Overview of the Cotton in Pakistan and its Future Prospects

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Review Article

Overview of the Cotton in Pakistan and its Future Prospects

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Abstract | Pakistan ranked 4th among cotton producing countries worldwide. Cotton cultivation along Indus river irrigation system across nearly three million/ha and recognized as the backbone of the economy for the country. Despite the fact that Pakistan is overwhelmingly an agricultural based economy. Cotton cultivation is mainly focused on its fiber but cotton seed oil is significantly used as a comestible vegetable oil and makes major contribute in the national oil industry. According to an estimate per capita usage of edible oil in the country is 15 kg, this is even higher than the consumption in countries with same economic status of economical evolution. Overall requirements for this purpose in 2028–30 is estimated at approximately 5.30 million/tons from which domestic share could be only 1.99 million/tons. Generally, the genetically modified cotton (Bacillus thuringiensis) was acquaint in Pakistan during the first decade of this century to moderate harmful effects of lepidopterous insects; which were causing major loss to the cotton production ultimately to the economy of the country. Currently the genetic modified cotton cultivation consumed for more than 95% area under cotton cultivation. There are certain pros and cons about the issues being faced by the cotton growing community of the country raising concerns for Bacillus thuringiensis cotton cultivation. Particularly in non-traditional cotton cultivation zones which is facing a limited insect-pest-pressure. Moreover, water scarcity is extremely high temperature in the core zones colligate, which is already under observations where the temperature is extremely high. In Pakistan, closely 1.7 million peoples they are engaged in growing cotton crop. The farmers of Pakistan surveying and evolution for high quality of fiber and high quality of lint yield sweetening, the Pakistan also fulfills its 18.8% of comestible oil demand from cotton seed oil. Information acquiring on seed cotton oil and its consumptions is while ever short and not available. There is impregnable need from industry to furthermore sanctify cottonseed oil to provide it suit for direct used as vegetable cooking oil alternatively of hydrogenating it is also known as ghee in (solid form), devising cotton production more vulnerable to abiotic and biotic menace.

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Introduction

The cotton *(G.hirsutum L.)* is a worldest preeminent fiber, and as well as natural crop extending one of the worlds' biggest textiles industries having a yearly economic impact of at least $600 billion worldwide (Ashraf *et al*., 2018). The genetic resources of upland cotton extensive a compass of germplasm of 50 cotton cultivated species which proffer distinctive chance for savvy the development of cultivated cotton from wild species antecedent they will pave the manner for analyzing the development of fiber lint

and function of polyploidy for increasing the cotton fiber and as well as lint production. The other aspects such as knowing the genetic diversity and its usage in getting sustainability of lint quality and cotton yield, and usage of bio-based substitute such as, procession in understanding change in various biochemical, physiological, morphological, and genetically significant traits had been discoursed such as other major crop, much accent was given on apprehension cotton belongs to genus Gossypium using different genomic technology that are considerably laid down the base for prolong the cotton fiber and lint yield by (Rahman *et al*., 2009). Yet there are many views to research (Chen *et al*., 2009). Enormous event in narrow and broad genetic base of cotton cultivars (Rahman *et al*., 2008). The conventional genetic resources had been applied over the years; while ever, cotton lint yield has been seeming for previous few years.

There was the demand of time to existence extremely for increasing fiber features aspects, evolving cotton confabulate resistance to disease and other harmful insect pests, and abiotic emphasize. That has been proponent genetic manipulation and revolution in advancement of genomes (Abelson, 1998). This critique covers all accessible and new genetic resources in cotton, and their possible for consumption in the futures. Meliorate consumption and genetic resources menace to cotton yield now a day. The cultivation of cotton, weaving and spinning in the Indus valley about 3000 Bce (Hutchinson, 1954), once upon a time when cotton was similar manner consumed in Egypt. Gossypium arboreum, which germinates from the primitive G. herbaceum, the cultivation has been delineated and it was ancient of Moen Jo daro at least 6000 Bce (Moulherat *et al*., 2002).

Pakistan is the world's largest No 4th producer of yarn, 2nd largest exporter, and the 3rd largest exporter (USA, ICAC), and the seventh largest cloth producer in the world. Pakistan's cotton products for nearly 60% of its overseas earnings (See Figure 1). However, at least 2% of gross domestic product economy of Pakistan's intemperately reliant on cotton and its derivations and about 10% its value added in agricultures by (Bakhsh *et al*., 2009; Sial *et al*., 2014).

China, India and the United States of America USA are the top most leading countries where measuring of cotton production in thousand metric tons. China is the top most first which cotton produced 6,532 thousand metric tons and India is the top 2nd cotton producing country that produces cotton 6,423 thousand metric tons in the previous last few years, whereas the united states of America had a top 3rd cotton producing country which produce cotton of 3,553 thousand metric tons.

