all other components of society has had to adapt to these forces at work. Unlike the 1960s when governments actively encouraged growth and development of agriculture, today community values and expectations for agriculture are far more complex and demanding and at times expensively restricting. The cost of doing business is higher and more complicated.

Today the need to better engage the public in various aspects of food and fibre production especially in the areas of natural resource management, biotechnology and rural socio-economic issues is paramount. Cotton has always been a leader in technology development and adoption but has not always enjoyed a harmonious public image. As the age of biotechnology progresses agriculture must work hand in hand with the general public to enhance the understanding, acceptance and responsible development of this very promising technology. Failure to do so will result in a significant lost opportunity for mankind.

Technological opportunities are the key to solving the challenges before us. Today we can do things that were not even thought of 40 years ago. Who in the 1960s would have thought it possible to have satellite-guided tractors steering 12 metre wide cultivation gear through fields day or night to a precision of 2 centimetres? Who in the heady days of the insect plagues in 1972 would have believed we would

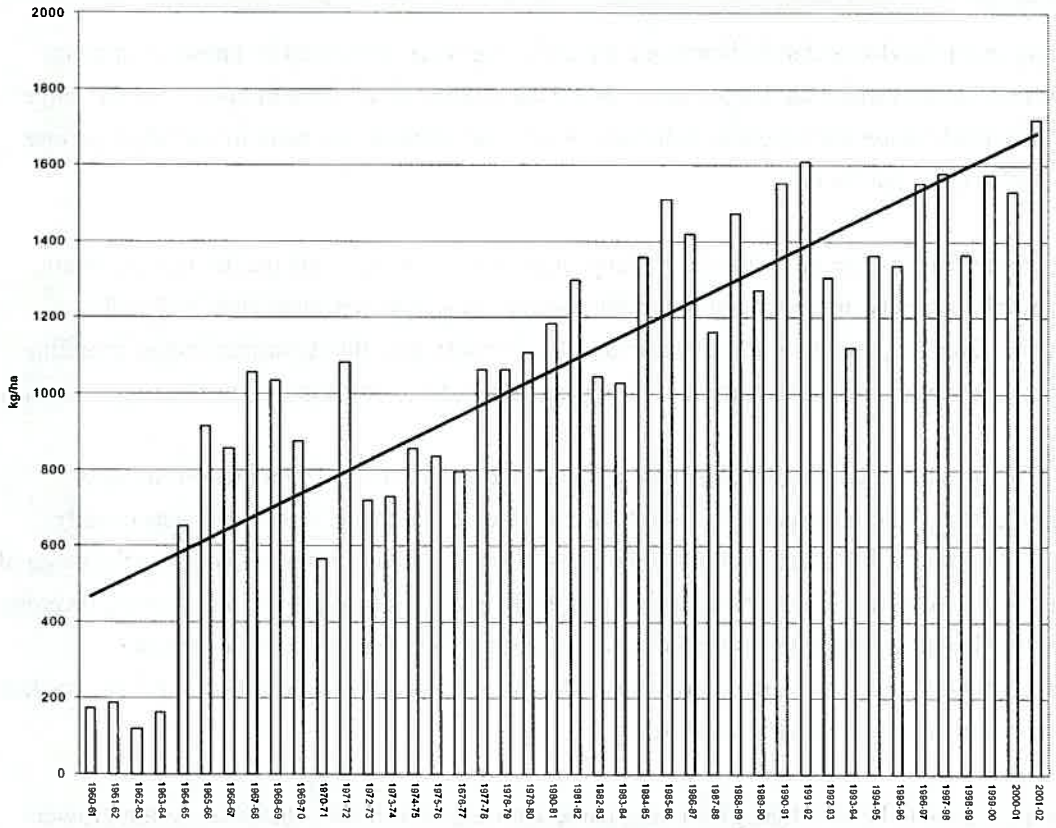
have insect resistant cotton plants that require no sprays for *Heliothis* caterpillars? What of the possibility of radio links from each field continuously transmitting soil moisture information from a growing crop to assist precision timing of irrigation? Could people in 1960 have believed the concept of a mobile phone delivering daily market prices and offers to a farmer sitting in their tractor cabin cultivating cotton kilometres from home? Did people dream of crops yielding 10 to 12 bales per hectare? These are just a few examples highlighting the procession of opportunities that have been turned into realities.

The following sections explore a few of the current and future opportunities in more detail.

Production Opportunities

a. Continuing yield improvement

One of the most striking features of the Australian cotton industry has been the constant yield improvement over time. Graph 1 shows Australian cotton yields plotted from 1961 to 2002.



