The ICAC Recorder

Snippets from Recent Global Cotton Production Data

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Introduction

The new edition of the COTTON DATA BOOK 2021 published in June 2021 has data on cotton production and cotton trade of 40 major cotton producing and consuming countries. Cotton production data include information from different cotton-growing provinces, states or regions of each of the countries. The data book covers aspects related to number of farmers, area, production, productivity (yield), seed processing, tillage methods, planting methods, stalk usage, weeding practices, methods of harvesting and ginning, spray application methods, fertilizer usage, cropping systems, water footprint, cost of production, cost of cultivation etc. All the national average values presented in the data book are weighted means derived from the states, provinces and regions. Government coordinating agencies and researchers kindly provided the data. A few countries publish their production data on web sites that was accessed as official source.

Cotton Area, Production and Productivity

Figure-1a, 1b, Global cotton map

Cotton acreage

Cotton was cultivated over an area of 31.66 million hectares. Cotton in 2020 was cultivated in more than a million hectares in each of these six countries- India, USA, China, Pakistan, Brazil, and Uzbekistan. Together, these countries account for more than 75% of the global cotton area. India leads in the area under cotton production with almost 13 million hectares that accounts for about 41% of the global area. (Fig. 2)

Cotton area trend

The global average cotton area was 32.917 million hectares (MHa) over 30 years from 1990 to 2020. Global acreage was highest at 36.1 MHa in 1995. Interestingly, area remained high at 33.3 MHa to 34.2 MHa from 1996 to 2001 and at 34.5 MHa to 35.5 MHa during the period 2004 to 2007. Cotton acreage increased to recent high at 34.8 MHa in 2019. (Fig. 3)

Cotton productivity

The global average productivity (yield Kg/Ha) in 2020 was 761 kg lint per hectare in a range from 700 to 800 Kg/Ha over the past 15 years since 2004. Amongst the major cotton growing countries, Australia is predicted to have the highest productivity of 1,905 kg lint per hectare in 2020 in the world. Six countries, namely, Australia, Brazil, China, Israel, Mexico and Turkey, have crossed the yield mark of 1500 kg/ha. Over the past 20-25

Figure-2. Cotton area

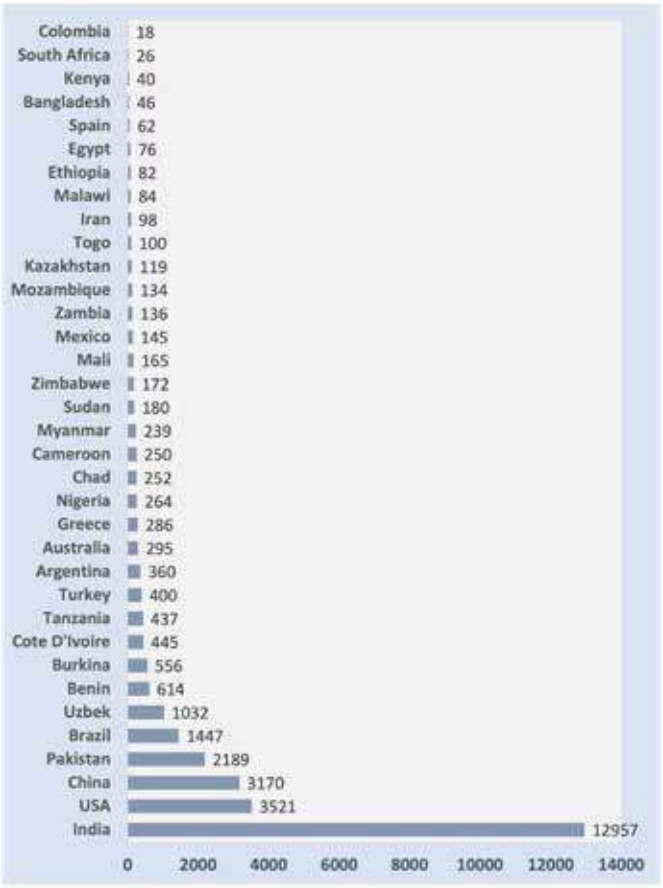
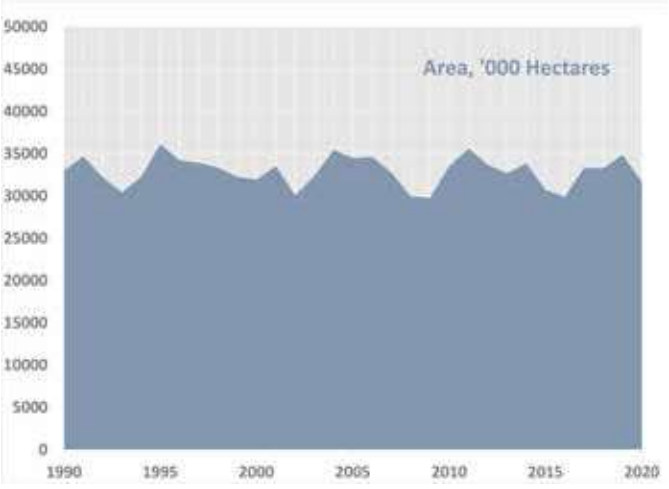
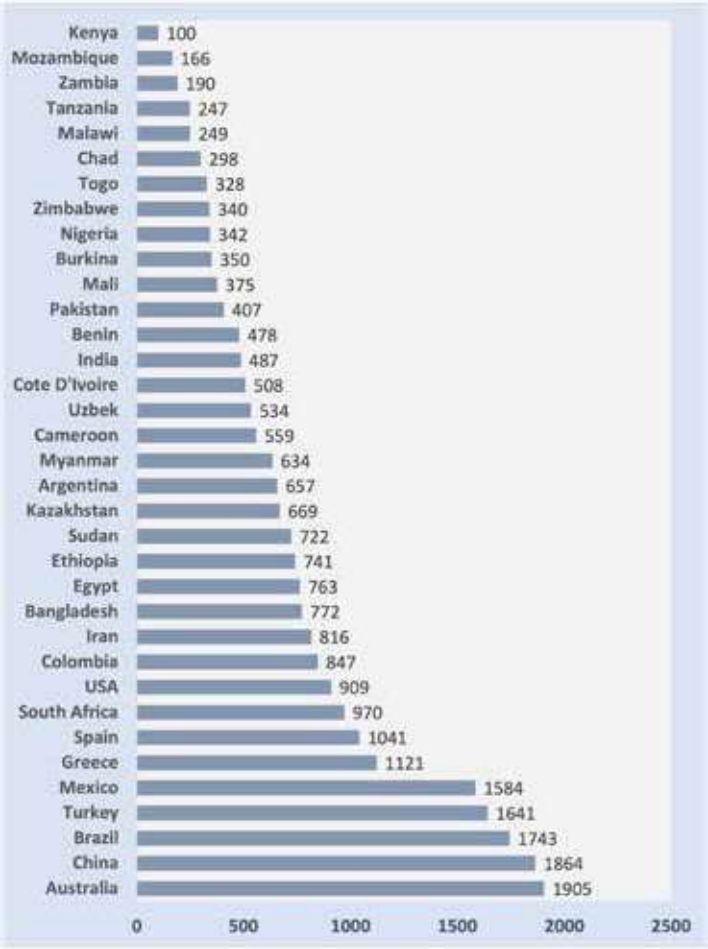


Figure-3. Cotton Area Trend 1990-2020



years, cotton productivity in China, Brazil and Greece has been consistently more than the global average yield. Eleven African countries harvested the lowest yields in the world. (Fig. 4)

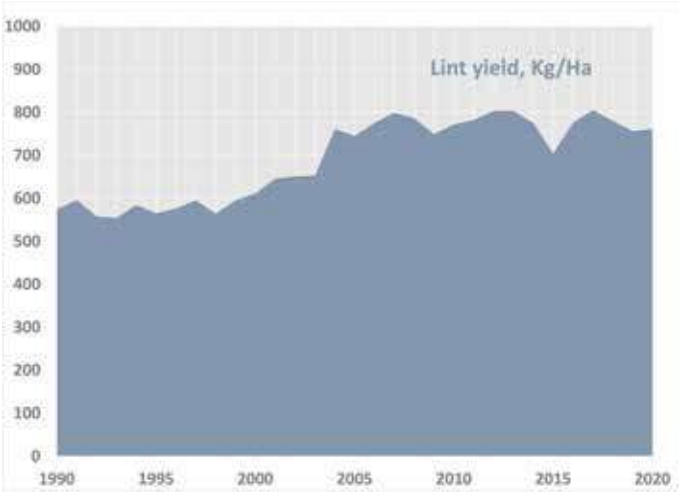
Figure-4. Cotton Lint Yield (Kg/Ha)



Cotton yield trend

The global average cotton yield was 692 Kg lint per hectare over 30 years from 1990 to 2020. Yield reached the highest point at 799-805 Kg/Ha in 2007, 2012, 2013 and 2017. Interestingly yields increased over the years with a decadal average of 576 Kg/Ha during 1990-1999, 718 Kg/Ha during 2000-2009 and 776 Kg/Ha during 2010-2019. (Fig. 5)

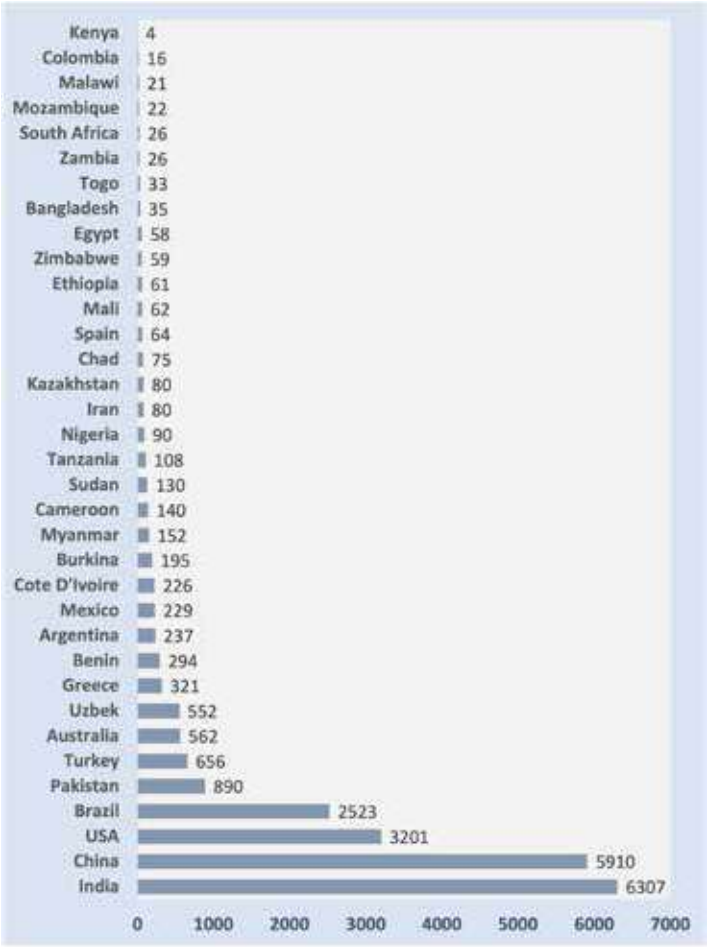
Figure-5. Global Lint Yield Trend 1990-2020



Cotton lint production

Global production is forecast to reach 24.1 million tonnes in 2020. India, China, USA and Brazil lead in cotton production producing more than 2 million tonnes each. Together, the four countries account for 21.1 million hectares and produce 17.9 million tonnes, which in percentage accounts for 66.6 percent of the global area under cotton and 74.4 percent of global production.

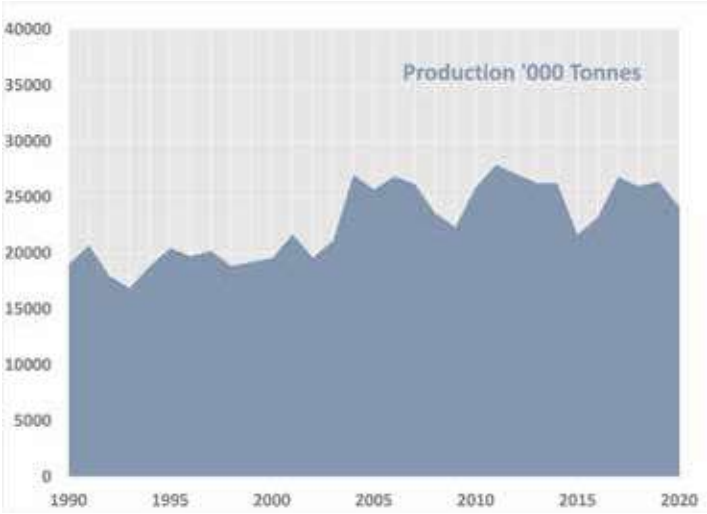
Figure-6. Cotton Lint Production



Cotton lint production trend

The global average production was 19.5 million tonnes (Mt) per year during 1990 to 2003. Production increased to a higher annual average of 25.5 Mt during the period 2004 to 2020. One of the main reasons for increase in production after 2004 is the significant increase in area and production in India. India's production increased from 3.0 Mt in 2003 to 5.2 Mt in 2007 and increased further to 6.76 Mt in 2013. India's average annual production during the last 10 years from 2011 to 2020 was 6.2 Mt. (Fig. 7)

Figure-7. Lint Production: Trend 1990-2020



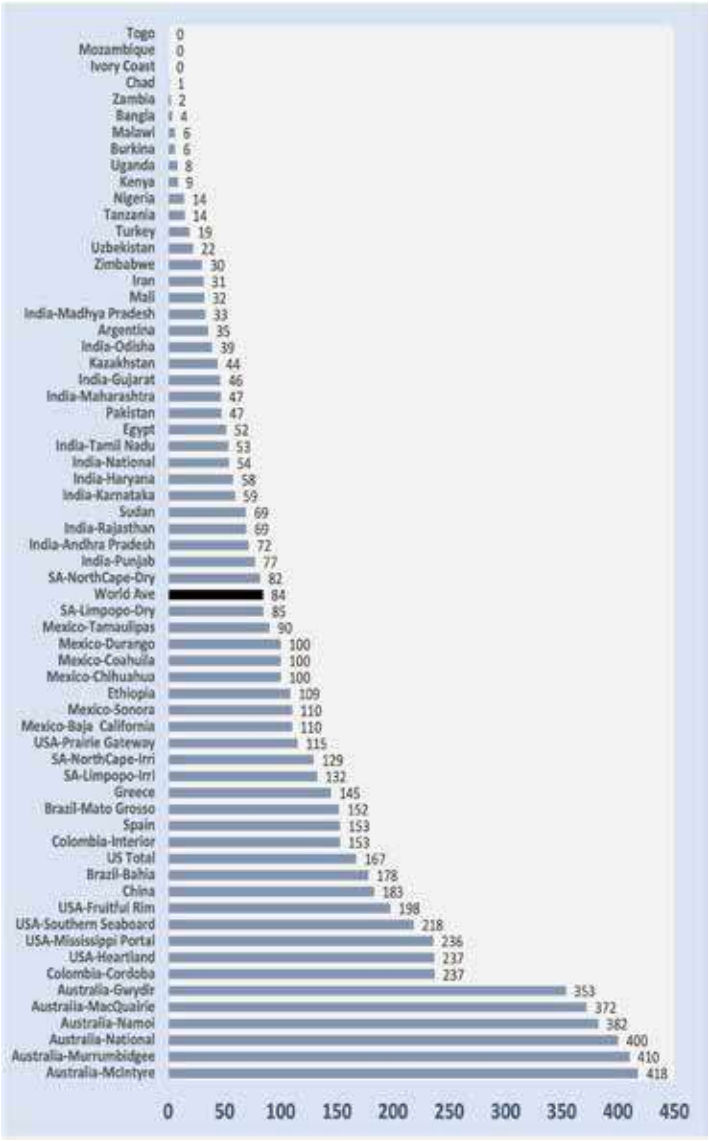
Cost of Cultivation: Input Costs per Hectare

Cost of cultivation data was provided by officials and researchers. Data of Australia, USA and India were compiled from official websites. All values were converted from local currencies to US$ based on the prevalent conversion rates of 2020.

Seed cost per hectare

The world average seed cost per hectare is US$ 84. Seed cost is dependent on the type of seed- whether it is a genetically modified variety or a genetically modified hybrid or a non-GM variety. It is important to mention that most countries across the globe cultivate cotton varieties. India has the largest acreage of cotton in the world. India cultivates *Bt* hybrids in more than 90% of it's area and incurs a seed cost ranging from US$ 33 to US$ 77 per hectare. The seed cost per hectare across the globe ranges from US$ 0 to US$ 418 per hectare. Togo, Mozambique, Ivory Coast, Chad, Zambia, Bangladesh, Malawi, Uganda, Burkina Faso and Kenya incur less than US$ 10 as seed cost per hectare. Australia, Colombia, USA, Brazil and China incur seed costs ranging from US$ 167 to US$ 418 per hectare mainly towards the high cost of proprietary GM seed. (Fig. 8)

Figure-8. Seed Cost (Us$) per Hectare



Fertiliser cost per hectare

Fertilisers are the important inputs that contribute to high yields if used through precision technologies. However, chemical fertilisers also contribute to high costs of cotton cultivation. Fertiliser cost per hectare is influenced both by the type of fertiliser used as well as the cost of fertilisers in a country. The world average fertilizer cost per hectare on cotton is US$ 218. Cotton farmers from 11 countries across the globe- USA, Turkey, Greece, South Africa, Brazil, Spain, Egypt, Bangladesh, Colombia, Australia and China spend more than 218 US$/Ha towards fertiliser costs. Fertiliser use per hectare is the highest in China (855 US$/ha) followed by Australia where farmers spend between 358-594 US$ per hectare. Fertiliser usage is very low in Africa therefore the low cost. However, low cost in many countries is primarily due to fertilizer subsidies on urea and fertiliser support to selected P& K fertilisers. (Fig. 9)

Figure-9. Fertiliser cost (US$) per hectare

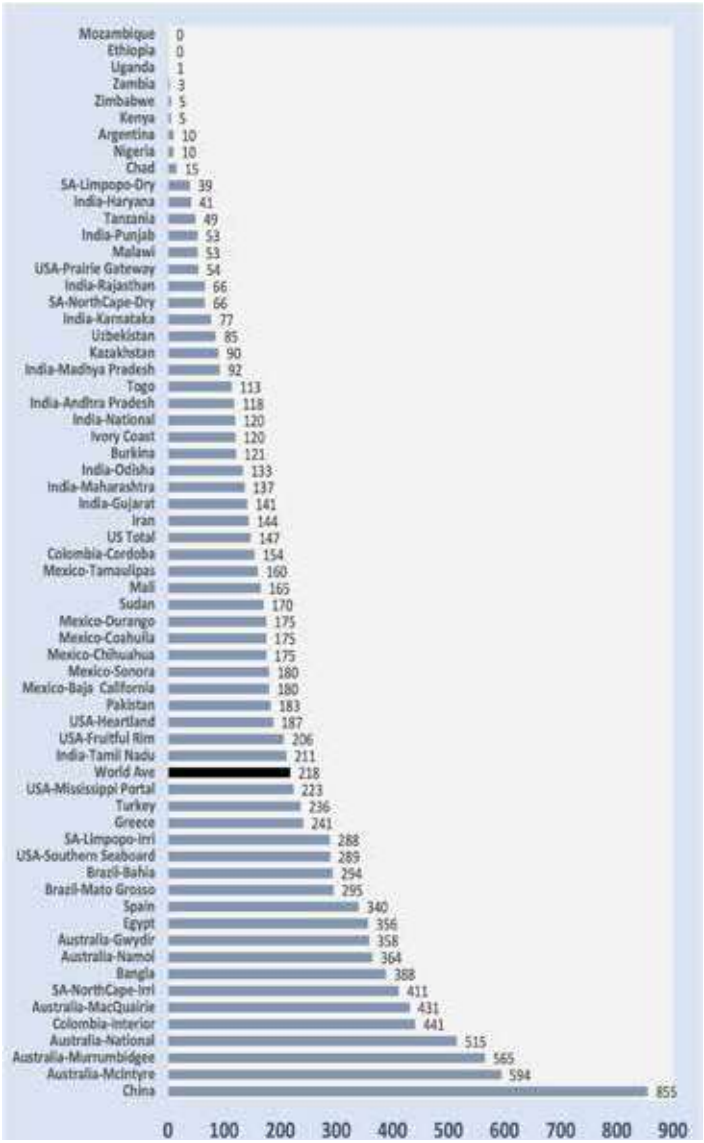
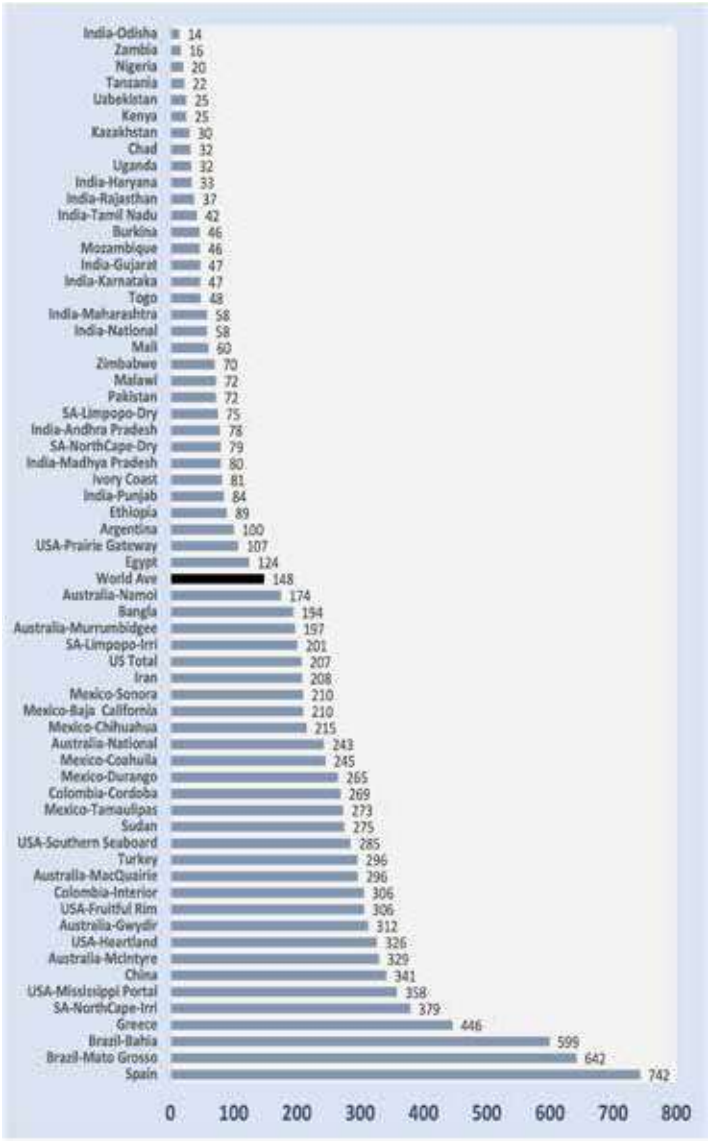


Figure-10. Pesticide cost (US$) per hectare



Pesticide costs per hectare

Pesticide costs range from US$ 14 to US$ 742 per hectare with a global average of US$ 148 per hectare. The top five countries with the highest pesticide costs per hectare are Spain, Brazil, Greece, parts of South Africa and USA. Pesticide costs of the 3 top cotton growing countries, India, China and USA are US$ 58, US$ 341 and US$ 207 per hectare respectively. Most countries in Africa use less than US$ 100 on pesticides per hectare. (Fig. 10)

Insecticide costs per hectare

In developed countries, chemical insecticides have become an integral input for cotton cultivation. The world incurs an average insecticide cost of US$ 94 per hectare of cotton. This value depends on the type, dose, cost, and frequency of application of the insecticides. Some countries, like Brazil, incur about 3.5 times higher than the world average of insecticide cost per hectare. Uzbekistan on the other hand, reported negligible cost on insecticides. The value of insecticide costs in the three dominant cotton producing countries of the world are US$ 58, US$ 52 and US$ 250 per hectare, in India, USA and China, respectively. It is interesting to note that many African countries do not cultivate Bt cotton. Yet, insecticide costs per hectare is less than half the world average as in Zambia, Malawi, Mozambique, Tanzania, Togo, Uganda, Chad, Burkina Faso, Ivory Coast and Mali. (Fig. 11)

Weeding costs per hectare

The global average cost per hectare on weeding is US$ 90. Weeding costs across the globe, range from US$ 13 to US$ 382 per hectare. Spain did not report any specific costs incurred on herbicides or weeding. These costs are influenced by the type of weeding (hand/herbicide) and the labour costs that are incurred on weeding. Weeding costs per hectare are the highest in Bangladesh, followed by Greece, Mexico, Sudan, parts of India, China, and Mali. Weeding costs are less than US$ 20 in Zambia, Pakistan, and Chad. (Fig. 12)

Figure-11. Insecticide cost (US$) per hectare

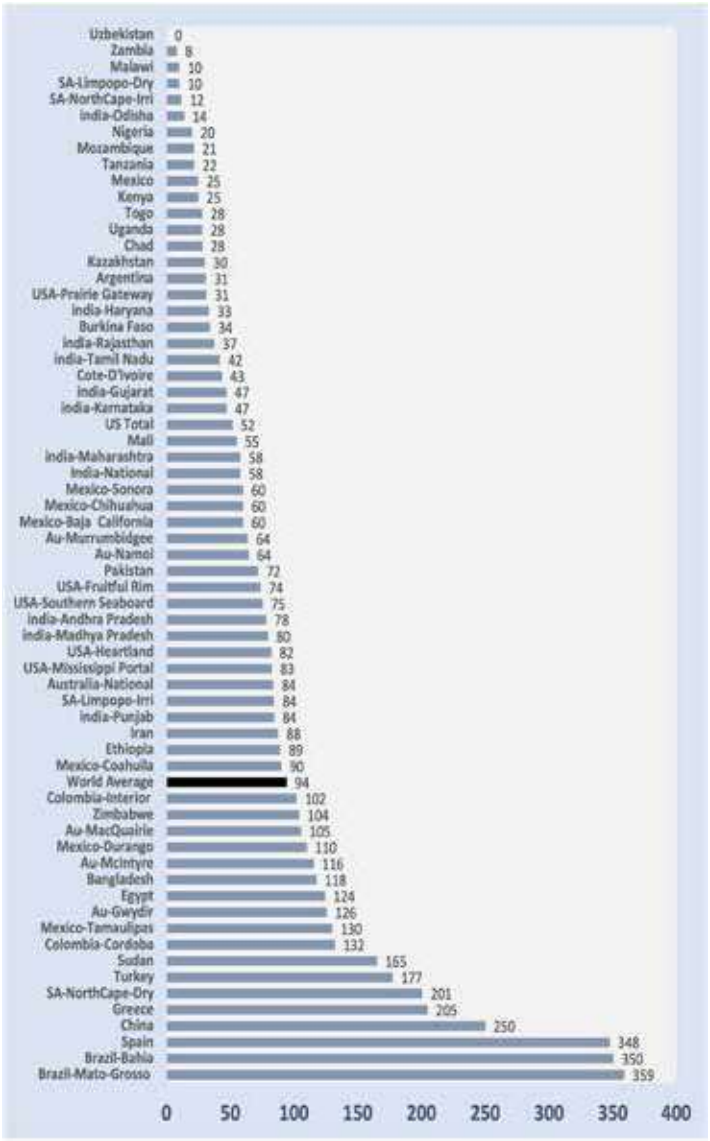
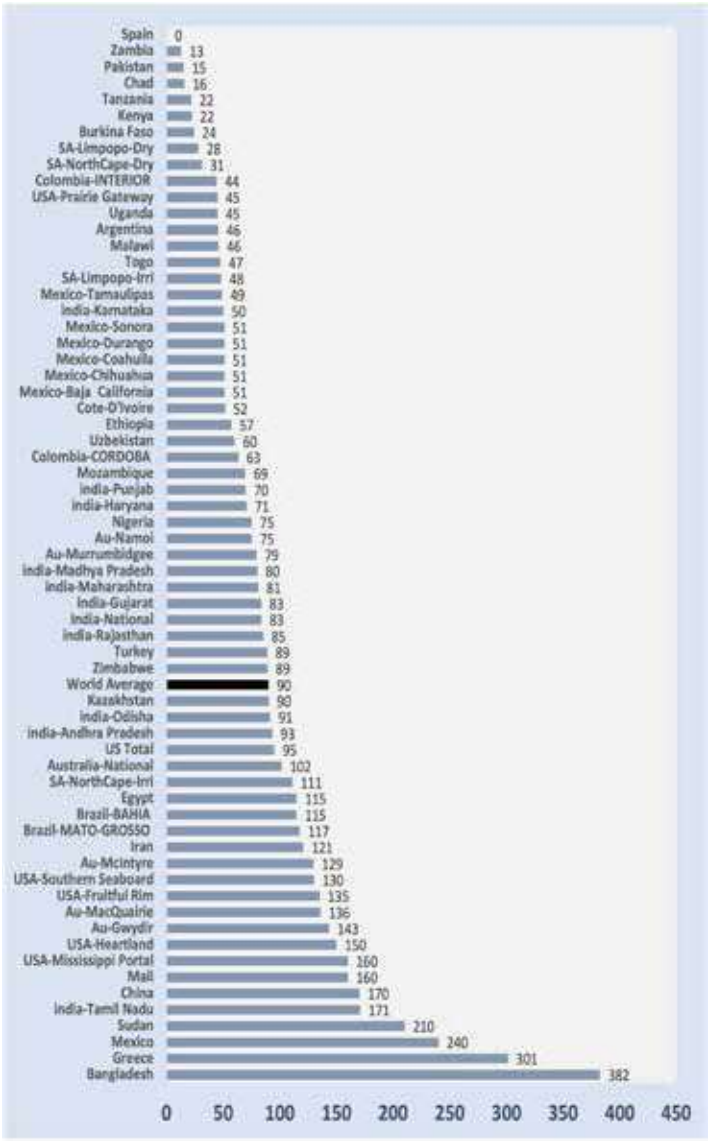


Figure-12. Weeding cost (US$) per hectare



Machine-use cost per hectare

Major cotton growing African countries barely use machines in their cotton production operations, as indicated by the machine-use cost of less than US$ 100 per hectare. Ethiopia, Mozambique and Sudan incur machine costs slightly higher than rest of the African countries. India, that cultivates the largest acreage of cotton, incurs a machine-use cost less than the world average, relying heavily on the use of manual labour. Machine-use cost is highest in Australia where the national average is US$ 2,782 that is at least 8.5-fold higher than the world average machine-use cost per hectare. Large farm holdings and scarce availability of manual labour has driven mechanized farm operations in Australia, China, Spain, Greece, Turkey, Mexico, Brazil, USA and parts of South Africa that also incur a machine cost over and above the world average. (Fig. 13)

Manpower costs per hectare

Manpower cost per hectare ranged from US$ 9.0 to US$ 1,437. The world average manpower cost per hectare was US$ 488.