Along with around nearly one lac farmers growing cotton, the china is the largest cotton producing country in the world. It has at least 7,400 textile companies that produce US $75 billion of cotton cloth annually. The cotton cultivation needs moderate rainfall for its growing. To save the cotton plant from harmful threats, such as chewing and various borers, there is a large amount of consumed of fertilizers and pesticides and fertilizers. See result below in (Table 1).

Table 1: *Top cotton producing countries in the world.*

Million 480 Ib. bales	2013 /2014	2014 /15	2015 /16	2016 /17	2017 /18	2017 /18
China	31.0	29.5	25.9	27.0	28.5	28.5
India	32.8	30.0	22.0	22.8	27.5	27.5
United States	12.9	16.3	12.9	17.2	21.3	21.0
Pakistan	9.5	10.6	7.0	7.7	8.2	8.2
Brazil	8.0	7.0	5.9	7.0	8.0	8.0
Australia	4.1	2.3	2.9	4.1	4.4	4.7
Turkey	2.3	3.2	2.7	3.2	4.0	4.0
Uzbekistan	4.1	3.9	3.8	3.7	3.7	3.6
Mexico	0.9	1.3	0.9	0.8	1.5	1.5
Turkmenistan	1.6	1.5	1.5	1.3	1.4	1.4
Mali	0.9	1.0	1.0	1.2	1.4	1.4
Burkina	1.3	1.4	1.1	1.3	1.3	1.3
Greece	1.4	1.3	1.0	1.0	1.2	1.2
Rest of World	9.8	9.8	7.7	8.5	9.0	9.6
African Franc Zone	4.1	4.8	4.0	4.8	4.8	4.8
EU-27	1.6	1.7	1.3	1.3	1.5	1.5
World	120.4	119.1	96.2	106.8	121.4	121.9

This statistic shows the world's leading cotton producing countries in crop year 2017/2018. China India, United States, and Pakistan these are the top most world's cotton growing countries, as mentioned in the Table 1.1.

Table 1.1: *Worldcotton exports.*

Million 480 Ib. bales	2013 /2014	2014 /15	2015 /16	2016 /17	2017 /18	2017 /18
United States	10.5	11.2	9.2	14.9	14.5	14.8

Australia	4.9	2.4	2.8	3.7	4.4	4.4
Brazil	2.2	3.9	4.3	2.8	4.2	4.2
India	9.3	4.2	5.8	4.6	4.2	4.2
Burkina	1.3	1.1	1.3	1.1	1.1	1.1
Greece	1.3	1.2	1.0	1.0	1.1	1.1
Mali	0.9	0.9	1.0	1.1	1.1	1.1
Uzbekistan	2.6	2.3	2.3	1.3	1.2	1.1
Turkmenistan	1.6	1.5	1.3	0.9	0.7	0.7
Benin	0.5	0.5	0.7	0.8	0.7	0.7
Cote d'Ivoire	0.8	0.9	0.8	0.6	0.6	0.6
Tajikistan	0.4	0.5	0.5	0.3	0.5	0.5
Sudan	0.2	0.1	0.1	0.3	0.1	0.5
Rest of World	4.7	4.6	4.1	4.0	3.9	3.9
African Franc Zone	4.1	4.0	4.6	4.3	3.9	3.9
EU-27	1.6	1.6	1.3	1.3	1.4	1.4
World	41.1	35.1	35.1	37.3	38.2	38.8

Source: https://www.worldatlas.com/articles/top-cotton-producing-countries-in-the-world.html.

The Pakistan cotton production

The Pakistan's cotton belt extends over 1200 km along with Indus river among the latitudes of 27 ◦N to 35 ◦N and altitudes from 27 m to 155 m. The soil changes from clay loam to sandy with clay dominant towards the south (ADB, 2009). In overall, the cotton cultivation covers the area about 2.79 million/ha. Upland cotton is mainly grown in two provinces of Pakistan: first one is Sindh and other one is in Punjab provinces, the Punjab, the most and specific cotton cultivation sector, and the other one is Sindh, Sindh is also well known about cotton cultivation, see in (Figure 3). In Punjab the cotton is cultivated mainly in Jhang, Raheem Yaar, Bahawalnagar, Bahawalpur, Vahari, Multan, Khanewal, Rajanpur, Ranipur, Muzufrabad, Lodran, and Faisalabad Districts of Punjab above all districts are well known for cultivation of cotton production. Whereas in Sindh province, it is commonly cultivated in these districts which are listed such as, Nawabshah, Kazi Ahmend, Naushero-feroze, Ghotki, and Khairpur districts. The above all areas fall in D zone. These are the very hot and dry regions of Sindh provinces where cotton is cultivated, the climatic zones of the Pakistan's country where the uppermost temperatures are measured up to maximum from 45 ◦C to 50 ◦C in the Pakistan (Figure 2). Cotton root is vertical so it is tolerant to drought and high temperatures so it is very sensitive to water availability, particularly at the time of flowering stage and ball formation stages. When increases in temperature increase development and evolution, it did not transcend 35 ◦C.

