Trends and Growth Performance in Area, Production and Productivity of Four Common Major Crops of Pakistan and India

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Abstract

The study analyzed and compared the growth rates of area, production and productivity of common major crops of Pakistan and India from 1984 85 to 2008 09. It reveals that in Pakistan the increase in the production growth rate of rice, wheat and sugarcane were due to increase both in its area and productivity, but productivity growth rate contributed more as compared to increase in its area growth, while for cottonseed area and productivity growth contributed equally. The study also confirms that in India the increase in the production growth of rice and wheat were due to increase both in its area and productivity growth but productivity contributed more than area. The study also confirms that area growth rate of rice and cottonseed for Pakistan increased by more percentage per annum as compared to India. The study also concludes that the area growth rate of wheat and sugarcane increased by more percentage for India as compared to Pakistan. The major finding of this study is that as far as production and productivity growth rates are concerned, it increased by more percentage for all the crops of Pakistan as compared to Indian crops.

Keywords: *Growth rates, technology-based growth in productivity, research and extension services, favorable price incentives, HYVs, negative area positive productivity.*

1. Introduction

It is needless to mention the role played by agriculture in developing countries like Pakistan and India. Majority of the population in both the countries are rural based and relies on employment and income, which depends in one way or another on agriculture. Therefore, agricultural growth is a catalyst for economic growth and development of the country. Its contribution towards capital formation etc., are well known. Its linkages with industries in supplying wage goods, providing raw materials and creating demand for the industrial products are well documented in literature.

Therefore a stable growth in crops area, production and productivity for Pakistan and India are highly essential.

Some of the studies (Narain (1977), Ray (1983), Parthasarathy (1984), Rao and Deshpande (1986), Mahendradev (1987), Thakur, Singh and Roy (1988), Pal and Sirohi (1988), Mitra (1990) and Swant and Achuthan (1995) related to this topic are available for India. In Pakistan, analysis of growth in crop production has been limited to only few studies (Khan and Siddiqui (1982), Khan and Mohsin (1995), Ghaffar, Mustafa and

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Qasim (1996) and Wasim (1999). However, no attempt has been made to estimate the growth differentials in area, production and productivity of rice, wheat, cotton seed and sugarcane crops for Pakistan and India.

Agriculture still generated 45 and 52 per cent of Pakistan's and India's employment respectively in 2007 08. It contributed about 21.8 and 16.6 per cent respectively of the Gross Domestic Product (GDP) in 2008 09.

In most of the crops there are per acre productivity differentials between both the countries. Better management of input supplies, lively policy and adoption of scientific agronomic and other cultural practices, sowing crops well in time, appropriate doses of fertilizer and water, better weed management practices, developments of rural roads, electricity and tubewells, tractorization, well-knit agricultural education and extension system played a vital role in productivity differential.

The magnitude of growth in area, production and productivity has serious implication for food security in Pakistan and India. Information about productivity growth differentials in major crops would help the policy makers of Pakistan and India to implement policies to increase productivity per hectare and export-import policy for different agricultural crops.

Examination of the issues stated above is expected to throw light on the nature of differential in crop productivity.

The present study is undertaken with a view to analyze the trends and growth situation in four major crops area, production and productivity of Pakistan and India. The specific objectives of the study are as follows:

1. to discuss about trends in area, production and productivity per hectare of rice, wheat, cotton seed and sugarcane in Pakistan and India.

2. to discuss about crops production share of Pakistan and India in their respective world crop production from 1995-96 to 2008-09.

3. to make a comparison of Pakistani and Indian crops productivity per hectare with respect to world productivity per hectare, 1995-96 to 2008-09.

4. to quantify the rate of growth in area, production and productivity of crops separately for Pakistan and India and within Pakistan and India.

5. to discuss the policy implications of the observed growth scenario in major crops production and productivity.

2. Data Sources

The analysis is based on secondary data for the last 25 years, i.e. from 1984 85 to 2008 09. The data related to area, production and productivity of rice, wheat, cottonseed and sugarcane crops of Pakistan and India were obtained from the Agricultural Statistics of Pakistan, Ministry of Food, Agriculture and Livestock, Government of Pakistan and

Economic Survey, Finance Division, Government of Pakistan.