Figure-13. Machine-use cost (US$) per hectare

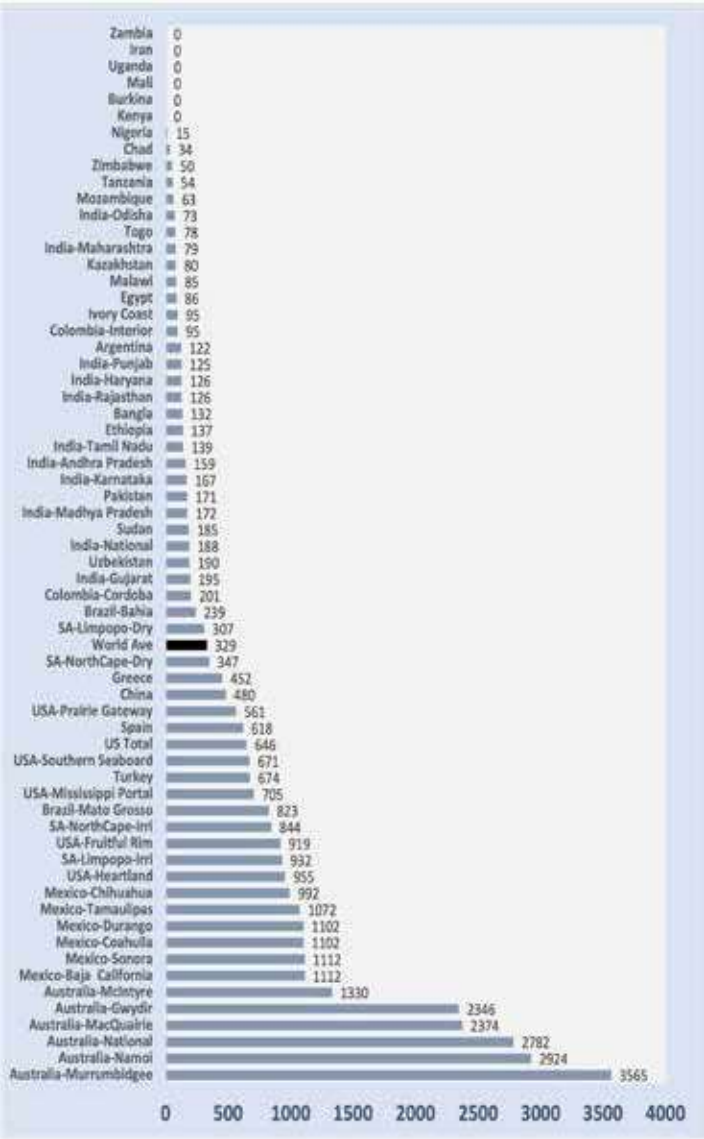
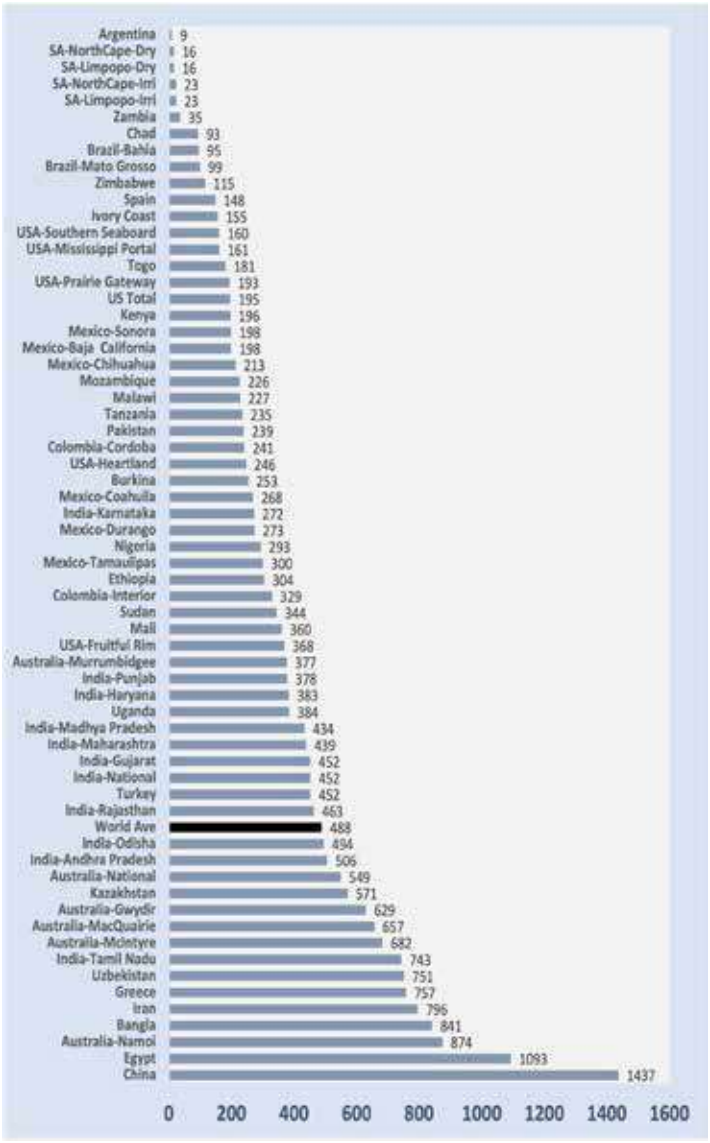


Figure-14. Manpower cost (US$) per hectare



China and Egypt incurred more than US$ 1000 per hectare on manpower cost. Brazil relies heavily on machinery for farm operations and therefore incurred manpower costs less than one fourth that of the world average. Costs on manpower wages and consultants is high in Australia, which explains the high manpower costs per hectare. Thus, despite intensive farm mechanization, Australia spent considerable amount on manpower cost per hectare. (Fig. 14)

Ginning cost per hectare

Ginning cost per hectare depends on cotton productivity (yield/Ha) and the actual costs per Kg seed-cotton or lint. The cost of ginning across cotton growing countries ranged from US$ 28 to 660 for cotton produced per hectare. The world average ginning cost per hectare is US$148. Egypt, Greece, Ethiopia, Iran, Pakistan, South Africa, USA, China and Australia and parts of Mexico and Brazil, incur ginning costs that are above the world average. The ginning costs are highest in Australia, parts of USA, irrigated north cape in South Africa and China. Ginning cost is low in Africa and India. (Fig. 15)

Figure-15. Ginning cost (US$) per hectare

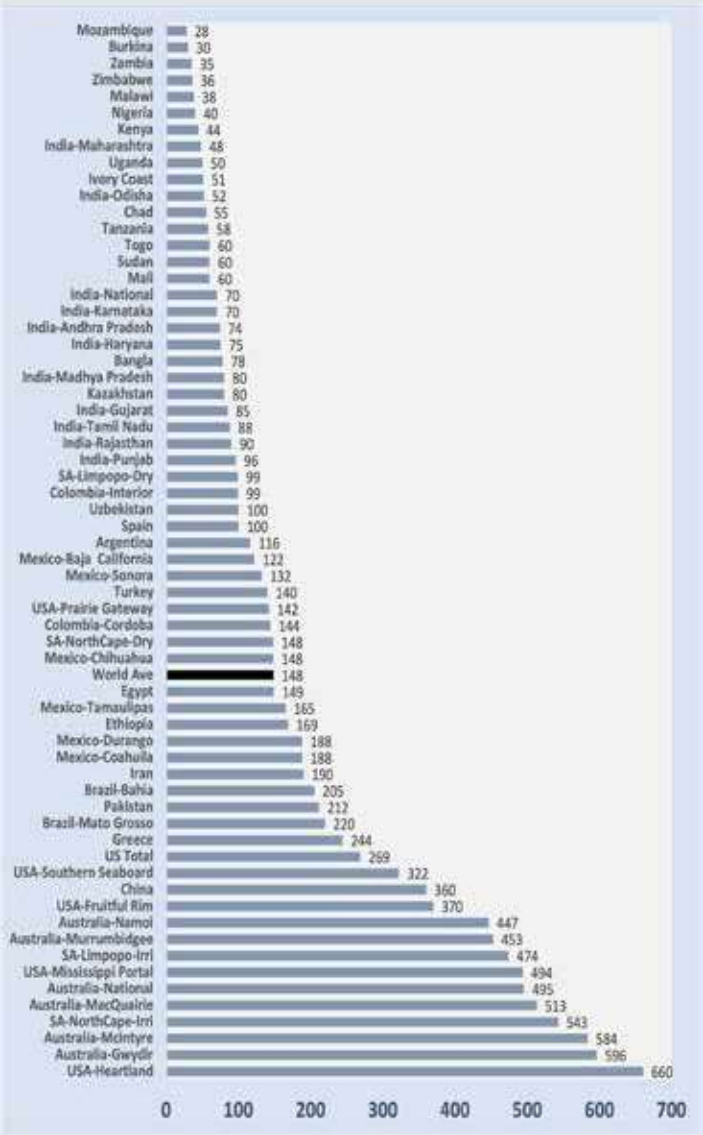
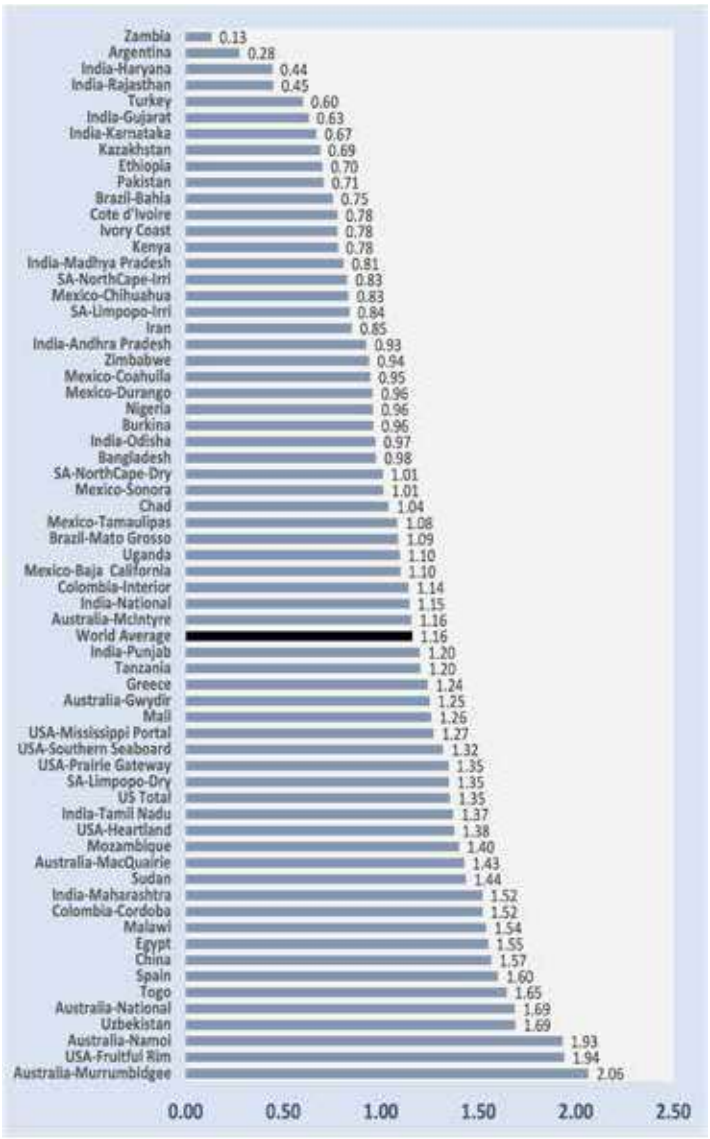


Figure-16. Production cost (US$) per Kg lint



Cost of Production: Input Costs per Kg/Lb Lint or Kg Seed-Cotton Produced

Methodology

Production cost of Kg lint = (Cost of cultivation + ginning cost - seed value) / Lint produced (Kg)

Production cost of Kg seed cotton = (Cost of cultivation) / Seed-cotton produced (Kg)

Cost of production (Kg lint)

The world average production cost per Kg of lint was US$ 1.16 in 2019-2020. Zambia, Argentina and Turkey incur a production cost of 13, 28 and 60 cents to produce a Kg of lint. In contrast Colombia-Cordoba, Malawi, Egypt, China, Spain, Togo, Uzbekistan and parts of Australia spent more than US$ 1.5 for every kilogram of lint produced. (Fig. 16)

Trend (2001-2020) in the cost per Kg lint produced

The global average cost to produce one Kg lint declined from US$ 1.34 was in 2019 to US$ 1.18 in 2020. (Fig.17)

Cost of production (lb lint)

The world average production cost per lb of lint was 53 cents. Zambia, Argentina and Turkey incur a production cost of 6, 13 and 27 cents to produce a lb of lint. In contrast Murrumbidgee in Australia incurred a production cost of 85 cents per lb of lint produced. (Fig. 18)

Cost of production (Kg seed-cotton)

Production costs on seed cotton vary 9-fold across the globe from US$ 0.09 to US$ 0.82 per Kg of seed cotton at a global average of US$ 0.55. Production costs are lowest in Zambia, Argentina, Kazakhstan, South Africa, Pakistan, parts of USA, Mexico, Ethiopia and parts of Brazil. The production cost per Kg of seed cotton is the highest in parts of India, Australia, Egypt, Malawi and China. (Fig. 19)

Figure-17. Production cost per Kg lint produced: Trend 2001-2020

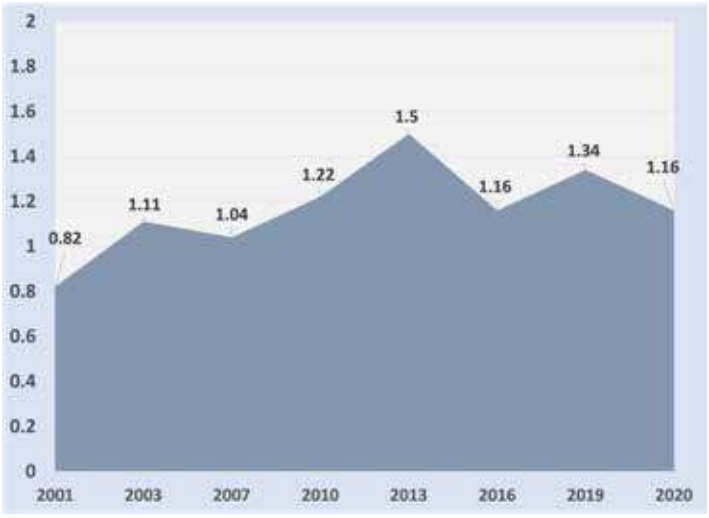


Figure-18. Production cost (US$) per lb lint

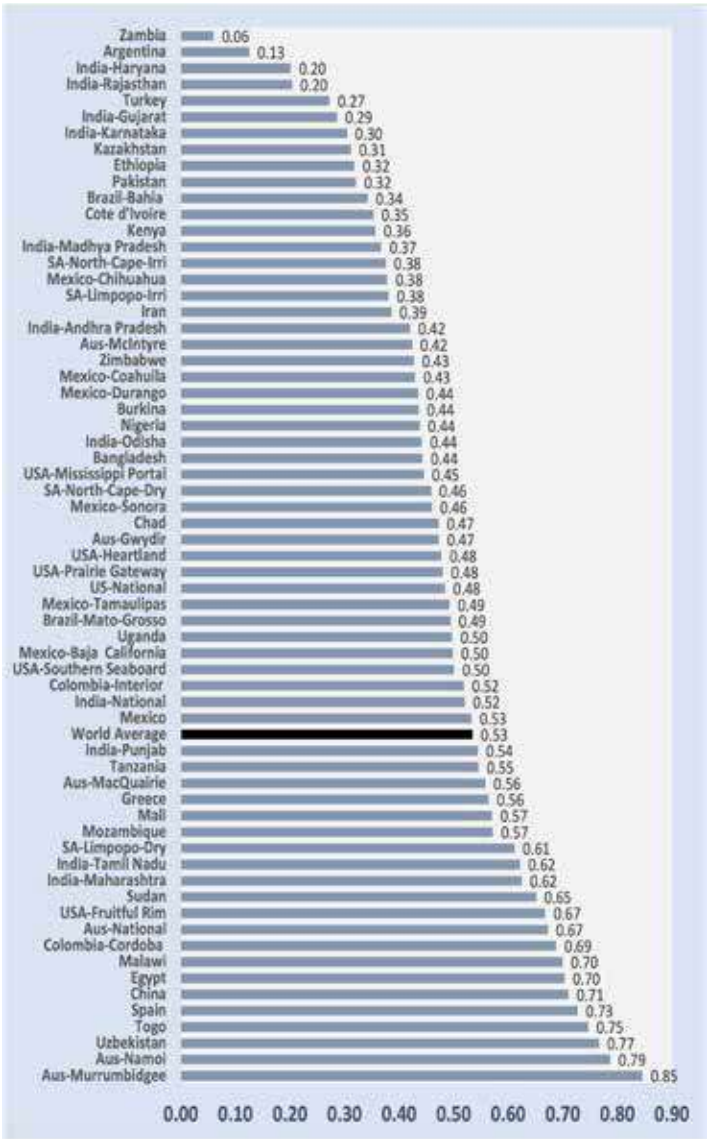
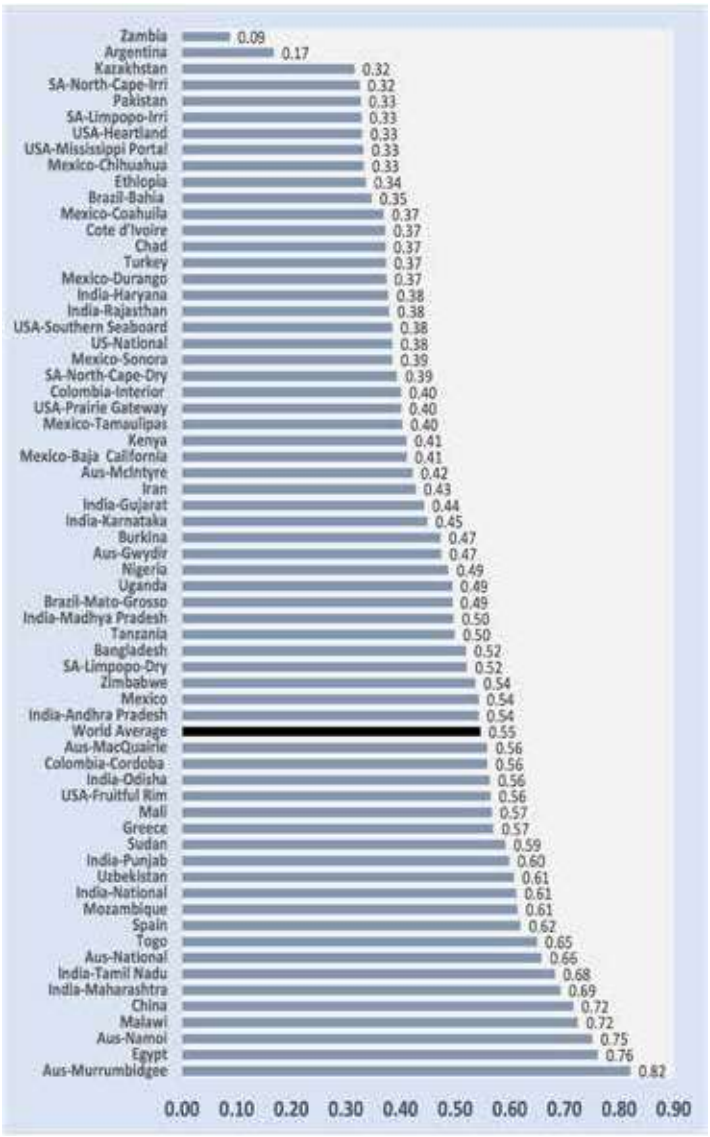


Figure-19. Production cost (US$) per Kg seed-cotton



Cost of production (lb seed-cotton)

Production costs on seed cotton vary 9-fold across the globe from US cents 4 to 37 cents per lb of seed cotton at a global average of 25 cents. Production costs are lowest in Zambia and Argentina. The production cost per Kg of seed cotton is the highest in parts of India, Australia, Egypt, Malawi and China. (Fig. 20)

Cost of weeding per Kg lint produced

Costs on weeding incurred varied across the world from US$ 0.02 to US$ 0.43 per Kg lint produced. The world average weeding costs are US$ 0.11 per Kg of lint produced. Bangladesh, Zimbabwe, Mali, Mozambique and Sudan incur the highest weeding costs per Kg of lint produced while Spain, Pakistan, Mexico, Colombia and parts of Australia and South Africa incur the least in terms of weeding costs (US$) per Kg of lint produced. (Fig. 21)

Figure-20. Production cost (US$) per lb seed-cotton

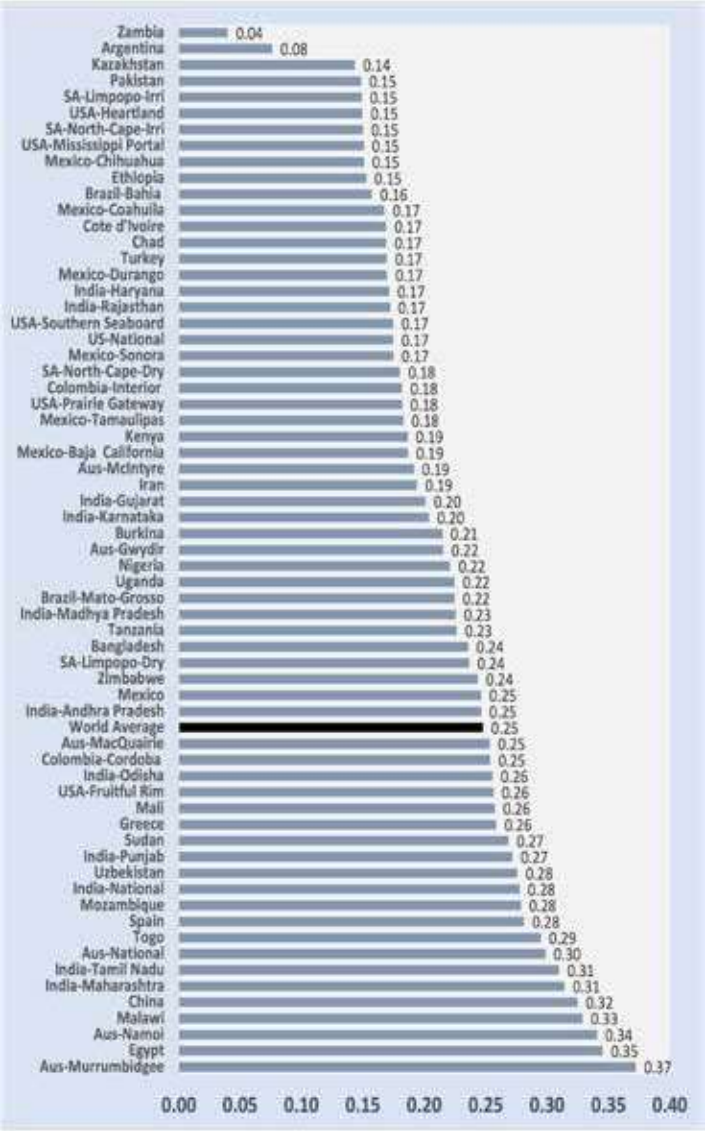
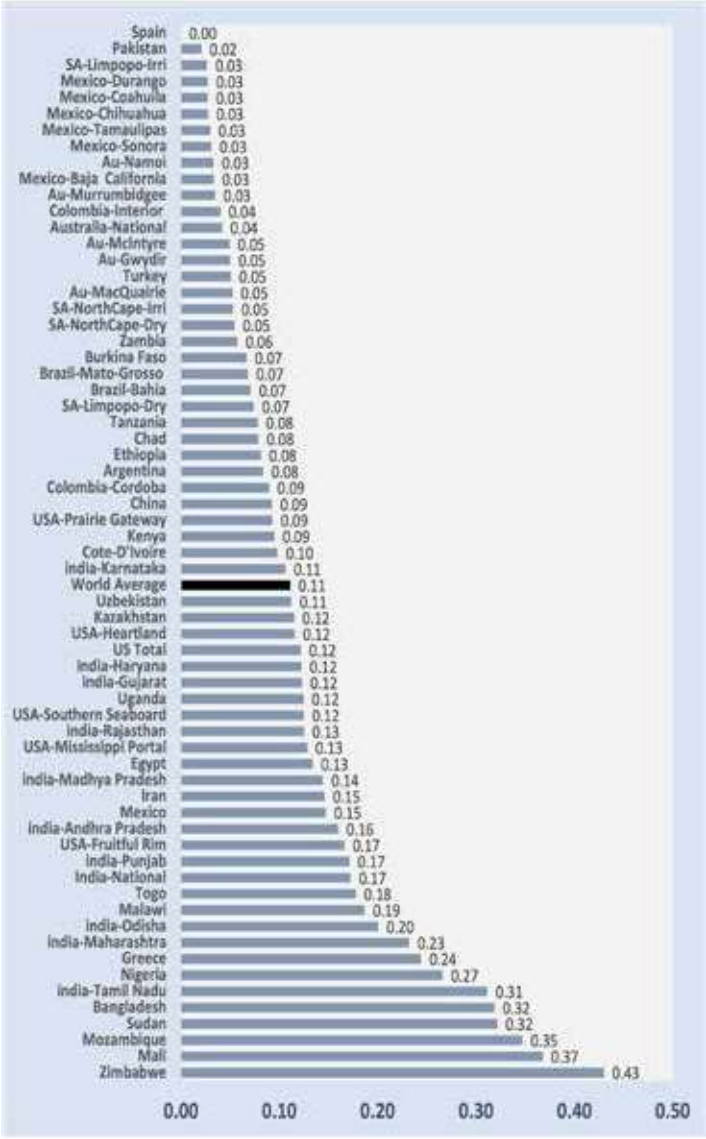


Figure-21. Weeding cost (US$) per Kg lint produced



Trend (2001-2020) in the cost of weeding per Kg lint produced

The global average cost of weeding to produce one Kg seed-cotton decreased significantly from 31 cents in 2013 to 11 cents in 2020. (Fig. 22)

Trend (2001-2020): Cost per Kg seed-cotton produced

The global average cost to produce one Kg seed-cotton increased to an all-time high of 55 cents in 2020, compared to 45-46 cents during 2016 to 2019. (Fig. 23)

Cost of fertiliser per Kg lint produced

The cost of fertilizer towards producing one kilogram of lint ranged from less than ten cents (US$ 0.01) to 46 cents (US$ 0.46). Fertilizer use efficiency (costs/Kg of lint) is dependent on the cost and amount of fertilizer used in a country, on cotton, in addition to the yields and ginning outturn. Farmers on an