According to very short rainfall (155 to 755 mm), the production of cotton is relying on irrigation. Regarding to the (WWF, 2005), the cotton plants take the 3rd largest partake of irrigation after than the sugarcane and rice. The yield of the cotton in sindh province is 855 kg per hacter and the average productions of cotton in Punjab province which is 695 kg/ha mentioned below in (Table 1, 2 and 3). These two figures are under irrigated where cotton is less when equate along the average to world cotton production. Pakistan is the world's largest cotton producer and most vulnerable to environment change The Bank of Asian Development Bank, (ABD, 2009). Growing of cotton, the majorly depends on water via the Asian river and its feeder; they will carried low irrigation because of the melting of ice on Tibetan and Himalayan mountains when temperature is high usually in the month of June and July and a drop-off in snowfall by (Rees and Collins, 2004; Van Raaij, 2010). Intergovernmental panel on climate change, 2008. When it further decreases happens in the accessibility of fresh water then growers will probably replacement to low irrigate needs for cotton Pakistan, (IPACC, 2009). The Pakistan cotton is a like a small farmer crop: at least 85% of farms are very shorter than ten/ hac.

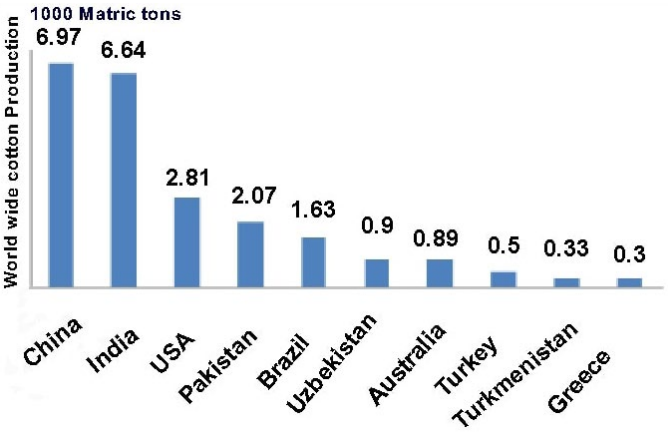

Figure 1: *World ten leading cotton producing countries (MMT) during 2013–14.*
Source: *Statista* http://www.statista.com/statistics/263055/cottonproduction-worldwide-by-top-countries/

Usually for cotton growth the maximum temperature is 28.5 ◦C to 35 ◦C but in Pakistan the temperature range up to 35◦C when cotton cultivation season the temperature is between 41◦C to 47 ◦C, sometimes it increases and goes up to peak point at least 50 ◦C which is very higher for human as well as for animal survival. In Pakistan heat stress is also a major restraint to increase the production per hectare by (Raza, 2014). A survey demonstrates that a when

temperature grownup of 0.4 ◦C. In previous few years it will rigorous consequence on yield of cotton crop and as well as cotton yield. The most important factors that are effecting on upland cotton among them one is also main problem which is effected by cotton leaf curl virus diseases CLCV disease, less water availability, Pakistan cotton facing many other problems which are also effecting on cotton yield and production such as, heat stress, and the huge costs of inputs which are essential for cotton crop such as (insecticide, seed pesticide, fertilizer, as well.), and the other relative high extremely harmful threats insect attackes, seed adulteration, also the basic problem of less availability of quality of the seed, from them there is no crop insurance nor cotton marketing issues system, these are all also major problems that are effecting on cotton production.

Table 2: *Area, production and average yield of cotton in Pakistan during 1947–2014.*

Sr	Year	Area (million hectares)	Lint Production (million bales)	Av. Lint yield (Kg/ha)
1	1947-48	1.24	1.11	362
2	1949-50	1.11	1.24	452
3	1959-60	1.34	1.64	494
4	1969-70	1.76	3.01	326
5	1979-80	2.08	0.73	350
6	1989-90	2.59	8.56	560
7	1999-00	2.98	11.24	641
8	2009-10	3.1	12.9	707
9	2014-15	2.78	1.48	810

Source: *Economic survey 2004-05 statistical appendix pp. 24-25, Economic survey 2010-11.*

Fiber of the cotton is a spectacular single-celled schematic system which is helpful in perusing procedures like as cell expansion and biosynthesis cellulose. These distinguish from the dermatogen's of evolution seeds, and are unbranched and unicellular. That have been described that higher than one and half millions fibers commonly evolve in every kernel of the seed of cotton . And the genes are connected in fiber evolution and are useful for apprehension in genetic ways (Haigler *et al.*, 2005). The G. arboreum have at least six species from them "bengalense" species which is mostly cultivated in Pakistan sindh province sanghar district (Rahman *et al.*, 2012). G. hirsutum cultivation begin in the indo subcontinent revolution of textiles in 1930 BCE (Rahman *et al.*, 2008), due to shortage of time, the cultivation have been moved to G. Arborium species, and it's now grown on less than 2.1% of the total land which is used for growing of cotton in Pakistan, and its expected continuously decreased.

