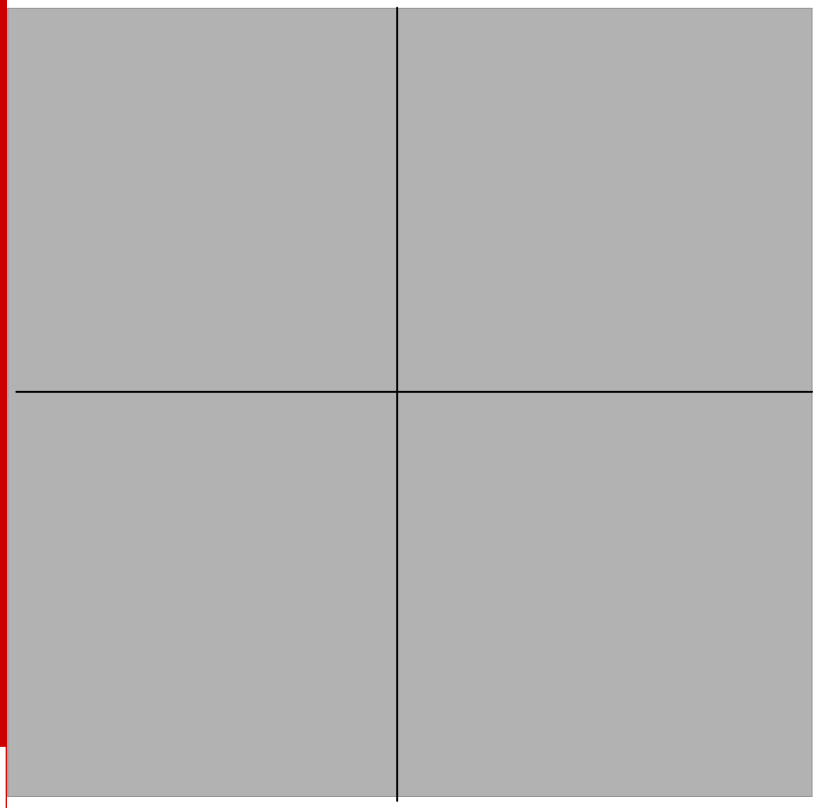
Beltwide Cotton Conference, San Antonio Texas 3-6 January 2006 and Visit to Corpus Christi and Texas A&M University 7-10 January 2006

David Hamilton, General Manager, Plant Science



Overseas Travel Report (whilst on Conference Leave)

Support from Cotton R&D Corporation is gratefully acknowledged.

30 January 2006

Queensland Government
Department of Primary Industries and Fisheries

Executive Summary

The Beltwide Cotton conferences are held every year, in early January. The conferences attract producers, industry personnel (marketers, ginners, etc.) research, extension and agribusiness participants from around the cotton growing areas of the United States of America (US) cotton belt.

World Cotton

The US has seen a decline in the cotton textile industry as a direct result of imports of textiles trebling in the last ten years. This is despite an increase in world production of cotton. Because of export dependence, the US cotton industry will experience greater price volatility and will need to improve quality and decrease the costs of production.

Trade

In WTO negotiations, cotton has been singled out for special treatment. A resolution from the recent round states that 'All forms of export subsidies for cotton will be eliminated by developed countries in 2006. Developed countries will give duty free and quota free access to cotton exports from less developed countries'. This presents particular challenges for the US cotton industry. Because Australian farmers have a much lower reliance on agricultural subsidies than US farmers, reductions in subsidies in the US would benefit Australian farmers through (presumably) higher export prices.

Irrigation and water Use Efficiency

Much of the cotton in the Texas, Arizona and California is irrigated and water scarcity and competing demands have increased the focus on water use efficiency (WUE) and improved irrigation technology. We have very considerable scope for improving WUE, but this science and technology needs to closely link with the policy aspects to ensure incentives are in place to maximise profitability and sustainability (and not simply exploit the water resource).

Weed Management and Herbicide Resistance

Weeds resistant to herbicides have been identified with several herbicides. Now, in the US, 107 biotypes of weeds have demonstrated herbicide resistance. Glyphosate-resistant Palmer Amaranth has been recently confirmed in Georgia. Glyphosate resistance renews concern about resistance to all herbicide chemistries, because the industry will now need to use other herbicides more heavily.

Insect Management

From a national perspective, cotton insect losses have been trending down since 1986. Boll weevil eradication and Bt cotton have been important factors. Cotton insect control costs are trending upwards, largely due to the cost of the Bt technology. Stink bugs and lygus bugs have an elevated status as pests. In South Texas (El Paso region) the Pink Bollworm eradication program has also been very successful.