Figure 22. Weeding cost per Kg lint produced: Trend 2001-2020

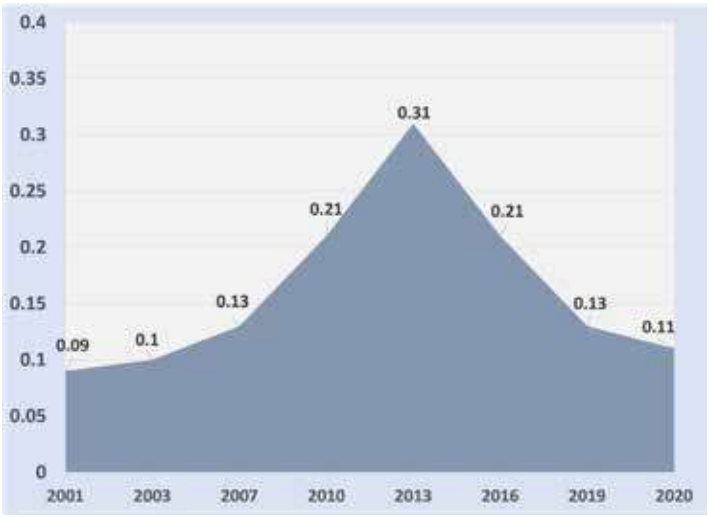
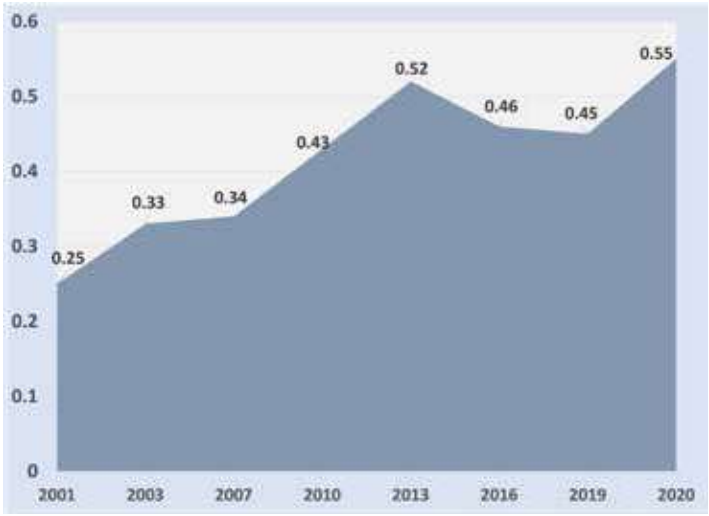


Figure 23. Cost per Kg seed-cotton produced: Trend 2001-2020



average, across the globe, spent 27 cents (0.27 US$) to produce a kilogram of lint. The fertiliser costs incurred to produce a Kg lint were higher than the world average in parts of India, USA-Southern Seaboard, Colombia-Cordoba, Spain, Bangladesh, Burkina Faso, Mali, Togo, Egypt and China. (Fig. 24)

Trend (2001-2020) in the cost of fertiliser per Kg lint produced

Fertiliser cost per Kg lint produced increased to an all-time high of 31 cents in 2019 but decreased marginally to 27 cents in 2020. (Fig. 25)

Insecticide cost (US$) per Kg lint

The insecticide expenses incurred per Kg of lint produced ranged from US$ 0 to US$ 0.55. The world average insecticide required to produce one Kg of lint was US$ 0.12. Insecticides used per Kg of lint are highest in parts of South Africa, parts of India, Zimbabwe, Spain, Colombia-Cordoba, Sudan, Greece, Egypt and Brazil. The amount used to produce one Kg lint is

Figure-24. Fertiliser cost (US$) per Kg lint

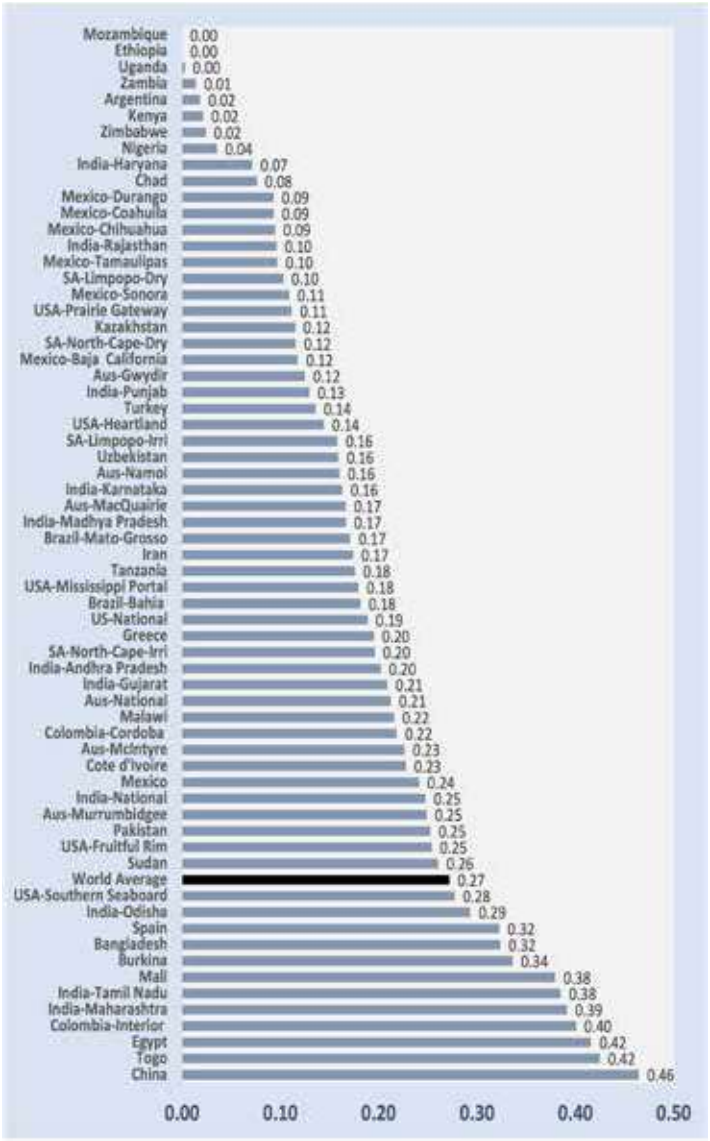
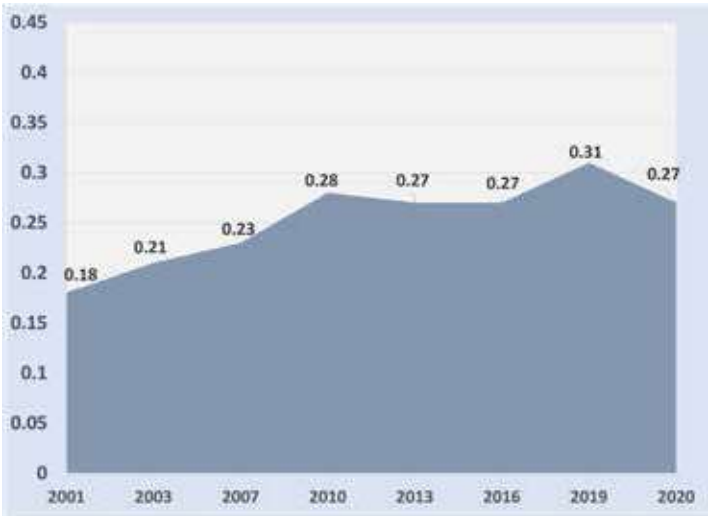
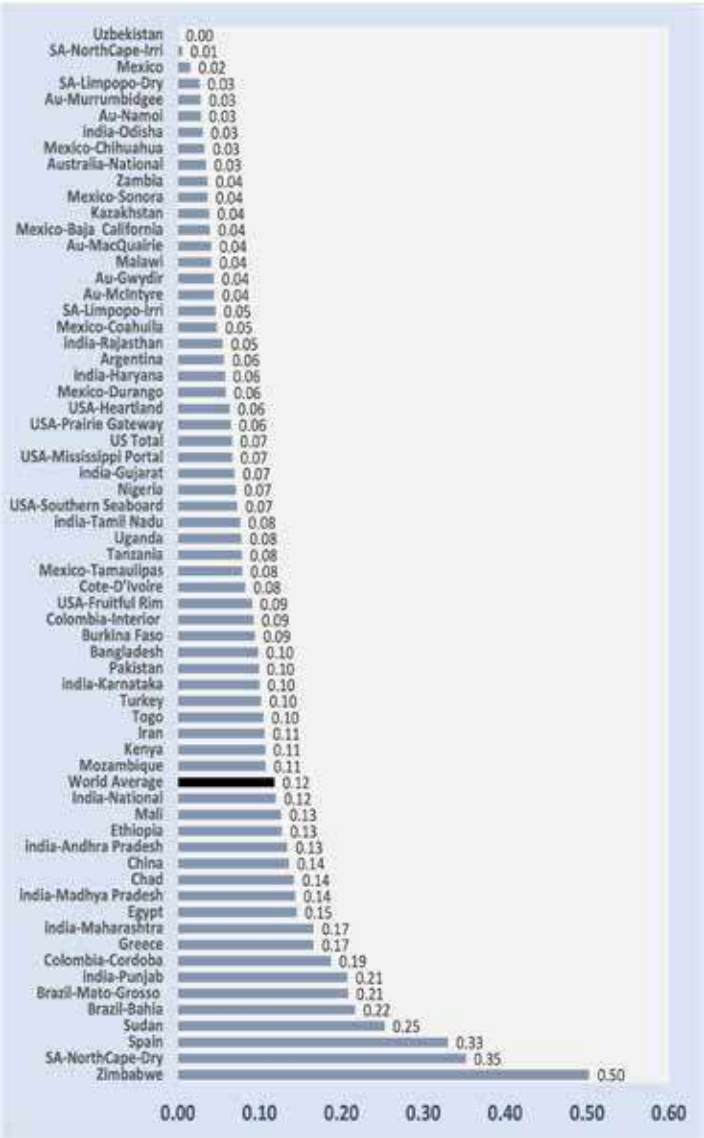


Figure-25. Fertiliser cost (US$) per Kg lint produced: Trend 2001-2020



less in Uzbekistan, Mexico, parts of South Africa, Australia and Odisha in India. (Fig. 26)

Figure-26. Insecticide cost (US$) per kg lint



Trend (2001-2020) in the insecticide cost (US$) per Kg lint produced

Insecticide cost per Kg lint produced increased to an all-time high of 18 cents in 2019 but decreased to 12 cents in 2020. interestingly, this value of 12 cents is an all-time low in 20 years. (Fig. 27)

Ginning cost (US$) per Kg lint

Global average ginning cost per kilogram of lint is US$ 0.19. The costs ranged from US$ 0.07 to US$ 0.51 per kilogram of lint over 36 countries. The average ginning cost per kilogram of lint in the US was US$ 0.34 which was 79% higher than the world average. Fourteen countries (China, Australia, Tanzania, Greece, Argentina, Ethiopia, Togo, Iran, South Africa, Chad, Pakistan, USA and parts of India and Colombia incur higher ginning costs compared to the world average. (Fig. 28)

Figure-27. Insecticide cost (US$) per Kg lint produced: Trend 2001-2020

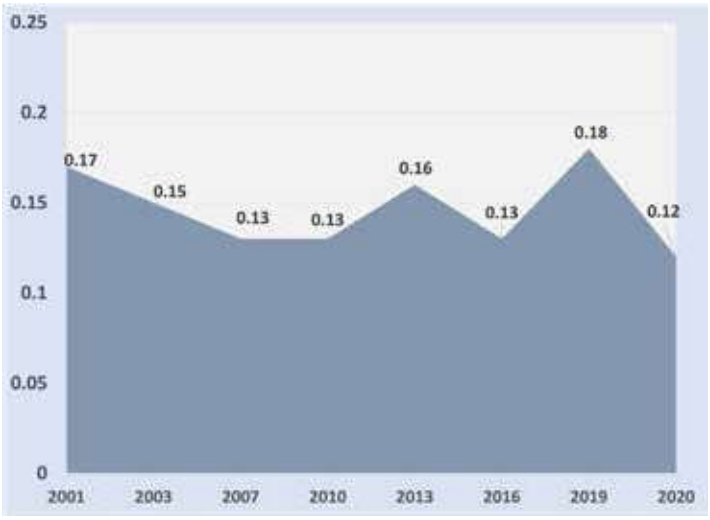
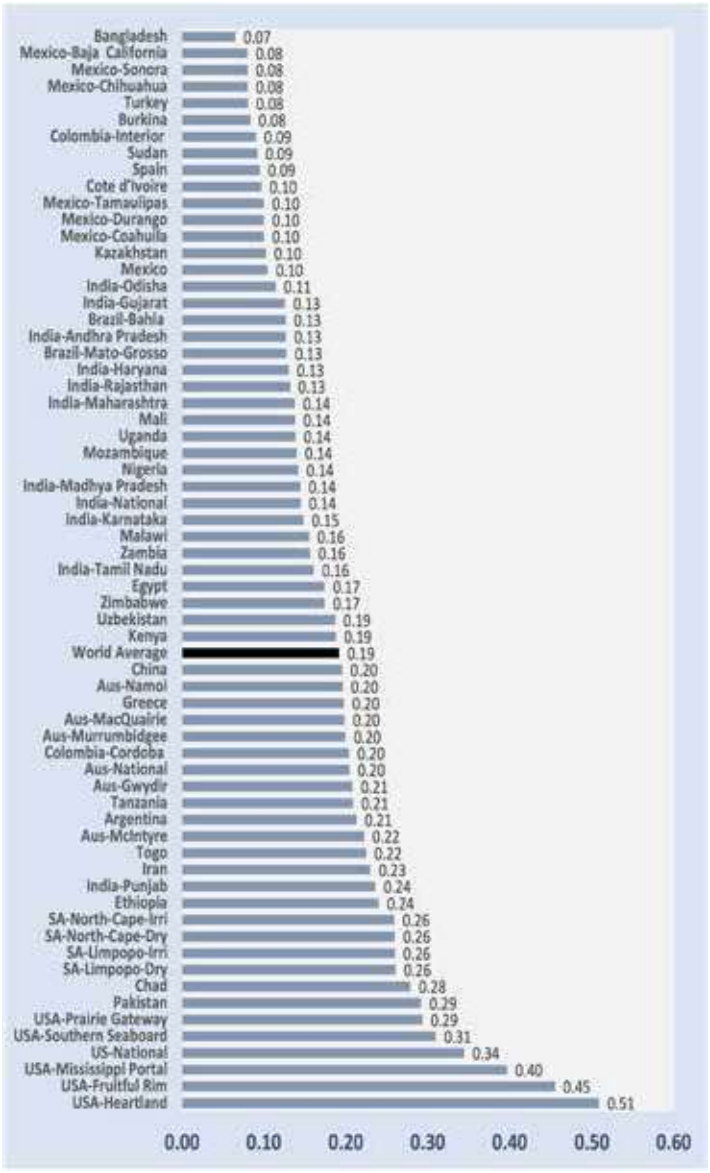


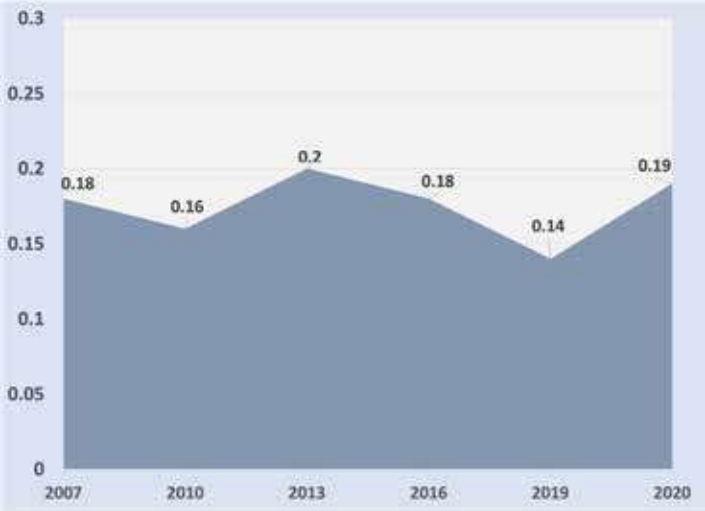
Figure-28. Ginning cost (US$) per Kg lint



Trend (2007-2020) in the ginning cost (US$) per Kg lint produced

Ginning cost per Kg lint produced had decreased to an all-time low of 14 cents in 2019 but increased to 19 cents in 2020. (Fig. 29)

Figure 29. Ginning cost per Kg lint produced: Trend 2007-2020



Cost of Cultivation & Net Returns per Hectare

Cost of cultivation

The world average cultivation cost per hectare is US$ 1,166. The total cost of cultivation across the world ranges from US$ 91 to US$ 5,114. African countries have the lowest costs of cultivation while Australia, Brazil, China, South Africa, Greece and Mexico have the highest cultivation costs. The total cost of cultivation in Australia and China is at least 2.5 times higher than the world average. (Fig. 30)

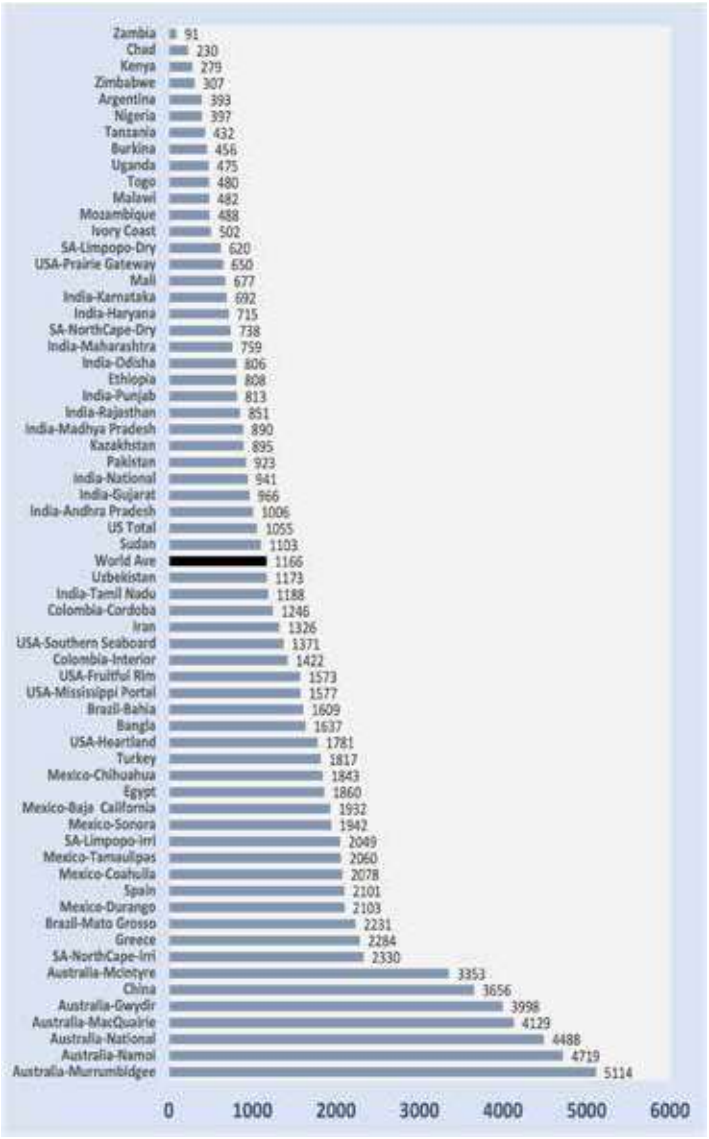
Value of lint (US$) produced per hectare

The value of lint produced per hectare depends on the productivity, ginning%, quality and the local price per Kg of fair average quality lint. The world average of lint value is US$ 1385 per hectare. Lint value across countries ranged from US$ 336 to US$ 5,439 per hectare. About 11 countries recorded lint values over and above the world average. Cotton yields are low in most countries of Africa and some states of India; therefore, the value of lint per hectare is lowest in these countries. Australia has the world's highest lint value per hectare because of high yields. (Fig. 31)

Net returns (US$) on lint per hectare

Net return on lint was calculated by subtracting the production cost of lint per hectare from the total commercial value of lint per hectare. Production cost of lint was calculated by adding ginning cost to the cost of production per hectare and subtracting the market value of cotton seed obtained from ginning. The world average net return on lint was US$ 453 per hectare. Murrumbidgee and Namoi in Australia recorded a

Figure-30. Cost of cultivation (US$) per hectare



negative net return value on lint per hectare (2019 data). The inclusion of land value, lant rent, taxes etc., in the production cost calculations also results in negative returns. Low net returns or negative returns could indicate higher cost of producing lint or low prices. The range of net returns on lint per hectare in those countries that had a positive net return value was US$ 14-1937. Parts of Australia and Mexico, Turkey, China and Brazil recorded more than 1000 US$ as net returns on lint per hectare. (Fig. 32)

Net returns (US$) on seed-cotton per hectare

Increasing cost of cultivation, low yields and/or decreasing market price of seed cotton, could result in negative net returns on seed cotton per hectare. Negative net returns for seed cotton per hectare was recorded in four African countries. Positive net return values on seed cotton per hectare ranged up to US$ 2521. Countries such as USA, Australia, Turkey. China, Brazil, Pakistan, Mexico and South Africa demonstrated positive net returns that were more than 5 times the world average. (Fig. 33)

Figure 31. Value of lint (US$) per hectare

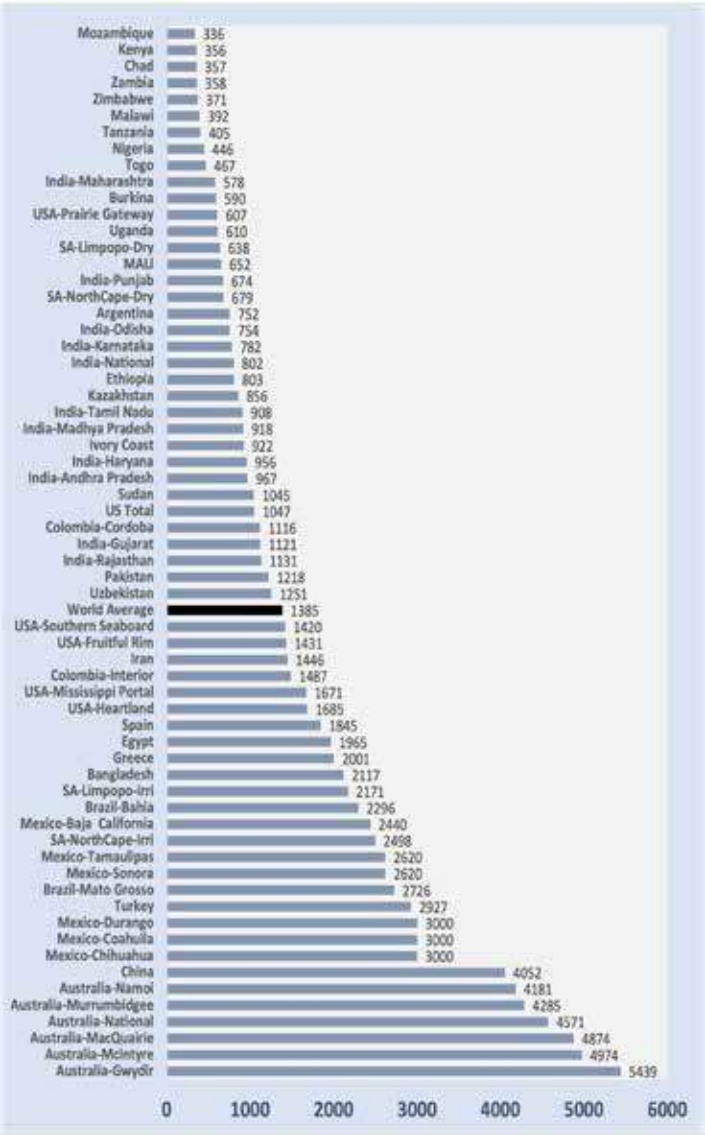


Figure-32. Net returns (US$) on lint per hectare

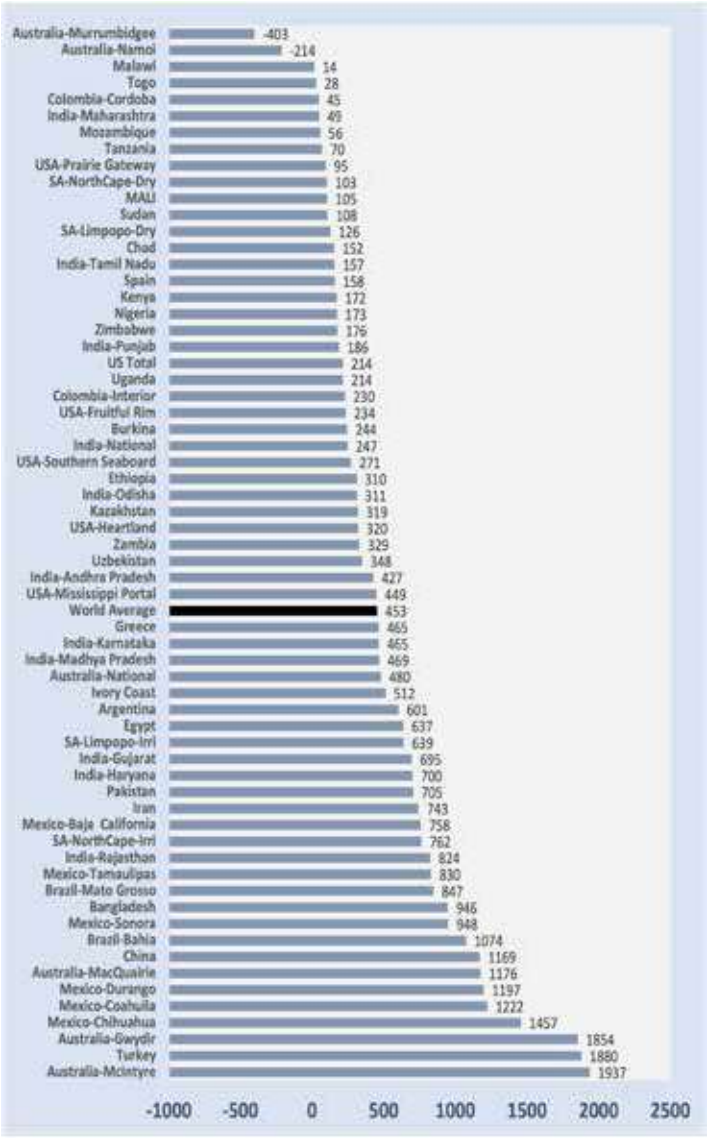


Figure-33. Net returns (US$) on seed-cotton per hectare

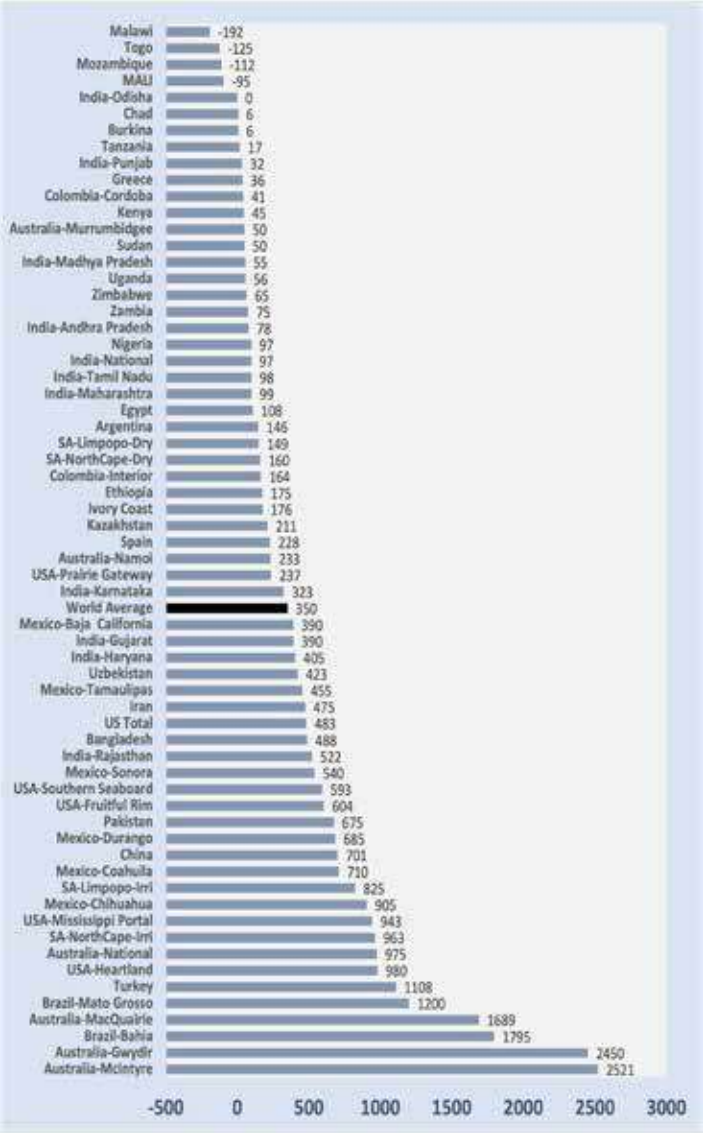
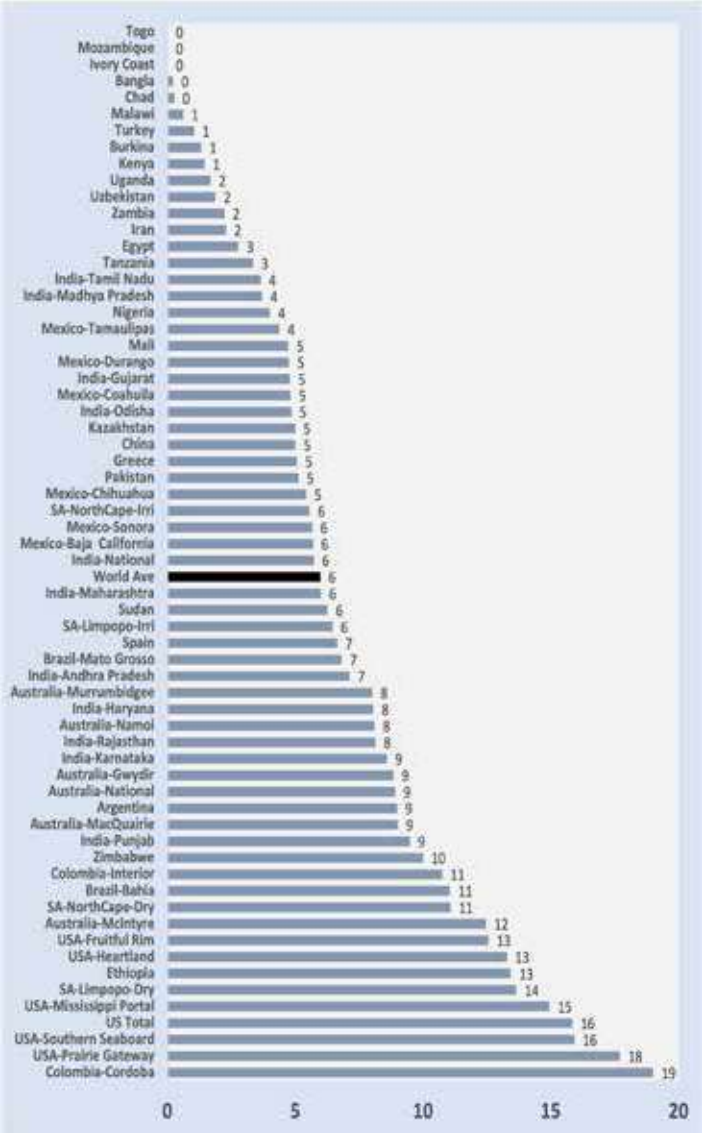


Figure-34. Seed cost as % of cultivation cost.