Table 3: *Cultivated area, seed consumed, available seed and yield per hectare during last six years.*

Sr. Year	Area (million hectares)	Seed Required	Seed Availability	Yield (Kg/ha)
2009-10	3.1	40000	12460(26%)	2107
2010-11	2.7	40000	7366 (18%)	2125
2011-12	2.8	40000	5446 (1.4%)	2416
2012-13	2.9	40000	4630 (1.4%)	2170
2013-14	2.8	40000	20684 (3%)	2319
2014-15	2.9	40000	20951 (22%)	--

**Percentage of certified seed, Source, Federal seed certification and Registration Department (FSC and RD) 2015-16.*

Table 4: *Province-wise and total target of cotton sowing and quality of seed required during 2015-16.*

Pakistan		Punjab		Sindh		KPK		Balochistan	
Area Quality(million/ha) (m/tons)		Area Quality (million/ha) (m/tons)		Area Quality (million/ha) (m/tons)		Area Quality (million/ha) (m/tons)		Area Quality (million/ha) (m/tons)	
3.2	40243	2.5	30252	0.6	58192	0.01	125	0.04	5.84

Source: *Federal seed certification and Registration Department (FSC and RD) 2015-16; *Percentage of certified seed, Source, Federal seed certification and Registration Department (FSC and RD) 2015-16.*

Table 5: *Scenario of pesticide used on cotton and other different Crops.*

No	Crop	Percentage of use
1	Cotton	60
2	Rice	7
3	Sugarcane	2
4	Cereals	4
5	other	27

Source: *Kang (2013); Lasbella and Kohlu in Balochistan and khan and murdan in KPK are most suited for organic cotton production.*

Lint or fibers are the main cotton products. Hull, linters, oil and meal, cotton seed cakes, are the products which we obtained from cotton seed subsequently from ginning process see in (Table 5). The Hindus and Chinese they obtained oil from cotton seed in the previous ancient times through conventional techniques. The oil they used for cattle feed, and they also used oil in lamps for light. On the other hand, the extraction of oil did not evolved for local used.

Table 6: *By products of cotton seed after ginning process.*

Products	Origin	Percentage	Usage
1 Linters	Short fiber till clinging To the seed after ginning	Depends upon the Species G.hirsutum has About 10.5% but arboreum Varieties have 4.3 to 5.9%	Cellulose products like cellulose acetate,-carboxy, Methyl cellulose ,viscose rayon, micro crystalline,
2 Hulls	A tough protective covering Of the kernel	30-35% depends upon conventional variety and species of cotton	feed rich with Cellulose
3 Oil	Extracted from the Kernel	20% vegetable oil	cattle used as edible
4 Meal	Meal Residues after oil extraction	40%	Rich in protein and used as animal feed

Source: *Balasubramanya and shaikh (2007).*

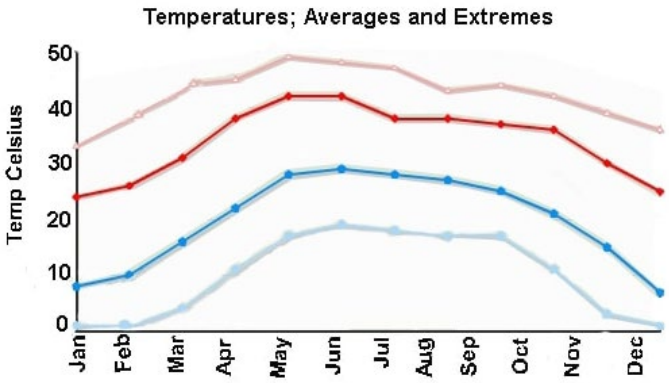

Figure 2: *Temperature of cotton region in Pakistan.*
Source: http://www.myweather2.com/City-Town/Pakistan/Multan/climate-profile.aspx

