

SHORT ROUNDUP ON COTTON PRODUCTION IN PAKISTAN

YEAR 2000-2019

Source: Based on Pakistan Economic Survey 2018-2019



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SHORT ROUND UP ON COTTON PRODUCTION IN PAKISTAN

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Section 1: Abstract

Like most developing countries, Pakistan is an agro-based economy, with agriculture contributing to 18.5% of the country's Gross Domestic product (GDP), and employing 38.5% of the country's national labor force. In terms of agricultural value addition, cotton is the second most important cash crop of Pakistan, with a 4.5% contribution. Moreover, cotton contributes to 0.8% of the country's GDP and is an important source of foreign exchange.

Given Pakistan's dependence on the cotton crop for both the agriculture and textile industries, improving the agricultural productivity of cotton is of extreme importance. Low cotton yields do not only impact those involved with growing and selling it, but also adversely affect cotton textile prices, decreasing exports.

Thus, the purpose of this paper is to analyze cotton production over the past 19 years, with the help of data provided in the Economic Survey of Pakistan 2018-2019, and to identify different factors that might lead to low or high cotton productivity over the years.

The following are the salient findings from the study:

1. In the past 19 years there has been an 18.2% decrease in the area of cropland under cotton.
2. The percentage of total cropland under cotton has decreased by 2.8% since the fiscal year 2000-01.
3. Cotton production decreased by 148 thousand tonnes from 2000.
4. Cotton yield increased by 83 kg/hectare over the past 19 years.

Disclaimer: The views and inferences expressed in the article are that of the author herself and Gallup Pakistan does not take any responsibility in this regard.

5. *Water availability is the lowest it has been in the past 19 years (127.40 MAF).*
6. *Area irrigated by canals decreased by 1.32 million hectares.*
7. *The percentage share of cotton output decreased by 5.49% from the year 2000 to 2019.*

Dear Reader,

Gallup Pakistan is delighted to share with you some of the remarkable work done by our Summer Interns this year through our platform.

We believe that the real issue in Pakistan with respect to empirical decision making is not the lack of availability of data but lack of awareness about sources of data sets.

This publication focuses on **Cotton Production in Pakistan**.

The main aim of this year's internship program was to engage our interns with the deluge of data available about Pakistan, process the complex information and convert it into usable information, upon which academics, journalists and also the common citizens can then build their expertise and analysis.

We accept that the analysis done by the interns may be quite rudimentary as they are not subject matter experts in relevant fields. However, the report attempts to convert dense data points and data sets into publicly usable information.

We are always happy to hear feedback on our efforts.

If you have any query or feedback regarding this exercise, please do not hesitate to contact Ms. Noor Un Nisa Shahid: noor@gallup.com.pk

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Section 2: Literature Review

The sub-continent region is often referred to as “the ancient home of cultivated cotton”, with the inhabitants of the area cultivating cotton here since prehistoric times. Archaeological evidence from the ancient city of Mohenjo-Daro (3,300 B.C.E – 2,700 B.C.E) consist of pieces of fabric made from indigenous cotton and fine muslins spun by Deccan weavers were well known outside of the region and were one of the most profitable exports until the colonial era.¹

The importance of cotton, commonly referred to as “white gold”, persists for the region. Cotton, as previously mentioned, is the second most important cash-crop of Pakistan and an important source of foreign exchange, as cotton products – in the form of textiles – contribute to 57% of the country’s exports.² Moreover, hundreds of ginning factories along with textile mills depend heavily on cotton for the production of their goods. This means that the cotton crop is not only an important source of livelihood for the millions of farmers in charge of cultivating it, but also for the millions of people employed along the entire cotton value chain, from weaving to textile and garment exports.³

Despite, its significance the agricultural performance of cotton has fallen short of desirable levels during the previous decade.⁴ Pakistan has fallen from being the fourth largest cotton producer in the world in 2015-2016, to being the fifth largest producer in 2018-2019.⁵ Given its importance, it is imperative that cotton production is brought up to mark and yield is not reduced even further.

