COTTON OUTLOOK

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Uzbekistan and the world cotton market: shifting patterns of production, consumption and trade

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Editor, Cotton Outlook

Much has changed since the ICAC Plenary Meeting was last held in Tashkent, in October 2017.

Uzbekistan's position in the world market has evolved significantly further. Seven years ago, the country's importance as an exporter of raw cotton was already on the wane but it was still exporting over 300,000 tonnes annually, roughly 40 percent of national output. Since then, the sustained expansion of domestic raw cotton consumption and the priority accorded to value-added textile manufacturing have meant that today Uzbek lint cotton barely figures in international trade statistics.

This is a path followed by a number of major producers that were once major exporters of raw cotton: Pakistan, Turkey and of course China have become textile manufacturing and exporting powerhouses, and all are now major net importers of raw cotton.

Whether India will as some point join that last group is a topical and keenly debated question. As yields have stagnated and investment in spinning capacity has continued, the country's cotton production and consumption have often been close to equilibrium in recent years. The area devoted to the 2024/25 cotton crop has fallen to the tune of about nine percent, suggesting that the country may be in deficit during the season ahead.

Meanwhile, the Union government has announced a hike in the Minimum Support Price for seed cotton of seven

percent, the latest in a number of annual increases. Since world values are in retreat, there is a substantial and potentially widening disparity between local and international prices. How that imbalance might be resolved over the coming months remains to be seen. The role of the Cotton Corporation of India – the body charged with acquiring seed cotton in order to defend the MSP – will be critical. Meanwhile, the re-emergence of regular import enquiry from Indian mills has been a feature of the international market in recent months, despite the barrier of import duties.

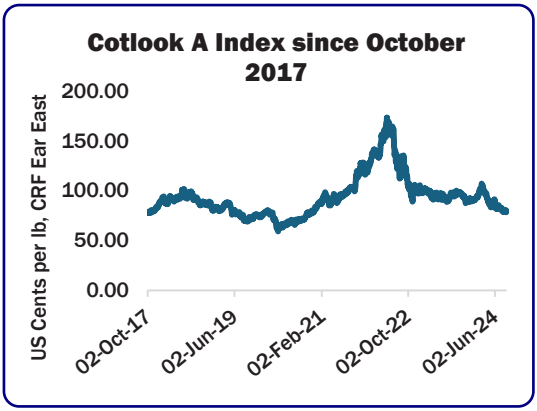
The place once occupied by Uzbek cotton in its erstwhile major export market, Bangladesh, is now largely filled by African Franc Zone producers, though those origins themselves face the prospect of intensified competition, most notably from the Southern Hemisphere. Indeed, the ascendancy of raw cotton exports from below the equator has been the defining feature of the world market over the past couple of seasons.

Most striking has been the continued expansion of cotton area in Brazil and the accompanying improvement of yields. In 2022/23, the national average set a new record of 1,907 kilos of lint per hectare – a major achievement in a rain-grown environment, albeit one characterised by mechanisation and the intensive use of inputs. At the time of writing, lint output from the 2023/24 crop is forecast at more than 3.6 million tonnes, a new record by a comfortable margin.

The driver of Brazilian growth has been the state of Mato Grosso, which accounted for 72 percent of the area devoted to the 2023/24 cotton crop. Cotton fields, however, represent a fraction of those cultivated with soybeans and corn. The principal constraints on further expansion of cotton production in a state that covers an area of more than 900,000 square kilometres – more than twice the size of Uzbekistan – are related to infrastructure rather than a lack of available land. Export logistics in particular represent a challenge as the bulk of cotton is shipped from the single, congested port of Santos.

Cotton production trends and trade flows have thus remained, as ever, in a state of constant change.