Precision Agriculture

Variable rate technology has increased water use efficiency, reduced production costs and increased profits. This technology will be very useful to Australian agriculture, but many of the possible applications are yet to be explored.

Crop Improvement

Over 25 years, the average yield improvement from genetic gain was more than 8.6 lbs/ac. Over the last 5 years, this improvement was greater than 15 lbs/ac (this equates to about 3% annual improvement).

Introduction

The Beltwide Cotton conferences are held every year, in early January. The conferences attract producers, industry personnel (marketers, ginners, etc.) research, extension and agribusiness participants from around the cotton growing areas of the United States of America (USA) cotton belt. International participants are welcome, and usually, small numbers of international participants come from the major cotton-producing countries. The conference is attended by United States (US) producers (in their mid-winter) but few southern hemisphere producers attend (mid summer and mid cotton season).

The format of the conference is, for first two days, a plenary session on major industry issues, followed by concurrent sessions for each of the speciality science areas. The third day is for concurrent sessions.

On the day preceding the 2006 Conference, (3 January) the Texas Agricultural Irrigation Association sponsored an irrigation workshop.

The following notes are highlights from the plenary sessions and key sessions of interest (to me) from the concurrent sessions. Because of the number of participants at the conference and the spread of concurrent sessions, no one can attend all of the presentations.

The conference gave me the opportunity to participate in the science sessions, but also gave me the opportunity to meet with other industry participants and gain insights into trends and opportunities for research, development and extension (RD&E) and insight into agricultural practices for the future.

World Cotton

The USA has seen a decline in the cotton textile industry as a direct result of imports of textiles trebling in the last ten years. This is despite an increase in world production of cotton.

- China is the largest producer (29M bales), largest processor and largest importer (16M bales) of cotton in the world
- Mexico is 2nd or 3rd largest customer of US cotton
- Brazil has enormous capacity to expand (100,000 ha of new land available)
- India is the 2nd largest spinner after China but Indian yields are generally low (around 400lb/ac)
- West Africa 4% of world production, has low yields (400 lb/ac) and falling behind
- Western Europe has little production and declining textile industry.

Because of export dependence, the US cotton industry will experience greater price volatility and will need to increase quality and decrease the costs of production.

Trade

In World Trade Organisation (WTO) negotiations, cotton has been singled out for special treatment. A resolution from the recent round states that *"All forms of export subsidies for cotton will be eliminated by developed countries in 2006. Developed countries will give duty free and quota free access to cotton exports from less developed countries"*.

This presents particular challenges for the US cotton industry, and the industry has questioned the logic of the proposal, particularly since the textile industries in some developing countries seem to be subsidised in some way.

Farmers in the US depend on the subsidies they receive from the Farm Bill, as do the industries that provide services to agriculture (machinery, agricultural inputs, processors, marketers, for example).

Oxfam has recently demanded an eighty percent reduction in all domestic cotton support in 2006 and ten percent in each of the following two years.

To gain an understanding of the subsidies that other countries may employ, the following figures were presented for China and India, the two biggest users of cotton in the world:

- In 2000, China and India had 44.6 M bale spinning capacity
- By 2005, China and India had 72 M bale spinning capacity
- China paid 74c/lb to 78c/lb for cotton, while the A Index was 62c to 63c/lb in 2003 and 2004

Because Australian farmers have a much lower reliance on agricultural subsidies than US farmers, reductions in subsidies in the US would benefit Australian farmers through (presumably) higher export prices. However, such action may have some unintended consequences, like a reduction in the supply of agricultural technology on which the Australian industry has prospered.

Irrigation and Water Use Efficiency

Much of the cotton in the Texas, Arizona and California is irrigated and water scarcity and competing demands have increased the focus on water use efficiency (WUE) and improved irrigation technology.

A variety of irrigation methods are employed; furrow, trickle, and overhead spray-usually centre pivot. Much of the water comes from underground aquifers and these are now under serious threat of depletion. Add to this increased pumping costs (large increases in fuel costs) and the incentive is strong for increasing WUE.

However, the legal basis for water allocation (capture rules) drives landowner (and farmer) behaviour with respect to water. Each state has its own legal basis for water rights. Landowners in Texas can legally pump unlimited quantities of water – they have a right to water if they capture it and put it to beneficial use. Texas uses a total of 16.5 Million Acre Feet of water each year (fifty-seven percent irrigation), for example, the Ogallala Aquifer (in north Texas) has 6.2 Million Acre feet used annually but the estimated recharge is 300,000 Acre Feet. This deficit has created a major concern.