¹ “Major Commodities of Pakistan-Cotton.” *Economic Digest*, vol. 3, no. 4, 1960, pp. 57–62. *JSTOR*, www.jstor.org/stable/41242978.

² <http://www.textile.gov.pk/>

³ Naheed, Ghazala, and Ghulam Rasul. "Recent water requirement of cotton crop in Pakistan." *Pakistan Journal of Meteorology* 6.12 (2010).

⁴ Pakistan Economic Survey 2018-2019

⁵ USDA Foreign Agricultural Service, <https://apps.fas.usda.gov/psdonline/circulars/cotton.pdf>

The decreasing performance of the cotton crop goes hand in hand with the stagnant productivity of the agriculture sector in recent decades. The low levels of cotton production can be attributed to various factors, such as increasing prices of agricultural inputs, pests and diseases, and lack of agricultural education. However, the most important cause of lower cotton yields in recent years is climate change. Higher temperatures, paired with lower levels of precipitation, are adversely impacting crop yields all over the region. Although, cotton is considered a drought resistant crop which prefers hot climates such as those of lower Punjab and Upper Sindh to flourish in recent temperature rises may prove to decrease cotton yields. A study aimed at identifying the effects of climate change on different crops in Pakistan found that the maximum temperature for cotton growth is 32 degrees centigrade during its production period, and that a one degree centigrade deviation of temperature from the maximum level would reduce production of cotton by 42.33 thousand bales.⁶ Given that the current summer temperatures in Pakistan well exceed 32 degrees, further reduction in cotton yield can be expected in future years.

Rising temperatures are not the only effects of climate change that adversely affect crop yield. Lack of sufficient rainfall is also a major contributor to low cotton production. The same study that determined the impact of rising temperature on cotton also identified the maximum level of precipitation required for cotton during its production cycle (40mm). A one millimeter deviation from this level would reduce cotton production by 0.50 thousand bales. Considering that cotton is grown in the arid regions of Pakistan, rainwater is not enough to sustain the crop during its growth. Moreover, since the groundwater in these regions is mostly brackish, irrigation canals are the main source of water for cotton

⁶ Siddiqui, Rehana, et al. "The impact of climate change on major agricultural crops: evidence from Punjab, Pakistan." *The Pakistan Development Review* (2012): 261-274.

crops.⁷ Thus, identifying the availability of canal water is highly imperative.

Moreover, the introduction of Genetically Modified (GM) cotton in Pakistan has also impacted crop yields. *Bacillus thuringiensis* is a soil bacterium that when expressed with the cotton gene, makes the cotton plant naturally pest resistant. Bt Cotton (GM cotton with *bacillus thuringiensis* in its genes) is now used widely all over the country and in 2010 accounted for 70% of all cropland.⁸ This cotton variety needs a lot of water to flourish,⁹ amounts which can only be provided in Pakistan from irrigation networks. Thus, a lack of irrigation water could cause significantly lower yields of cotton, a majority of which is now Bt Cotton.