Graph 1 shows the trends in Australian Cotton yields from 1961 to 2002
(adapted from CSIRO and Cotton R & D Corporation information to ACGRA in 2003).

While much of the nineties and some of the new millennia have been affected by drought, yields from adequately watered fields continue the upward trend. In many cases fields and in some instances whole farms have recorded yields in excess of 10 bales per hectare.

Researchers have attributed the improvement to the following factors:

- 45% through plant breeding achievements;
- 25% through improved agronomy in soils, nutrition and water
- 20% through better insect management
- 10% through improved control of disease.

The success of the Australian industry will depend on its ability to maintain an acceptable margin per hectare for the risks taken. Costs have generally been rising in the industry. The Boyce Comparative Analysis [1] indicates total production costs range between $2,600 and $3,000 per hectare. It was only a decade ago that total costs were around $2,000 per hectare. Costs stepped up around the mid-1990s largely due to higher insect control, fertilizer and harvesting costs.

Thus the continued upward trend in cotton yields is critical to success. CSIRO plant breeders estimate the average annual rate of yield increase at nearly 23 kgs per hectare per year. This represents a 1.2% increase on an 8.5 bale per hectare crop or around 0.1 bales per hectare per year. While seasonal variation impacts year-to-year results the long-term yield trend has been outstanding.

Further analysis of the Boyce data indicates the top 20% of growers (assessed on operating margin) were achieving higher yields than the average. While the average yield in the industry is in the range 7.6 to 8.0 bale per hectare, the top growers in the Boyce benchmarking are more frequently reporting yields of 9 to 10 bales per hectare.

With low production cost countries like Brazil improving both their yield and quality it is important that the Australian variety improvement programs remain focused on continual yield and quality improvement. Breeders can never rest on their laurels. Investment in the Australian cotton breeding programs must remain amongst the highest of our priorities and one of the greatest of our opportunities.

Breeding programs are becoming increasingly complex due to the various combinations of traits required in the field. These include insect resistance, herbicide resistance, disease resistance, early maturity and improved fibre characteristics. The complexity is added to when we consider the range of growing environments from Emerald to Tandou and the Riverina. It is important that the lead breeding teams have sufficient resources to ensure the routine aspects of a breeding program such as backcrossing and line-increase work do not restrict or hinder in any way the efforts of the lead breeders to reach out at new yield and quality horizons.

There is good reason to believe that, given reasonable seasonal conditions, Australian cotton growers will be producing higher and higher yielding crops in the future. A significant source of this gain will be through plant genetics combined with various agronomic practices as discussed later in this paper.

b. Continuing quality improvement

The quality of Australian cotton has improved substantially over the last few decades. Take staple length for instance. We have moved from being a 1-1/16 inch (code 34) producer in the 1960s and 70s through the 1-3/32 inch (35) range to today where the bulk of our cotton is 1-1/8 inch (36) or longer.

With the world awash with medium and lower quality cottons especially 1-3/32" and shorter staple, the opportunity for Australia is to push forward with longer, stronger and finer cottons that will command premium prices. The challenge as mentioned above will be to combine progressively higher yield genetics with continually improving fibre quality traits. The breeders believe this is possible and they now talk of the 40:40:40 milestone (length of code 40 (1-1/14"): a strength of 40 grams per tex : and a micronaire of 4.0).

We should be under no illusion of the difficulties of the challenge of raising yields and quality together to these high benchmarks. There is no doubt that a 40:40:40 outcome would be the next thing to Utopia and if combined with 10+ bale per hectare yields would be Utopia. It is most likely we will have to take a short-term yield penalty on varieties meeting these high quality parameters. It will be important in the near future to release some of these high quality lines even with a yield trade off so we can indicate to our markets our commitment to high quality cotton.

Spinners are looking to produce higher value yarns and fabrics just as cotton growers strive for premium grades. The speed of cotton spinning equipment continues to increase as spinners strive for higher and higher productivities in their mills. New spinning technology such as vortex spinning is allowing spinners to produce higher quality yarns at very high speeds. Higher quality has generally meant sourcing cottons that can satisfy 40 count yarn requirements but increasingly it means sourcing cottons that can produce 50 and 60 count yarn. These yarns can go into so-called "feel good" products that are soft and silky to feel. Such quality requires longer, stronger, finer cotton. If Australia can supply this style of cotton then we will continue to command the value basis we enjoy today. If we fail to rise to the occasion then our competitors will continue to encroach on our markets competing on price – a price which is often subsidised or supported in one form or another. This encroachment is real. Many cotton producing areas that were once tagged as short-staple producers are now producing higher amounts of medium length fibre. As examples, over 30% of the cotton produced in Mississippi and Tennessee in recent years was 1-3/32 staple length.