So too has the market: price movements in the period since the last Tashkent Plenary have often been tumultuous. As delegates departed that meeting, the Cotlook A Index was fluctuating in the high 70s cents per lb. The Index briefly crossed the dollar threshold in May and June of the next year, before falling back as trade tensions between the United States and China escalated. Cotton and textiles became directly involved in the so-called 'tariff war', world raw cotton consumption suffered, and the Index drifted below 70.00 cents per lb in late August 2019. A gradual recovery was observed over the following months as a rapprochement between Washington and Beijing restored trading confidence. On January 15,



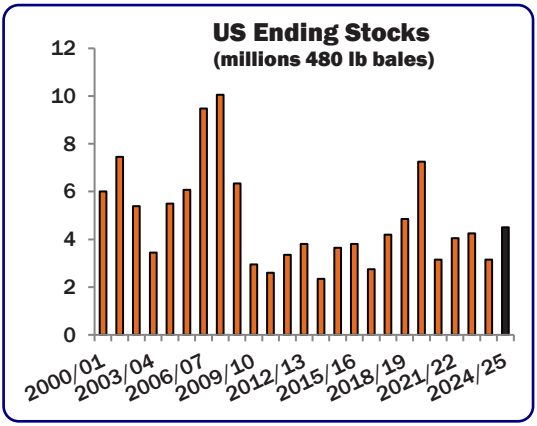
2020, the two countries signed the so-called Phase One agreement, which amongst other commitments obligated China to substantially increase its purchases of US agricultural commodities, including cotton. The same day, the A Index regained the benchmark of 80.00 cents per lb.

Then came Covid.

Amid drastic public health measures across the globe, the sudden and unprecedented paralysis of demand at a retail level reverberated back down the cotton textile supply chain. In that fraught environment, world cotton prices collapsed. The A Index shed 26 percent of its value in the space of about ten weeks, falling below 60.00 cents per lb at the beginning of April.

The response of Central Banks to the crisis was to inject huge sums of money into the economy. Some of these funds found their way into financial markets, including commodity futures. New York cotton was one of the beneficiaries, and futures began to recover. But the physical market was initially slow to follow, given the persistence of Covid-related disruption to the supply chain.

Before long, however, cotton fundamentals also became supportive. Most notably, estimates of US production were revised substantially downward owing to adverse conditions in West Texas, while China began to meet the commitments made under the Phase One agreement, the significance of which had almost been forgotten in the turmoil of the early Covid period. Lower production and heavy Chinese buying meant that the US ending stock fell from a daunting 7.25 million bales (nearly 1.6 million tonnes) at the end of the 2019/20 marketing year

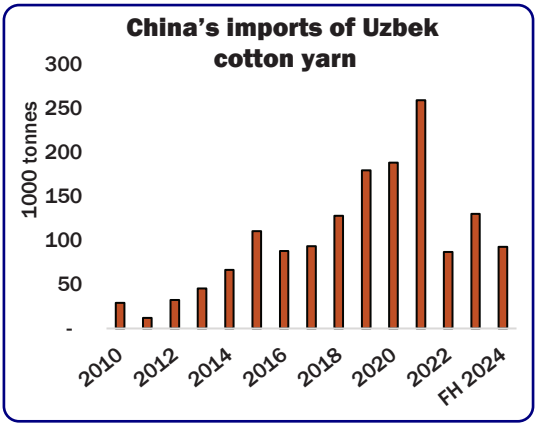


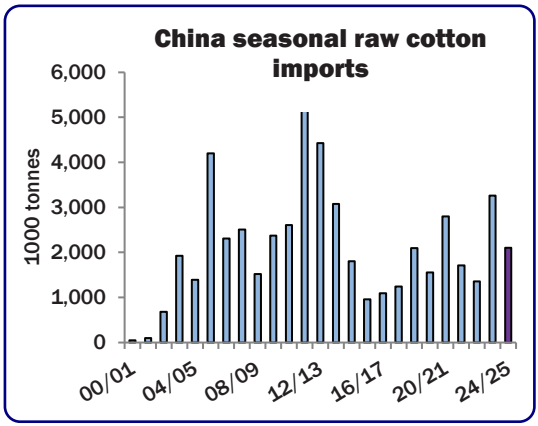
to a much more supportive 3.15 million bales (less than 700,000 tonnes).