Section 3: Area under Cotton Crop

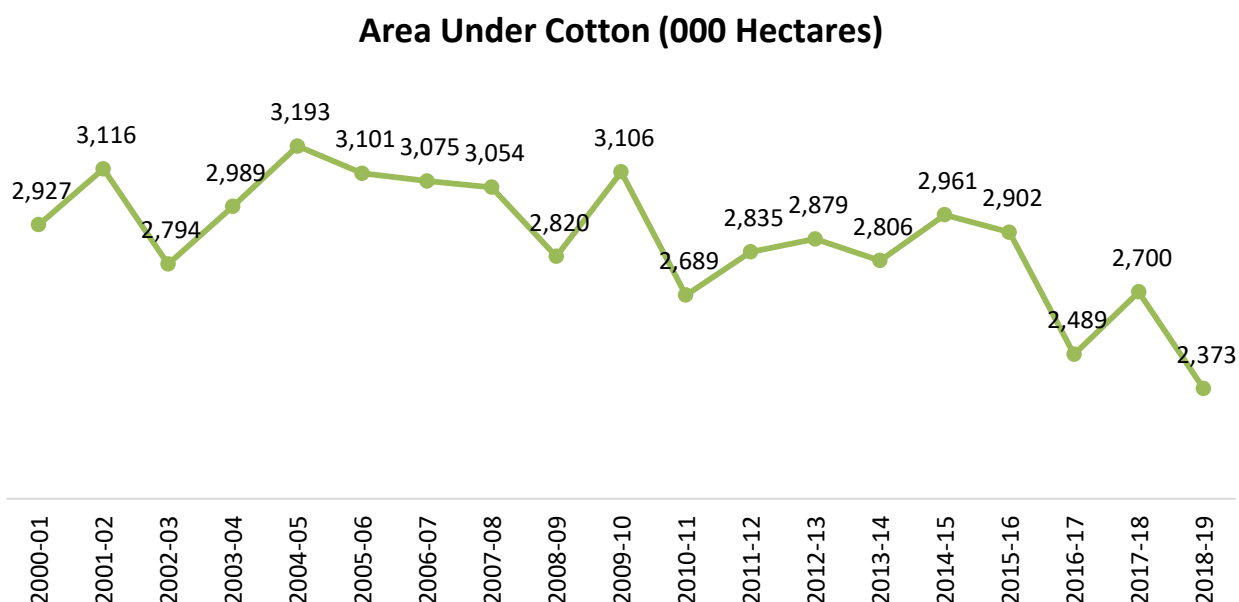
Cropland under cotton decreased by 554 thousand hectares over the past 19 years.

In Pakistan, over the last 19 years there has been an 18.9% decrease in cropland under the cotton crop. In the fiscal year 2000-01 the area under cotton was 2,927 thousand hectares, a figure which increased to 3,193 thousand hectares in the fiscal year 2004-05. From then onwards the area under cotton has been steadily decreasing with a few variations over the years. Area under cotton has reached its lowest value (2,373 thousand hectares) in the current fiscal year, 2018-19.

⁷ Ali, L. "Seed cotton yield and water use efficiency of cotton (*Gossypium hirsutum* L.) sown in different planting methods." *Pakistan Journal of Agricultural Sciences (Pakistan)* (2007).

⁸ Abdullah, Ahsan. "An analysis of Bt cotton cultivation in Punjab, Pakistan using the agriculture Decision Support System (ADSS)." (2010).

⁹ Kranthi, K. R. *Bt cotton-questions and answers*. Indian Society for Cotton Improvement (ISCI), Mumbai, 2012.



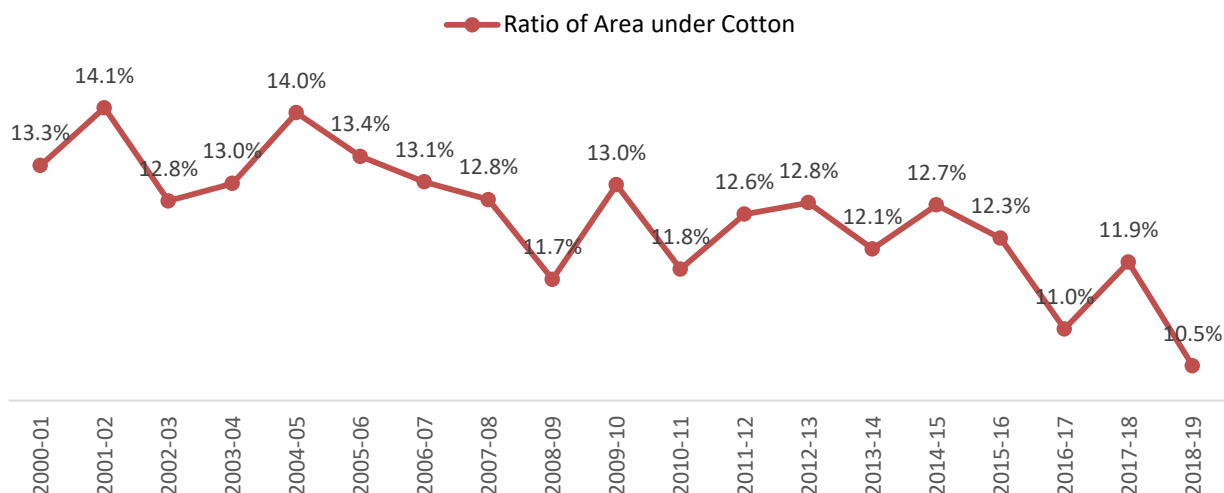
Source: Pakistan Economic Survey 2018-2019