Input Costs: Proportion of Total Cost of Cultivation

Seed cost as % of cultivation cost

The global average seed costs account for only 6% of the total cultivation cost. While seed costs range from 0 to 19% of cultivation costs across cotton growing countries, the proportion is low in Togo, Mozambique, Ivory Coast, Bangladesh, Chad, Malawi, Turkey and African countries that predominantly use farm saved seeds. (Fig. 34)

Fertiliser cost as % of cultivation cost

Fertilizer cost as % of cultivation cost ranged from 0 to 31%. The world average fertilizer cost as percentage of cultivation cost was 15%. The fertilizer cost as percentage of cultivation cost increased in those countries where fertilizer cost was high and/or its use is high. The proportional fertiliser costs were above the world average in 15 countries. The value is zero to less than 1 for the 3 African countries- Uganda, Mozambique and Ethiopia. (Fig. 35)

Pesticide cost as % of cultivation cost

Pesticides include insecticides, herbicides, fungicides, growth regulators etc. The global average on pesticide-costs is only 10% of the cultivation costs. The values range from 2% to 37% of the total cost of cultivation across the cotton growing countries. The top six countries where pesticides contribute to a higher percentage of the cultivation costs are Zimbabwe (23%), Brazil (29-37%), Spain (35%), USA (16% to 23%) and Colombia (21% to 22%). Pesticides contribute to less than 10% of the total cultivation cost in parts of India, Uzbekistan, Australia, Kazakhstan, Tanzania, Egypt, Uganda, Nigeria, Pakistan, Mali, China, Mozambique and Malawi. (Fig. 36).

Machinery cost as % of cultivation cost

The world average of machinery cost as percentage of cultivation cost was 23%. The proportion of machinery costs ranged

Figure-35. Fertilizer cost as % of cultivation cost.

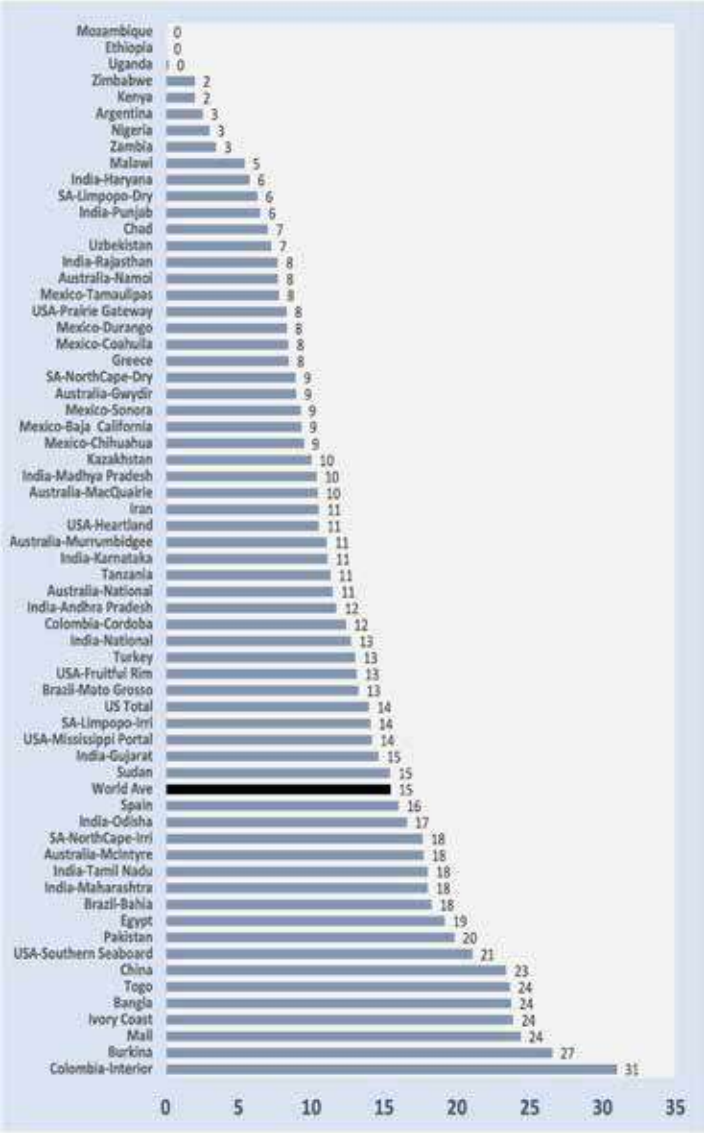
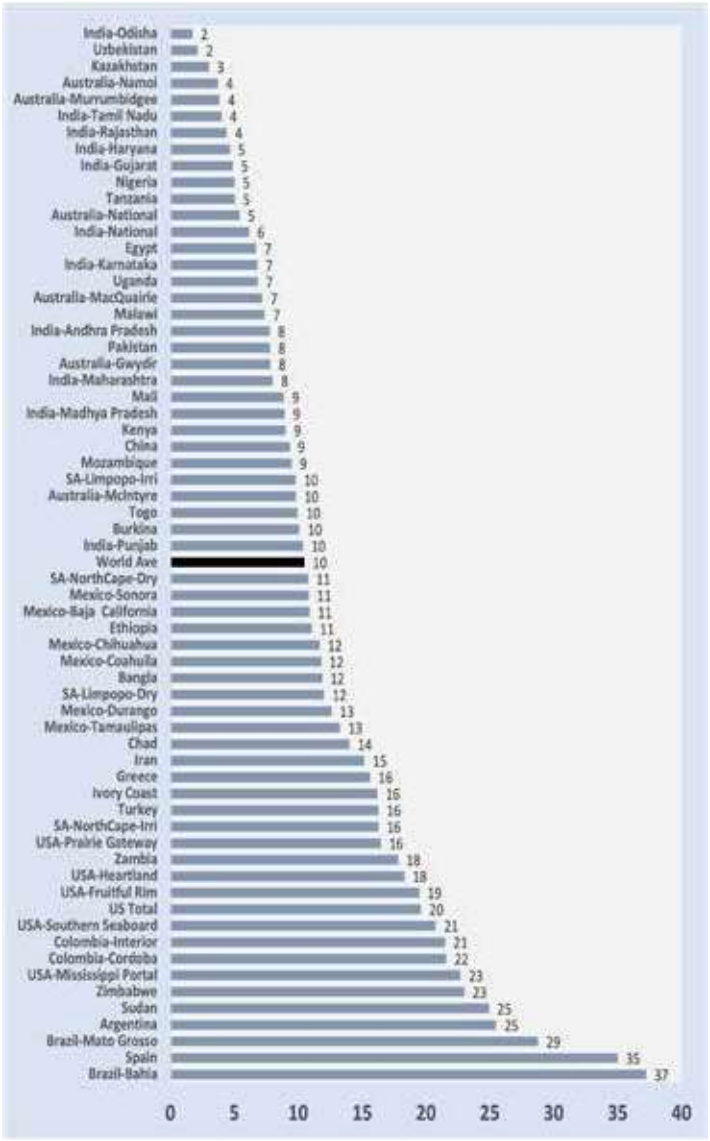


Figure-36. Pesticide cost as % of cultivation cost



from 0 to 86%. Australia, USA and Mexico reported the highest proportion of machinery costs as percentage pf total cost of cultivation. Zambia, Uganda, Mali, Iran, Kenya and Burkina Faso are the 6 countries where machinery costs are not incurred. Amongst African countries, machinery costs as percentage of cultivation costs are the highest in Mozambique. (Fig. 37)

Manpower cost as % of cultivation cost

The world average manpower costs as percentage of cultivation costs was 35%. Manpower costs were lower in those countries where machinery costs were higher as percentage of cultivation costs. Manpower costs contributed to a high percentage of the cultivation costs (more than half the cultivation cost) in twelve countries, namely, India, Bangladesh, Mali, Burkina Faso, Tanzania, Iran, Egypt, Kazakhstan, Uzbekistan, Kenya, Nigeria and Uganda. The proportion of manpower costs to total cultivation costs was low in South Africa, Argentina, Brazil, Spain, Australia, USA and Mexico. (Fig. 38)

Figure-37. Machinery cost as % of cultivation cost.

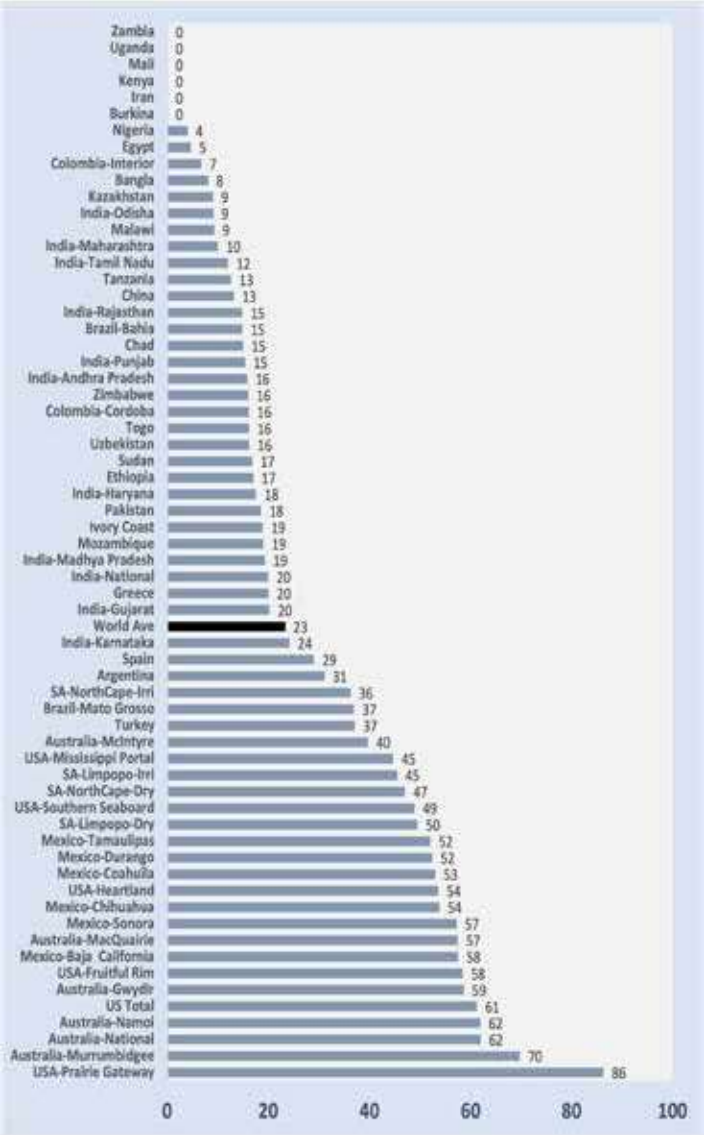
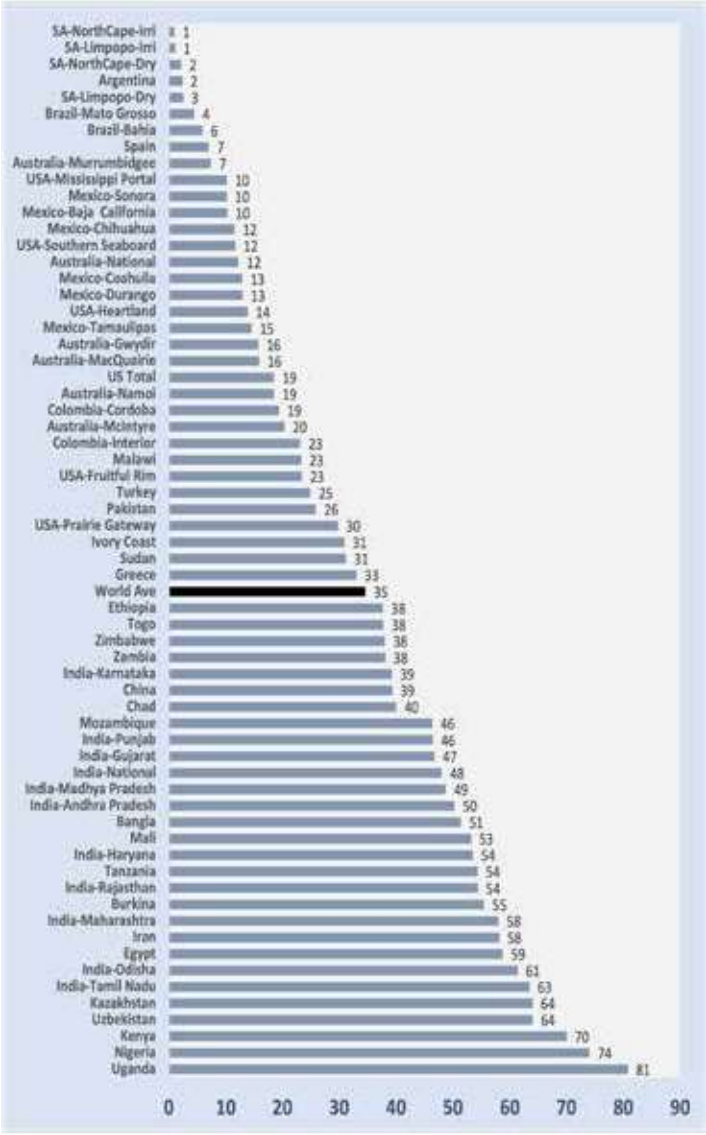


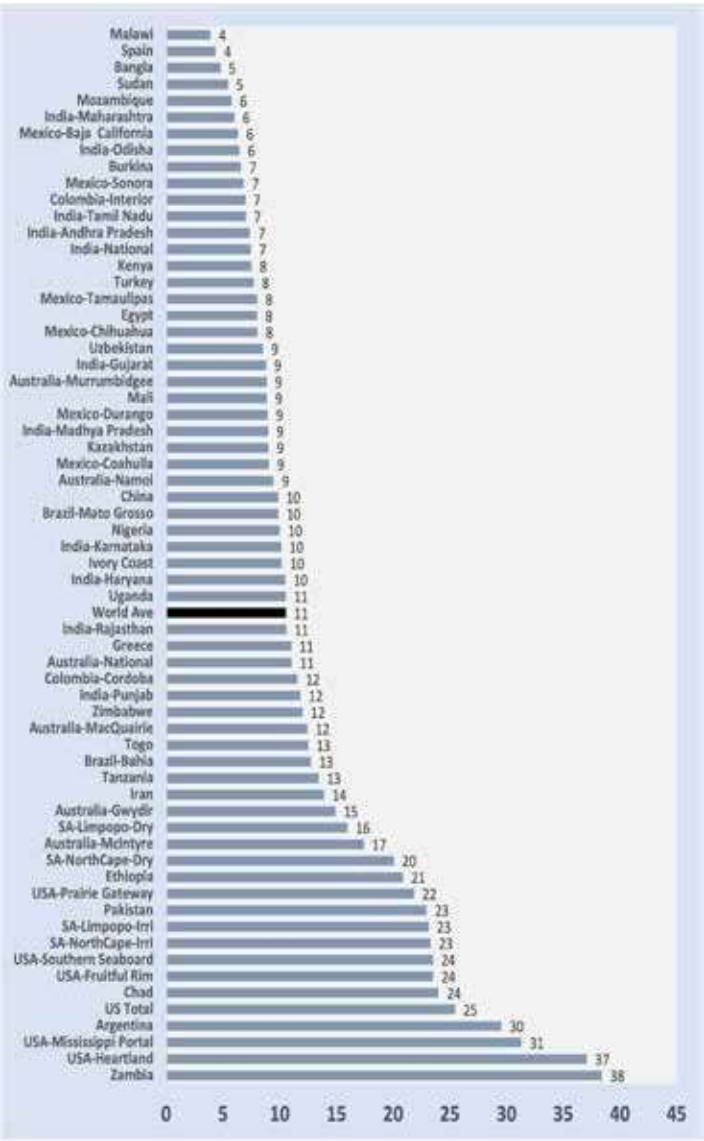
Figure-38. Manpower cost as % of cultivation cost.



Ginning cost as % of cultivation cost

The global average ginning cost as percentage of cultivation cost was 11%. The proportion of ginning costs to the total cost of cultivation ranged from 4% to 38%. Zambia reported the highest ginning costs as percentage of cultivation cost in the world. (Fig. 39)

Figure-39. Ginning cost as % of cultivation cost.



Pesticide Usage

Global pesticide market 2017-2019

The total global pesticide market was worth US$ 59.8 billion in 2019 (Table-1). Cotton had a market share of 4.71% of all the pesticides sold globally. Amongst pesticides, herbicides had the highest market share followed by fungicides/bactericides and insecticides. However, amongst all pesticides, the sale of insecticides was highest on cotton at US$ 1.55 billion with a market share of 10.24% of all insecticides used in global crop protection. (Table 1)

Pesticide use in agriculture

In terms of volume, China, USA, Brazil and Argentina used the largest amount of pesticide in Agriculture (Table 2). China alone accounts for more than half the global pesticide consumption in agriculture. USA, Brazil and Argentina together account for about 30% of the global pesticide usage. (Table 2)

Table 1. Global Crop Protection Pesticide Market (US$ Million) 2017-2019

	Global sales all crops			Global sales on cotton			% Share of cotton		
	2017	2018	2019	2017	2018	2019	2017	2018	2019
Herbicide sales	25,160	26,563	26,175	609.6	727.5	761.4	2.42	2.74	2.91
Insecticide sales	14,060	15,121	15,146	1,473	1,629	1,551	10.48	10.78	10.24
Fungicide sales	15,739	16,473	16,356	152.4	189.2	169.2	0.97	1.15	1.03
Other pesticide sales	2,044	2,148	2,150	304.8	363.8	338.4	14.91	16.93	15.74
Global pesticide sales	57,003	60,304	59,827	2,540	2,910	2,820	4.46	4.83	4.71

Data estimates: Kranthi, ICAC

Table 2. Pesticide Use on all Crops (Metric Tonnes) 2018

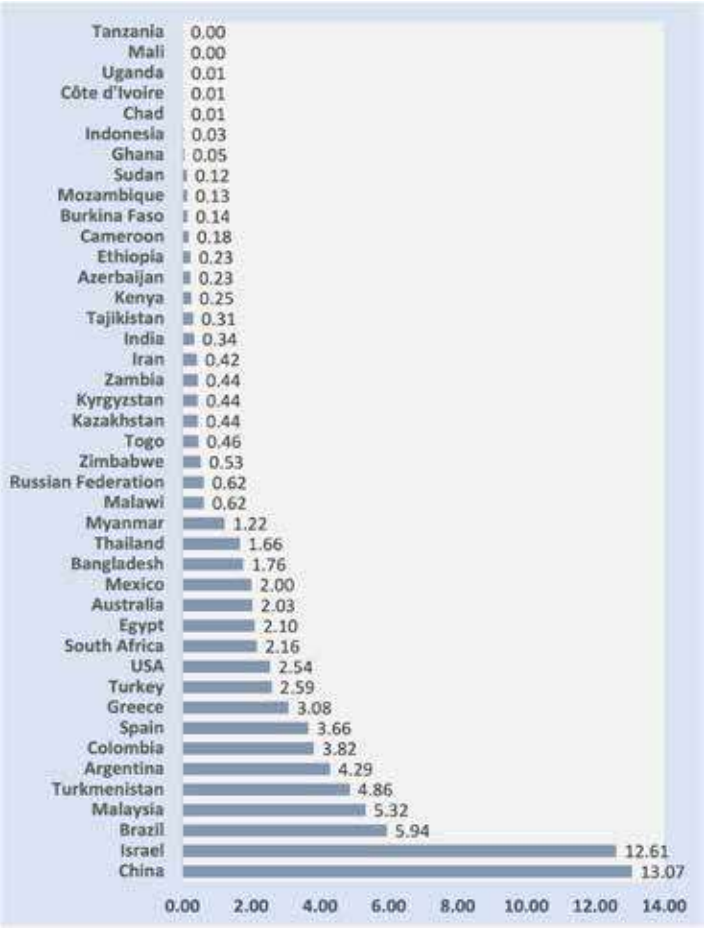
	Insecticides	Herbicides	Fungicides Etc.,	Others	Total Pesticides
China					1,773,689
United States of America	65,771	255,826	24,040	62,142	407,779
Brazil	60,607	234,384	59,124	23,061	377,176
Argentina	3,747	161,502	3,427	4,252	172,928
Russian Federation	10,198	34,532	26,164	5,475	76,369
Australia	14,196	43,789	4,544	887	63,416
Spain	6,488	16,593	38,067	195	61,343
Turkey	16,069	14,794	23,047	6,110	60,020
India	20,619	6,335	13,055	18,151	58,160
Mexico	12,991	11,552	28,601	0	53,144
Malaysia	3,547	37,452	3,021	95	44,115
Colombia	5,188		7,214	25,371	37,773
South Africa	6,158	9,469	8,928	2,302	26,857
Myanmar	4,249	6,925	4,023	129	15,326
Bangladesh	2,184	1,195	11,758	7	15,144
Kazakhstan	528	11,051	1,074	405	13,058
Taiwan	2,830	4,392	2,917	410	10,549
Greece	2,258	2,714	2,014	2,946	9,932
Turkmenistan	1,294	680	7,738	0	9,712
Egypt	3,199	1,245	3,599	1	8,044
Iran	1,756	1,564	1,100	2,421	6,841
Israel	525	1,381	2,843	1,344	6,093
Ethiopia	638	3,110	377	3	4,128
Sudan	654	1,668	84	63	2,469
Malawi	575	1,180	420	183	2,358
Zimbabwe	1,092	549	360	184	2,185
Zambia	476	250	328	616	1,670
Indonesia	929	354	224	90	1,597
Kenya	303	562	711	2	1,578
Cameroon	243	417	705	8	1,373
Togo	522	709	19	43	1,293
Burkina Faso	186	657	0	0	843
Mozambique	200	442	122	5	769
Kyrgyzstan	165	400	43	-1	607
Azerbaijan	169	59	276	39	543
Ghana	155	194	30	13	392
Tajikistan	70	70	68	57	265
Côte d'Ivoire	75	10	8	0	93
Uganda	42	8	38	0	88
Chad	42		0	0	42
Central African Republic	22	0	0	1	23
Niger	21		0	0	21
Mali	3			1	4
Pakistan	0	0	0	1	1
Tanzania	1	0	0	0	1

Data source FAO)

Pesticide use kg per hectare

China, Israel and Brazil had the highest average pesticide application per hectare. Pesticide use is very low in Africa. The per hectare usage of pesticides is also low in India. China, Israel, Brazil, Malaysia, Turkmenistan and Argentina use more than 4.0 Kg pesticide per hectare. (Fig. 40)

Figure-40. Pesticide use Kg per hectare



Water Usage

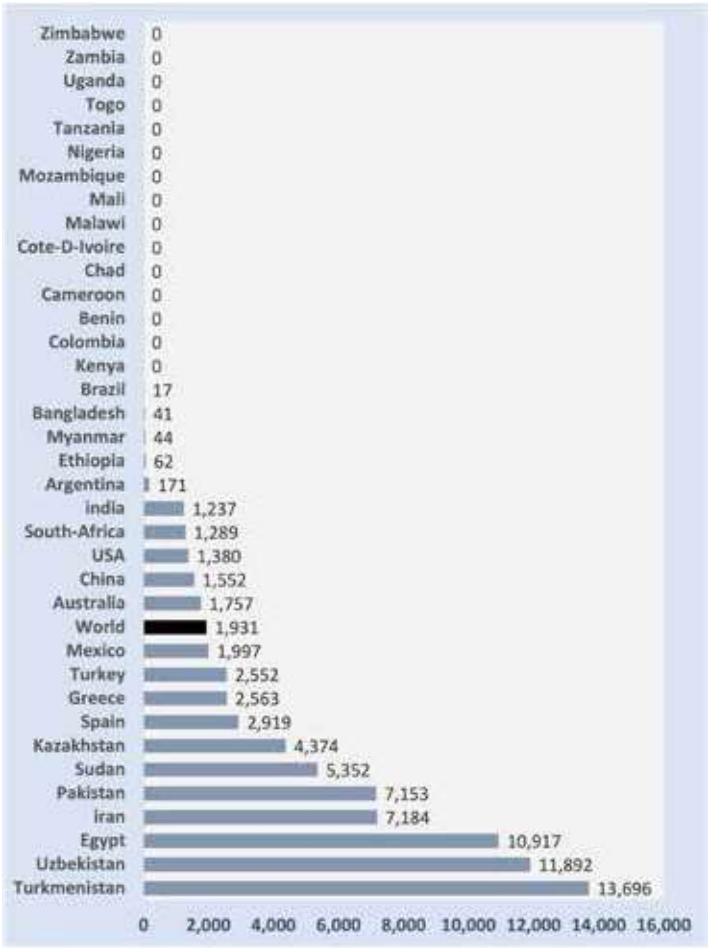
Data on irrigation water (Blue) and rainwater (Green) was collected from databases, web sites, research publications, researchers, farmers and officials. Irrigation data of USA was of 2018 and most countries of 2019 or 2020 but the calculations of water footprint were based on production of 2020. Therefore, the data has limitations and must be considered only as indicative.

1. **Irrigation water footprint** (Litres per Kg lint produced) = Total irrigation water provided / Total lint produced (Kg).
2. **Rainwater footprint** (Litres per Kg lint produced) = Total effective rainfall received / Total lint produced (Kg).
3. **Effective rainfall** was calculated from the total seasonal rainfall based on the soil type of the region and ranged from 60 to 75% of the seasonal rainfall.
4. **Crop Evapotranspiration (ETc)** was calculated from meteorological data by means of the FAO Penman-Monteith equation.