Over the next two years or so, the bullish trend that had begun in such unpromising circumstances gained extraordinary momentum and a longevity that few could have foreseen. By early May 2022, the A Index had risen to a peak of 173.45 cents per lb – second only to the all-time high of 243.65 attained in March 2011. As on that earlier occasion, prices had manifestly risen to an unsustainable level and the collapse, when it came, was equally brutal. Between May and November 2022, the Index lost nearly half of its value.

The subsequent two years or so have been characterised by poor demand from downstream textile markets in the face of various macro-economic and geopolitical challenges. Mill purchasing of raw cotton has been of an equally anaemic and short-term nature. In the circumstances, for a time raw cotton prices displayed a surprising stability. For much of the 2023/24 season, another much depleted United States crop, coupled with China's re-emergence as a major importer from the world market, kept the supply-side pressure from the Southern Hemisphere at bay.

During the later months of the season, however, bearish influences came to the fore. Despite challenging conditions in West Texas, US production from the 2024/25 crop is forecast to recover by 25 percent. Ending stocks are projected at 4.5 million bales (just shy of a million tonnes). US cotton must vie for market share with the record Brazilian output described above. Globally, mill demand remains lacklustre. And crucially, the general expectation is that China's import needs will be much lower than the 3.26 million tonnes shipped to that market in 2023/24 – the highest volume for eleven years.





As already observed, by the time the momentous price movements described above were taking place, Uzbekistan was no longer as directly exposed to the risks involved as in earlier times. However, the country's cotton-textile sector was not immune to the negative impact of the extreme volatility of cotton prices and the disruption of trade flows in the late Covid period.

Uzbek exports of cotton yarn have grown substantially in recent years, including those destined for China, by far the most significant import market for the commodity. In 2021, shipments to that destination rose to nearly 260,000 tonnes, before falling back sharply the following year – in line with a fall of imports from all origins. The upward trend in shipments of Uzbek yarn was resumed in 2023 and so far in 2024 exports are on the rise once again. During the first half of the year, the volume was in excess of 90,000 tonnes, placing Uzbekistan in third place amongst suppliers, behind Vietnam and Pakistan.

The strength of import demand for cotton yarn from China thus remains important for the well-being of Uzbekistan's textile sector, just as the volume of Chinese raw cotton imports frequently holds the key to the behaviour of world raw cotton prices.

Recent cotton sector reforms in Uzbekistan and future reform agenda

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PLEASE NOTE: This contribution was prepared by Sergiy Zorya, global lead on agricultural public policy and expenditures, World Bank. The findings, interpretations, and conclusions expressed in this work do not necessarily reflect the views of the Executive Directors of The World Bank or the governments they represent.

1. Since 2017, Uzbekistan's cotton industry has experienced a historic transformation due to significant economic and social reforms. These changes eliminated state cotton production and procurement quotas, eradicated child and forced labor, enhanced value addition, and generated new employment opportunities within the cotton-textile value chain. However, the transformation remains incomplete, necessitating additional reforms to complete the transition from a planned economy to a market-based system. This brief outlines the recent reforms in the cotton sector and proposes an agenda for future reforms.

2. The cotton sector is a crucial component of Uzbekistan's agriculture, which represents a third of the country's GDP and employs a quarter of its workforce. Before the reforms, despite having favorable conditions for growth and job creation,[1] the agricultural sector suffered from significant distortions in production and marketing, resulting in low productivity and farmer incomes. Since the early 1990s, farmers were constrained by a state-mandated production system that dictated the cultivation of cotton and wheat,

[1] Uzbekistan Country Private Sector Diagnostic (International Finance Corporation/World Bank (WB) 2019).

along with mandatory production and procurement targets. Farmers had no autonomy over seed and technology choices for their fields, being compelled to follow generic input recommendations that did not consider local environmental, soil, and water conditions. They received inputs from the state and sold their produce at fixed prices, far below market rates, effectively taxing farm income, estimated at 1.6 percent of GDP per year from 2016 to 2018.[2] Annually, over two million people were mobilized for cotton harvesting, many under coercion,[3] contributing to the country's negative international reputation.