Percentage of Total Area under Cotton: The percentage of total cropland in Pakistan under the cotton crop has decreased 2.8% in the last 19 years.

In Pakistan, the percentage of total area under cotton was 13.3% in the fiscal year 2000-01. This figure reached its maximum value over the past 19 years in the fiscal year 2001-02, and has decreased overall ever since (with a few variations over the years). The percentage of area under cotton is at its minimum value (10.5%) in the current fiscal year, 2018-19. The trend of the percentage of total cropland under cotton is similar to the one displayed by the area of cropland under cotton which shows that increases/decreases in area cultivated by cotton are proportional to the increases and decreases in total cultivatable area in Pakistan.

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Percentage of Total Area under Cotton



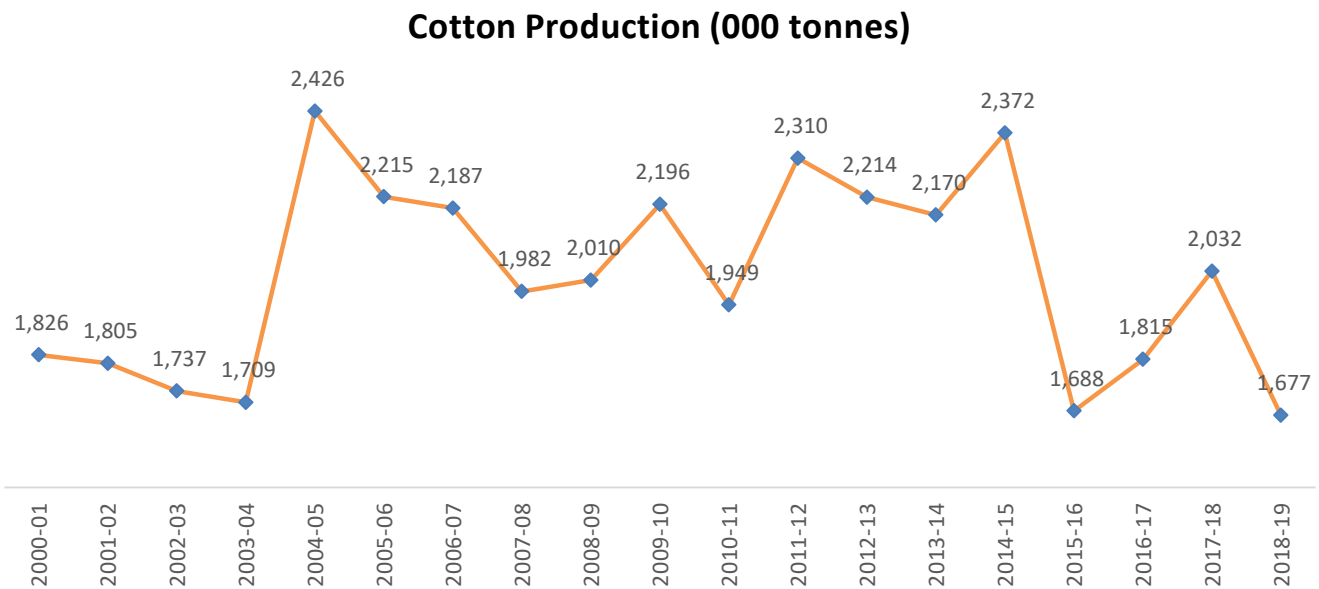
Source: Pakistan Economic Survey 2018-2019

Section 4: Cotton Production

Cotton Production reaches a low of 1,677 thousand tonnes in the current fiscal year 2018-19.