Irrigation (blue) water footprint per Kg lint produced

Blue water footprint presented here is not the same as irrigation water-use-efficiency. Blue water footprint represents the amount of irrigation water used in addition to rainfall received, to produce one Kg lint. At least fifteen African cotton growing countries do not use irrigation water to cultivate cotton hence the blue water used to produce 1Kg of lint is considered as zero. Twenty countries use blue water ranging from 17 litres (as in Brazil) to 13,696 (as in Turkmenistan) to produce 1Kg of lint. Variability in the use of irrigation water to produce 1Kg of lint was 805-fold across the globe. The world average blue water used to produce a kilogram of lint was 1931 litres. The top four cotton growing countries- India, China, USA and Brazil use 1237, 1552, 1380 and 17 litres of blue water respectively to cultivate a kilogram of cotton lint. (Fig. 41)

Figure-41. Irrigation (Blue) water footprint per Kg lint produced

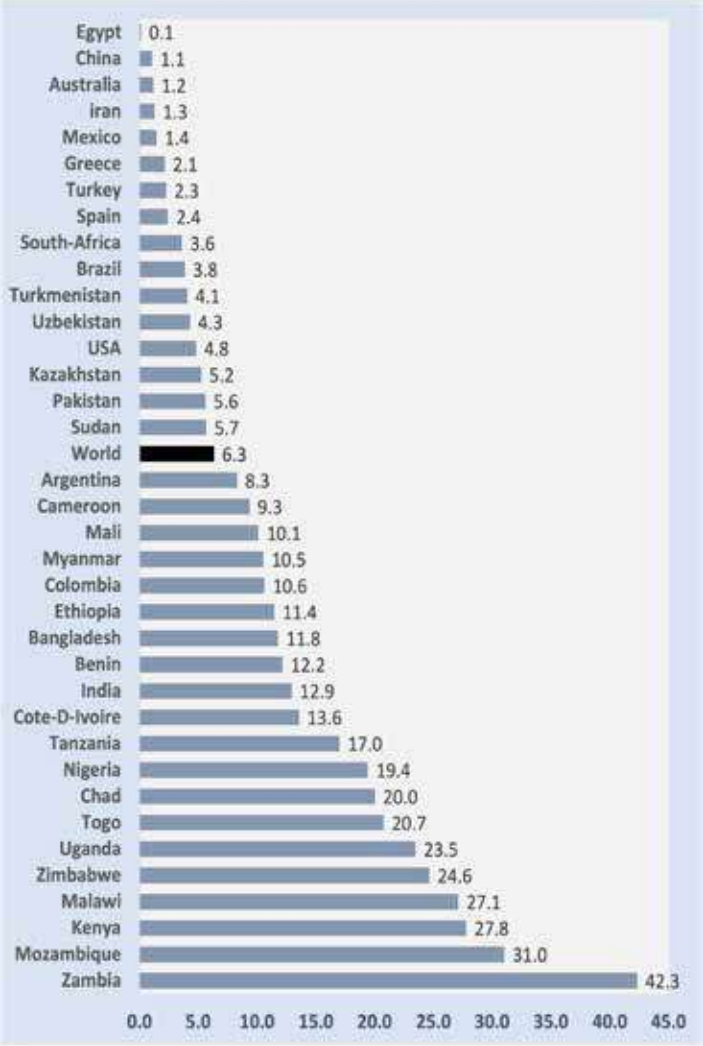


Rain (green) water footprint ('000 litres) per Kg lint produced

Effective rainfall was calculated based on soil types. the total amount of effective rainfall used for cotton production is shown here as green water ('000 litres) per Kg lint produced. Low yields invariably result in a high green water footprint in

rainfed countries with high precipitation rates. The world average green water, to produce a kilogram of lint is 6003 litres. The green water footprint in majority of the cotton growing countries in Africa is about 10,000 to 42,300 litres of rainwater per Kg lint produced. Ironically excessive rainfall depresses yields due to waterlogging in poor drained fields. In contrast, countries with low rainfall such as Egypt, China, Australia, Iran and Mexico use less than 2,000 litres of green water for every kilogram of lint produced. (Fig. 42)

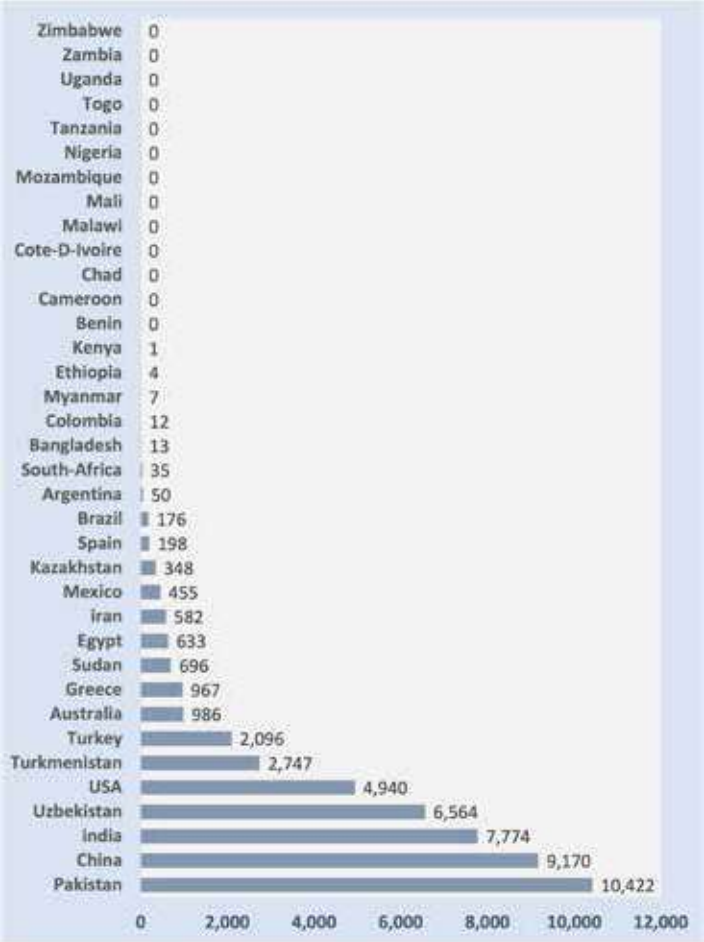
Figure-42. Rain (green) water footprint ('000 litres) per Kg lint produced



Irrigation water (billion litres) used for cotton production

About 95% of cotton in Africa is rainfed. Majority of the African countries depend solely on rainfall for cotton production. The total amount of irrigation water (in billion litres written as Mm^3) used on cotton is 4,940 Mm^3 in USA; 6,564 Mm^3 in Uzbekistan, 7,774 Mm^3 in India, 9,170 Mm^3 in China and 10,422 Mm^3 in Pakistan. Australia, that is often stricken by drought uses 986 Mm^3 of water for irrigation. An estimated 48,338 trillion litres of irrigation water were used for cotton production in 2018-2019. (Fig. 43)

Figure-43. Irrigation water (billion litres) used for cotton production



Rainfed area

On an average 52% of cotton area in the world is rainfed. At least thirteen African cotton growing countries are entirely rainfed and cotton cultivation is fully dependent on green water. In contrast, Uzbekistan, Pakistan, Mexico, Kazakhstan and Egypt cultivate cotton entirely under irrigation. The top four countries have varied levels of rainfed areas with India at 65%, USA 63%, China 2.0% and Brazil at 87%. Australia that has the highest productivity produces cotton under rainfed condition in 20% of its area. (Fig. 44)

Fertiliser Usage

Data on fertiliser usage either as total quantities used in cotton or per hectare of NPK was provided by officials and researchers and was sourced from data published by FAO and OECD.

Nitrogen application Kg per hectare

The world average nitrogen use is 132 Kg per hectare. Amongst all the nutrients, nitrogen is the most important nutrient for cotton growth and productivity. However, amongst all nutrients, nitrogen contributes the most directly to global warming by emitting nitrous oxide (NO2) and ammonia (NH3). At least seven countries, namely, Australia, Egypt, Uzbekistan, Pakistan, China, India and Brazil apply nitrogen quantities higher

Figure-44. % Rainfed area

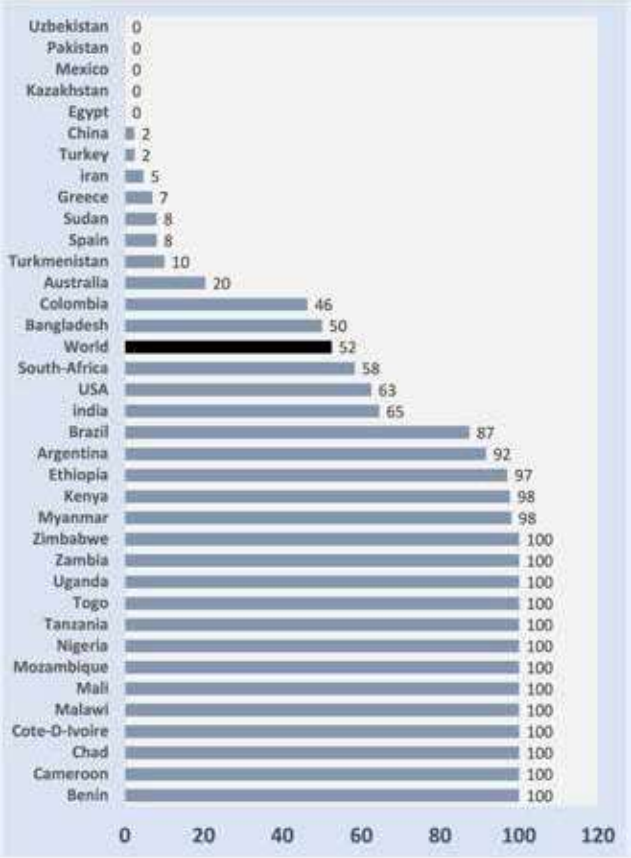
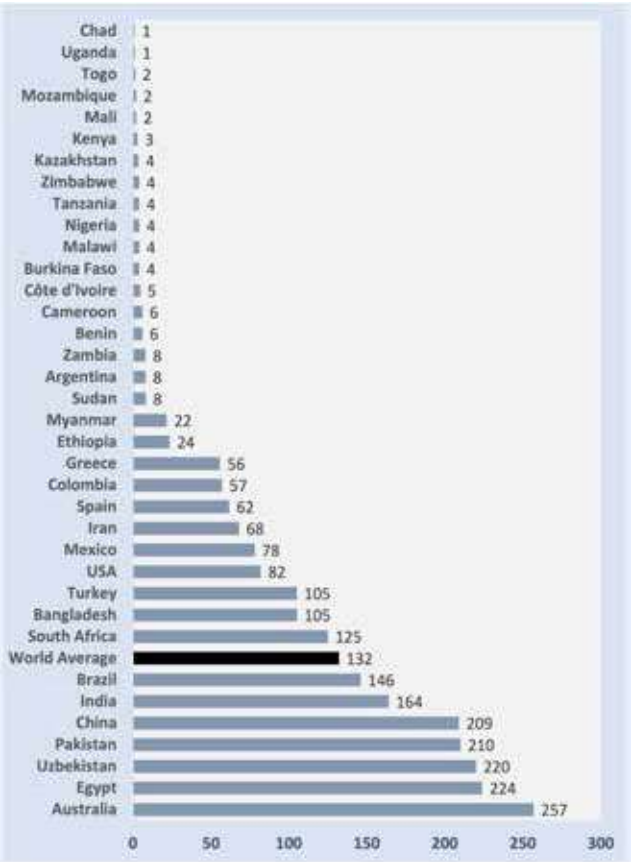


Figure 45. Nitrogen application Kg per hectare

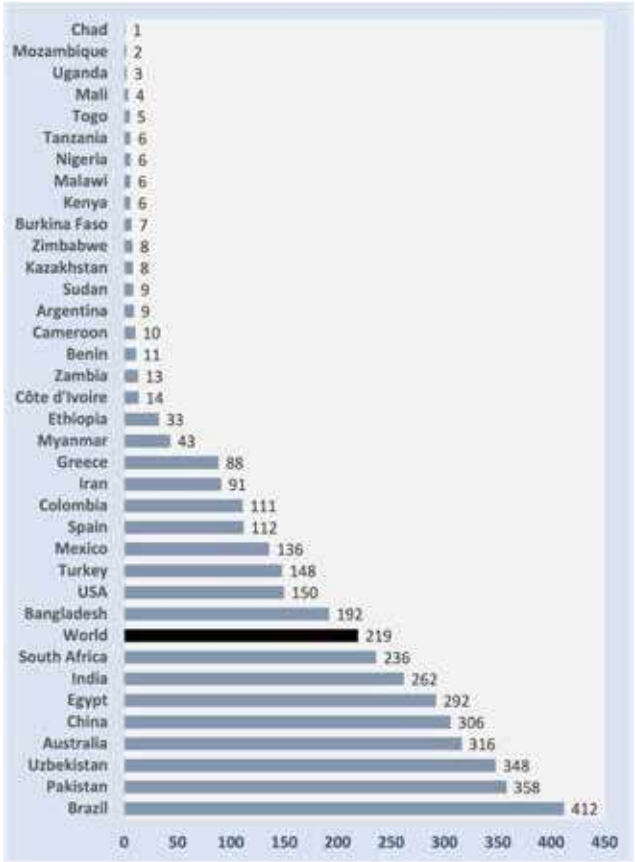


than the global average. Nitrogen application is lowest across Africa. Very few African countries have domestic fertilizer manufacturing plants. The retail price of fertilisers in Africa is at least 3-6 times higher compared to many developing countries. Thus, there is very less economic incentive for the use of fertilisers in Africa. (Fig. 45)

NPK application Kg per hectare

The world average use of nitrogen + phosphorus + potassium (NPK) is 219 Kg per hectare. NPK are the major nutrients for cotton growth and productivity. The usage of phosphorus and potassium fertilizers could lead to eutrophication but does not result in serious greenhouse gas emissions. At least eight countries, namely, Australia, Egypt, Uzbekistan, South Africa, Pakistan, China, India and Brazil apply NPK quantities higher than the global average. NPK application is lowest across Africa. Chemical fertilisers are very expensive in Africa compared to many other countries of the world. The use of NPK is therefore lowest in Africa. (Fig. 46)

Figure 46. NPK application Kg per hectare



Nitrogen and NPK use efficiency

The global average nitrogen use efficiency is 173 grams per kg lint produced. The global average NPK use efficiency is 287 grams per kg lint produced At least four countries, namely, Pakistan, Uzbekistan, India and Egypt have a lesser fertilizer use efficiency compared to the global average. Interestingly, the fertilizer use efficiency is very high across majority of the African continent, due to low application rates despite low yields.

Figure-47a. Nitrogen use efficiency (grams per Kg lint produced)

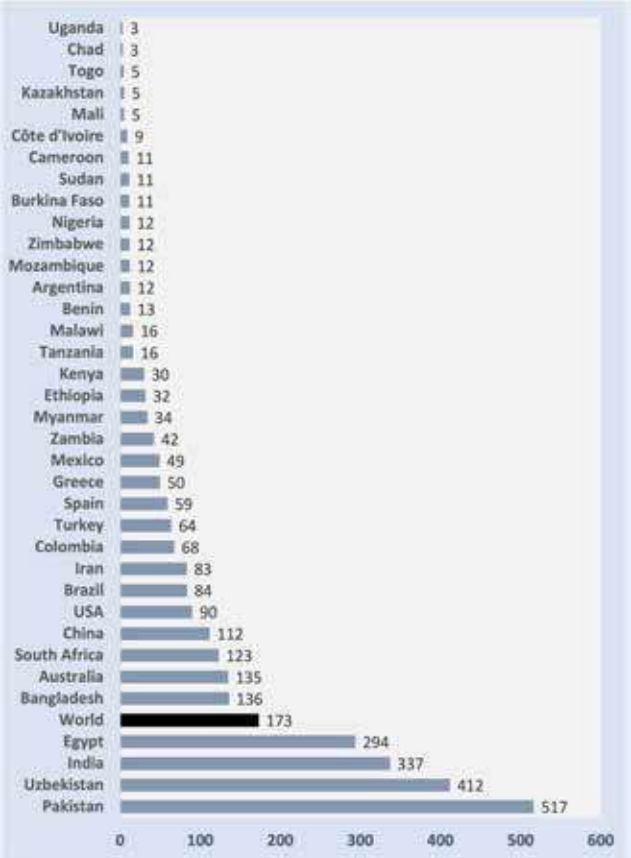
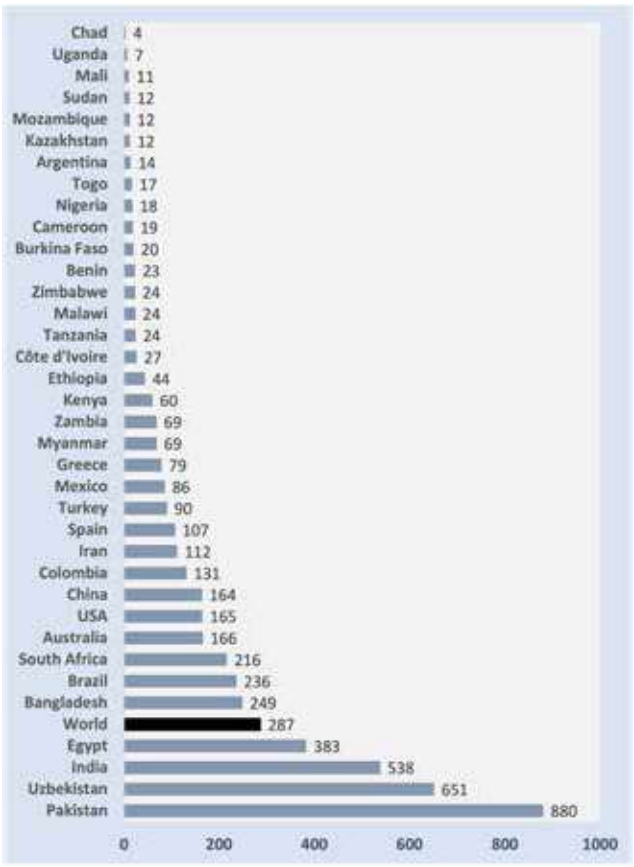


Figure-47b. NPK use efficiency (grams per Kg lint produced)

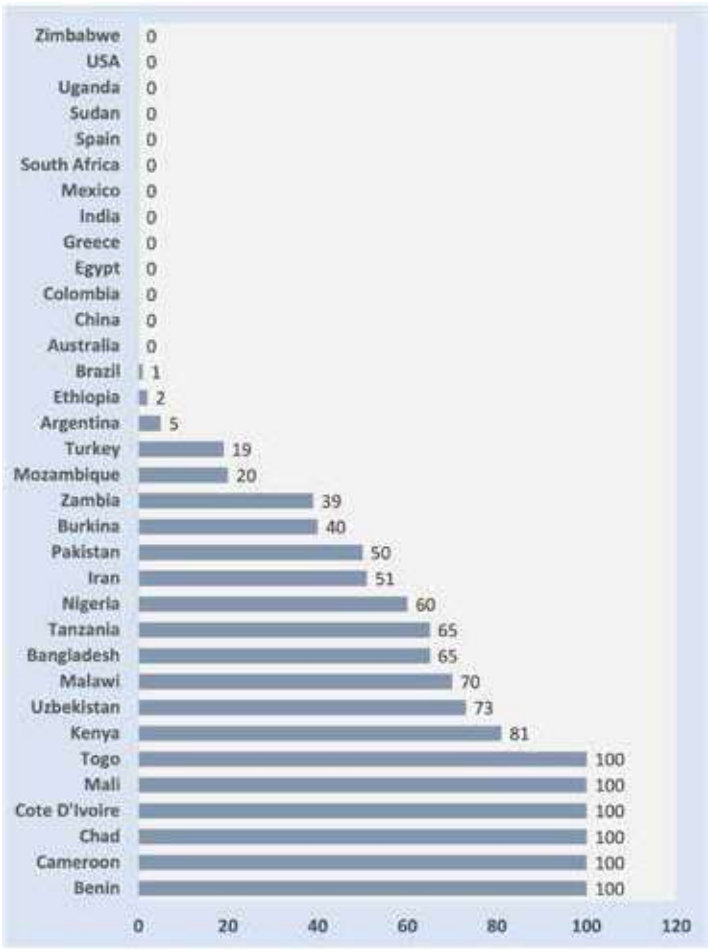


Seed Usage and Byproducts

Use of fuzzy seeds for planting (sowing)

At least six African countries use 100% fuzzy seeds for sowing. More than 50% of the area is sown with fuzzy seeds in at least eight countries, namely, Pakistan, Iran, Nigeria, Tanzania, Bangladesh, Malawi, Uzbekistan and Kenya. Amongst the African countries, Zimbabwe, Uganda, Sudan, South Africa and Ethiopia reported 98-100% de-linted seeds for sowing. (Fig. 48)

Figure-48. Use of fuzzy seeds for planting (sowing)



Seeds crushed for oil

Cotton seed oil is a valuable commercial commodity. Majority of the cotton growing countries crush cotton seeds to extract oil at a variable average extraction efficiency of 10 to 18% with a global average extraction efficiency of 11.59%. A few countries use most of the cotton seeds directly as cattle feed. Cotton seed meal is exported by many countries. A few countries also waste cotton seeds due to the lack of infrastructure required for seed processing. (Fig. 49)

Cotton-seed oil production

Five million metric tonnes of cotton-seed oil were produced in 2020. Seven countries, namely, India, China, Brazil, Pakistan, USA, Uzbekistan and Turkey accounted for 86.55% of the global cotton-seed oil production. (Fig. 50)

Figure 49. Crushed for oil

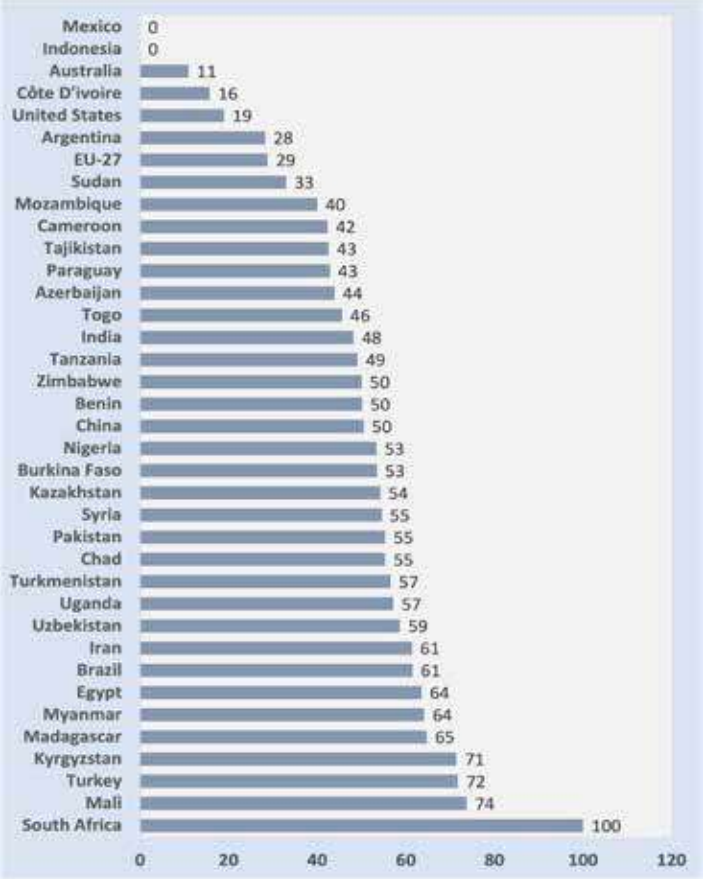
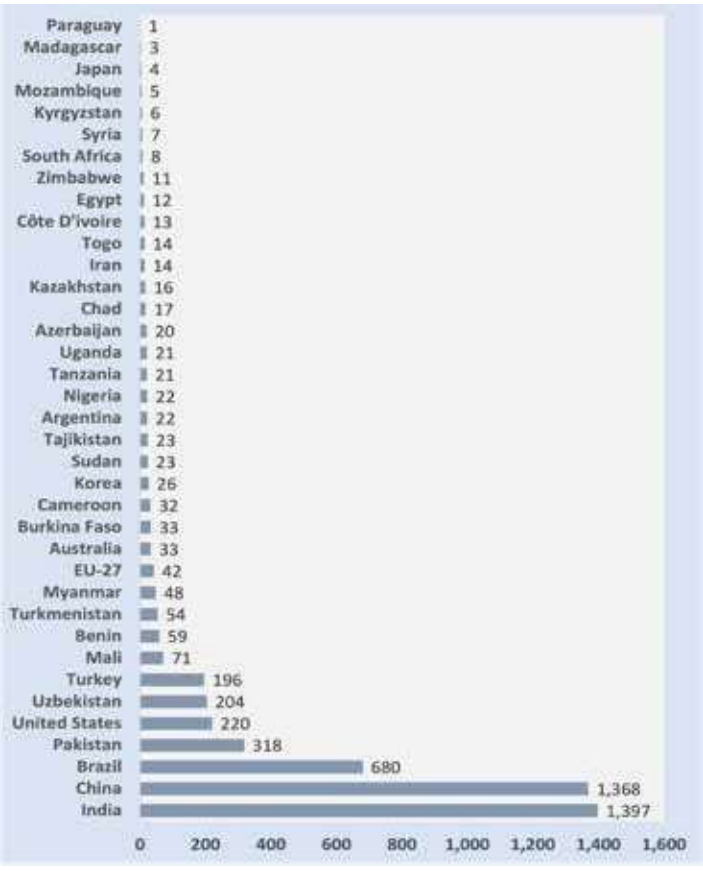


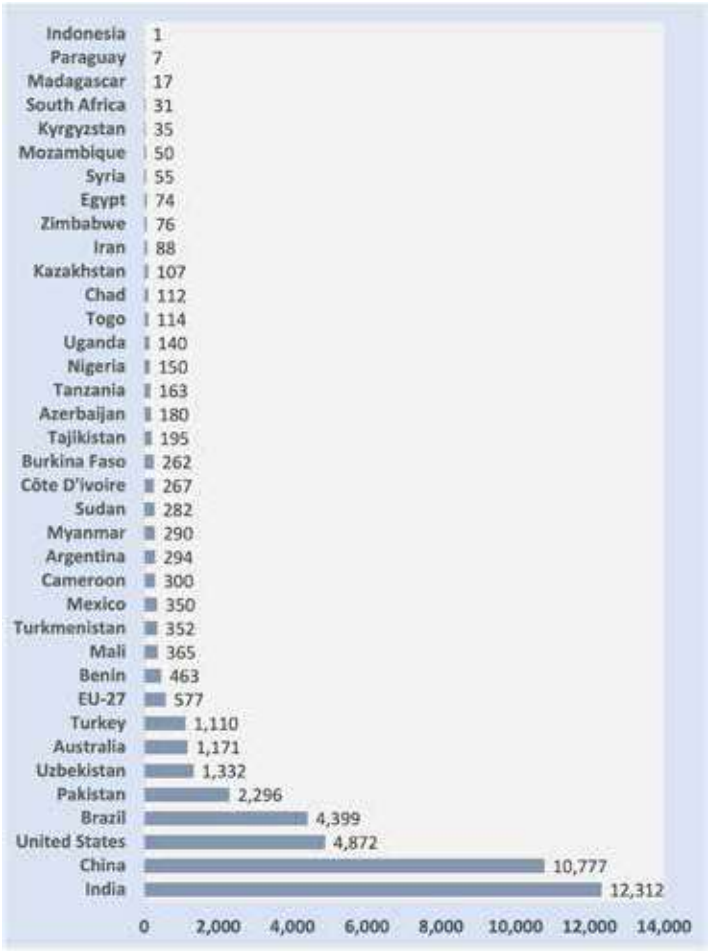
Figure-50. Cotton-seed oil production ('000 Tonnes)



Cotton seed production ('000 Tonnes)

A total of 43.67 million tonnes of cotton seeds were produced in 2020. The average oil extraction efficiency across the globe was 11.59%. India and China together account for 52.87% of the global cotton seed production. United States, Brazil, Pakistan, Uzbekistan, Australia and Turkey together account for 34.76% of the global cotton seed production. (Fig. 51)

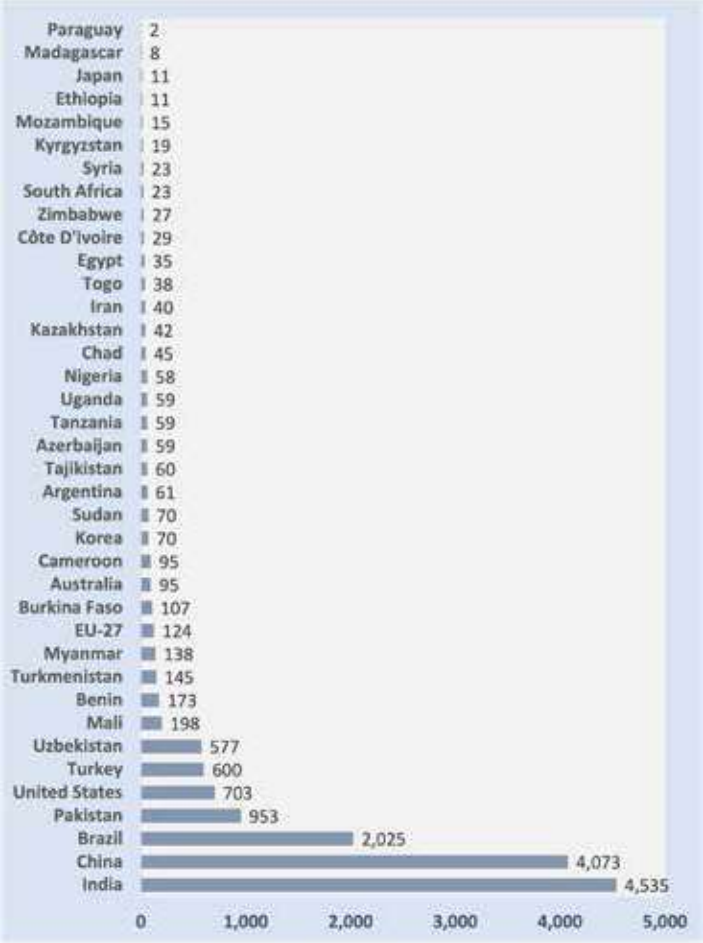
Figure-51. Cotton seed production ('000 Tonnes)



Cotton seed-meal production ('000 Tonnes)

About 40 cotton growing countries produce 15.4 million tonnes of cotton seed meal that are as cattle feed. India, China and Brazil together account for 69.0% of the global cotton seed meal production. Pakistan, USA, Turkey and Uzbekistan are the other major producers who together account for 18.4% of the global production. (Fig. 52)

Figure-52. Seed-meal production ('000 Tonnes)



Trade of Cotton Linters, Seeds and Byproducts (2020)

Carded and combed exports

The global value of carded and combed cotton exports was US$ 190.2 million. The top five exporting countries USA, Uganda, Indonesia, India and Mexico commanded a share of 60% in in the export market. USA exported carded and combed cotton worth US$ 40.9 million in 2020. (Fig. 53)

Carded and combed imports

The global value of carded and combed cotton exports was US$ 213.5 million. Vietnam, France, Taiwan, Poland, Spain, UK, Russian federation, South Africa, Bangladesh and Japan imported 70% of the globally traded carded and combed cotton. These top ten countries accounted for 70% of the total global imports of carded and combed cotton. (Fig. 54)

Figure 53. Carded and combed exports ('000 US$)