3. Initiated in 2017, the reform of the cotton sector was among the most challenging. Despite the sector's significant distortions and the clear need for change, the path to reform was not straightforward. Cotton holds a unique place in Uzbek culture and identity, transcending its economic value. Consequently, the government opted for a phased approach to reforms, initially targeting the elimination of price distortions, encouraging private sector involvement to assume roles previously managed by the state, eradicating child and forced labor, and enhancing cotton processing to increase value addition and create more rural employment opportunities.[4]

4. The initial phase of the reform focused on removing the most significant distortions, such as state production targets, price taxation, and forced labor, achieving substantial success. From 2017 to 2022, the area dedicated to cotton cultivation decreased by 20 percent, with the majority of cotton production transitioning to private cotton-textile clusters. These clusters promote raw cotton production through contract farming and process the cotton into higher-value products like yarn and textiles. In March 2020, the Presidential Resolution 4633 abolished state production and procurement targets, which had mandated that all cotton be sold to the state and that all cotton-growing areas meet stringent annual production quotas. These targets, which imposed severe penalties for non-compliance, were widely regarded as barriers to eliminating forced and child labor in the cotton sector. They also contributed to environmentally harmful agricultural practices and hindered climate adaptation efforts. Following years of proactive measures to eliminate forced labor, in 2021, the International Labour Organization (ILO) recognized Uzbekistan as a country free from systematic and systemic forced and child labor in cotton production.[5]

5. The reforms have significantly transformed Uzbekistan's cotton-textile value chain. The cotton growing areas have been reduced, while average yields have improved. Farmers received farmgate prices for their cotton that were nearly on par with international export levels. Investments by over 134 private-sector cotton-textile clusters in both primary cotton production and its processing into yarn and garments have been substantial. These clusters have also

[2] Second Agricultural Public Expenditure Review for Uzbekistan (WB 2021).
[3] Uzbekistan's Third-Party Monitoring Report (International Labor Organization (ILO) 2019).
[4] Uzbekistan Agri-Food Job Diagnostic (WB 2020).
[5] Third-Party Monitoring Report (ILO 2022).
[6] In 2022, the areas under drip irrigation and laser leveling increased tenfold compared to 2020, from 20,000 ha to 200-300,000 ha, according to Uzbekistan's Ministry of Agriculture.

invested in enhanced soil testing, drip irrigation, and field laser leveling, which have increased the climate resilience of cotton cultivation and decreased water usage.[6] However, these improvements have predominantly benefited fields under direct farming rather than contract farming.[7] In March 2022, the Cotton Campaign, an international NGO, encouraged global garment and textile brands to phase out their boycott of Uzbek cotton and textile products. Additionally, the Better Cotton Initiative (BCI), a globally recognized sustainable cotton production certification body, established an office in Uzbekistan.[8] The proportion of domestically processed cotton fiber has dramatically increased to nearly 100 percent, up from just 40 percent in 2017. The European Union (EU) granted Uzbekistan the Generalized System of Preferences Plus trading status, allowing tariff-free entry for textile products into the EU. The export of textile and garment products has tripled, from US$1.2 billion in 2017 to US$3.3 billion in 2022, and employment in these industries has more than doubled, from 214,000 in 2019 to 450,000 in 2022, with rural women being the primary beneficiaries.