Cotton production has decreased by 148 thousand tonnes over the past 19 years. In the fiscal year 2000-01 cotton production in Pakistan, was 1,826 tonnes which increased to the maximum value of 2,426 thousand tonnes in 2004-05. The steepest drop in cotton production was from 2014-15 to 2015-16 when it dropped by 684 thousand tonnes and reached a value of 1,688 thousand tonnes. Cotton production dropped to its lowest value (1,677 thousand tonnes) in 2018-19.

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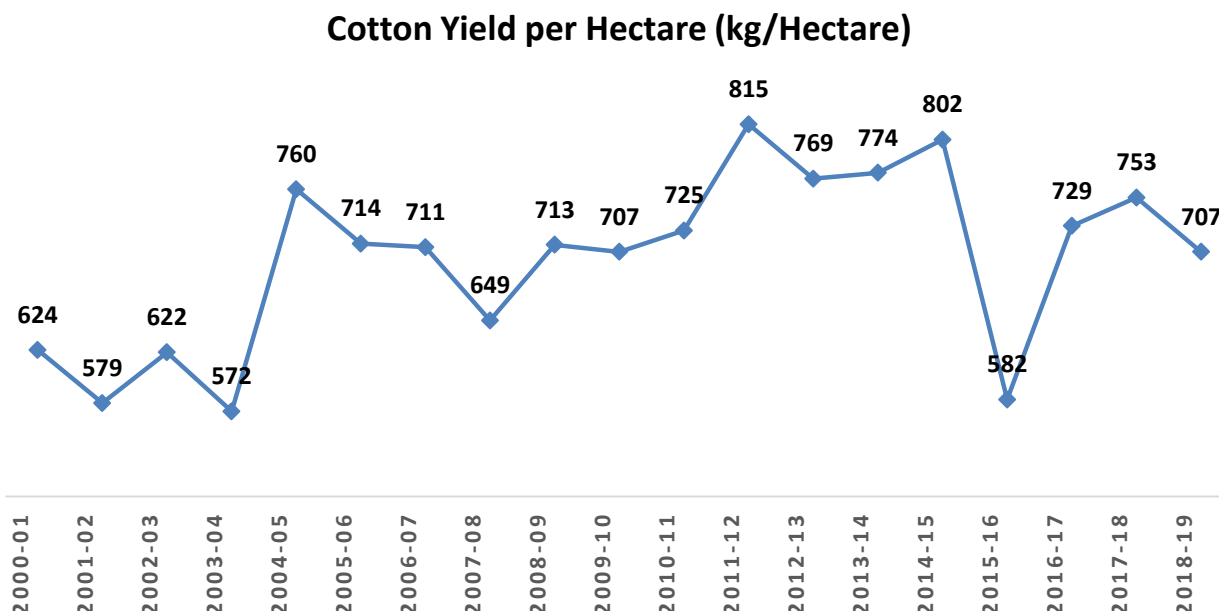


Source: Pakistan Economic Survey 2018-2019

Cotton yield per hectare increases by 83 kg/hectare over the past 19 years.

In 2000-01 cotton yield per hectare was 624 kg/hectare. The cotton yield reached its maximum value (802 kg/hectare) in 2014-15. This increase can be attributed to the legalization of the use of Bt Cotton in 2013. Bt Cotton provides farmers with higher yields, thus cotton yields per hectare have increased over the last 19 years while cotton production itself has declined. The most significant drop in cotton yields per hectare was from 2014-15 to 2015-16 when cotton yields dropped from 802 kg/hectare to 582 kg/hectare. Given that cotton production also declined sharply during that year, the cause of decline was most probably associated with water availability or a virus (such as leaf curl virus).