We cannot place all the responsibility for improved fibre characteristics on plant breeders. At the farm level there is a clear opportunity to implement the best agronomy practices possible to produce the most mature and cleanest cotton possible within the constraints of seasonal weather conditions. Mature, low trash raw cotton provides the ginner (and ultimately the spinner) with the best opportunity to preserve optimum fibre characteristics for yarn and fabric production. Mature fibre is less prone to neps (micro knotting) and is more resilient to the cleaning processes of ginning and spinning. Clean, seed cotton requires far less cleaning in the ginning process to achieve premium grades. As well Australian farmers must continue to ensure their image as a contamination free cotton producer is maintained, especially with regard to synthetics, oils and sugars (aphid and white fly exudates).

Australian ginners are undertaking more research and development work as they seek to best preserve the spinning qualities of the cotton they receive. The involvement of the CSIRO Textile and Fibre Technology Division in Geelong, Victoria with the ginning sector is providing new opportunities while the traditional gin manufacturing companies are also focusing more and more on fibre quality matters.

Before leaving this section we should also reflect on the opportunities gene technology can provide with regards fibre quality. Gene technology provides the opportunity to understand the cellulose synthesis and lay down processes in a plant. It is not difficult to imagine that in the future we may be better able to control the formation and development of cotton fibres so as to produce cotton, which better meets the spinning and end-user needs. Seasonal variability has the biggest influence on fibre formation but with improved genetics we may be able to better buffer the fibre formation processes against these environmental influences thus producing smart natural fibre!

c. New farming systems

Australian cotton growers appreciate the importance of strictly controlling and managing soil compaction. Through the 1970s and 1980s Australian cotton producers began to adopt minimum tillage and controlled traffic farming techniques. With over 90% of the industry developed on medium and heavy grey and brown clays, often referred to as vertisols, the industry through considerable R & D effort and commercial experimentation gained a great understanding of how to manage these soils for high and sustained productivity. Recognition and understanding of the "self-repair" nature of these soils achieved through strategic shrinking and swelling phases using rotation crops combined with confining wheel traffic to the same position in the field on every pass provided farmers with the opportunity to break through the yield limiting compaction barrier. A new era emerged where farmers took notice of what was happening below the ground as well as on top. The SOILpak system aimed at monitoring and measuring soil physical health was borne from this work.

Today minimum tillage, strategic precision tillage and controlled traffic programs are key practices of the industry. Like many innovations they become standard practice in time losing their novel status. With the advent of gene technology especially herbicide resistant cottons further farming systems opportunities are emerging. Contrary to popular belief, herbicide tolerant crops offer the ability to lower overall herbicide use, reduce soil run-off from the field through greater stubble retention and reduce cultivation work aimed at weed control. It also allows greater opportunities to develop direct sowing systems. More robust herbicide resistance plants will be available in the future e.g. Flex, allowing greater flexibility and crop safety hence enhancing farming systems opportunities.

As an example of the new opportunities, herbicide resistant cotton could be planted directly into the stubble of previous rotation crops like wheat, sorghum and canola. Savings in land preparation costs, lower fuel and horsepower requirements, better retention of rainfall and protection of seedlings from wind blasting would result. Research work has also shown that retained standing stubble can provide protection to young cotton from early season insect attack.

Another innovative element of farming systems will be the "Age of Precision Farming". This is being spearheaded through the use of tractors and harvesters employing ground positioning satellite technology (GPS). Currently the application of this technology is in its infancy. Nonetheless it is already providing farmers with the ability to create yield and elevation maps of their fields. From these maps farmers can focus on those areas of fields that are lower yielding rather than dealing with whole field management. For instance instead of lasering whole established fields at considerable cost farmers

can now focus on specific problem areas quantifying the exact area needing attention and making better economic decisions on the amelioration work required.

The biggest opportunity ahead with this technology is to modify the way we apply agronomic inputs such as fertilizer, water, gypsum etc to meet specific needs of sections of a field rather than the current broad brush agronomic approach. It is not hard to imagine that one day monitoring and sensing devices will be attached to tractors and harvesting equipment allowing measurement of various soil traits including biological activity, nitrogen, phosphorous, pH, salinity and compaction along with field elevation levels on each pass through the field. When this is transformed into a Geographic Information System (GIS) format combined with yield maps the crop manager will be better able to identify constraints to higher production. While it may not be practical nor economic to try and lift every section of a field into producing 14 bale per hectare cotton it should be possible to raise the yield of the bottom 25 to 50% of yields within a field thereby raising the field profitability substantially.