Figure 3: *The Pakistan cotton production*

Introduction or of new technology to cut off the hulls and linters, the industry of cottonseed expand now around in the world as mentioned in (Table 6). Cotton is mostly grown as a source for yarn and fiber a major rootage of comestible vegetable oil. Whiles, the soya bean, Rape and Mustard, Canola oil, and Date palm oil are also the world's leading oilseeds crops in the Pakistan, which includes (282.4 million tons in 2012 to 2014) comply by rape and mustard seed (72.1 million tons), and the amounted of cottonseed is 45.6 million tons by FOA Food Outlook (2014). In previous time, the Pakistan was self-sufficient in oil producing but with the short of time local yield remains not growing whereas require is grow because of growing of population, growing of peoples incomes and variations in used procedures. A survey had been demonstrate that when the population and local production grown with the similar time, the overall need will be 5.39 million tons and the national yield will 1.97 million tons by 2028–30, implying the require of total which is import 3.37 million tons. In what comply, it is expected that the growing of population and yield will also grown at similar manner that is 2030 by (Zaman *et al.*, 2010). According in 2013 and 2014 the humans used oil is 3.74 million/ton, which is equal to per person consumed of 15 kg, which is doubled in the very short in developed countries. Most comestible oils are used by the peoples of Pakistani are (1000/tons): Soya bean oil is used 1.78%, Helianthus annus seed oil is 385.9 (13.33%), Cottonseed oil 478.10 (17.37%), Date palm oil is 1298.9 (49.65%), Canola oil 365.1 (13.27%), and Rape/mastard oil is 75.6 (3.37%). Overall of the 2.74 million tons of oil used in total in 2013 to 2014, 0.847 million tons (41.21%) was locally created. 1.894 million tons (78.73%), were imported from foreign countries see in (Table 7) from various countries during the year, such as date palm and soya bean oils of the national yield, the main contributed which is (66.67%) is obtained from cotton seed. Regarding 2013 and 2014, the cotton was grown on the area of 3 million/ha as mentioned in the (Table 8) and create 3.12 million/tons of cottonseed with an optimum average of 1.38 t/ha as equate to the last few years 2012 to 2013 when total cotton seed yield was 4.01 million tons at an ordinary of 1.35 ton/ha (USDA, 2014). The cotton seed oil, sort as comestible vegetable oil, is popular for cooking's such as (fries, excite, so on.) it also used for salad oil (it is also especially used for recipes for making mayonnaise).

Table 7: *World oilseed production and oil production during 2013-14.*

No	Oilseed Crop	World oilseed production (million tons)	World oil production (million tons)
1	Soyabean	282.4	45.11
2	Rapeseed	72.1	25.33
3	Cottonseed	44.5	5.14
4	Sunflower	41.7	14.39
5	Ground nut	38.81	4.80
6	Palm kernel	14.6	56.63
7	Copra	5.6	--
Total		499.7	

Source: *FAO Food Outlook May (2014).*

It tastes like as coconut oil. Cotton seeds of different varieties have different chemicals constitution and fatty acids. A single spoon (12.9 g) of cotton seed oil includes 127 calories and 3.4 g of impregnate proteins. That is a great source of antioxidants, vitamen k and vitamen A. these are deeming as a good health and diet. The oxidative constancy of cotton seed oil is sufficient because having huge level of linoleic acids which is (18:2) as mentioned in (Table 9) that grows its tendency to become sour. To indemnify for this, that is partially hydrogenated. Which decreases the position of linoleic acid but it also grows the quantity of unsuitable trans-proteins (Dowd *et al.*, 2010). The cotton seed oil has also a large amount of a fat soluble vitamin, natural antioxidants which contribute to the lengthy healthy life. The natural oxcidants are hold huge levels frying products and maintained them pure and fresh for a long time period. Fat soluble vitamins are the major abundant and had major activity of vitamen E, having higher concentrations of cotton seed oil than most of the other oily seeds crops as mentioned in (Table 10).

Table 8: *Major oil imports (quantity and value) during 2009-10, 2010-11, and 2011-12.*

	2009-10		2010-11		2011-12	
No oil crop	Quantity (1000 t)	Value (Millions $)	Quantity (1000 t)	Value (Millions $)	Quantity (1000 t)	Value (Millions $)
1 Soyabean	27	28	66	67	39	51
2 Palm oil	1702	1951	2375	2021	2109	2375
3 Total	129	1979	2441	2088	2148	2426

Source: *Memon (2012), Federal Bureau of statistics.*

Table 9: *Cultivation, yield and production of major oil seeds crops in Pakistan.*

No	Crop	Cultivation(million/ha)		Yield (tons/ha)		Production (million/ tons)		Oil extracted (1000T)
		2012-13	2013-14	2012-13	2013-14	2012-13	2013-14	2013-14
1	Cottonseed	3.00	3.00	1.33	1.37	4.00	4.10	478.0
2	Sunflower	0.47	0.40	1.49	1.50	0.70	0.60	251.0
3	Rapeseed	0.38	0.36	0.92	0.89	0.35	0.32	128.0
4	others	0.11	0.11	--	0.10	0.10	0.10	--
5	Total	3.96	3.87	1.30	1.32	5.12	5.12	857