3. Research Methodology

The annual compound growth rates are estimated by using loglinear functions on the time series data on area, production and productivity. The equation fitted to analyze the trend growth rate is semilog exponential form.

$$\text{Log } Y_t = a + bt \qquad (1)$$ where,

Y = area (hectares)/production (metric tones)/productivity (kg/hectares) of major crops.
a = constant
t = time variable in year (1,2, … … 25)
b = expresses the rate of change and when multiplied by 100 gives the percentage growth rate in area/production/productivity of major crops.

4. Results and Discussion

Trends in Area, Production and Productivity of Crops

Pakistan

Trends in area, production and productivity are presented in Table 1 and Graph 1.

Rice

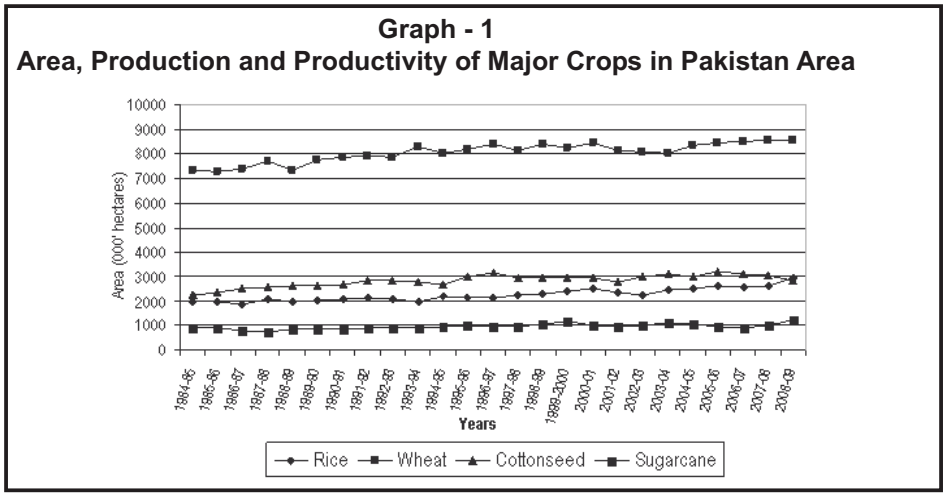
The area under rice showed an increasing trend, being 1998 thousand hectares at the starting of the period and ended to 2963 thousand hectares at the end of the study period (2008 09). The maximum area of 2963 thousand hectares was recorded in 2008 09. Production and productivity of the crop showed more or less an increasing trend. The production of the crop showed three times increase at the end of the study period. The productivity of the crop recorded its highest (3520 Kg./hectares) in 2008 09. Per hectare increase in productivity was mainly due to favorable climatic conditions and adoption of new farm technologies.

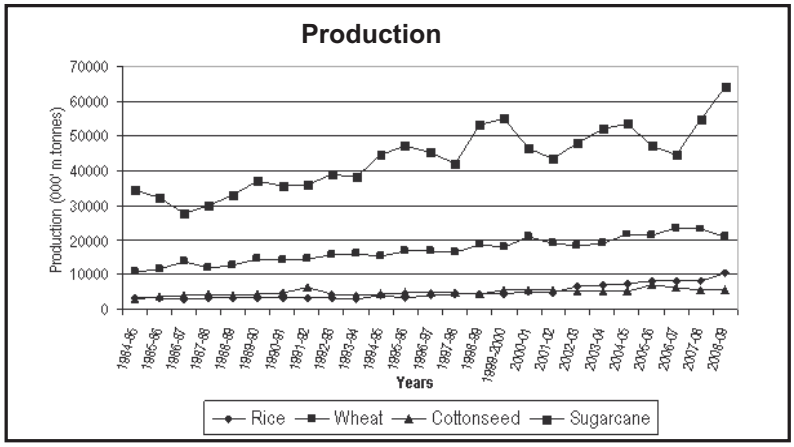
Table - 1 Trends in Area, Production and Productivity of Major Crops in Pakistan