Electromagnetic (EM) technology has also been proving very useful in the cotton industry. Mobile monitoring devices are helping identify the most ideal sites for water storages and are also being used to detect sections of supply and drainage channels that may be losing water through excessive seepage or locating leaking sections of reservoirs. This technology provides the opportunity to develop accurate, low cost whole farm plans that will help with farm water use efficiency, salinity monitoring capability and on farm environmental infrastructure planning such as tree planting, and drainage and artificial wetlands.

d. Other fundamental agronomics

Water is the most topical issue of the age. Often incorrectly labelled as a "thirsty industry" the Australian cotton industry must continue to work on enhancing water use efficiency. While we are amongst the most efficient users of water on cotton in the world the fact remains that water is our most limiting factor with community pressure likely to remain focused on water issues for the foreseeable future.

Comparing research and field data on crop water consumption between the 1970s and today on Auscott's Narrabri property we find crops from both eras are using about the same amount of water but yields today are double those of the 1970s. Hence plant breeding and improved agronomics can play a significant role in improved water use efficiency.

The vertisols used for cotton production provide for very high in-field water application efficiencies. Well-managed furrow surface irrigation can achieve in-field efficiencies exceeding 90%. Perhaps the greatest opportunities for improved water use come from reducing transmission and evaporative losses in the general farm system. EM monitoring of channels and water storages will allow seepage areas to be identified for sealing or lining. Piping and covering of channels and storages is neither practical nor economically feasible with current technology. However, deepening of storages and the inclusion of storage cells within a broad storage complex will reduce evaporative losses. These works are expensive but it is likely more farmers will undertake such works in the future.

Sub-surface drip and overhead irrigation systems such as lateral move or centre-pivot installations, are being employed by some growers. These require considerable capital outlays and need substantial yield and water saving benefits to justify their installation. The cost of a buried drip systems can reach $6,000 to $6,500 per hectare. This means continuous cotton is required to provide reasonable economic returns and this is not always possible given disease management and drought scenarios.

Overhead systems come at lower capital cost to buried drip and provide some added advantages for crop establishment and use on rotation crops. They require more maintenance than buried drip and may not suit all land types. At around $300,000 per unit, uptake of overhead machines is not going to be rapid. Nonetheless these different application systems are likely to be further employed and tested in the industry. In particular the management 'recipe' for obtaining optimum yields under such systems requires more work. Overhead systems offer opportunities in minimum tillage systems that could lead to significant cost savings especially when combined with retained stubble farming, herbicide resistant cottons and in-crop nutrient applications.

Generally the greatest opportunities for improved water use efficiency lie in enhancing the management of existing surface furrow irrigation applications. Research work has shown that farmers can lift their efficiencies further through closer management of irrigations. Farmers should be benchmarking themselves against the most efficient surface irrigators in the industry. Along with yields per hectare we should be promoting yield per megalitre of water as a measure of farming standards. Gains can be made through shorter watering times, reduced tail-water volumes and reduced storage and transmission losses.

Irrigation scheduling, already highly developed within the industry, will continue to focus on accurate monitoring of soil moisture deficits. Remote sensing technologies, which deliver constant soil moisture information to the crop manager offer useful information for precise irrigation timing. Coupled to this the industry has the opportunity to combine telemetry into the farm management program. Telemetry provides remote monitoring and control of farm channel, pump and storage systems. Perhaps its greatest applications lie in better conservation of water and reduced water logging of fields in storm events. During rainfall events access around the farm can be very difficult and slow. Telemetry will allow pumps and gates to be controlled remotely while channel flows and heights can be continuously monitored. With the high values of water today and the yield losses brought about by waterlogging telemetry provides significant opportunities to the modern farmer.

One of the key tools in assisting higher water use efficiency is modern weather forecasting. While in the past weather forecasting may have been perceived as a 50:50 hit or miss activity, today the confidence in four and seven day forecasting has been building steadily. If we can continue to enhance the reliability of such forecasts to the point where irrigators can delay irrigations when a rainfall event is forecast savings in water and reductions in water logging can be enormous. Given that a typical irrigation requires 0.9 to 1.1 megalitres per hectare saving just a single irrigation could represent 12 to 20% water saving for the season.

There are water efficiency opportunities beyond the farm gate as well. Catchment level efficiencies are very important. Farmers should not be the only ones carrying the burden of improved water use.

Catchment level issues include wetland management, reducing systems losses such as at Menindee Lakes, and the adoption of continuous accounting and capacity sharing water accounts that overcome the "use it or lose it" mentality cultivated by traditional water allocation methods. Some of these, especially wetland management, may seem controversial only because they challenge the wisdom of a society so focused on natural environments that any suggestion of using engineering or management processes to enhance environmental objectives is objectionable.