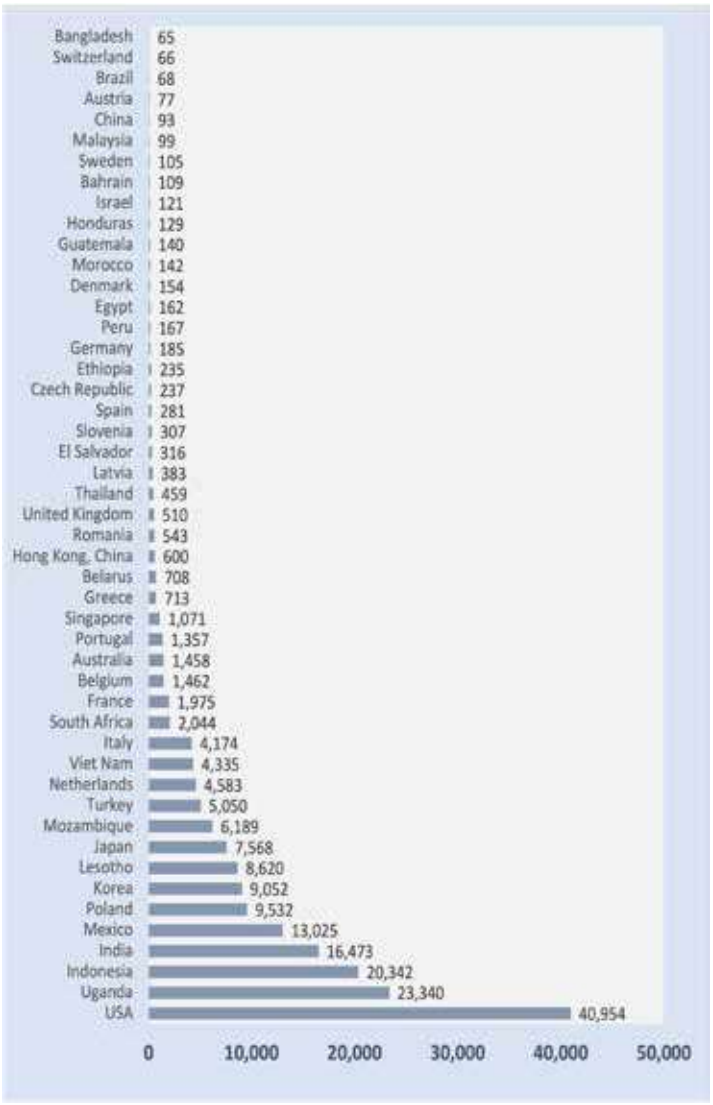
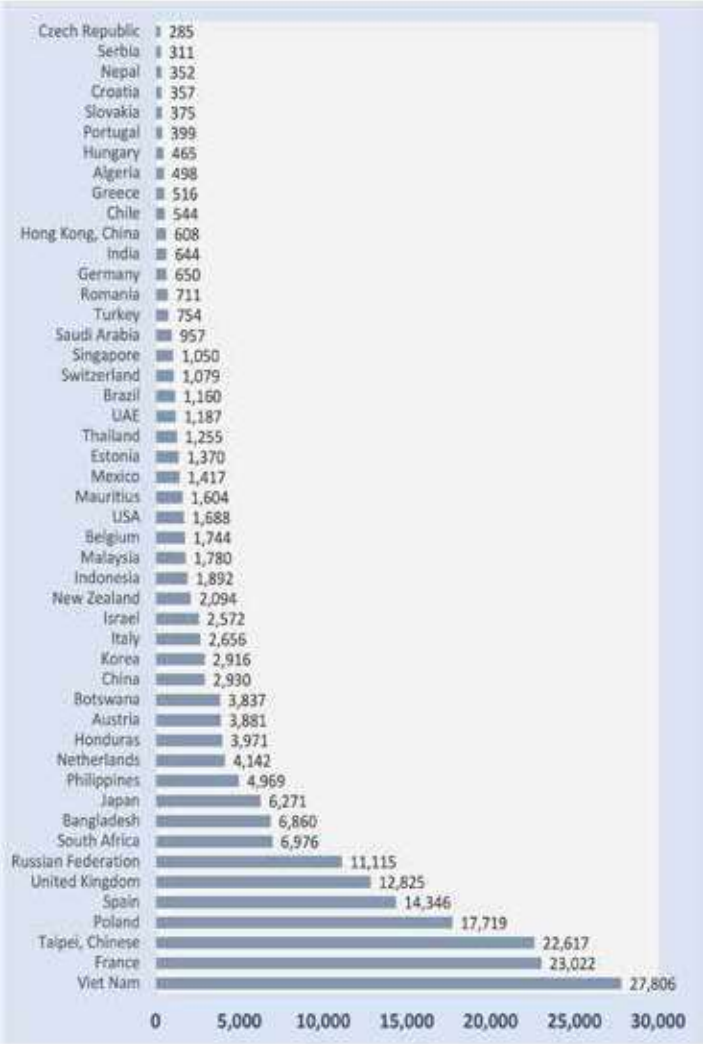


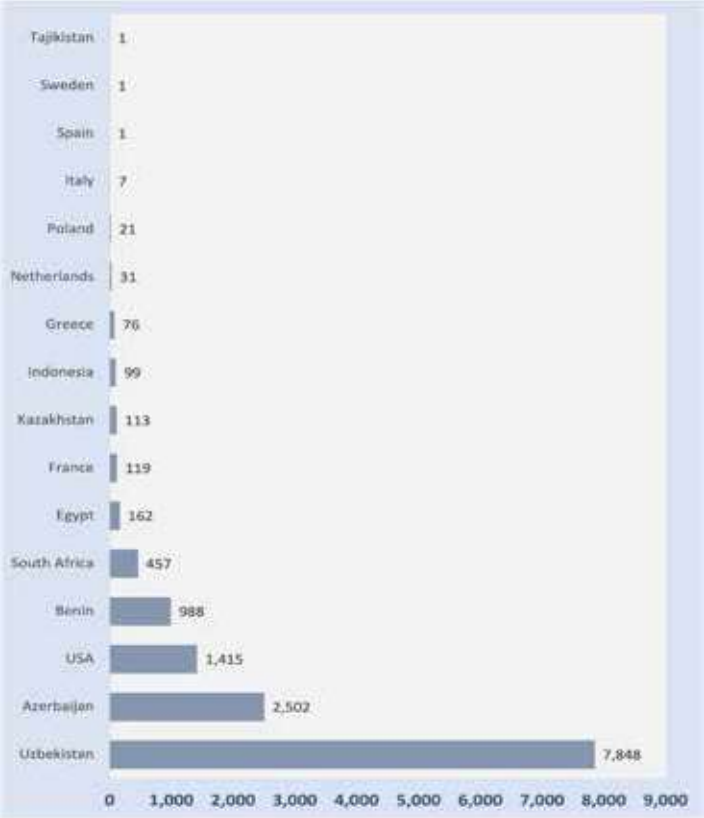
Figure 54. Carded and combed imports ('000 US$)



Crude seed oil exports

The total globally traded crude cotton seed oil export business was worth US$ 13.8 million in 2020. Crude cotton seed was exported by about a dozen countries. The top five countries Uzbekistan, Azerbaijan, USA, Benin and South Africa accounted for 95% of the globally exported crude cotton seed oil. (Fig. 55)

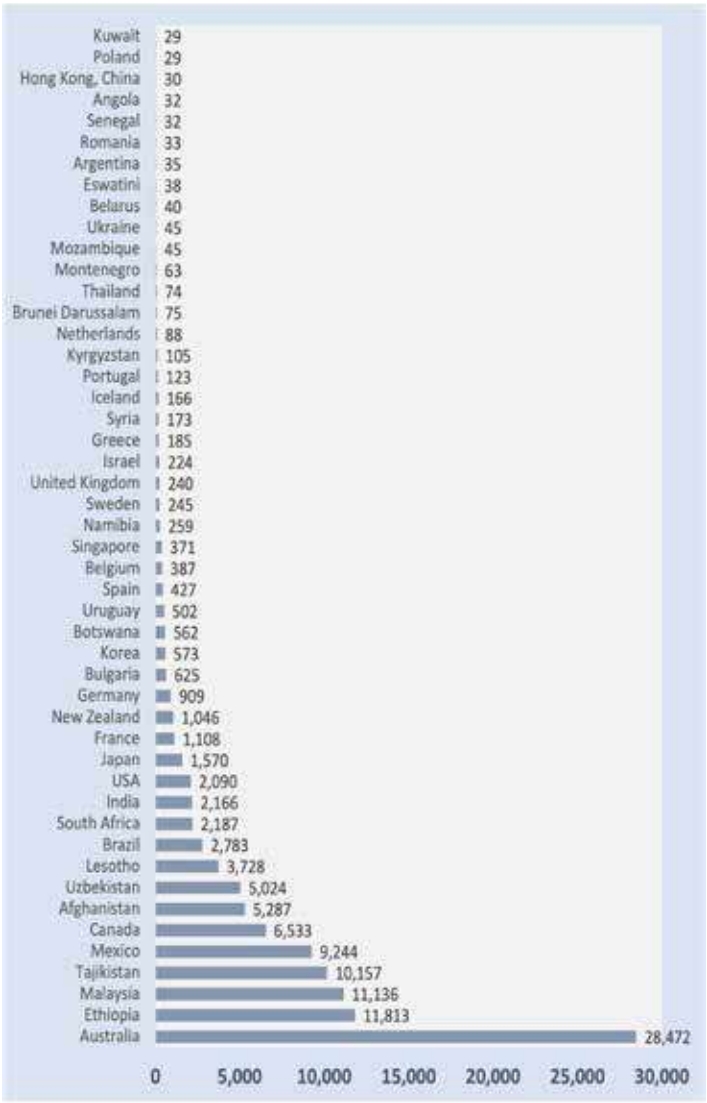
Figure 55. Crude cotton seed oil exports ('000 US$)



Crude seed oil imports

The import market of crude cotton seed oil was worth US$ 19.4 million. Central Asian countries were the main crude cotton seed oil importers. The top five importers, namely, Tajikistan, Kyrgyzstan, Afghanistan, Turkey and Nigeria import 90% of the global crude cotton seed oil traded. (Fig. 56)

Figure 56. Crude cotton seed oil import ('000 US$)



Cotton oil exports

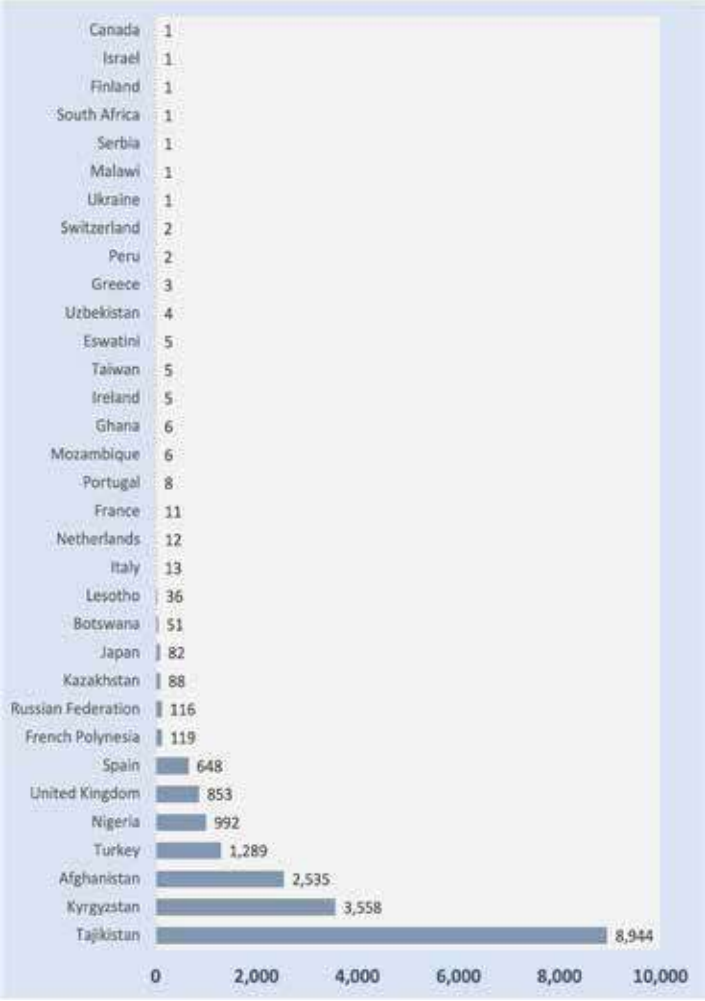
The global cotton seed oil exports were worth US$ 96.4 million. Interestingly, the top ten countries that exported 92% of the globally traded cotton seed oil are geographically distributed all over the globe. The top ten cotton seed oil exporting countries were USA, Kazakhstan, Malaysia, Uzbekistan, South Africa, Turkey, Brazil, Zambia, China and Benin. (Fig. 57)

Figure 57. Cotton seed oil exports ('000 US$)

Cotton oil imports

The cotton seed oil import market was worth US$ 111.6 million. Australia imported US$ 28.47 million worth of cotton seed oil and is the world's largest cotton oil importer. The top five countries, namely, Australia, Ethiopia, Malaysia, Tajikistan and Mexico imported cotton seed oil worth US$ 70.8 million with a share of 63% in the import market. (Fig. 58)

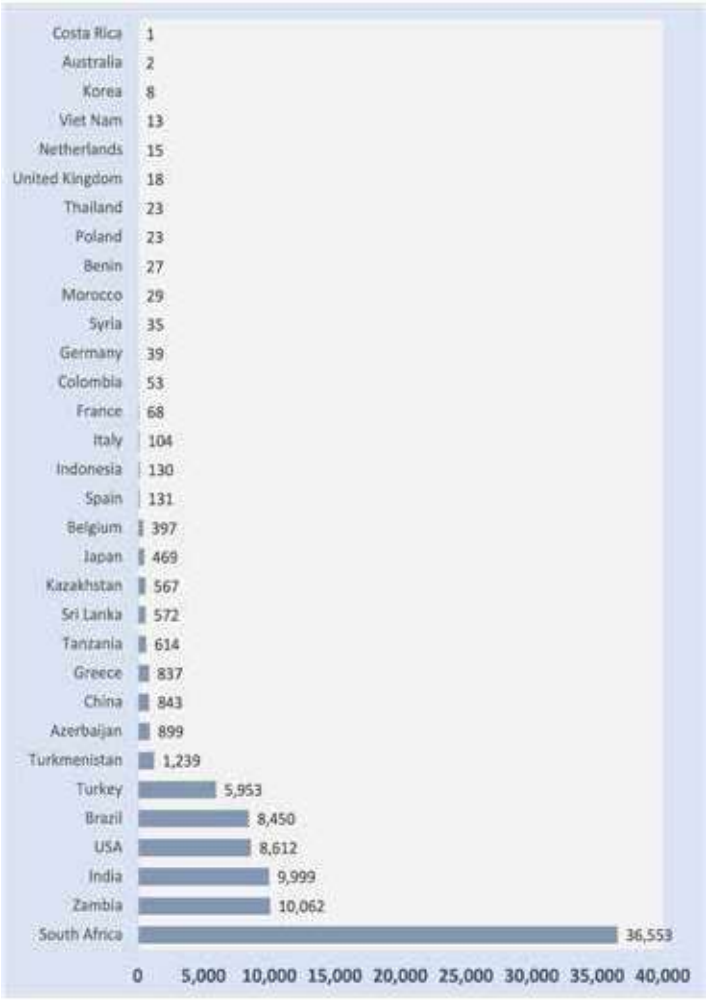
Figure 58. Cotton seed oil imports ('000 US$)



Linter exports

The global linters export market was US$ 86.8 million. South Africa exported linters worth US$ 36.5 million with the world's largest market share of 42%. The top five countries, namely, South Africa, Zambia, India, USA and Brazil together earned US$ 73.7 million from linter exports and accounted for 85% of the global market share. (Fig. 59)

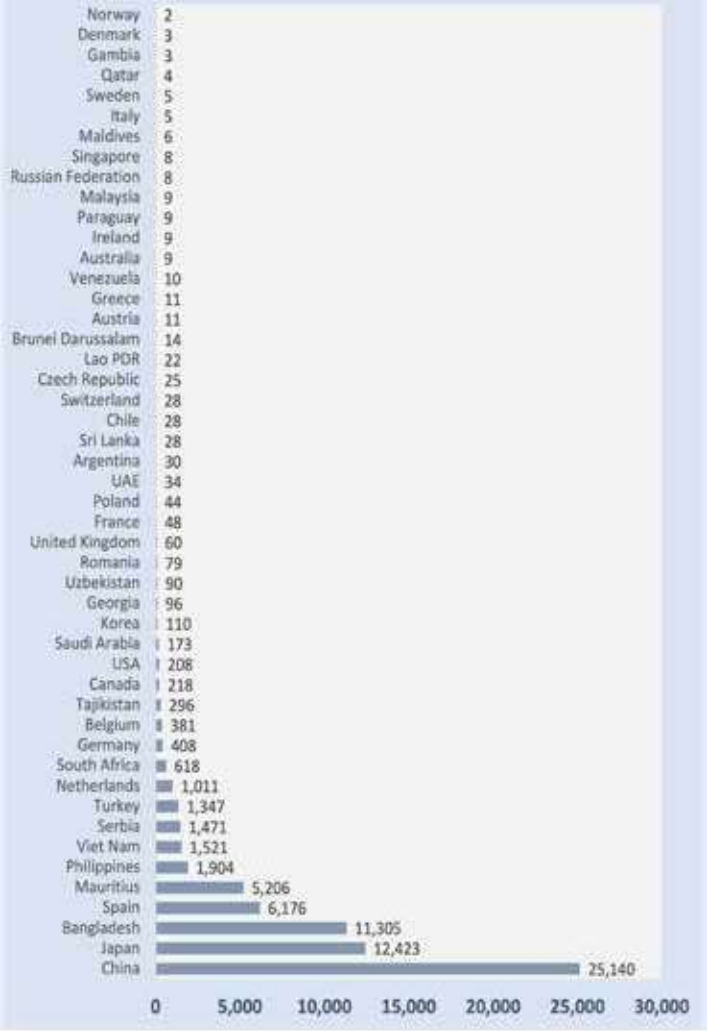
Figure 59. Linter exports ('000 US$)



Linter imports

The total value of global linter import is US$ 70.7 million. In 2020, China imported 36% of the globally traded linters worth 25.14 million. The top five countries, China, Japan, Bangladesh, Spain and Mauritius imported 85% of global total linters valued at US$ 60.25 million. (Fig. 60)

Figure 60. Linter imports ('000 US$)



Cotton seed exports

The global seed export market was US$ 184.6 million. This market deals with cotton seeds used for purposes other than sowing. United States of America and Greece exported cotton seeds worth US$ 149.5 million and are the world's largest cotton seed exporters with a market share of 81%. Ethiopia and Brazil are the other two major cotton seed exporters with a 10% market share. (Fig. 61)

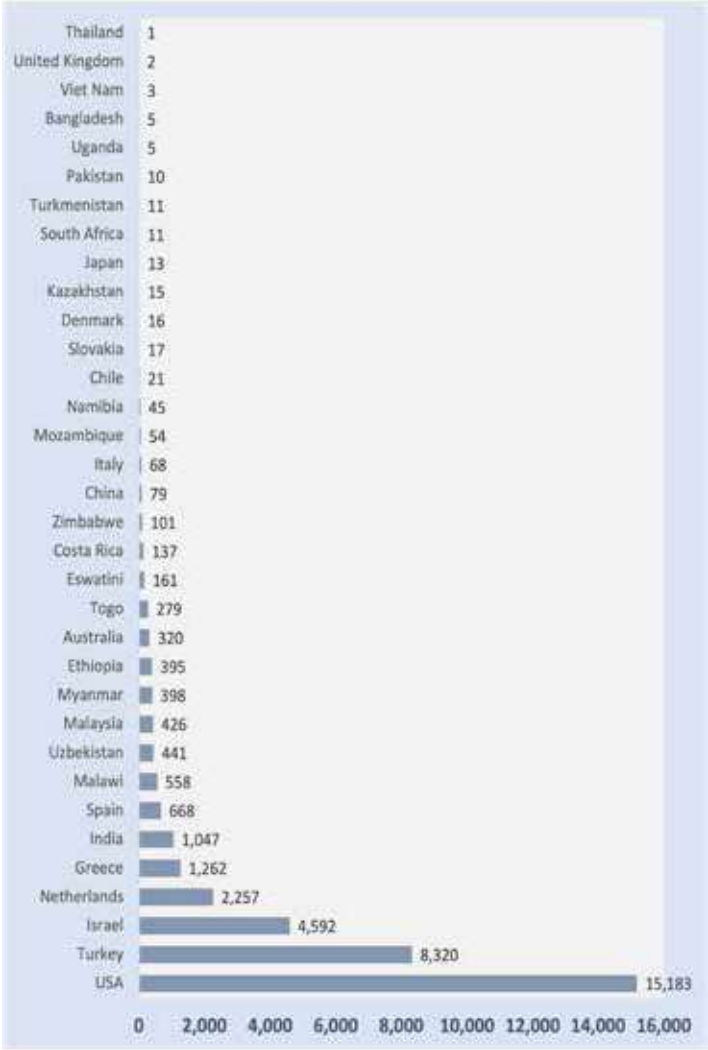
Cotton seed imports

The global cotton seed imports business was worth US$ 194.6 million. The top five countries, namely, Italy, Korea, Saudi Arabia, Japan and Mexico accounted for 85% of the total cotton seed import market. The top five countries imported cotton seeds worth US$ 164 million. (Fig. 62)

Figure 61. Cotton seed exports ('000 US$)

Figure 62. Cotton seed imports ('000 US$)

Figure 63. Cotton seeds exported for sowing purposes ('000 US$)



Cotton seed for sowing exports

The global market value of cotton seeds exported for sowing purposes is US$ 36.9 million. Six countries, namely, USA, Turkey, Israel, Netherlands, Greece and India were the largest cotton seed (for sowing) exporters in 2020 with a market share of 88%. (Fig. 63)

Cotton seeds for sowing imports

The global import market of cotton seeds (for sowing purposes) was US$ 33.4 million. Azerbaijan, USA, Mexico, Zimbabwe and Greece imported seeds worth US$ 21.97 million and accounted for 66% share in the global cotton seed (for sowing) import market. (Fig. 64)

Cotton mill waste exports

India was the world's largest cotton mill waste exporter with a market share of 21% in the total global export market worth US$ 398.7 million. India, Pakistan, Turkey, Germany and Belgium together exported cotton mill waste valued at US$ 253.2 million and accounted for 66% share in the global export market of cotton mill waste. (Fig. 65)

Cotton mill waste imports

The total global cotton mill waste import market was US$ 394.7 million. Germany was the largest importer of cotton mill waste worth US$ 81.9 million in 2020 with 21% of the import market share. Cotton mill waste is imported by more than 100 countries. The top five countries, namely, Germany, Belgium, India, USA and France imported cotton mill waste worth US$ 177.5 million and accounted for 45% of the global market share. (Fig. 66)

Figure 64. Cotton seeds imported for sowing purposes ('000 US$)

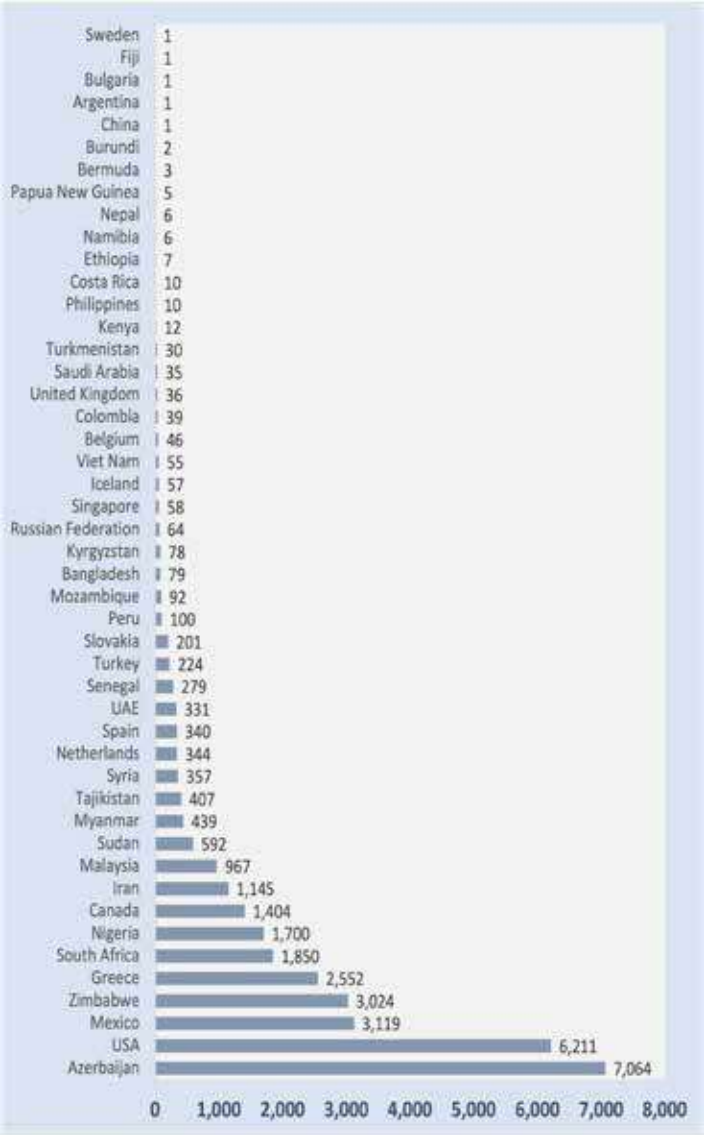
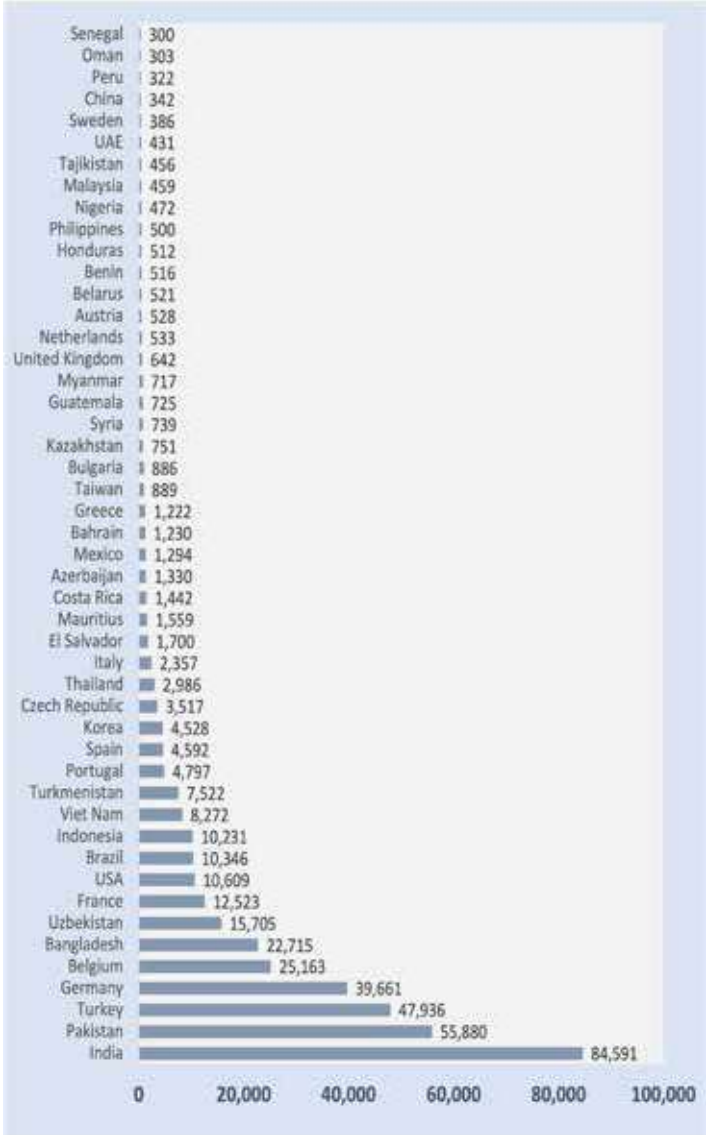


Figure 65. Cotton mill waste exports ('000 US$)



