SEARCH

Cotton is produced in more than 100 countries in the world, but six of them – China, India, Pakistan, USA, Brazil and Uzbekistan – contribute about 80% of the total annual production of about 25 million tonnes of lint[1].

While China is the major producer of cotton, producing about 7 million tonnes per annum, Australia is the 8th largest producer, producing about 1 million tonnes per annum, 99.9% of which is exported, mainly to China (about 0.3 million tonnes) and India (about 0.22 million tonnes).

As Hamilton[2] shows in the article in this issue of *World Agriculture*, cotton lint production in Australia has increased steadily from 0.5 tonnes/ha in 1965 to 2 tonnes/ha five decades later.

This steady increase, which is considerably greater than that of the world average[2], is attributed to the considerable input of Research, Development and Extension by the government, universities, growers, industry, and extension services.

Early adoption of GM technology by the industry has resulted in not only increased production, but also fewer inputs of insecticides and herbicides, lowering costs and providing significant environmental benefits.

Seventy seven per cent of Australian cotton is grown with irrigation at an average yield of 2.5 t/ha, while the remaining 23% is grown under dryland conditions and yields 0.9 t/ha.

With droughts and reduced rainfall as a result of climate change there has been an emphasis in Australia on increased water use efficiency in cotton production.

Water productivity has increased by 40% since 2003 through limited and managed irrigation scheduling, in-field measurement of plant-available soil water content, laser levelling to ensure even distribution of flood irrigation across the crop, improved reticulation across the farm, and farm drainage plans[2, 3].

China's cotton lint production is over 6 million tonnes per annum with another 4.5 million tonnes of higher-quality lint imported each year[4] to feed the world's largest textile industry.

While cotton production in China has been falling over the past five years (48% less than in 2008) due to decreasing area under cotton production by small-holder farmers in the eastern provinces, it has been steady in Xinjian Autonomous Region, the largest and highest-yielding cotton-producing province with 62.5% of total production grown on 50% of total hectares.

China remains the largest textile manufacturer in the world and recently announced plans to significantly expand the textile industry in the Xinjiang region over the next 8-10 years(5).

The expansion in China's textile industry, coupled with lower cotton production and reserves, is likely to lead to an increase in demand for imported cotton[5].

In northern China, cotton is drip irrigated and grown under plastic (polyethylene) film mulch to improve the hydrothermal conditions in the soil in spring[6, 7], thereby enabling earlier planting, better weed and disease control, and improved crop productivity.

In Xinxiang Autonomous Region, Yan *et al.*[8] reported that the use of plastic-film mulch was 60 kg/ha/year over a 10-year period in the 1990s, almost twice that in any other province, and mainly applied to cotton.

As the thin (8 µm) plastic film is easily damaged and difficult to remove, fragments of the plastic film are left in the soil creating soil pollution.

According to a survey[9] in Xinjiang, average plastic film residues in cotton fields exceed 200 kg/ha, and the area polluted by plastic film residues covered more than 0.6 million ha in 2013, accounting for 60% of the total arable land area of Xinjiang.

Studies have shown that the presence of such large quantities of plastic fragments restrict the flow of water in the surface soil, reduce seedling emergence and growth of wheat and cotton[8].

Three options for reducing the plastic-film pollution of the soil and making the system more sustainable have been proposed[8]:

(i) use less plastic film by using a thicker film (15 μm), removing it after harvest or using it *in-situ* for several years, (ii) use biodegradable plastic film, (iii) mechanize residual plastic recycling technology and/or use planters that pick up residue from previous years.

An alternative would be to use thicker plastic and remove it when it is no longer required for soil warming. Yan *et al.*[7] in this issue of *World Agriculture*, report on an experiment that aimed to determine when (thicker) plastic can be safely removed for future use or how long biodegradable plastic film needs to remain before degradation affects yield.

The results show that in northern Xinjiang, the soil needs to be covered for a period of 95±5 days after sowing for there to be no yield loss. This would clearly depend on cultivar, region and plastic-film characteristics.

Cotton is in competition with synthetic fibres. While the global volume of cotton production has continued to show a strong upward trend until recently, due to improvements in the insect and herbicide-resistance and productivity of new cultivars and improved management of cotton cultivation, its share of the textile fibre market has declined from 62% in the 1960s to 40% in the 2000s due to the large increase in synthetic fibre production.

Nevertheless, cotton still remains the major natural fibre (90% of global consumption) used in textiles[10]. This can be attributed in part to technical progress in the production of cotton as well as its valuable characteristics which sustain demand for its use in blends with chemical fibres.

While the price for cotton is considerably higher than chemical fibres, they are not a perfect substitute so that the qualities of many chemical fibres are improved when they are blended with cotton[9].

Nevertheless, Australian farmers are subject to the vagaries of climate and changes in supply and demand as they are price-takers with no subsidies and no government intervention to help stabilize prices.

On the other hand, the Chinese government attempts to moderate fluctuations in prices paid to Chinese farmers for cotton by reducing the amount of cotton that can enter China duty free and increasing tariff levels on cotton imports when global cotton prices are depressed.

This helps maintain the price paid for domestic cotton. Xinjiang cotton-growers are financially much more dependent on cotton than most growers of cotton elsewhere in China.

Thus, the Chinese system requires Chinese cotton importers to buy a specified amount of cotton from Xinjiang to qualify for their import quotas, giving financial preference to Xinjiang.

Despite these interventions, the prices paid to Chinese growers of cotton still fluctuate considerably[10].

Despite the economic and environmental risks, cotton production in Australia and China appears strong and sustainable. While global climate change will limit the irrigation capacity in both nations, water productivity has increased by better irrigation management especially by use of plastic film technology.

As poverty in the developing world continues to decrease and populations become wealthier, there will likely be an increased demand for natural fibres and richer blends of natural and synthetic fibres, enhancing the demand for cotton.

The role of Research, Development and Extension in improving cotton productivity, fibre quality, and water use efficiency, and reducing input costs for labour, fertilisers, insecticides and plastic-film (particularly biodegradable film) will continue to be important in enabling cotton production to continue sustainably and profitably.

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Comments