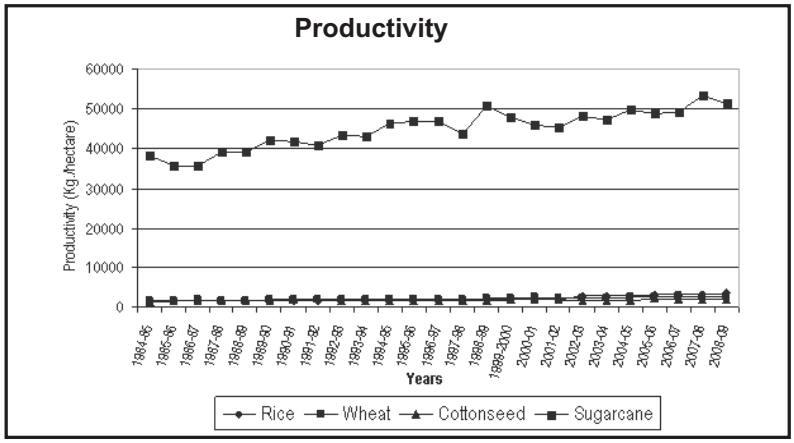
Years	Rice			Wheat			Cotton Seed			Sugarcane		
	Area ('000 hectares)	Prodn. ('000 m.tonnes)	Prody. (Kg/ hectares)	Area ('000 hectares)	Prodn. ('000 m.tonnes)	Prody. (Kg/ hectares)	Area ('000 hectares)	Prodn. ('000 m.tonnes)	Prody. (Kg/ hectares)	Area ('000 hectares)	Prodn. ('000 m.tonnes)	Prody. (Kg/ hectares)
1984-85	1998	3340	1672	7343	10882	1481	2242	3026	1350	896	34287	38267
1985-86	1998	3315	1659	7259	11703	1613	2364	3651	1545	904	32140	35553
1986-87	1863	2919	1567	7403	13923	1881	2505	3959	1580	780	27856	35713
1987-88	2066	3486	1687	7706	12016	1559	2568	4405	1716	762	29926	39273
1988-89	1963	3241	1651	7308	12675	1734	2619	4278	1632	842	33029	39227
1989-90	2042	3200	1567	7730	14419	1865	2599	4367	1680	877	36976	42162
1990-91	2107	3220	1528	7845	14316	1825	2662	4913	1845	854	35494	41562
1991-92	2113	3261	1543	7911	14565	1841	2836	6543	2307	884	35989	40711
1992-93	2097	3243	1546	7878	15684	1991	2836	4620	1629	896	38865	43376
1993-94	1973	3116	1579	8300	16157	1946	2805	4103	1464	885	38059	43004
1994-95	2187	3995	1827	8034	15213	1893	2653	4438	1671	963	44427	46134
1995-96	2125	3447	1622	8170	17002	2081	2997	4783	1596	1009	47168	46747
1996-97	2162	3967	1835	8377	16907	2018	3149	4686	1584	963	45230	46968
1997-98	2251	4305	1912	8109	16651	2053	2960	4686	1584	965	41998	43521
1998-99	2317	4333	1870	8395	18694	2238	2923	4485	1536	1050	53104	50575
1999-2000	2424	4674	1928	8230	17856	2170	2960	5735	1962	1155	55191	47780
2000-01	2515	5156	2050	8463	21079	2491	2927	5476	1871	1010	46333	45883
2001-02	2376	4803	2021	8125	19024	2341	2794	5476	1960	961	43606	45385
2002-03	2225	6718	3019	8058	18227	2262	2989	5187	1735	1000	48042	48056
2003-04	2461	7272	2955	8034	19183	2388	3100	5197	1676	1100	52056	47323
2004-05	2520	7538	2991	8358	21612	2586	2989	5127	1715	1075	53419	49692
2005-06	2621	8321	3174	8448	21277	2519	3193	7279	2280	966	47244	48907
2006-07	2572	8137	3164	8494	23520	2769	3075	6252	2033	907	44666	49229
2007-08	2600	8300	3192	8578	23295	2716	3054	5677	1859	1029	54752	53209
2008-09	2963	10428	3520	8550	20959	2451	2820	5770	2046	1241	63920	51494

Source: Agricultural Statistics of Pakistan (various issues).

Graph - 1
Area, Production and Productivity of Major Crops in Pakistan Area







Wheat

Area, production and productivity of the crop recorded fluctuating but increasing trend. Production and productivity just doubled at the end of the study period as compared to area. It clearly indicates the utilization of new farm technologies.

Cotton Seed

The area, production and productivity of the crop showed a combination of fluctuating and increasing trend. Production and productivity of the crop increased by more percentage as compared to area increase. The highest area of 3193 thousand hectares was recorded in 2005 06, highest production of 7279 thousand tonnes was recorded in 2005-06 and highest yield of 2307 kg per hectare was in 1991-92.