It is estimated that through better management and some engineering works at Menindee Lakes on the Darling River system in western NSW, that on average around 100,000 megalitres of water lost to evaporation annually could be saved for better use within the Murray Darling system. Rather than having water spread wide and shallow in these ephemeral lakes for lengthy periods engineering works would allow selective filling and draining which minimised the evaporative surfaces. Governments have been slow to move on such works and opportunities to save water have been lost. It is hoped such works will be commenced shortly under a National Water Initiative currently being proposed at state and federal levels.

In the Macquarie Marshes the gradual increase in "channelisation' of the main water bearing streams has meant more and more water is required to create the same level of flooding that occurred 40 years ago. While ever-deep channels exist, more and more water will flow through them and beyond the marshes providing less and less water to the adjacent flood plain and wetlands. Water has to be spread wider and channels need to be made shallower so they carry less water. Spreading water wider has been given the name 'sequence management' or 'natural sequence farming.'

The benefits of sequencing water through shallow waterways to improve the spread and utilisation of environmental water to enhance native habitats have been demonstrated in private works at 'Tarwyn Park' in the Hunter Valley of NSW [3]. It seems the managers and custodians of our wetlands are not testing or utilising this knowledge. Clearly there is an opportunity for irrigators, graziers (who utilise flooding in wetlands to sustain pastures) and representatives of the wetlands to work together to achieve a common set of agreed outcomes. Unless these groups can work together to consider opportunities and find solutions all groups will remain at loggerheads unable to make enduring progress.

The opportunity for supply enhancement needs some consideration. Cloud seeding offers some very cost effective opportunities for Australia. The water debate has been focused on flows and cutting water use. Statements about restricting irrigation and "no more dams" are commonly heard. The water debate in Australia has been a very negative campaign. Many of the old and at times misleading clichés about the world's driest continent and the closing of the Murray mouth are dragged out. If the huge dry interior of Australia where agriculture is mostly limited to low intensity grazing is held aside for a moment we find that the main farming belts of Australia are on average very comparable in rainfall to many of the best farming areas of the world. The biggest problem for Australian agriculture has been the rainfall variability. Cloud seeding while not a means to reverse variability does offer a means of lessening some of the impacts.

Most supply augmentation projects such as dams are expensive but cloud seeding offers a very cost effective and low intrusion alternative. While CSIRO has not continued its cloud seeding work several past CSIRO researchers and some new international work indicate we should re-think the whole issue. Numerous countries use cloud seeding today and the Hydro Tasmania website provides some useful information on cloud seeding. The Cotton Research and Development Corporation (CRDC) based in Narrabri NSW funded a cloud seeding feasibility study in the 1990s. That study found that along the tablelands of NSW conditions conducive to effective cloud seeding frequently exist. Unfortunately this work has not progressed to actual seeding flights and the issue and that research lie dormant. International work on cloud seeding documented by Aron Gingis[4] shows great promise especially with new satellite technology that allows better analysis of cloud seeding work. Currently the NSW Government has commenced cloud seeding evaluations in the Australian Alps. This effort is to be applauded although the methodology employed and the analysis of results must be undertaken with great scientific vigour and without bias. The opportunity remains with cloud seeding to enhance the yield of catchments under certain atmospheric conditions providing water for productive, environmental and community use at very low cost. One wonders how Sydney's water supply may have benefited through cloud seeding given the number of days heavy clouds appeared but failed to produce significant rain.

In an earlier section mention was made of new cotton varieties that required no sprays for *Heliothis* caterpillars. These are transgenic cottons incorporating natural genes that provide specific resistance to certain pests like *Heliothis*. As we journey into the realm of biotechnology we experience the dream of a cotton plant that does not require repeated sprays for what is one of the world's most troublesome crop pests. 80 to 100% spray reductions for *Heliothis* are being reported with the latest two Bt gene transgenic plants (Bollgard). Transgenics provide the foundation stone for very effective integrated pest management (IPM) programs. Natural predators and beneficial insects often disrupted by conventional pesticides now grace transgenic cotton fields. These predators play an important role in controlling or suppressing secondary pests. In the future we would hope gene technology can bring plant resistance to many of these secondary pests including mirids, aphids and mites.

Transgenic plants bring enormous benefits to the community and the environment. By planting insect resistant cottons pesticide loads have been reduced enormously[2].