6. However, by 2023, the cluster system began to exhibit several weaknesses. Farmers were assigned to specific clusters, and the lack of competition among clusters impeded the market-based formation of cotton prices. The minimum cotton price, while pegged to international cotton prices at the Intercontinental Exchange (ICE) in New York, did not account for spatial differences within Uzbekistan or the domestic supply and demand conditions. The cluster system became prone to interference from local governments. Contract arrangements between farmers and clusters continued to emphasize production over farm income. Clusters were expected to provide additional agronomic and technical services to farmers, but very few did so. Instead, some clusters sold inputs to farmers at high margins, well above market prices. Public expenditures for the cotton-textile value chain did not decrease as initially planned; instead, the government continued to provide subsidized finance to both cotton growers and processors. By the end of 2023, the clusters had accumulated significant debts to commercial banks and the state.

7. The second phase of the reform aimed to address these emerging weaknesses. In December 2023, Presidential decree 205 altered the rules for allocating advances for cotton production, now transferring funds directly to farmers' accounts and empowering them to manage their own input purchases. The Uzbekistan Commodity Exchange (UZEX) started offering smaller lots of fertilizer and fuel, more suited to the needs of individual farmers. Clusters were now required to compete for farmers within the regional boundaries by offering attractive future cotton prices at UZEX, with contracts between farmers and clusters made transparent and digitally signed on the UZEX platform. Farmers are allowed to sell about 30 percent of their cotton production, which exceeded the normative production, to any buyer, either directly or through UZEX. All ginners were mandated to use digital scales to accurately record cotton weight

[7] Direct farming is a type of the cluster when a textile enterprise leases agricultural land from the state for its own raw cotton production. Contract farming is a textile enterprise, which organizes a cluster, makes contracts with individual farmers for raw cotton production.
[8] In 2023, the BCI evaluated 12 cotton farmers and some of them already received a three-year certification.

and quality, with an instant automated link to the State Fund for Agricultural Support under the Ministry of Finance to minimize fraud. Farmers are guaranteed to receive 80 percent of the payment for raw cotton within three days of delivery, with the remaining 20 percent paid by December 31.

8. The reform has revitalized the cluster system enhancing the role of markets and competition and improving the position of farmers. The 2024 cotton harvest will be the first to reflect the recent reforms, which will be closely observed by various stakeholders, including for potential refinements to regulations and the collaborative arrangements between farmers, clusters, and the state. It is also time to contemplate future reforms to enhance the international competitiveness of Uzbekistan's cotton-textile value chain.

9. The third phase of the cotton reforms should further advance the liberalization of the cluster system and strengthen environmental and social sustainability in cotton production and processing, which are crucial for international competitiveness. Private financing of cotton-textile value chain should gradually replace public financing. More competition among clusters and creation of the nation-wide spot and futures market are necessary to improve market-based determination of domestic prices. Support is needed for farmers and the textile industry to meet the emerging global consumer demands for sustainability. This support could include: (i) the strengthening of land tenure security, (ii) credit lines and matching grants to encourage investments in climate-smart cotton production, and (iii) a significant enhancement of the Agricultural Knowledge and Innovation System to support research into climate-resilient production and to provide advisory services for the adoption of climate-smart technologies. Farmers should be incentivized to obtain BCI certification for sustainable cotton production. For cotton processing, public investments in legislation and infrastructure are necessary to enable private investments in supply chain traceability and auditability, and to ensure compliance with international and local labor laws in the textile industry. These and other measures are essential for Uzbekistan's cotton-textile value chain to remain competitive internationally and to continue playing a significant role in the national economy.

The involvement of the plant phytochrome gene family in cotton fibre development

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Introduction

The continuous lower price of synthetic fibres compared to natural cotton fibre and the declining quality of clothes/textile products underscore the urgent need for novel innovations in producing superior-quality natural fibres. This urgency is further emphasised by the need to make natural cotton fibres competitive with artificial fibres through improvements in quality without affecting critical agronomic performance or environmentally friendly credentials. In this work, we innovatively solved the conventional puzzle of how to improve naturally coarse-fibred upland cotton without adverse effects on crop maturity and productivity – a challenging task that has defeated the efforts of past-century contemporary cotton breeding. Our research not only improves the quality of cotton fibre but also ensures that it is environmentally friendly, providing reassurance and support for our work.