Source: *Economic survey of Pakistan 2013-14, oilseed development board.*

Table 10: *Fatty acid comparison of cotton seed oil with major oil sources.*

No	Source	Myristic	Palmitic	Stearic	others	Oleic	Linoleic	linolenic
1	Cottonseed	0.79	24.70	2.20	--	20.87	50.76	--
2	Sunflower	0.38	4.27	5.46	--	49.41	40.48	--
3	Soyabean	--	10.33	3.86	--	26.52	52.92	6.37
4	Mustard	--	2.10	0.39	3.01	10.31	13.80	11.52
5	Palm	1.50	45.00	4.00	--	39.00	10.50	--

Source: *Agarwal et al (2003).*

Table 11: *Tocophrol contents in various edible oils.*

No	Oil	Total Contents (mg/100g)	Alpha-tocopherol (Mg/100g)			
			Alpha	Beta	Gamma	Equivalent
1	Canola	66	19	43	4	23
2	Corn	104	26	75	3	33
3	Cottonseed	65	35	30	--	38
4	Olive	13	12	1	--	12
5	Palm-oil	26	6	11	9	8
6	Rapeseed	67	22	19	26	24
7	Soyabean	104	10	70	24	17
8	Sunflower	65	62	3	--	62

Source: *Agarwal et al (2003).*

Agricultural national research system of cotton in Pakistan

The local organization along with official mandate for evolution and development in the Pakistan is Cotton Central Committee (PCCC) it is working under the ministry of textile industry. It possess 3 stations: number one Cotton Central Research Institute which is situated in Punjab, district Multan, the second one is Cotton Central Research Institute which is located in

Sindh, district Sakrand, and the third one is Pakistan Institute of Cotton Research and Technology that is situated in Sindh, district Karachi, in Sindh there are at least seven Research Institutes which are located in different regions of sindh emplacement (Khyber Pakhtunkhwa includes one Cotton Research Institute, there are two cotton research institutes which are located in Balochistan, and two cotton research institutes which are in Sindh, and two stations are Punjab).

The research institutes system supervise collection of germplasm, multiplication sustainment, characterisation, classification, and partitioning to private as well as public sectors, the evolution of stress resistant and higher yielding varieties, the manner of acting of local interconnected varietal trials, and the production of cotton issues, the purvey backup to the cotton seed production system, with the international and national actions and other cotton seed companies and management projects. As so far according to that sector, greater than 42 germplasm had been evaluated by means of conventional breeding methods. Most of the institutes' they are conducted some activity through the Director of Agriculture and Research, which comes under in the national cotton R and D department. There are three research stations in Pakistan, Atomic energy Commission (PAEC), this institute also working undertakes in R and D department. The National Institute of Biotechnology and Genetic Engineering (NIBGE), located in Faisalabad, and the Nuclear Institute of Agriculture (NIA), situated in tando jam sindh province. They possess the Nuclear Institute of Agriculture and Biology (NIAB), which is situated in Faisalabad; above these all institutes are working developing new and methods for evaluating new varieties and germplasm through conventional breeding methods such as (molecular breeding, mutation breeding, and evolution of transgenic material). In the provincial levels, very short institutions are also developing cotton genotypes. In Punjab province, cotton research institute had also three sub research institutes which are situated in different climatic zones, are listed below Multan, vahari, Dera Gazi Khan, and in Sindh province, Balochistan, Khyber Pakhtunkhwa, cotton botanists are working under R and D department. Since the coming of Genetic modified cotton in Pakistan, different provincial and national institutions and 12–15 registered seed companies and private sectors had to start a seed production and breeding programs with the coordination of the Pakistan Central Cotton Committee (PCCC). Different national and international cotton R and D departments with some important aims are also being undertaken to address a range of issues along the ultimate aims of multiplying local cotton yield and quality of cotton.