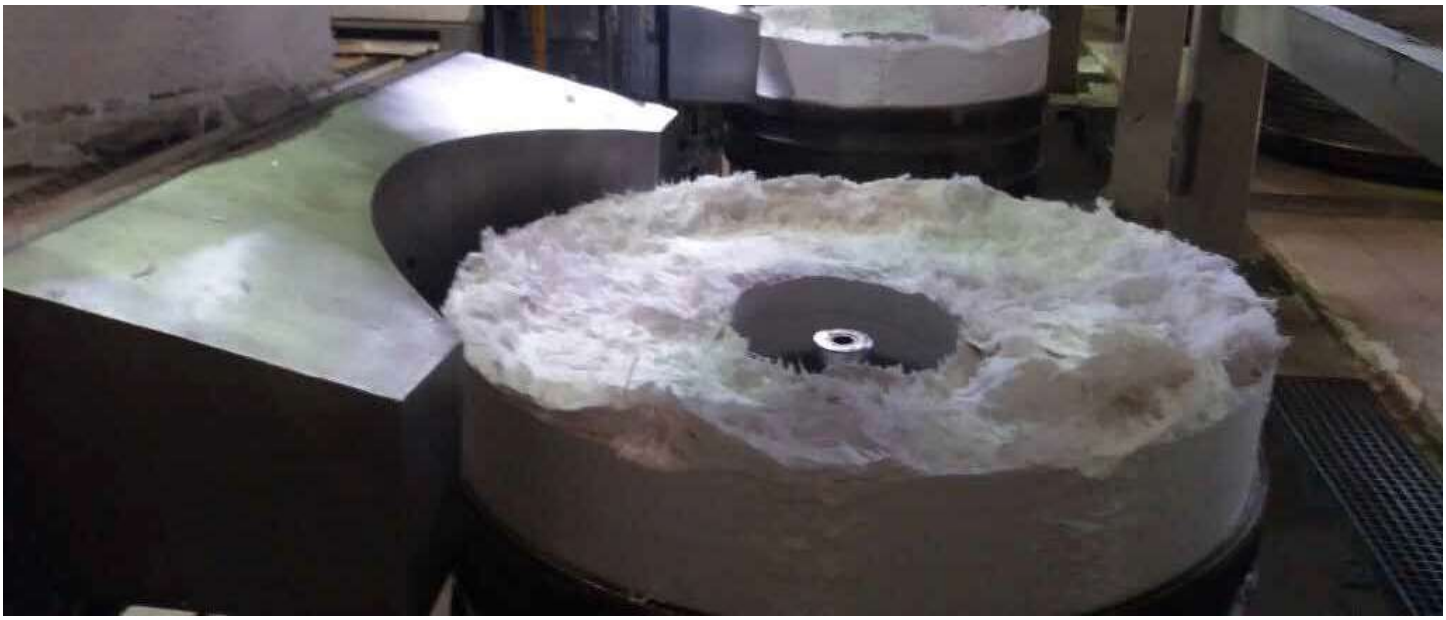
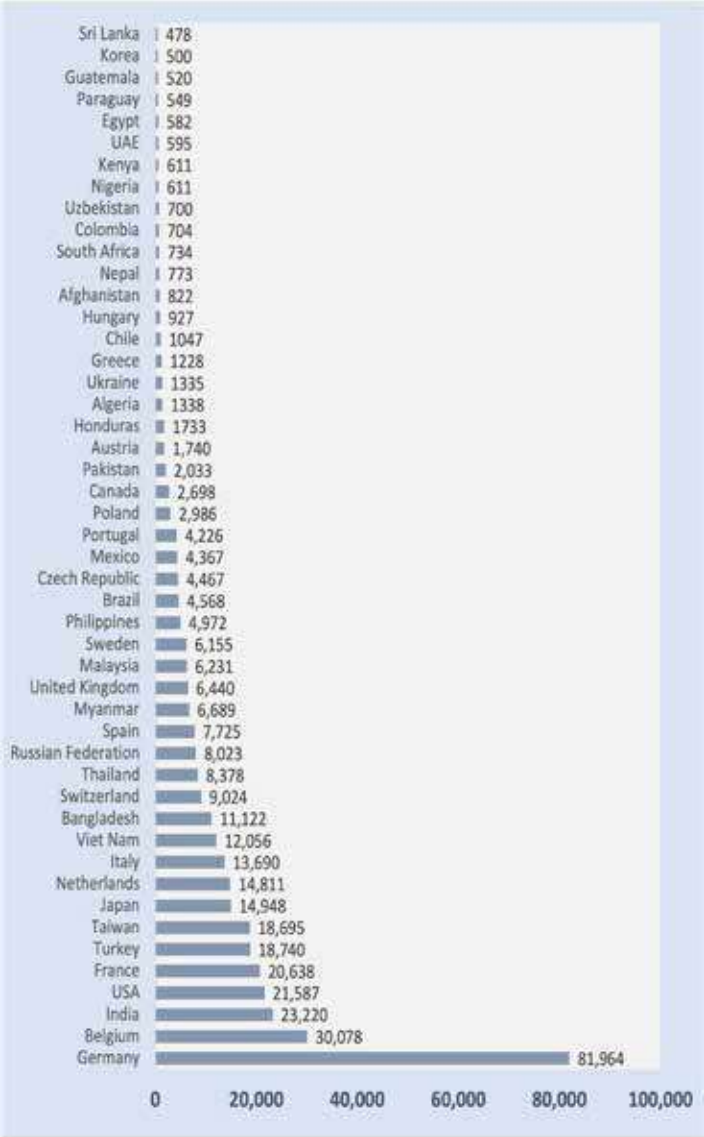


Figure 66. Cotton mill waste imports ('000 US$)



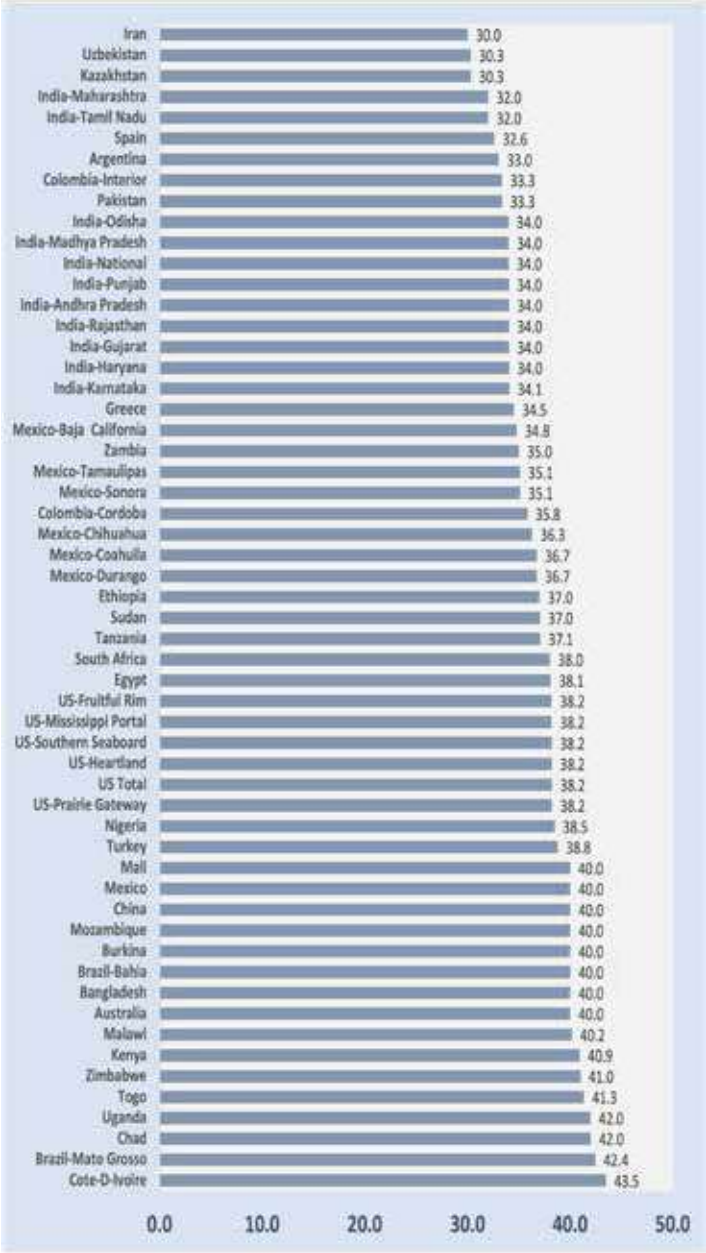
Ginning% Out-Turn

Ginning%

Ginning outturn (percentage) is the lint proportional recovery of lint from seed cotton after ginning expressed as percentage by weight. Abbreviated as GOT, it ranges from 30-43.5% across the globe. Higher GOT results in higher amount of lint from seed-cotton and therefore leads to higher yields.

Fifteen countries recorded a GOT of 40 and above. The countries with high GOT are Mali, Mexico, China, Mozambique, Burkina Faso, Brazil, Bangladesh, Australia, Malawi, Kenya, Zimbabwe, Togo, Uganda, Chad and Ivory Coast. Some African cotton varieties are reputed for their high ginning outturn. (Fig. 67)

Figure-67. Ginning % (ginning outturn GOT)



Cotton varieties with >40 ginning%

High ginning percent results in high fibre recovery and higher lint yields. There are several varieties across the world that produce seed-cotton with more than 40% fibre recovery. The table below list the names countries, names of the varieties with >40% ginning out-turn and other fibre traits. (Table-3a-3e).

Table 3a. Cotton varieties in Americas with Ginning Out-Turn (GOT) >40%

Country	Variety	Year released	Ginning%	Length mm	Strength g/tex	Mic
Argentina	Pora 3 INTA BGRR	2019	40	29.4	33.2	4.5
Brazil	FM 975 WS	2017	41	29.3	29.96	4
Brazil	FM 906 GLT	2017	41	28.5	29.7	3.9
Brazil	TMG 42 WS	2014	42.9	30.1	30.7	4.01
Brazil	TMG 81 WS	2013	43	29	30.8	4.27
Brazil	TMG 44 B2RF	2018	43.1	30.3	31.1	3.99
Brazil	FM 954 GLT	2016	43.3	31.8	30.3	4.3
Brazil	TMG 47 B2RF	2019	43.5	31.81	29.03	3.93
Brazil	TMG 81 WS	2013	45.5	29	30	4.6
Brazil	DP 1536 B2RF	2013	39-41	29.58	31.5	4.4
Brazil	FM 983 GLT	2016	40-41	30.2	30.9	4
Brazil	IMA 8405 GLT	2016	40-41	29.8 - 31.1	29.2 - 30.5	3.9 - 4.3
Brazil	FM 944 GL	2016	40-42	30	31.8	3.9
Mexico	DP 1822		43	1.18	33.2	4.7
Mexico	DP 1845		44	1.21	30.5	4.5
Mexico	DP 1555		44	30.2	31.2	4.5
USA	DP 1845 B3XF		40.6	30.7	30.5	4.5
USA	PHY 350 W3FE		41	30.1	30.3	5
USA	PHY 480 W3FE		41	28.8	29.7	4.4
USA	DP 1948 B3XF		41.4	30.9	33.3	3.8
USA	ST 5707 B2XF		41.7	30.2	29	4.5
USA	PHY 444 WRF		42	32.5	31	3.9
USA	DP 1518 B2XF		42	29.8	28.2	4.5
USA	NG 3930 B3XF		42.4	29.8	30.2	4.3
USA	ST 5600 B2XF		42.9	29.5	30.3	4.5
USA	DP 1646 B2XF		43	31	30.3	4.2
USA	DP 1840 B3XF		43.3	30	30.2	4
USA	PHY 400 W3FE		44	29.7	31.4	4.2
USA	DP 1820 B3XF		44	30.6	31.9	4.6
USA	DP 1725 B2XF		45	29.3	30.4	4.9

Table 3b. Cotton varieties in Australia with Ginning Out-Turn (GOT) >40%

Country	Variety	Year released	Ginning%	Length mm	Strength g/tex	Mic
Australia	Sicot 812RRF		41	31.2	31	4.3
Australia	Siokra 250		41	33	32.6	4.2
Australia	Sicot 714B3F	2016	42	30.5	30	4.4
Australia	Sicot 707B3F		42	30.2	30	4.6
Australia	Sicot 754B3F		43	31.5	31	4.5
Australia	Sicot 606B3F*		43	30.2	31.9	4
Australia	Sicot 711RRF		43	30.2	30	4.4
Australia	Sicot 748B3F	2016	44	31.2	31	4.5
Australia	Sicot 746B3F	2016	45	30.7	30	4.5
Australia	Sicot 620		45	32	31.1	4.1

Table 3c. Cotton varieties in Asia with Ginning Out-Turn (GOT) >40%

Country	Variety	Year released	Ginning%	Length mm	Strength g/tex	Mic
Bangladesh	CB-12	2010	40	29	30.5	4
Bangladesh	CB-15	2016	40.7	29.5	40	5.2
Bangladesh	CB-18	2019	41	31	84.87PSI	4.35
Bangladesh	CB-13	2013	42	29.5	29	3.8
Bangladesh	CB-16	2017	42	30.56	86.25PSI	4.4
Bangladesh	CB-17	2018	40-42	28.19	84-85PSI	4.1
Pakistan	CIM-663	-	40	31.8	27.2	4.5
Pakistan	KOONJ	2017	40	29	96	4.1
Pakistan	FH-142	2013	40.1	28.3	101.4	4.8
Pakistan	CIM-620	2016	40.2	28.9	93	4.6
Pakistan	Bt.Cyto-179	2017	40.2	28.2	107.6	4.2
Pakistan	AGC-777	2015	40.2	29.2	95.7	4.8
Pakistan	CIM-610,	2018	40.2	28.8	101.9	4.3
Pakistan	CRIS-543	2020	40.5	28.3	30.1	4.6
Pakistan	AGC-555	2013	40.7	27.8	102.8	4.7
Pakistan	CRIS-533	2017	40.7	28.8	90.5	4.5
Pakistan	MNH-886	2013	41	28.2	99.5	5
Pakistan	CRIS-613	2020	41.6	28.8	28.7	4.7
Pakistan	NS-121	2010	41.9	26.2	106	5.1
Pakistan	IUB-13	2015	42	28.8	93	4.7
Pakistan	FH-Lalazar	2015	42	28.9	98.6	4.8
Pakistan	Bt.CIM-343	-	42	32.1	27.1	4.8
Pakistan	Bt.CIM-632	2018	42.2	28.8	100.6	4.5
Pakistan	IR-3701	2010	43.6	25.9	95.6	5.7

Table 3d. Cotton varieties in Mediterranean/Europe with Ginning Out-Turn (GOT) >40%

Country	Variety	Year released	Ginning%	Length mm	Strength g/tex	Mic
Egypt	Giza 95	2015	40	29.3	36.5	4.3
Spain	DP332	2009	43	28.5		4.7
Spain	JUNCAL	2004	43.5			
Turkey	Lidya	2012	40-42		32-38	4.0-4.8
Turkey	Flash	2008	40-42		31-35	4.6-4.9
Turkey	BA-119	2002	41-43		31-33	4.4-4.6
Turkey	Gloria	2010	41-43		33-35	3.9-4.2
Turkey	May 498	2015	42-43		30-32	4.6-4.8
Turkey	SG-125	1999	42-43		32-34	4.3-4.8
Turkey	Carisma	2013	42-44		30-32	4.4-4.9
Turkey	BA-440	2015	42-44		31-33	4.6-4.9
Turkey	May 468	2006	44-45		34-36	4.2-4.4
Turkey	May 455		44-46		32-35	4.4-4.8
Turkey	Lima		44-46		32-36	4.3-4.8
Turkey	Candia	2008	44-46		33-35	4.0-4.3
Turkey	Fiona		44-46		33-35	4.0-4.5
Turkey	Lima		44-46		32-36	4.3-4.8
Turkey	DP-332	2011	44-46		35-39	4.3-4.8

Table 3e. Cotton varieties in Africa with Ginning Out-Turn (GOT) >40%

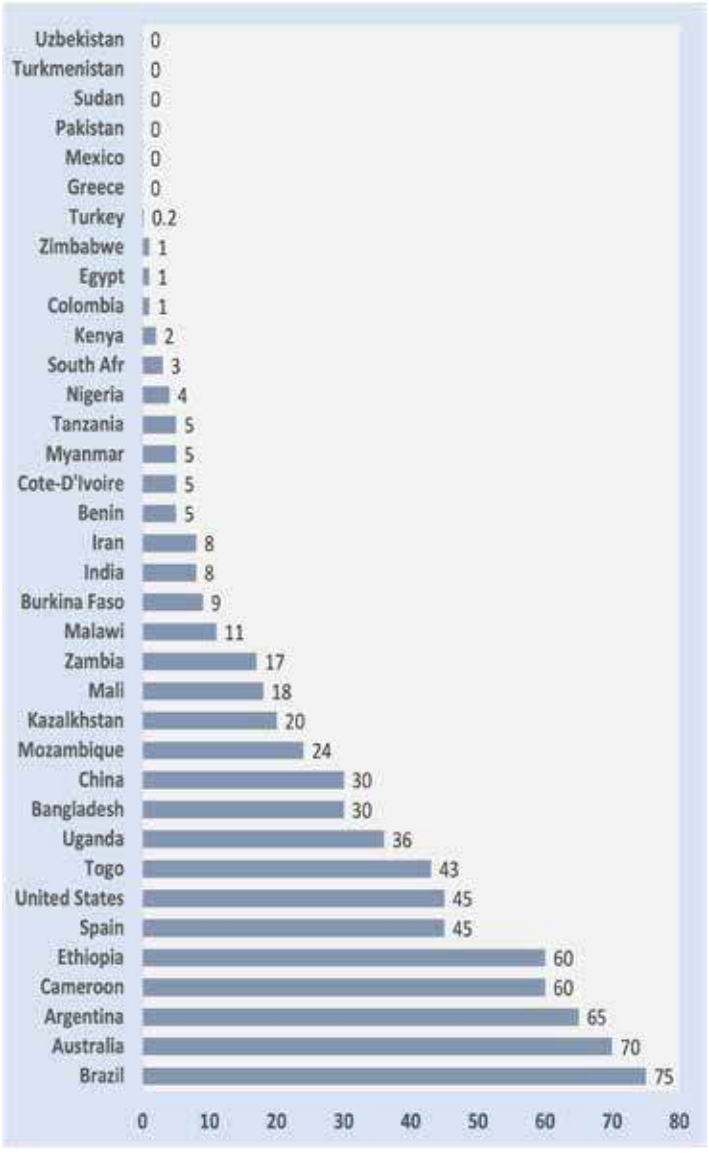
Country	Variety	Year released	Ginning%	Length mm	Strength g/tex	Mic
Benin	OKP 768	2015	40	30	31	4.2
Benin	KET 782	2015	40	30	31	4.3
Cameroon	IRMA L484	2007	41.5	29.9	30.5	3.8
Cameroon	IRMA Q302	2012	44.2	30.5	31.3	3.7
Cameroon	IRMA L457	2008	44.7	28.6	30.3	3.8
Chad	A51	1991	41.5	28.2	21.4	3.8
Chad	STAMF	1983	41.7	28.9	21.5	3.9
Chad	IRMA Q302	2019	42	30.5	29.5	3.8
Cote d'Ivoire	Y 331 C	2013	43	28		
Côte d'Ivoire	SICAMA Vir 1	2018	43	28.5		
Côte d'Ivoire	Y 331 BLT	2014	44	29		
Côte d'Ivoire	GOUASSOU Fus 1	2018	45	29		
Ethiopia	Claudia	2017	46	29.5	29.6	4.6
Mali	G 440	2004	42.7	28.2	26.8	4.3
Mali	Stam 279A	2003	43.4	28.5	26.6	4.3
Mali	NTA 90-5	1996	43.5	30.7	29	4.1
Mali	Stam 59A	1996	43.8	29.1	28.2	4.1
Mali	NTA 93-15	2004	44.9	29.9	26.9	3.8
Mozambique	Chureza	1994	40	28.60	26-28	3.5-4.0
Mozambique	ALBAR SZ 9314	1999	41.6	28.60	26-29	3.5-4.0
Mozambique	CA-324	1994	41.6	28.60	33.00	3.5-4.0
Tanzania	UKM 08	2008	42.3	32.385	30.2	4.03
Togo	STAM 129 A	1999-20	41	28.9	30.2	4.5
Togo	STAM 190	2017-18	43	28.9	30.5	4.1
Uganda	BPA2015A	2015	41	28 - 30	29 - 33	3.7-4.6
Uganda	SZ9314	1993	42	28 - 31	29 - 33	3.7-4.6
Uganda	CRIMS1	1998	42	28 - 30	29 - 33	3.7-4.6
Uganda	QM301	2010	42	28 - 30	29 - 33	3.7-4.6
Zambia	Chureza	1987	40.7	28.9	24.3	4.3
Zambia	CDT II	2005	42.4	29.5	24.8	4.2
Zambia	CDT V	2010	45.6	30.1	24.3	4.1
Zimbabwe	SZ 9314	1992	41	29	31.2	4.1

Tillage And Planting

Conservation tillage

Brazil, Australia, Argentina, Cameroon and Ethiopia reported more than 60% of the cotton acreage to be under zero tillage. Togo, United States and Spain reported 43-45% of their cotton area under zero tillage. Uzbekistan, Turkmenistan, Sudan, Pakistan, Mexico, Greece and Turkey reported almost complete conventional tillage in cotton cultivation. (Fig. 68)

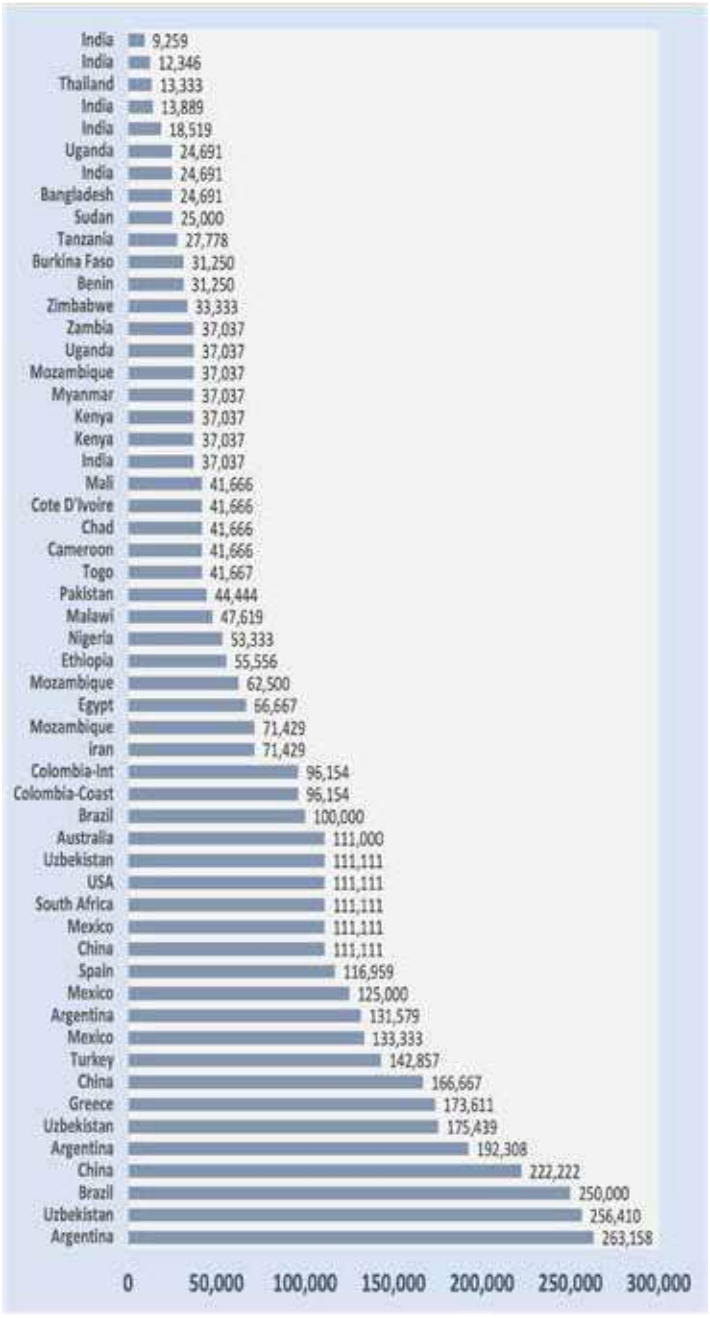
Figure-68. Zero Tillage



Plant population per hectare

Plant population is lowest in Africa, India, Bangladesh and Pakistan. While row to row distance is 80 to 100cm across the world, low plant population is mainly due to the wide spacing of plants within a row. The plant population is high at more than 95,000 plants per hectare in Argentina, Australia, Brazil, Colombia, China, Greece, Mexico, Spain, South Africa, Turkey, Uzbekistan and United States. Almost all the countries that follow a high density of 8-12 plants per metre within the row follow machine harvesting (except China). These countries harvest 700 to 2400 Kg lint per hectare. All countries with a wide spacing between plants in a row have low national average yields of less than 600 kg per hectare. (Fig. 69)

Figure-69. Plant Population



Number of Cotton Farmers

A total number of 22.14 million farmers cultivate cotton (Table-4). Asia has the largest number of cotton farmers. India, China and Pakistan together account for 79.3% of the global cotton farmers; 72.3% of male farmers and 90.1% of female farmers. Africa has 3.0 million male farmers and 0.68 million female farmers with a global share of 22.3% male, 7.8% female and 16.6% total farmers. Thus, Asia and Africa together account for more than 90% of the global cotton farmers. (Table 4)

Table 4. Number of cotton farmers

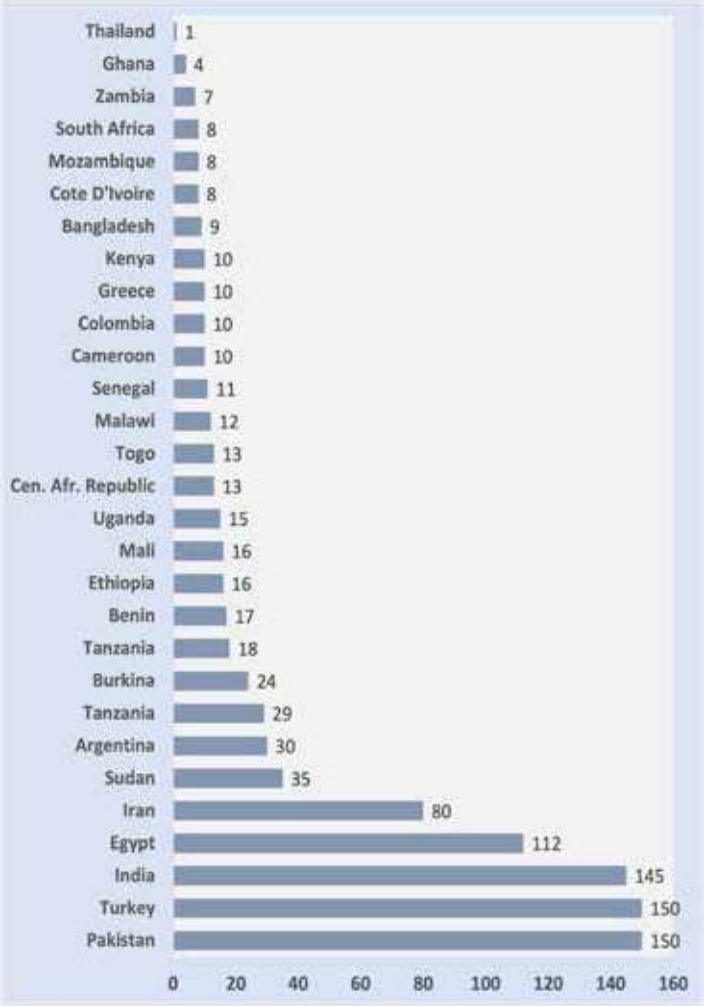
Country	Male	Female	Total
India	6,157,385	4,104,922	10,262,307
China	2,118,511	3,681,489	5,800,000
Pakistan	1,440,900	59,100	1,500,000
Tanzania	394,021	224,393	618,414
Burkina Faso	313,625	11,375	325,000
Zambia	283,944	40,631	324,575
Nigeria	270,000	30,000	300,000
Chad	238,944	9,100	248,044
Cameroon	220,600	29,400	250,000
Zimbabwe	216,074	141,014	357,088
Benin	190,657	23,408	214,065
Myanmar	190,424	47,606	238,030
Sudan	180,000	20,000	200,000
Mali	161,655	1,100	162,755
Togo	138,580	14,072	152,652
Turkmenistan	120,662	0	120,662
Côte-d'Ivoire	117,766	2,270	120,036
Mozambique	110,776	39,689	150,465
Uzbekistan	86,260	6,144	92,404
Uganda	73,900	73,200	147,100
Turkey	70,201	21,000	91,201
Egypt	67,129	25,819	92,948
Bangladesh	53,000	35,000	88,000
Ethiopia	48,627	750	49,377
Iran	32,951	0	32,951
Kazakhstan	31,745	10,000	41,745
Greece	25,256	23,025	48,281
Malawi	21,000	14,000	35,000
Kenya	18,745	9,293	28,038
Paraguay	10,000	2,000	12,000
USA	6,806	1,297	8,103
Mexico	6,676	788	7,464
Argentina	4,400	440	4,840
Spain	3,112	1,689	4,801
Vietnam	3,000	1,000	4,000
Brazil	2,651	612	3,263
South Africa	1,176	1,501	2,677
Australia	1,155	345	1,500
Kyrgyzstan	700	69	769
Indonesia	600	400	1,000
Colombia	496	113	609
Israel	40	40	80
WORLD TOTAL	**13,434,150**	**8,708,094**	**22,142,244**

Number of Public Sector Cotton Researchers

Researchers in the public sector

Data on the number of cotton researchers in major cotton growing countries such as China, USA, Brazil, and Mexico are not available. In the available dataset, Pakistan, Turkey, India and Egypt have the largest number of cotton researchers. (Fig. 70)

Figure-70. Number of public sector cotton researchers



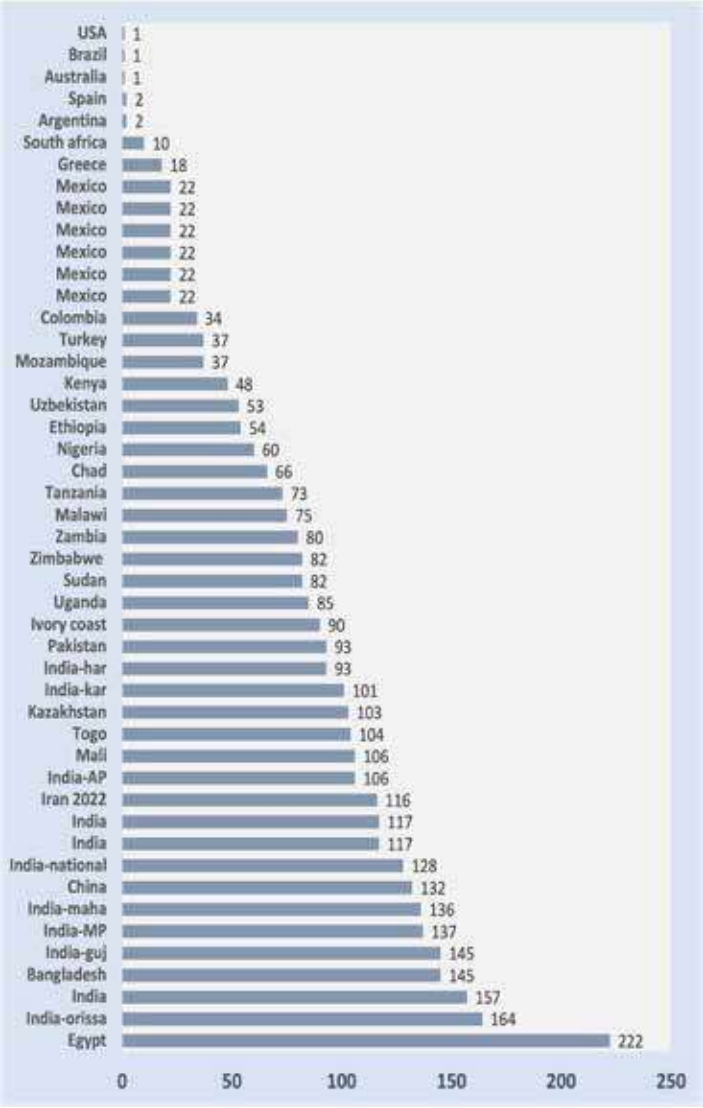
Employment on Cotton Farms

Employment on cotton farms

Employment of manpower is highest in developing and least developed countries where mechanization is low. Conversely, many developing and developed countries deploy machines for many production practices such as tillage, weeding, spraying, irrigation, fertilizer application and harvesting and employ a few persons on the farm to oversee and operate the machines. Wages are high in most developed countries because labour availability is scare, compared to developing and least developed countries. Therefore, mechanization was imperative in developed countries. USA, Brazil, Australia, Spain, Argentina,

Greece and Mexico employ very persons on cotton farms, whereas India, China, Egypt, Bangladesh, Iran, Mali, Togo and Kazakhstan employ more than 100 persons per hectare per season. (Fig. 71)

Figure-71. Employment on cotton farms
(man-days per hectare per season)



Trade of Cotton Fibre, Yarn, Fabric and Apparel (2020)

Fibre exports

The global cotton fibre export market was US$ 13.5 billion. United States exported 3.8 million tonnes of cotton fibre worth US$ 6 billion, accounting for world's largest market share of 44%.