Challenges to managing the water shortage situation include aquifer mining, depletion rules, multiple districts over aquifers, defining and enforcing aquifer sustainability, and cities acquiring more groundwater. Therefore they have a greater movement towards groundwater management. To enable these difficult problems to be resolved, we need to clearly link production research with policy, and ensure the legal basis for water rights provides proper incentives for profitable and sustainable use of the resource.

The workshop focussed on crop physiology and crop response to water supply, irrigation techniques to enhance efficiency and ways of reducing irrigation costs. 'The more water that evaporates through the plant, the higher the yield potential' was one comment. Low pressure spray irrigation (LEPA - Low energy, Precision Application) techniques are now widely used. Pressure regulators and alternate row application helps increase WUE and reduce evaporation form the soil surface and from the irrigation system.

The Texas Agricultural Experiment Station has developed a Potential Evapotranspiration (ET) Network and it is reported to be well used (>50% of farmers apparently) in some areas (less so in others). Weather stations located across Texas supply data regularly (hourly) which is updated on the web, and which allows farmers to estimate crop water use. ET usually gives an over-estimate, but it is helpful.

My overall conclusion is that we have very considerable scope for improving WUE, but this science and technology needs to closely link with the policy aspects to ensure incentives are in place to maximise profitability and sustainability (and not simply exploit the water resource).

Weed Management and Herbicide Resistance

Weeds resistant to herbicides have been identified with several herbicides. Now, in the US, 107 biotypes of weeds have demonstrated herbicide resistance. Glyphosate-resistant Palmer Amaranth has been recently confirmed in Georgia. Glyphosate resistance renews concern about resistance to all herbicide chemistries, because the industry will now need to use other herbicides more heavily.

- Herbicide resistant weeds occur naturally
- herbicides do not create resistance
- herbicides select for resistant plants.

Herbicide resistance takes from three to fifteen years to develop. Some of the strategies outlined to combat the problem are as follows:

- know the weed problem
- use sanitation
- reduce herbicide reliance
  - capitalise on cultural control
  - use mechanical control where feasible
- use a diversity of Modes of Action
  - crop rotation – different MOAs
  - multiple MOAs in a particular crop (eg glyphosate, diuron).

Roundup Ready Flex cotton allows a wider window for over-the-top applications of glyphosate and will replace Roundup Ready varieties.

Insect Management

From a national perspective, cotton insect losses in the US have been trending down since 1986. Boll weevil eradication and Bt cotton have been important factors. Cotton insect control costs are trending upwards, largely due to the cost of the Bt technology. Stink bugs and lygus bugs have an elevated status as pests because of the reduction in use of broad spectrum insecticides. Some pests are 'induced' by insecticides (which remove beneficial insects) – eg spider mites.

Area Wide Management (AWM) of plant bugs has been successful in some areas. Reduction of host weeds in headlands and strategic (strip) control treatments next to host crops has proven successful. A Landscape approach in California offers opportunity for AWM.

Future opportunities include new selective chemistry for thrips, destruction of insect populations in staging areas, and the development of transgenic technologies to control plant bugs.

In South Texas (El Paso region) the Pink Bollworm eradication program has been very successful. This program had three phases: mapping, detection and control. The following treatments were employed:

- cultural practices to reduce over-wintering pests
- Bt transgenic cotton
- mating disruption (with pheromones)
- limited insecticide
- sterile moths (260/ac/day) released.

Over the period 2001 to 2005 the program gave a 99.4% reduction in moth catches and a 99.9% reduction in larvae detections. Very successful!

Precision Agriculture

Use of GPS guidance and remote sensing appears to be well accepted across cotton producing areas, but further RD&E is required to make full use of the currently available technology.

A variable rate technology prototype for centre pivot irrigation has been developed and used successfully. GPS sensors, pressure regulators and valves were fitted to each emitter on the centre Pivot. The area is mapped, and the decision is made for some areas to receive more water (areas of good crop growth, different textured soils) while other areas to receive less water (roadsides, poorly drained areas, areas of poor growth). This is then used to program an irrigation application. (Controllers and software were of Australian origin!). Apparently, this precision water application saved twelve to sixteen percent water on average, but as much as twenty-eight percent.

Variable rate seeding has increased yields (two to ten percent) reduced seed costs and increased profits. Variable rate fertiliser gave savings of $7/ac. Site specific application of insecticide for plant bugs and variable rate plant growth regulator and defoliants delivered further saving.