Organic cotton in Pakistan

Actually the cotton devours more insecticides rather than other crops; it is calculated 30% area of the worldwide consume of pesticides and 15% of insecticides consume is counted for by cotton crop growing. Many insecticides sprayed in the cotton fields areas easily run off and pollute fresh air as well as fresh water sources. Insecticide poisons are established in human nutrition's and animal's farms and even in breast milk. The World Health Organization (WHO) calculates that every annual 2000 thousand people were died in developing countries because of pesticide residues. The pesticides cause many diseases such as neuro developmental effects in children's, and cancer in adults. The pesticides snare in the threads are a source of different harmful effects like as dizziness, rashes, irritated skin, rashes, headache, (Diet, 2013). At least 60% of insecticides are consumed for cotton cultivation in Pakistan; mentioned in (Table 4) (Kang, 2013). In additions, the most plebeian insecticide group which is ingesting for cotton cultivation which is organophosphate. The above pesticides groups had residual effects for long term that are very harmful for all living organisms which are engaged in cotton belt are especially prone. Along the inauguration of genetically modified cotton, the consumed of insecticides fail but did not stop. People, of the American and European countries, are currently more worried about their health, and the requirement of organic cotton is growing up day by day continuously. In Pakistan, Balochistan, KPK, Vaheri and some other places of Punjab districts have potency area to cultivate organic cotton due the pest is very less and consequently a less quantity of insecticides is consumed as comparisons to other cotton growing places, in the Punjab districts such as Faisalabad, Jaffarabad, and Nasirabad.

Genetically Modified Cotton (GMC) in Pakistan

In Pakistan generally genetically modified cotton is one of the most harmful menace in the cotton cultivation crop are attacked by mastication insect pests; they had been decreased yearly production by 35–45% (Masood *et al*., 2011). Due to illegally growing of Bacillus thuringiensis cotton in Pakistan. Bt cotton was grown by few liberal growers at the starting

of the 21st century. Bacillus thuringiensis cotton was legally certified by the Pakistan government in 2009, and BT cotton was first grown in 2010 in Pakistan. Prior to certify by the government officials, unofficially imports and uncertified varieties growing lead to the distribution of substandard seeds having the tag of Bt. cotton (Altaf and Ahsan, 2009). At this time greater than 80% of the land is cultivated along Bt. Cotton cultivation in Pakistan. Regarding the year 2011 to 2015 a total of 16 Bacillus thuringiensis cotton genotypes was officially certified and allows for local growing at the different areas of the country.

The standard for the toxin manifestation of Cry1AC genotype is 1.4 µg/g but various surveys described that the average expression from 0.04 to 1.98 µg/g by (Cheema *et al*., 2015), in national varieties. Very less levels of the poisons manifestation may lead to resistance between plague opposed to this gene (Ferre and Van Rie, 2002). Concurrently with 2015, resentment usually the evaluation of resistant genes in cotton crop opposed target pierces plague was so common as to demand the optimization of the gene's manifestation or the inaugurations more than two genes to address the matter. Overall genetically modified cotton associated activities are lead out below the provisions and National Bio-safety principles and plans, 2007. To convey discipline to the local seed companies, regarding the act of 1976 has been modernize as the 2015 seed revise act; and in 2016 The Plant Breeders Right act Bill is being introduced in discipline to boost investing in national plant breeding and to fortify the local seed yield plans.

BT cotton in Pakistan

Bacillus thuringiensis cotton was legally acquainted in Pakistan during in 2010. In despite, even prior to that, Bacillus thuringiensis cotton was cultivated in highest tracts (overall 52% of the land under cotton cultivation) along uncertified Bacillus thuringiensis cotton genotypes by (Hayee, 2005; Nazli, 2009) described that some large and liberal growers in the Punjab provinces and in Sindh provinces first grown Bacillus thuringiensis cotton contraband from australia and adjacent countries in the anciently in 2000, after that they started selling seeds produced at their own farms to other farmers in different area of the country. We designed this survey taking into consideration the spreading of un-officially Bt cotton seeds in the survey area.

The overall performance of Bacillus thuringiensis cotton depends on the agronomical-climatic conditions, genotype of the variety and harvesting pattern. A good-performing Bt cotton variety in one area may not produce wanted intensely results if cultivated in a various agronomical-climatic zones. Therefore, only certified Bt cotton genotypes, which are manifested for the local agronomical-climatic conditions, are referred for use. A country has to comply bio-safety conditions to approve a Bt cotton variety for commercial use. In Pakistan, the Bacillus thuringiensis varieties were developed by different private or public sector plant scientists through hybridization Bt cotton material with local germ-plasm genes so that the Bt trait is shifted to locally developed cotton genotypes. These genotypes are circulating without a formal regulatory framework that ascent several pertain about seed quality, cognisance between farmers, and the potential impacts on human as well as on animal health, and biodiversity. Six of these genotypes were certified for field trials in 2009 and expected to be released for local use in 2010. The deficiency of in-depth study about the economic and yield performance of these Bt genotypes relative to conventional varieties, and the Pakistan spokes about farmers‟ suicide, death of sheep constellate and lower profitability acclivity savvy about the commercial acceptation of Bt cotton in Pakistan. The NGOs and civilization society organizations are retention presentment against the local adoption of Bt cotton by Reference the Pakistani examples.