Transgenic technology must be preserved. A key opportunity for the Australian industry is to show its leadership on preventing resistance to transgenic cottons. Australian growers supported their research colleagues by adopting a resistance management program when the first insect resistant plants known as Ingard were released. A similar process is happening with the latest insect resistant Bollgard varieties. New technologies are increasingly difficult and more expensive to develop. The industry would be totally irresponsible if it failed to demand and enforce robust resistance management programs. Many countries in the world will have difficulties doing this but Australia has no excuses. While some may want to exploit short term benefits Australian cotton growers generally take a much longer view. The reality is there is no clear plant protection technology beyond transgenics. The Australian industry has seen what happens when technologies are not protected, as was the case with the release of pyrethroid sprays for *Heliothis*.

The opportunities for transgenic cottons are endless. In a world that does not favour pesticides, transgenics offer the mainstream solution to continued high agricultural productivity and cost competitive food and fibre production. This is an area of science, which while under threat by many for various political and ideological reasons, must succeed and be allowed to play its role in global food and fibre opportunities of the future.

The Australian cotton industry has taken a major initiative to bring all its production issues together under the banner of Best Management Practice (BMP). It provides the opportunity to demonstrate to the community, governments and markets the effectiveness and openness of self-regulation. BMP provides a simple but effective three-step formula of:

1. Identifying the hazards in operations,
2. Considering the risks of these hazards to employees, the community, neighbours, the environment and the product
3. Assigning appropriate management actions to deal with the identified issues.

It provides the information sharing mechanisms and structural guidelines for rapid adoption of best management practices. It also uses external auditing to check and approve compliance. The key opportunities provided by BMP include:

a. Protection of new and existing technologies
b. Benchmarking high operational standards.
c. Greater consumer confidence in production techniques
d. Improved cooperation with neighbours and other industries
e. Reduced impacts outside the field boundaries.
f. Market access issues

Protecting new and existing technologies is a very important aspect. The pesticide, endosulfan is a case in point. In the mid to late1990s endosulfan was under attack by the Australian beef industry for beef contamination issues. Through determined cotton industry effort including the BMP process there have been no impacts on the beef industry since 1999. BMP provided a vehicle for change management. It also provides regulators and the community with more confidence in the industry's ability to use and manage various technologies such as pesticides and gene technology. This is a key vehicle of opportunity the industry should not take lightly.

Marketing

Australian cotton growers are well aware they are part of a value chain that flows from the field through to the consumer. Markets keep them in business.

The Australian cotton producer is well served by processing and marketing services. Australian growers have a great range of marketing choices for their crops well supported by healthy competition between merchants and ginning organisations. There is confidence and trust in the way Australian marketers deal with the crop. The marketing process is open and transparent with no single, dominant player. The industry provides internal self-regulating processes and referees to handle disputes on grade

and quality. Transport and warehousing chains are efficient. Thus the bale-handling infrastructure is quite capable of meeting new opportunities in world markets.

Australian cotton, like most world cotton growths, uses the traditional United States Department of Agriculture (USDA) grading systems as the basis for valuing cotton. At times this has been a contentious issue with some people believing Australian cotton could be better valued if we revised our classing systems to better reflect the needs of the spinner. Attempts to do this have not been successful. However, if properly guided there is an opportunity for the industry to work with spinners on a revised system of valuation. This will be no easy task and its implementation could be expensive. The rewards must be clearly defined.

As an example of the issues with the traditional USDA system the "preparation" of cotton (the degree it was smoothly combed) was once an important consideration during sales negotiations. Often better preparation meant double lint cleaning and increased drying. Today it is realised that less well "prepared" cotton has better length, lower neps and lower short fibre content – all traits highly desired by spinners. Hence by and large "preparation" is not used today to influence price. With less emphasis on 'preparation' growers will receive higher outturns as well. Our industry should continue to clarify which factors are important to the spinner so that we can maximise the benefits to the grower and those partners further down the value chain.

Having said that the Australian marketing process serves the grower well, it is important that the industry players in the marketing chain – growers, processors and marketers – work closely together as we seek to differentiate Australian fibre from the sea of other improving growths. This can be controversial at times as was seen with recent attempts to redefine base grade at 1-1/8" (36) rather than 1-3/32" (35). It is essential that the merchant segment of the industry send out a clear, agreed message to growers on the type of cotton Australia should be aiming to produce. If most spinners wants 1-1/8" (36) or longer cotton from Australia, as the trend in forward contract specifications suggest, then growers must get a clear commercial signal so they can make more informed decisions on variety choice and breeding program priorities. Merchants will not be the ones penalising growers for 1-3/32" cotton. The market as a whole will determine what spinners are prepared to pay for Australian 1-3/32" cotton based on product requirements and supply and demand factors. The Australian Cotton Shippers' Association (ACSA) needs to do more work on this issue so that Australian growers have a clearer picture of future trends.