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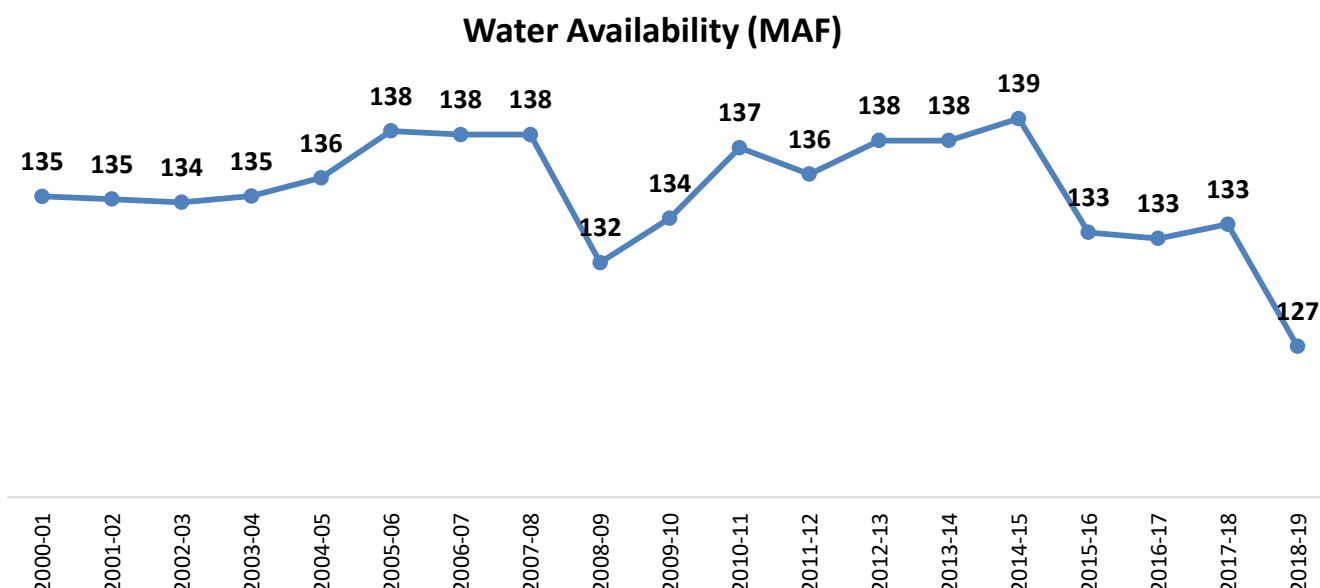
Source: Pakistan Economic Survey 2018-2019

Section 5: Water Availability

Water availability (in million acre feet) reaches a low of 127.40 million acre feet in the current fiscal year (2018-19).

Water availability has steadily decreased from 2014-15, when it was at its maximum value (138.59 MAF). In 2018-19 water availability reached its lowest value, 127.40 MAF, which might be a significant cause of decreasing area under cotton as well as cotton production, as less water makes the land uncultivable. Furthermore, Bt Cotton requires more water to grow thus, decreasing water productivity can also cause decrease in production.

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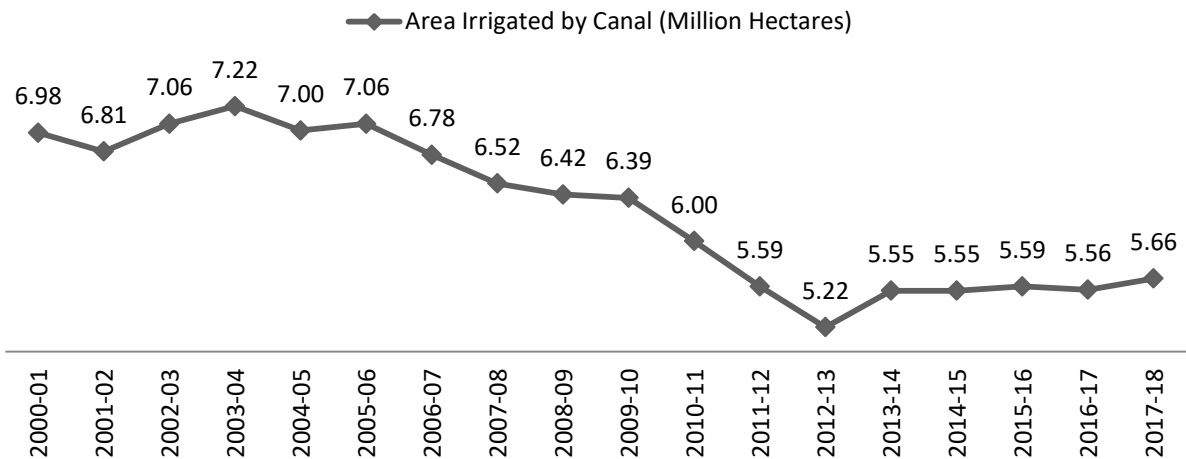
Source: Pakistan Economic Survey 2018-2019