Our research is novel and groundbreaking. We have developed state-of-the-art "omics"-derived superior fibre quality upland cotton cultivars, simultaneously improving yield, maturity, and abiotic stress tolerance. For the first time, we cloned and characterised the cotton phytochrome gene family of cotton and found a close association of the cotton phytochrome A1 gene with fibre length and strength traits. There was a particular interest in the phytochrome gene family of cotton because of its multiple gene effects in plant development; its roles in the conditioning of yield potential and productivity, early flowering, and plant architecture; possible association of phytochrome genes with salt, cold/freezing and drought tolerance, fungal

disease resistance; and regulation of nitrate assimilation. Evidence shows that the far red/red (FR/R) photon ratio influences the length and diameter of developing fibre.

Our innovation is not just a step forward; it's a leap. A binary RNA interference (RNAi) genetic construct was developed and somatically transformed into embryogenic *Gossypium hirsutum* L. cv. Coker 312. The resulting PHYA1-specific single cell-derived and single-seed decent novel RNAi plants of T0-10 generation, compared to wild-type Coker 312, showed improved fibre length (38-40 mm vs. 30-32 mm; Fig.1 and Fig.2), strength (31.2 vs. 29.7 g/tex) and Micronaire (3.9-4.2) of roller ginned fibre, as well as early maturity (for 5-10 days) and higher seed cotton yield (~10-18% higher), and an improved root system (two-fold) with resistance to drought, salt and heat. This technology, a true innovation, demonstrated a great potential to quickly develop superior cultivars in globally important upland cotton cultivars in a short time without any adverse effect on yield and maturity; it creates longer and stronger novel upland cotton fibre with superior yarn and textile qualities, promising a brighter future for the cotton industry.

Collaborative research on detailed transcriptome and miRome analysis results deciphered a complex network of key genetic regulation pathways and miRNA expression profiles in RNAi lines. Compared to ordinary cotton, RNAi genotypes showed differential expression of a large number of genes, allelic variations, evidence for multiple alternative splicing events, and key epigenomic alterations as a result of *PHYA1* RNAi and a compensatory over-expression of other phytochromes. These results have elucidated and conferred the phenotype of the *PHYA1* RNAi line(s) with simultaneously improved natural fibre quality and other key agronomic traits**,** which are helpful for future fine-tuning this RNAi technology and for its application in globally important crops as all have similar photoreceptor system.

To test the transferability and stability of complex RNAi effects, the nominee sexually crossed RNAi Coker-312 plants with several improved commercial varieties from Uzbekistan following a "personalised" individual plant selection procedure to fix complex RNAi effects, which drastically improved the natural fibre quality, maturity, and yield potential of upland cultivars. For instance, in $F_{2\text{-}10}$ generation selected hybrids of "AN-Boyovut-2" (the most widely grown Uzbek upland strain) x RNAi Coker-312, we observed high-quality RNAi genotypes with fibre length (UHM) of 1.37 inches, micronaire (MIC) of 3.8, strength (STR) of 31.5 g/tex, and uniformity (UI) of 90 percent.

The same-field grown control AN-Boyovut-2 plants had an average UHM of 1.17 inches, MIC of 4.9-5.2, STR of 30 g/tex, and UI of 86 percent. A similar trend of fibre trait, yield improvement, and flowering and root development improvement was observed in $F_{2:10}$ generations of other variety crosses. As a result, the first generation of novel RNAi cotton cultivar series "Porloq-1", "Porloq-2", "Porloq-3" and "Porloq-4" (which can be translated as "Shiny" or "Great Future") has been developed in different upland cotton cultivar backgrounds.