This technology will be very useful to Australian agriculture, but many of the possible applications are yet to be explored.

Fibre Quality

Apart from plant variety effects and seasonal effects, soil moisture can influence fibre properties. Fibre length is correlated with soil water content, fibre length strongly correlated with fibre strength, micronaire negatively correlated with dryland.

Crop Improvement

Tom Kerby (Deltapine) gave a paper outlining an analysis of a large number research trials on variety performance over the last twenty-five years. This showed an average yield improvement from genetic gain of more than 8.6 lbs/ac. Over the last five years, this improvement was greater than 15 lbs/ac (this equates to about three percent annual improvement).

New Technology of Interest

Air injected nozzles to further reduce the risk of pesticide drift.

15” row cotton harvesters

John Deere with a ‘round-bale’ cotton module maker prototype on new harvesters.

Case IH has a ‘square-bale’ cotton module maker prototype on new harvesters.

Use of an ‘electronic nose’ to detect stink bugs – innovative method of pest assessment.

Soil compaction – Auto steer for a tractor to keep tractor off the planted row resulted in increased yields. A sixteen percent reduction in yield was measured when compaction was closer to the row than 2”.

Visit to Corpus Christi and Texas A&M University 7 to 10 January 2006

David Hamilton
General Manager, Plant Science
Department of Primary Industries and Fisheries
January 2006

Jimmy Dodson, Farmer, Corpus Christi

Farms 9500 ac. mostly rented land. Grows dryland sorghum and cotton. Grew 3rd best dryland sorghum yield in US in 2005 yielding 135 bushels/ac (around 9 t/ha). Average cotton yield of 1.5 bales /ac (3.7 b/ha). Has a representative role for producers in Washington. Chair of local grower cooperative which operates cotton gin.

Fertiliser and herbicide is applied with a modern sprayrig (80lbN/ac 0.5lb atrazine /ac). This 120-ft wide rig applies 30 gals/ac at 18 mph. (300L/ha@29kph) or 100 ha per hour.

Carlos Fernandez, Associate Professor, Texas A&M

Developing Decision Aids for farmers around Corpus Christi. Refined software. Looking for a process to enhance industry adoption.

J. Tom Cotheren, Professor Crop Production /Physiology

Researching physiological methods to help breeders breed for drought resistance.

Looking or a PhD student on cotton Water Use Efficiency. Has grants from Texas Water Resources Institute.

Dudley T Smith, Professor, Texas A&M

Agricultural Production in Texas.

Bill Rooney, Associate Professor, Sorghum Breeder

Texas A&M has been a world leader in sorghum breeding for over thirty years. Nowdays, the public sector breeding programs supply germplasm to private companies such as Pioneer & Monsanto (in Bill's view, the only companies interested in sorghum research). Monsanto has aggregated then consolidated (Asgrow, DeKalb, NCPlus). Farmer uptake of varieties a concern – logistics of licencing and consolidation of companies has restricted the use of some germplasm. TAES edict – must be a licence or an MTA. Public programs still have free exchange of germplasm. Interest in drought resistance and 'high biomass' sorghum for ethanol production. Ethanol plants have been built in Texas, but much of the sorghum produced in south Texas is exported to Mexico. 'Sorghum seed companies only in the sorghum seed business to sell maize seed'. Still predominantly public plant breeding for wheat. Originally, a lot of private sector breeding interest in genetically modified wheats and hybrid wheats, but private sector programs have dropped out. No interest in GM wheat in marketplace. Corn, cotton, soybeans (all with GM) now in private sector. Wheat, peanuts etc Public Sector.

C. Wayne Smith, Professor and Interim Head, Soil and Crop Sciences

Public programs now in germplasm enhancement rather than variety development. Monsanto has a Cotton States program where they initiate backcrossing (of GM traits) into cotton submitted lines. Public programs then licence these varieties and royalties can flow back to Experiment Station.

Wheat is predominantly a public sector program.

James Supak (Retired) and Robert Lemon (Professors, Cotton Extension Specialists)

Extension to be more professional in future (MS and working towards PhD). More specialised. Cotton Specialists undertake a field research (translational research) role and support County Agents.

Jurg M Blumenthal, Associate Professor, State Sorghum Cropping Systems Specialist

Sorghum Physiology and Extension Agronomy. Sorghum under pressure in Texas from cotton. Also maize preferred in high-yield (irrigated) environments. Highest yields – 19000 kg/ha for maize and 12000kg/ha for sorghum.