Sugarcane

Though the crop area, production and productivity increased at the end of the study period but with a fluctuating trend. Production and productivity increased by more percentage as compared to area. The highest production was recorded in 2008 09.

India

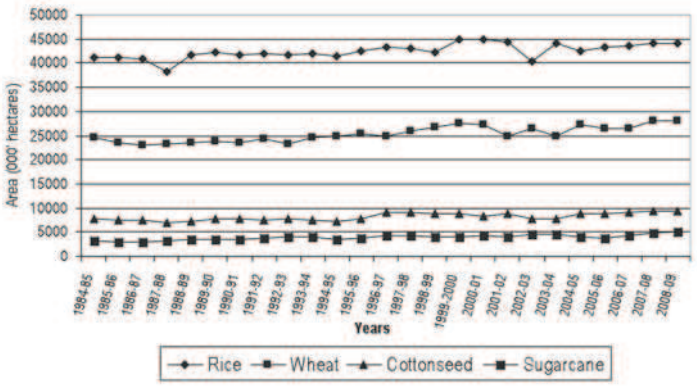
Trends in area, production and productivity are presented in Table 2 and Graph 2.

Table - 2 Trends in Area, Production and Productivity of Major Crops in India

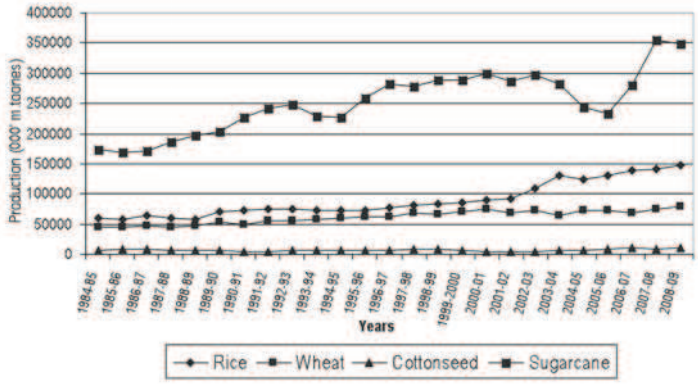
Years	Rice		Wheat			Cotton Seed			Sugarcane		
	Area ('000 hectares)	Prodn. ('000 m.tonnes)	Prody. (Kg/ hectares)	Area ('000 hectares)	Prodn. ('000 m.tonnes)	Prody. (Kg/ hectares)	Area ('000 hectares)	Prodn. ('000 m.tonnes)	Prody. (Kg/ hectares)	Area ('000 hectares)	Prodn. ('000 m.tonnes)	Prody. (Kg/ hectares)
1984-85	41200	60100	1459	24700	45500	1842	7721	6386	827	3110	174000	55948
1985-86	41200	58300	1415	23600	44100	1869	7382	8507	1152	2953	170000	57568
1986-87	40900	64200	1570	23100	46900	2030	7581	8612	1136	2862	172000	60098
1987-88	38319	60600	1581	23300	44300	1901	7031	6905	982	3202	186000	58089
1988-89	41736	56900	1363	23500	46200	1966	7273	6382	877	3475	197000	56690
1989-90	42177	70500	1671	23900	54100	2263	7690	5864	762	3489	203000	58183
1990-91	41800	73600	1761	23500	49800	2119	7695	5029	653	3411	226000	66256
1991-92	41927	74300	1772	24200	55100	2277	7440	4981	665	3682	241000	65453
1992-93	41637	74700	1794	23300	55700	2390	7661	5937	775	4105	249000	64776
1993-94	42034	72600	1727	24600	57200	2325	7543	6274	832	4112	228000	63018
1994-95	41457	72600	1751	24900	59100	2373	7321	7039	961	3442	227000	63443
1995-96	42500	72400	1703	25400	63000	2480	7871	7141	907	3867	259000	69067
1996-97	43280	77000	1779	25000	62100	2484	9035	7276	805	4147	282900	68218
1997-98	43080	81700	1896	25900	69400	2679	9121	7913	867	4174	277250	66423
1998-99	42300	82500	1950	26700	66300	2483	8868	7720	871	3930	289000	73537
1999-2000	44800	86100	1922	27500	71300	2593	8759	5910	675	4055	289000	71270
2000-01	45000	89500	1989	27400	75600	2759	8409	4788	890	4225	299000	70769
2001-02	44500	92300	2074	25000	68500	2740	8800	5250	596	4050	286000	70617
2002-03	40410	108900	2695	26340	72760	2762	7700	4450	578	4412	297208	67370
2003-04	44000	130400	2964	24886	65120	2617	7800	7040	903	4608	281600	61116
2004-05	42500	124400	2927	27300	72060	2640	8700	7200	828	4100	244800	59707
2005-06	43400	130513	3007	26500	72000	2717	8826	7500	850	3750	232320	61952
2006-07	43617	139137	3190	26484	69355	2619	9142	11568	1265	4201	281172	66928
2007-08	44000	141134	3208	28035	74890	2671	9300	9480	1019	4900	355200	72555
2008-09	44000	148260	3370	28039	78570	2802	9373	11305	1206	5055	348188	68877