The fibre quality of a new cultivar, "Porloq-1", grown in Uzbekistan, was tested by Cotton Incorporated (CI), USA. Cotton Incorporated compared "Porloq-1" fibre with "Q4", a high-quality fibre experimental upland line in the US. High volume Instrumentation

(HVI) measurements were made, and the yarn was spun from natural fibres of both "Porloq-1" vs. "Q4" US varieties. Advanced Fibre Information System (AFIS) and HVI measurements showed that "Porloq-1" fibre had better Micronaire (4.4 vs. 3.4), longer fibre length (1.28 vs. 1.22 inches), greater strength (33.67 vs. 31.88 g/tex), improved colour grade (8.38 vs.6.9), and less short fibre (7.19 vs.9.66) and trash compared to either the saw or roller ginned "Q4".

Yarn spinning trial data showed that the natural fibre of "Porloq-1" was superior to "Q4" in many traits. "Porloq" yarn was stronger with fewer thin (6.1 vs. 12) and thick places (284 vs.459) in the yarn, along with fewer neps (258 vs. 556), lower total imperfection index (IPI; 548 vs. 1026) and less hairiness. The yarn from "Porloq" was of very high quality when compared to "Q4", which was also spun into a perfect quality yarn. "Porloq" spun into an excellent quality yarn, which would appear suitable for spinning into even finer combed yarns with large volumes of fibres used for scouring and spinning. Yarn tests demonstrated that RNAi fibre produces significantly higher-end textile products than fibre of similar quality in other cultivars, which requires further investigation.

To transfer this technology and make it available for major cotton-growing countries worldwide, single-seed decent T-7 family RNAi plant seeds of the sixth generation were transferred to USDA-ARS, Mississippi, US. The results from 2015/16 US field evaluations in replicated plots suggested a significant improvement in the fibre quality of the RNAi genotypes compared to its wild-type Coker 312 in the US environment. The saw-ginned fibre from the RNAi line, on average, had a fibre length of 1.21 inches and strength of 31.8 g/tex compared to the Coker 312 control plant with a fibre length of 1.16 inches and strength of 29.4 gm/tex. Genetic crosses of the RNAi genotype with 10 US cultivars indicated a potential for increasing the fibre length and strength of US cultivars with this phytochrome-based RNAi technology. These efforts will help transfer technology among US farmers and eventually to other stakeholders of all cotton-growing countries.

Economic impact

Exemplifying the first natural-fibre-related RNAi cotton commercialisation success worldwide, RNAi cultivars demonstrated their superiority to any traditional Uzbekistan varieties, both in terms of fibre quality, adaptation to harsh the environmental conditions across Uzbekistan, early maturity, and at least 20/30-percent increase in seed cotton yield or production of average lint fibre over 1,000 kilos per hectare versus the current estimate of 753 kilos/ha in Uzbekistan. "Porloq" varieties are producing 38-41 code cotton fibre (compared to 36-35 code of ordinary upland cotton) that would command a premium price and represent an increase in income of at least $100 per acre in Uzbekistan. This means that Uzbekistan could earn an additional $250 million from its current annual production of one million metric tonnes of lint fibre. This high-quality upland fibre makes it possible to spin a fine count of 50-70 Ne cotton yarn (against 30-40 Ne from ordinary uplands that Uzbekistan produces).

The yarn quality difference itself provides a 10-percent higher income. This pricing should allow expanded cotton production on marginal land and create a new cotton fibre/cloth market. That would mean Uzbekistan could

produce the same amount of 3.5 million tonnes of seed cotton or one million tonnes of lint, but in high fibre quality, by providing an opportunity to decrease its 25-percent cotton planting area. Given all the above, there are several positive ramifications associated with the anticipated usage of *PHYA1*-derived RNAi cultivars by farmers locally and globally that include: (1) the opportunity to produce superior, novel RNAi cotton fibre that should command a premium price and provide increased income per acre, and (2) the opportunity to spin a fine-count cotton yarn from any production zone.