Allan Jones (Director, Texas Water Resources Institute and Assistant Vice Chancellor) Tom Gerik, Professor, Crop Physiology and Production, Blackland Research and Extension Center.

Would like to formalise collaboration - perhaps a joint scholarship - suggest a four week exchange, in area of Water Use Efficiency.

Discussions and key sessions attended at Cotton Beltwide Conference and visit to Texas A&M University 1 to 10 January 2006

Date	Name and Discussion
3-Jan-06	Irrigation Workshop, Charles Stichler, TCE Extension Agronomist - Cotton crop physiology and response to irrigation
	Irrigation Workshop Danny Sosebee Netafim -USA - using drip irrigation for the application of fertilisers and herbicides
	Irrigation Workshop Leon Newn Agricultural Engineer - Irrigation TAMU Amarillo - Managing energy costs and pumping plant performance for water use efficiency
	Irrigation Workshop Bruce Lesikar Water Usage and Water Rights - Legal basis for water rights, water scarcity and changes in water use.
	Irrigation Workshop Thomas Marek ET Network - Using Potential Evapotranspiration for irrigation scheduling.
3-Jan-06	Bruce Roberts California State University, Fresno - Extension in the Californian cotton industry.
3-Jan-06	Dinner with Harvey Buhering (County Agent Nueces County, Corpus Christi) , Adam Kay, Greg Kauter, Dallas Gibb, Mike Bange, Julie O'Halloran - performance of FibreMax cotton varieties in south Texas.
4-Jan-06	Elsa Murano, Vice Chancellor Texas A&M - Agriculture and Life Sciences - Priorities for Agriculture - Texas A&M University
4-Jan-06	Gary Adams, National Cotton Council - Cotton and Global markets
4-Jan-06	Alan York, North Carolina State University, Managing Resistant Weeds
4-Jan-06	Crop Loss and Insect Pressure, Plant Bugs, Stink Bugs, Spider Mites
4-Jan-06	Carl Hobbs, Kenneth Hood and James Mahan - Variable Rate Technology
4-Jan-06	New Developments from Industry, Roundup Ready Flex, New Varieties
4-Jan-06	Gus Lorenz - Arkansas update on plant bugs -Scott Stewart Tennessee -Peter Goodell - San Joaquin Valley Area-Wide Management
5-Jan-06	Craig Bednarz - Georgia - J.C. Banks, Oklahoma State - The First Forty Days (Systems Approach Favoured)
5-Jan-06	Mark Lange - National Cotton Council, Memphis - Trade Issues facing US Cotton
5-Jan-06	Innovative Grower Panel - Cannon Michael, Precision Farming California, Doug Wilde San Angelo Texas, recycled water, Justin Cariker, Boll Weevil eradication - David Dunlow - farming systems
5-Jan-06	Lunch with James Supak
5-Jan-06	Giovanni Pachini Water Use Efficiency
5-Jan-06	New Developments, Air Injecteed Nozzles, Applicator-mounted sensors, Vacuum Type Header for harvesting cotton
5-Jan-06	Cotton Engineering - Soil Water Relationships and Cotton Simulation Models, Precision Farming
5-Jan-06	Transgenic Cotton, Confirming Glyphosate-Resistant Palmer Amaranth in Georgia Cotton
6-Jan-06	Cotton Insect Research and Control - Boll Weevil Eradication, Pink Bollworm Eradication
6-Jan-06	Shifting Patterns of Insecticide Use in California
6-Jan-06	Peter Goodell, IPM Advisor, California
6-Jan-06	On-Farm Precision Agriculture, Performance of Roundup Ready Flex, Yield and Quality

	improvement over 25 Years (Tom Kerby)
7-Jan-06	Travel to Corpus Christi
7-Jan-06	Carlos Fernando, Associate Professor, Texas A&M, Jimmy Dodson, Farmer Corpus Christi
8-Jan-06	Travel from Corpus Christi to College Station, stay with Ed and Pat Runge
9-Jan-06	Tom Cotheren, Cotton Crop Physiology, Dudley T. Smith, Texas Agriculture, Bill Rooney, Sorghum Breeding and commercialisation
9-Jan-06	Wayne Smith, Interim Head, Soil & Crop Sciences, Exchange and Sabbatical, James Supak, Robert Lemmon Cotton Extension Specialist, Jurg Blumenthal, Sorghum Physiology and State Extension Specialist.
9-Jan-06	Alvie Niles
10-Jan-06	Bob Metzer
10-Jan-06	Tom Gerik, Allan Jones, Michael Bange, Water Use Efficiency, Collaboration and International Exchange.