The top five countries, USA, Brazil, India, Greece and Australia together earned US$ 11.4 billion from cotton fibre exports and accounted for 85% of the global market share. (Fig. 72 and 73)

Figure 72. Cotton Fibre exports by Country
(Million Tonnes & Billion US$)

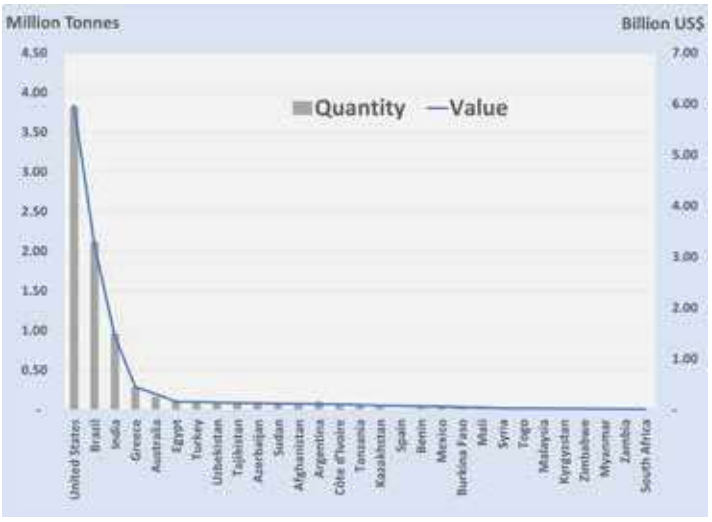
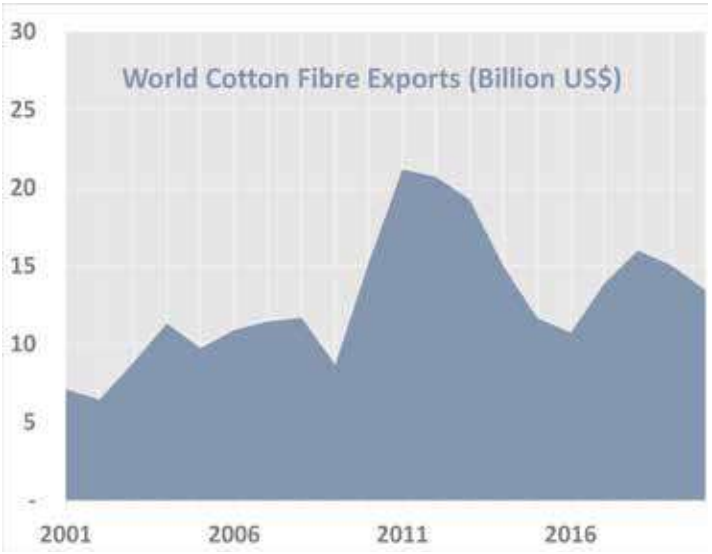


Figure 73. World Cotton Fibre Exports (Billion US$)



Fibre imports

A total of 8.1 million tonnes of cotton fibre worth US$ 12.9 billion were imported in 2020.

Five countries — China, Vietnam, Turkey, Bangladesh and Pakistan — accounted for 77% of the global market share.

In volume terms, China (2.2 million tonnes) comprises the largest market for imported cotton fibre worldwide, accounting for 27% of global imports.

The average price of imported cotton fibre varies from country to country.

Amongst the top 5 importers, Vietnam registered the lowest price (US$1.49/kg), while the China was the highest (US$1.65/kg). (Fig. 74 and 75)

Figure 74. Cotton Fibre imports by Country
(Million Tonnes & Billion US$)

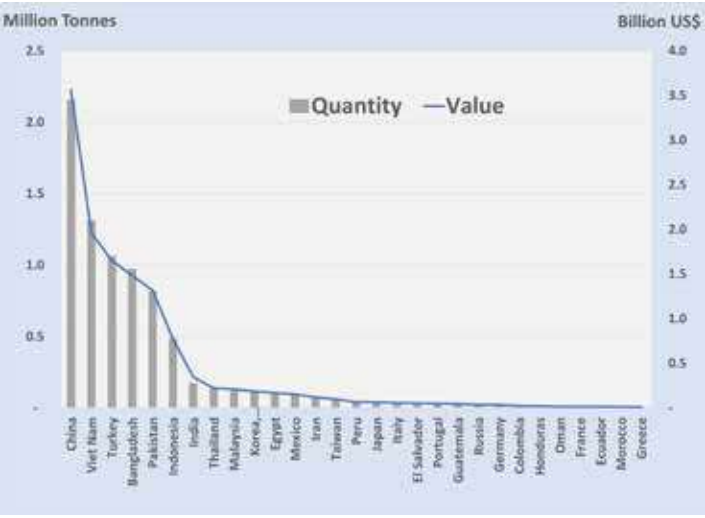
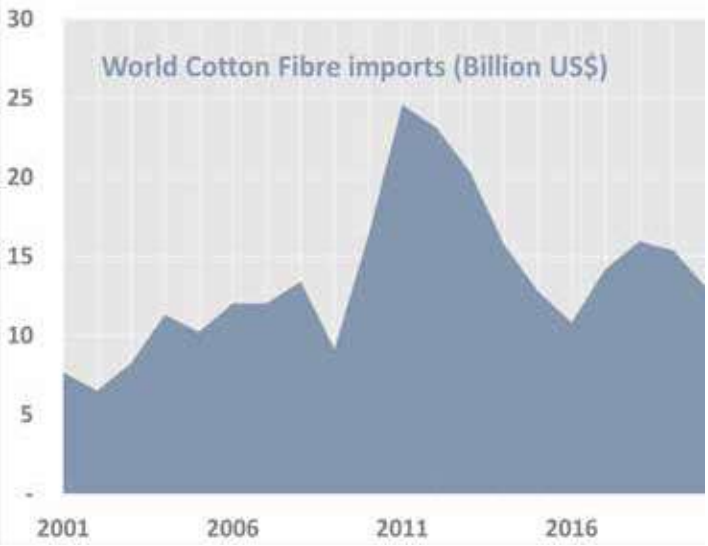


Figure 75. World Cotton Fibre Imports (Billion US$)



Yarn exports

World cotton yarn exports by volume decreased by 8% to 4.4 million tonnes in 2020. The global cotton yarn exports were worth US$ 11.8 billion. Vietnam was the largest exporter of cotton yarn in the world, with approximately 1.1 million tonnes. India was the second-largest exporter, followed by Uzbekistan, Pakistan and China. Among these five countries, Pakistan received the lowest unit value (US$2.03/kg) and China received the highest (US$3.96/kg). (Fig. 76 and 77)

Figure 76. Cotton Yarn exports by Country
(Million Tonnes & Billion US$)

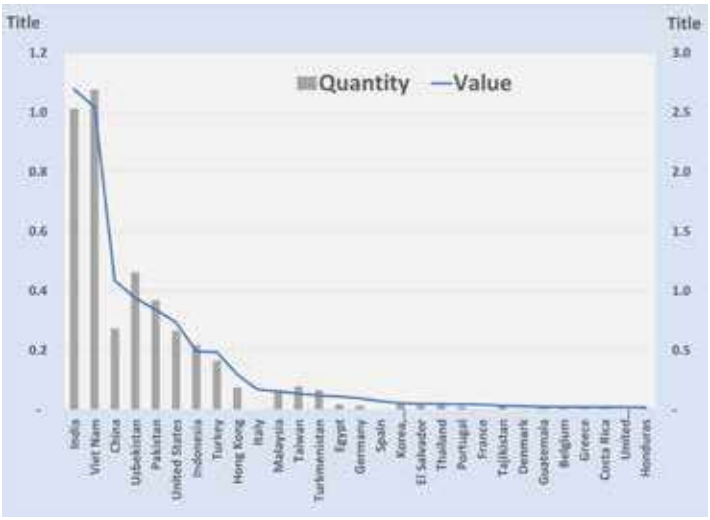
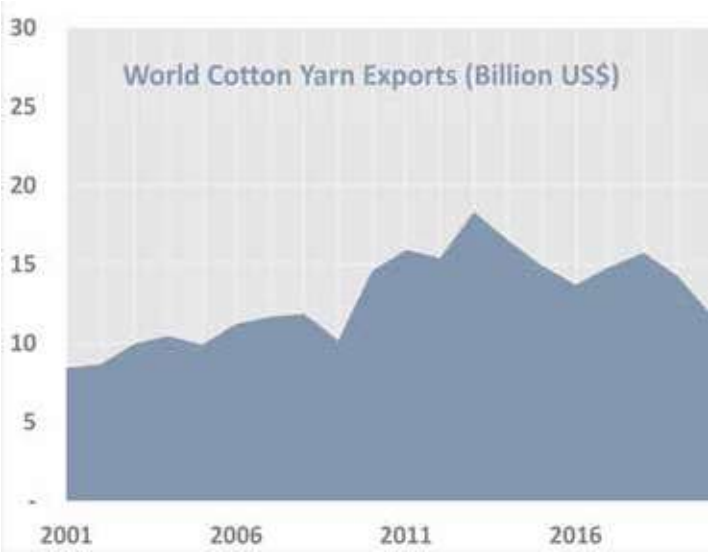


Figure 77. World Cotton Yarn exports (Billion US$)



Yarn imports

World cotton yarn imports by value decreased by 11% to US$ 11.3 billion in 2020 — the lowest level in 11 years. China was the largest importer of cotton yarn with 1.9 million tonnes, valued at US$4.3 billion. Bangladesh and Turkey were the second- and third-largest cotton yarn importers, accounting for 8% and 5%, respectively. These three countries accounted for 58% of global cotton yarn imports in terms of volume. (Fig. 78 and 79)

Figure 78. Cotton Yarn imports by Country (Million Tonnes & Billion US$)

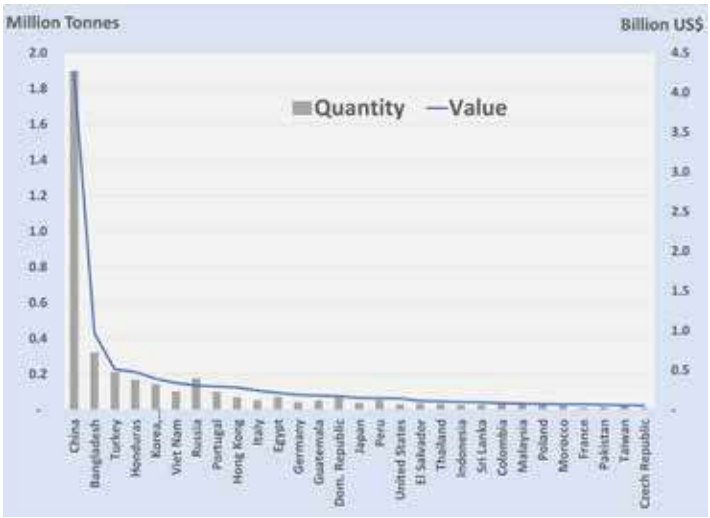
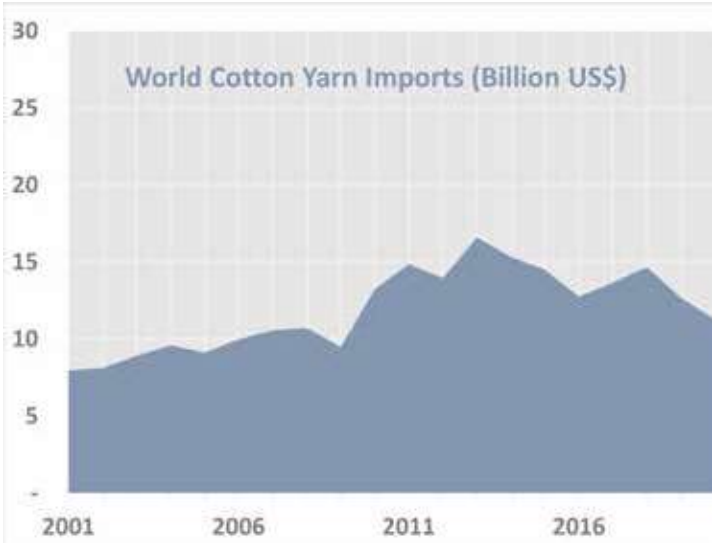


Figure 79. World Cotton Yarn imports (Billion US$)



Fabric exports

In value terms, cotton fabric exports (woven and knitted) stood at US$ 27.2 billion in 2020. China remained the largest exporter of cotton fabrics accounting for 49% of global exports. The second-largest exporter was India (7%), followed by Pakistan (6%) and Turkey (5%). These four countries accounted for approximately 68% of all cotton fabric exports in 2020. The vast majority of cotton fabric exports were woven fabrics, accounting for 74% of the total. (Fig. 80 and 81)

Figure 80. World Cotton Fabric exports (Billion US$)

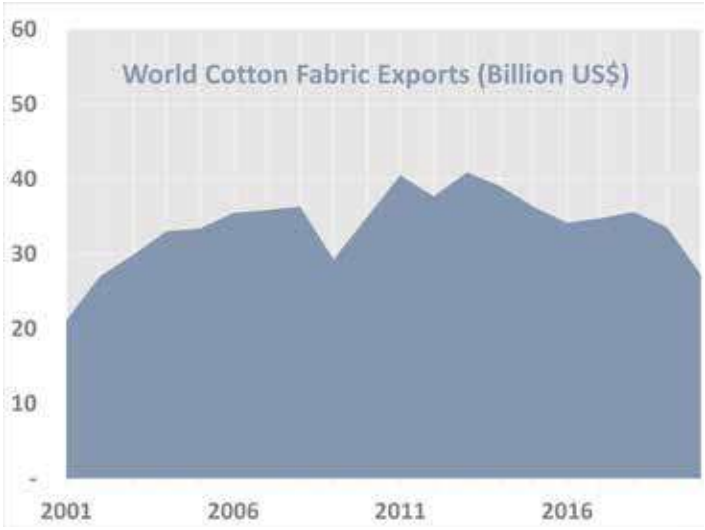
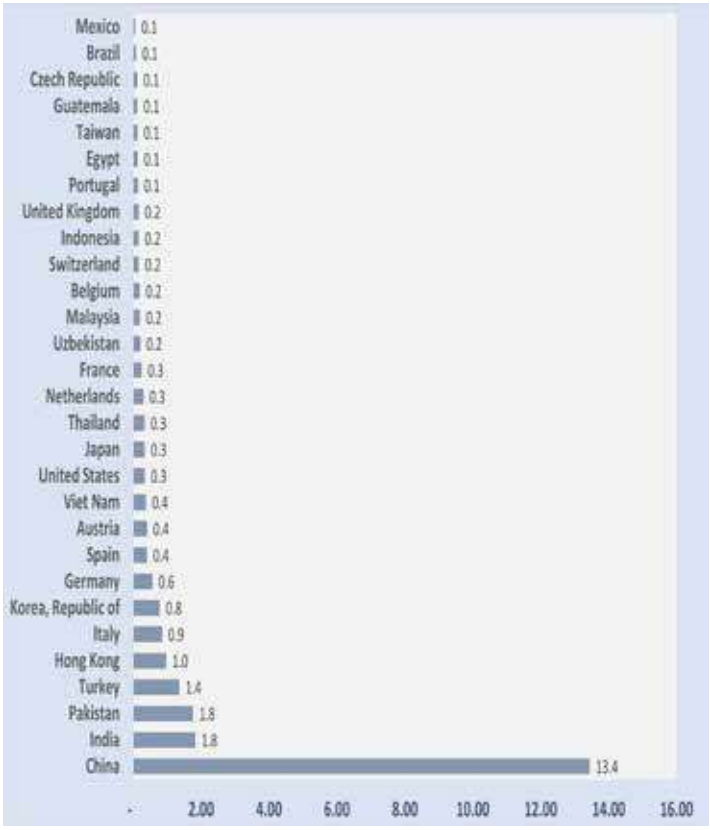


Figure 81. Cotton Fabric exports by Country (Billion US$)



Fabric imports

The global import value of cotton fabrics (woven and knitted) was approximately US$ 21.8 billion, down 14% from 2019 and the lowest since 2001. Vietnam (US$ 3.4 billion), Bangladesh (us$ 2.7 billion), Hong Kong (US$ 0.89 billion), USA (US$ 0.86 billion) and Indonesia (US$ 0.83 billion) were the main importers of cotton fabric, accounting for approximately 40% of the total. (Fig. 82 and 83)

Figure 82. World Cotton Fabric imports (Billion US$)

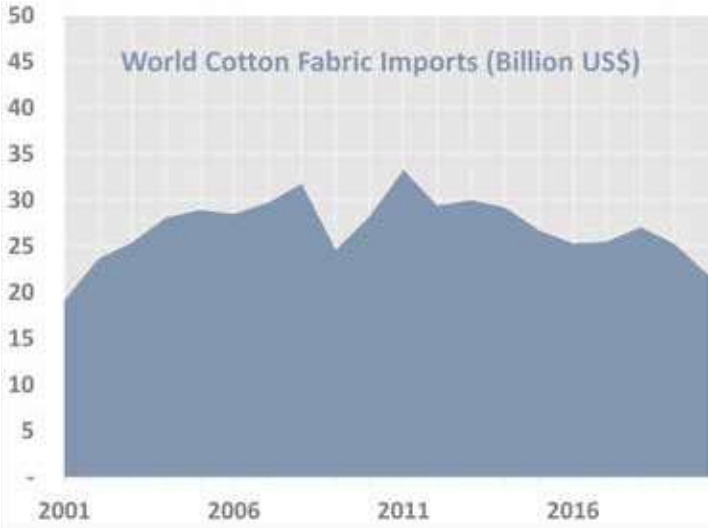
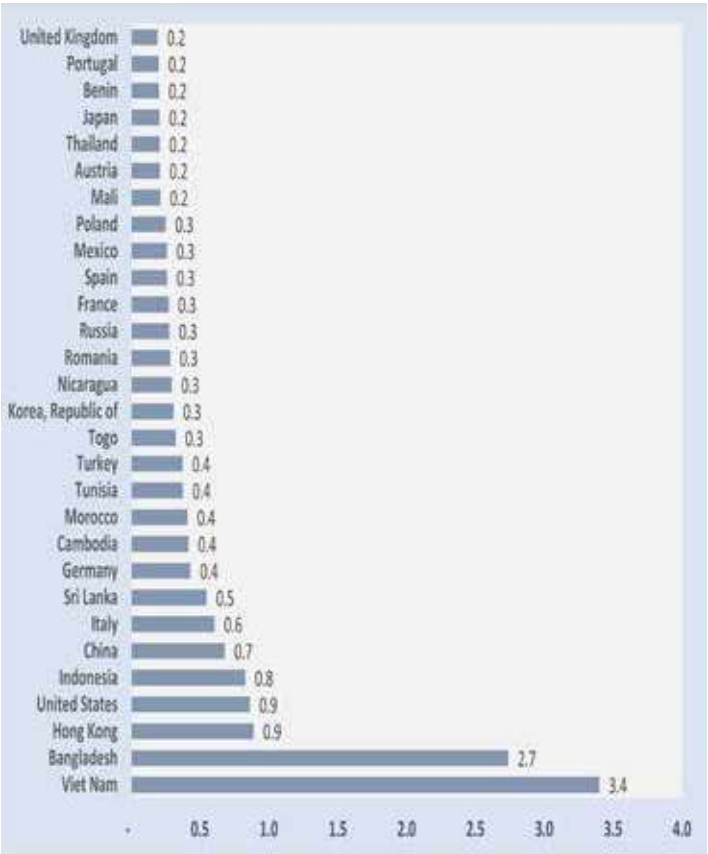


Figure 83. Cotton Fabric imports by Country (Billion US$)



Apparel exports

In 2020, the value of the global apparel export market was US$ 423 billion, a decrease of 10% from 2019 and the lowest level since 2012. Ten countries accounted for 70% of the world's clothing exports in value terms in 2020, namely China, Bangladesh, Vietnam, Germany, Italy, Turkey, India, Spain Netherlands. Three countries — India (-25%), Spain (-19%) and Italy (-15%) — suffered the most significant drop in total apparel exports in 2020. (Fig. 84 and 85)

Figure 84. World Apparel exports (Billion US$)

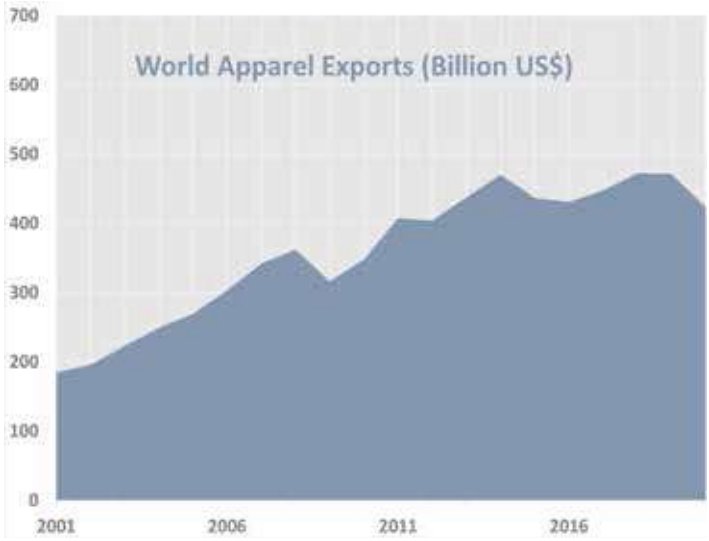
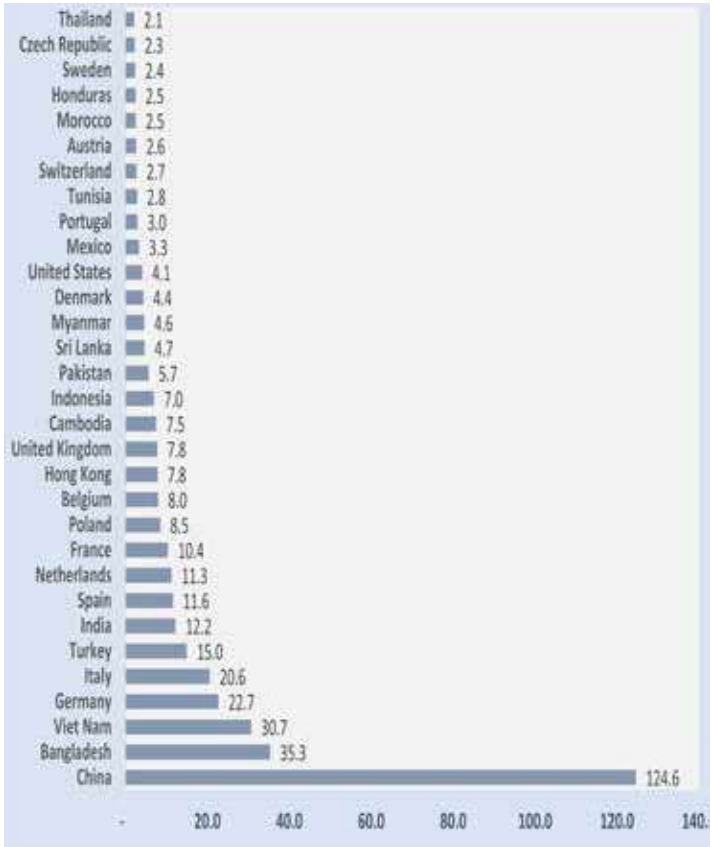


Figure 85. Apparel exports by Country (Billion US$)



Apparel imports

The value of world apparel imports totalled US$ 380 billion in 2020. The European Union was the top ranked global apparel importer with a share of approximately 41% of total imports, followed by USA (19%), Japan (6.3%), and the UK (6%). (Fig. 86 and 87)

Figure 86. World Apparel imports (Billion US$)

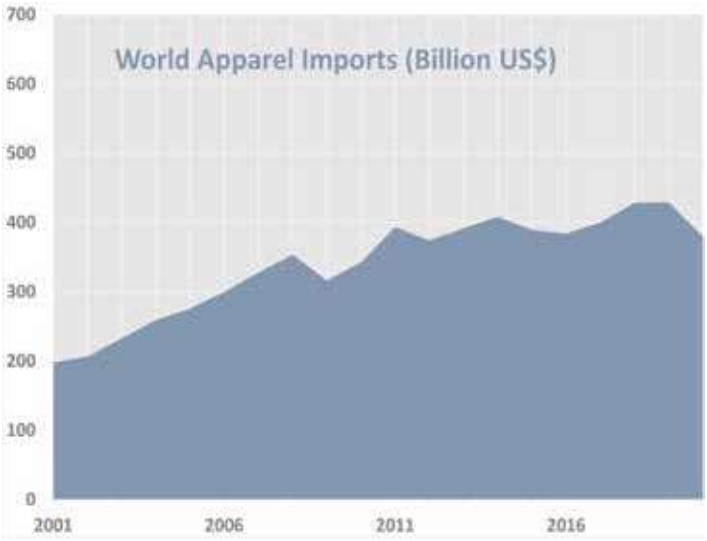
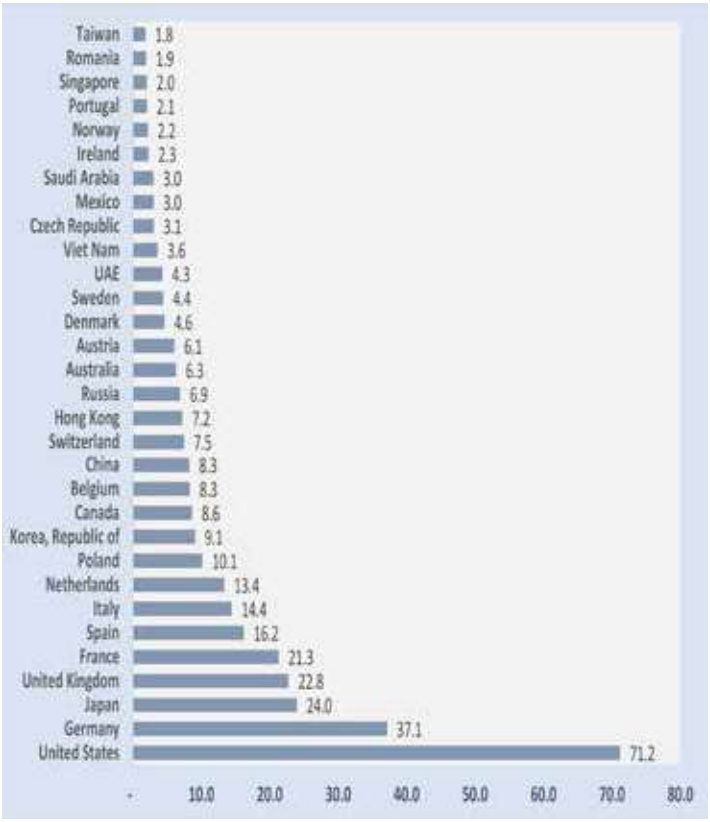


Figure 87. Apparel imports by Country (Billion US$)



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