Furthermore, the early flowering and maturity of *PHYA1*-derived RNAi varieties should provide an opportunity for early and quality crop harvests and on-time planting of rotation crops before harsh weather arrives, perfectly suitable and required for a northerly cotton-growing country like Uzbekistan. RNAi cultivars have increased seed cotton and lint yield per acre – farmers' foremost target and interest. Most importantly, early observations and ongoing field experiments revealed better utilisation of fertilisers and nutrients (due to increased nitrate reductase activity and robust root system). Increased photosynthesis rates, and salt, heat, and drought tolerance are added advantages of novel *PHYA1* RNAi varieties.

This sufficiently addresses the issue of problematic shortages in irrigation and water deficiencies triggered by forecast global warming that remains a priority danger for the Central Asian regions and other parts of the world. Through the use of cotton's gene, unlike other existing transgenic technologies of cotton, utilising foreign genes, this state-of-the-art *PHYA1*-mediated RNAi technology assures RNAi cotton cultivars' ecological safety. A high premium price of cotton fibre and increased yield should allow the expanded cotton production on marginal land and create a new cotton fibre/cloth market. Finally, a decrease in cotton planting area provides an opportunity to grow more food crops/plants that help to sustain world agriculture, food security and the environment at the regional and global levels.

Commercialisation

Self-pollinated T10 generation of single cell-derived and single seed decent RNAi Coker 312 plants, with fixed RNAi effects, are available in worldwide cotton breeding programs. Commercially adapted Uzbek RNAi cotton cultivars series "Porloq" successfully passed large-scale field trials of 13 different soil-climatic regions of Uzbekistan in 2013-2016, which were approved for comprehensive production and planted in over 65,000 hectares in the six major provinces of Uzbekistan in 2015-2017. More than 60,000 tonnes of RNAi lint fibre are available for the world textile industry to test and market novel textile products.

To make this technology readily accessible to all cotton-growing countries, a patent application on the new RNAi technology was filed in Uzbekistan, the US and internationally (PCT application; National phase applications in India, China, Egypt, and Russia). The US patent US9663560 was granted in 2017, and the technology is ready for licensing to other cotton-growing countries. RNAi cotton cultivar-derived products, including cottonseed oil and feeding products, have been evaluated biochemically and toxicologically via animal feeding experiments in mice and are fully approved for human use by the Ministry of Health of Uzbekistan.

Potential

Unlike existing transgenic cotton and technologies, phytochrome-specific and RNAi-based cotton cultivars, bearing only cotton genes, are ecologically safer. They could potentially have a multi-billion-dollar impact on the global cotton industry and help farmers fend off increasing competition from synthetic fibres.

This will increase the competitiveness of natural cotton fibres versus synthetic fibres, which have been snagging an increasing market share every year.

"The PHYA1 RNAi-based technology addresses multiple critical fibre quality needs in the cotton industry (especially length, strength, and elongation). The fibre data is comparable to the high-end "SJV Acala" cotton. The severe drought continues in California, and very little "SJV Acala" cotton was planted in 2014. Likely, there will be even fewer planted in 2015, and thus, there is a strong world demand for this high-quality fibre".

Cotton Incorporated

Conclusion

As described herein, the novel RNAi fibre with superior quality creates the possibility for new cotton fibre/cloth markets worldwide that provide better quality and long-lasting cloth/textile for lower prices.

Appendix

These achievements were highlighted in the recent report UNESCO Science Report: towards 2030 (https://en.unesco.org/sites/default/files/usr15_central_asia.pdf)

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"Porloq-4" PHYA1 RNAi cultivars planted on 25 April 2024 in prime farming land in the Nishan region of Qashqadaryo Province.

N.B. The Nishan region presents various challenges to cotton farming because of its elevated salinity and drought levels. Our latest research suggests that RNAi cultivars with suppressed phytochrom A genes may have good salinity resistance:

https://www.sciencedirect.com/science/article/abs/pii/S0885576521001521

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