Canal Irrigation: Area irrigated by canals decreased by 1.32 million hectares over the past 19 years.

In the fiscal year 2000-01, the amount of area irrigated by canals in Pakistan was 6.98 million hectares. This figure increased to its highest value on 2003-04 when it was 7.22 million hectares, after which canal irrigated area steadily decreased till it reached 5.22 million hectares in 2012-13. From then onwards canal irrigated area increased a little and remained mostly constant. In 2017-18 it reached a value of 5.66 million hectares.

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Area Irrigated by Canal (Million Hectares)



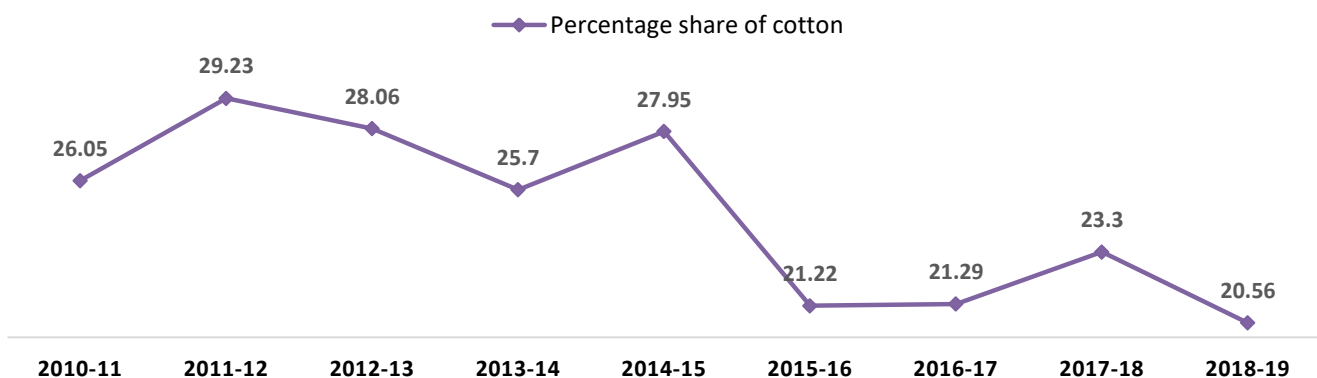
Source: Pakistan Economic Survey 2018-2019

Section 6: Percentage Share of Cotton Output

Percentage share of cotton output reaches its lowest value, 20.56%, in 2018-19.

Decreasing cotton production over the last 19 years seems to go hand in hand with the decrease in percentage share of cotton output, in Pakistan. In the fiscal year 2000-01, cotton output had a 26.05% share, which increased to its highest value (29.23%) in the following year, 2001-02. In 2018-19 it reached its lowest value of 20.56%.

Percentage Share of Cotton Output (%)



Source: Pakistan Economic Survey 2018-2019

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Section 8: **Conclusion**

Based on the analysis above it can be concluded that cotton production has been deteriorating over the past 19 years. Cotton production decreased by 148 thousand tonnes from 2000 to 2019. This could be due to a 554 thousand hectares drop in cotton cropland and a 7.37 MAF drop in water availability over the 19 years. Since cotton is an important source of foreign exchange revenue and essential for the livelihoods of the millions of people involved in the agriculture and textile sectors, its productivity should not be allowed to decrease further.



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