Future prospects for cotton production

The cotton yield in 2014 to 2016 diminution by 27pc to 8.95m bales, due to because of agronomical-environmental changes, rivalry along other crops, very low market costs and eruption of harmful pink bollworm, regarding to the international advisory cotton commission that held its 75 celebration in Islamabad. It informed about future aspects on cotton plan ideate a no strategic that possess evaluation hybridization cotton, crop management and ameliorate farms, and germ-plasm improvements, bringing supplementary land under cotton growing especially in Khyber Pakhtunkhwa and Balochistan and decreasing post-harvest losing. Coordination and planning research and evaluation cotton departments, between provincial and federal cotton research stations, is being fortify to improve cotton yield, increase production/ha, create pest resistant genotypes, boost bacillus thuringiensis cotton growing and meliorate the overall quality and production of upland cotton.

Cotton crop is harvested by 1.3m growers on over the area 3.2m hectares of land, that is 16pc of the arable area land of the country, along an optimum yield oscillate vicinity 13.9m bales to 14.10m bales. That is ingesting highly by the country's 522 textile mills, however the quality at least 1m bales is also exported to foreign countries. While ever, to fulfill the requirement of additionally long staple cotton at least 2.3m bales are imported from foreign countries yearly. Regarding to the government of Pakistan argument, National Research Cotton and development sector was being streamlined along with interest to carry it at with international levels. The local government was also promoting national and international technology suppliers to acquaint the new and highly effective insect pest protection technologies. The idea of this objective is to review and document best practices available for production of cotton worldwide and possibilities of their implementation in Pakistan. The study would include good practices for picking, storing and transportation as well. Geographical distribution and current status of cotton production in Pakistan, to assess the current geographical distribution and suitability of cotton yield in Pakistan, production levels, and climatically suitability, of both quality and quantity base, their restraint and happening of expanding yield in other many desirable zones. Socioeconomic profits to cotton growers will be determined to create case survey to expand its production in other non-traditional areas.

Trace and identify cotton supply chain and determine current supply, demand and consumption status, to determine current supply chain of cotton production and its sanctity focusing on cater chain dynamics and supplier behavior with a view to changing market forces. They are changing the way they are sourcing from their suppliers. The spreading presence of the mass merchandisers in cotton is expected to actually excite need for product from farmers, but it also leads to an increased rivalry for providers. Therefore, it is important to review the provide chain to streamline efforts to coordinate motley of business functions among different supply chain actors. There is a no of institutions driving the spreading use of international and national cotton. Equally a consequence of consumer interestingness, usually the cotton fiber is consumed in every things which are used for humans consumed such as (make-up removal pads, sanitary products, swabs, and cotton puffs), and for home accessories like as (sheets, towels, beddings, bathrobes, and blankets), for children's merchandise like (toys and diapers), and all kinds of clothes and styles such as (sports or the workplace, whether for lounging), and all kind of stationery and note pads and note cards.

Determine current condition of cotton certification in Pakistan, certification of cotton yield sums believability to the last merchandise guaranteed the purchaser need of status and merchandise promotes defrayal of premium cost to growers who pursue in organic pattern. Certification programmers and criterion change, especially in reaction to regional differences; however, there are commonly underlying conception. The international organic federation and agricultural department have created basic criterion screening organic yield and also textile procedures that cater a minimal basis upon which criterion in many countries had been based. Under this situation, that is so significant to appraise the current position of certification processes, practices and their procedures. Possibilities of developing enabling environment for cotton yields review current cotton production policies and plans to develop a set of recommendations for policy makers.

Conclusions and Recommendations

The Pakistan, closely 1.7 millions of formers are engaged in cotton cultivation and its value chain. The Pakistan is the fourth biggest cotton lint producing country in the world. The major work and investigation, evaluation work in the country is adjusted to the lint production and the quality of lint sweetening. Pakistan also fulfills its 18.8% of comestible oil demand from cotton seed oil. There is solid demand from industries to foster more sublimate cotton oil to provide it suit for direct ingestion equally frying and cooking oil alternatively of hydrogenating it is also known as ghee in (solid form), devising cotton production more vulnerable to abiotic and biotic menace. Some target traits such as drought to resistance and heat stress, insect diseases and pests, and some utile like as physiological and morphological aspects have been established in diploid cotton cultivation varieties. For acquaint helpful traits in cotton varieties, crossing in many species such as G. arboreum, G. herbaceum, G. barbadense, and Gossypium laxum with G.barbadence and G. hirsutum comply by elevation of embryos in culture media may ease for overcoming cytogenetically barriers. This procedure is used for increasing the genetic base as well as acquaints genes confabulate traits which are nonexistent in the cotton

cultivated varieties.

Author's contribution

QFM conceived the review paper, AHJ wrote this review paper LW, XW, investigations and interpretations of this manuscript, and FS analysed and finalized the review paper, all authors read the final manuscript and approved for submission.

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