The recent and continued downturn in Australian cotton production due to drought has allowed some competitor cottons to "fill the void" of Australian cottons in the world market. While Australian cotton has many excellent attributes we will need to work hard to maintain the differential value of our cottons once production returns to non-drought levels.

Considerable work has been done on the "spinnability" of our cottons especially the "Field to Fabric" process supported by Australian research, processing and marketing bodies. The opportunity exists to progress the quality of our cottons as mentioned earlier – longer, stronger and finer. The "Field to

Fabric" process joins plant breeders, farmers, gin operators, marketing people and spinning mills into a focused team with common goals. Thus the industry has the opportunity to move forward on fibre quality issues with confidence.

We must never underestimate global competition nor should we believe the US Farm Bill will miraculously disappear creating a more level playing field with US cottons. Also the US is not the only subsidised cotton in the world. Despite Brazil's challenge of US trade policies through the World Trade Organisation US cotton production is likely to remain at fairly high levels. Coupled to this we have the on going decline in the US spinning industry resulting in more US raw cotton competing against Australian cotton in our traditional and emerging markets. Where once the US domestic spinning industry consumed 70 to 80% of cotton produced in the US that has now dropped to around 35% or approximately 5.8 million bales. Further falls are likely. With annual domestic production around 17 to 19 million bales the US becomes a more direct competitor with Australia and other growths than it has in the past. To prevent domestic stock levels rising, the US will have to export around 12 million bales annually. This is a colossal amount especially when we consider the next biggest exporter is Uzbekistan at 3.9 million bales.

Brazil is stepping up as one of the world's most important cotton nations. It is lies just behind Australia on the table of top exporting countries and like Australia is not subsidised. It is also a southern hemisphere producer. Brazil's cotton production is almost double that of Australia and may triple our production in the next 5 to 7 years. While Brazil produces cotton for less cost per kilogram, Australia's yield and price combination provide a sound margin. Australia needs to continue its opportunities in yield and quality enhancement to ensure our competitiveness remains high.

Global cotton consumption continues to grow (see graph 2) in absolute terms although as a percentage of world textiles it has declined from 68% in 1960 to 39% today (see graph 3). Man made fibres have jumped from 22% to 58% in the same period.

World population continues its upward spiral while consumer-spending power continues to grow(5). It is reasonable to expect total fibre consumption will continue to rise. Given cotton's desirable natural features especially comfort it should maintain a significant proportion of world fibre markets. However, in marketing there is never room for complacency. Man-made fibres present a constant threat and are getting smarter. In 1989 the US based Cotton Incorporated under took a massive cotton promotion launching 'The Fabric of our Lives' campaign. It is a very effective campaign promoting the benefits and fashions of cotton to consumers. That program continues today but its influence is mainly within the USA. In today's fashion conscious society there is an opportunity for numerous cotton producing countries worldwide to ratchet up cotton promotions both in generic and market specific terms. These programs could complement the Cotton Incorporated initiatives. Such a program needs to be synchronised through the value chain from producers through processors and spinners to fabric makers and retailers.

Regulatory initiatives, interventions by non-government organisations (NGO) and comments by the media add pressures to the daily activities of farming. Frequently these pressures are ill informed or are part of orchestrated attempts to influence political decision making on key issues. It is very important that our industry continues to provide resources to deal with these and other community issues. The BMP program is one tool to assist in our community engagement endeavours.

Managing endosulfan and eliminating its impacts on the beef industry without losing this valuable technology demonstrates the value of BMP. There is no doubt that without the BMP initiative endosulfan would have been lost to the cotton industry several years ago.

It is not in the interests of any industry to be continually receiving bad press. Thus a system like BMP, which helps identify operating issues and provides world class operating guidelines is an invaluable tool. To gain maximum value the BMP system must continue to be built on robust science, credible practices and commitment to the goals of best management practice.

BMP cannot be relied upon alone. We have to use the instruments of state farmer organisations, irrigation groups, and the National Farmers Federation in conjunction with industry bodies like Cotton Australia and the ACIC to protect industry interests. The industry must engage with and support these groups. Those who challenge practices in agriculture particularly those dealing with water and natural resources are politically well connected and well funded. They are passionate about their objectives. The cotton industry must work hard to engage at the political level. Early access and contribution to policy development processes are crucial. The recent water reform process especially in NSW highlights the difficulties when legislation is not formulated in a balanced or fair way. The resources required to untangle such issues are enormous and for many farmers overwhelming. The answer to this is being smarter at the way we do things. The industry needs to develop more politically savvy types, committed and well supported who can embroil themselves full time to protect the interests of the industry.

In the natural resources debate we need to take more visible leadership in environmental management. We should explore the opportunity of creating new outcome focused programs, which will restore agreed environmental assets while retaining productive agricultural and regional benefits. Unfortunately we live in an age that encourages adversarial activities. The cotton industry cannot afford such engagements. Our best opportunities will come by working with the reasonable factions of various interest groups to identifying common ground, define achievable outcomes and set in place a course of action to bring these goals to fruition. It will not be a fast nor easy process but it will be a positive one.

The Murray Darling Basin Ministerial Commission has identified several so called "icon sites" within the Murray Darling basin, which will be the focus of major environmental improvement works. These include the Barmah-Millewa Forest, the Murray Mouth and the Coorong. Ironically the Barmah-Millewa site gets too much water due to summer flooding from operational activities. There is an opportunity for the cotton industry to identify some key icon sites within the growing areas and undertake some joint works with other stakeholders. It will take money and it will take human

resources. Currently much of our industry resources are tied up and burnt out in a myriad of meetings usually ending in frustration, little progress and continual costs to the industry. There must be a better way of dealing with these issues so that all stakeholders benefit.

Industry

The Australian cotton industry has grown from an era when three main processors, Auscott Limited, Namoi Cooperative and Queensland Cotton Marketing Board (now Queensland Cotton) undertook most of the post farm gate issues on behalf of the industry including community, regulatory and political issues. The three organisations addressed issues and agreed on actions, which were believed to be in the best interests of the industry. The Australian Cotton Growers Research Association (ACGRA) addressed research and development issues hand in hand with CSIRO and the state agriculture and primary industry departments. CRDC and several Cotton Cooperative Research Centres came later and are very active and supportive of the industry. Cottonseed Distributors addressed varieties, seed supply and seed quality.

Today the industry is much bigger, more geographically spread and the issues it deals with far more diverse and complex. As a result various organisations have evolved within and outside the industry to cater for the various interests and issues. Cotton Australia emerged as a key body with its roots firmly anchored within the grower segment but also including processors and marketers. Through various industry debates largely facilitated by Cotton Australia, the Australian Cotton Industry Council (ACIC) emerged. It represents the interests of all the major industry stakeholders and is considered the peak industry body acting as a strategic clearing-house for major issues. Cotton Australia provides much of the day to day resources for many industry issues while groups such as the ACSA are taking lead roles on marketing issues and working closely with ACIC.

An important key to the success of this industry is the unity of purpose based on sound dialogue and credible debate. This can be difficult in an industry where there are significant commercial interests at all levels. ACIC provides a vehicle for such dialogue and it encompasses wide-ranging industry interests. Few people like building bureaucratic structures and to the Australian industry's credit ACIC operates basically through voluntary actions of interested and committed people. It operates on the basis of unanimous voting, which has both positive and negative attributes. To date it has worked reasonably well. However, the organisation needs to review from time to time its modus operandi to ensure it is robust and appropriate to meet the many challenges the industry faces. It must when necessary, be able to drive the appropriate decisions in the long-term interests of the industry. The idea of an off-season (to the Cotton Industry Conference) industry forum held in a regional site will be a good opportunity to review and reinforce the operation of ACIC.

Conclusions

The Australian Cotton Industry can be very proud of its achievements. It has created and utilised many opportunities over four decades. The key opportunities for the future include:

a. Continued strong support for R & D, which has served the industry well.
b. Continuing drive for productivity gains especially yield and operating margins.
c. Continuing work to improve length, strength and fineness of Australian cotton combined with a clear resolve to maintain our reputation as a contamination free cotton supplier.
d. Development of new farming systems aided by precision farming, gene technology and remote monitoring technologies.
e. Continued development and promotion of BMP.
f. Continuing enhancement of water use in the industry with a strong emphasis on whole farm water use efficiency.
g. On going support for the Field to Fabric program focusing on customer needs with clear communication to the industry on the types of cotton that will serve the best interests of the Australian industry.
h. Development of focused environmental programs to deliver balanced outcomes.
i. Strengthening and broadening the way the industry engages the community, politicians and environmental groups with emphasis on early involvement in policy formulation.
j. Ensuring the strength of its industry bodies to meet the challenges the industry faces.

"People are always blaming their circumstances for what they are. I don't believe in circumstances. The people who get on in this world are the people who get up and look for the circumstances they want, and, if they can't find them, make them." *- George Bernard Shaw*

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