Source: Agricultural Statistics of Pakistan (various issues).

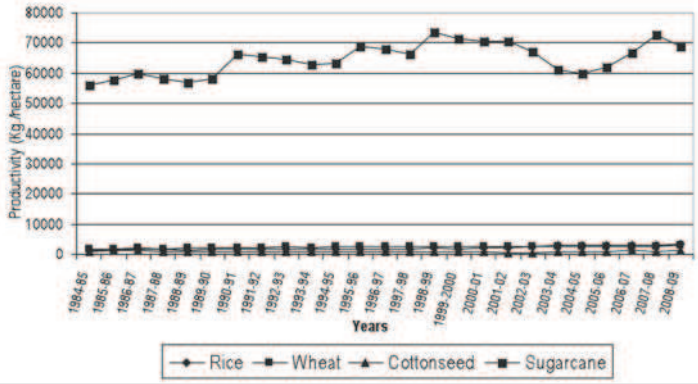
Graph - 2
Area, Production and Productivity of Major Crops in IndiaArea



Production



Productivity



Rice

Madhya Pradesh. Production and productivity of the crop increased more as compared to increase in its area. The maximum production and productivity was recorded at the end of the study period (2008 09), while area recorded highest hectarage in 2000-01.

Wheat

Uttar Pradesh, Punjab, Haryana and Madhya Pradesh are the major growing states for wheat cultivation. Production and productivity of the crop increased more as compared to increase in its area. The highest production and producivity was recorded in 2008 09.

Cotton Seed

Mostly grown in the state of Punjab, Andhra Pradesh and Maharashtra. The production and productivity of the crop increased from 6386 thousand tonnes and 827 kg per hectare respectively in 1984-85 to 11305 thousand tonnes and 1206 kg per hectare respectively in 2008-09. The area of the crop increased slightly. The highest productivity of 1265 kg per hectares was recorded in the year 2006-07.

Sugarcane

The area, production and productivity of the crop increased at the end of the study period, though this increase showed a fluctuating trend. Uttar Pradesh is the major state for sugercane cultivation. The highest increase in production and productivity was recorded in 2007 08.

Common Major Crops Production Share Of Pakistan And India In Their Respective World Crop Production, 1995-96 To 2008-09

We have also calculated Pakistan's and India's common major crops production share in their respective crops world production. India has the large percentage of world production share in all the crops production as compared to Pakistan mainly because India has large each crop acreage as compared to Pakistan. India had the maximum world production share (23.84 per cent) in sugarcane, followed by rice (22.24 per cent), cotton seed (17.13 percent) and wheat (12.95 per cent). From 1995-96 to 2008-09 shares are shown in Table 3 and Bar-Diagram 3. As far as Pakistan is concerned it has highest percentage world share (10.85 per cent) in cottonseed, followed by sugarcane (4.36 per cent), wheat (3.88 per cent) and rice (1.52 per cent). If we compare the two countries' crops production share, then it can be seen that since India has more cultivated area of each crop as compared to Pakistan, its world crop production share is also high for all common crops. Pakistan has the highest world crop production share in cottonseed while India has in sugarcane. Pakistan and India has minimum world share in rice and wheat respectively.

Comparison Of Productivity Per Hectare Of Crops Of Pakistan And India With Respective To Crops World Productivity, 1995 96 To 2008 --09

Productivity per hectares means that how many of kilograms of any crop you are getting from one hectare of land. Higher productivity of any crop means that the factors like favorable price incentives, expanded irrigation system, good monsoons rain (in case of India), HYVs, rising level of chemical fertilizer applications, timely sowing, better use

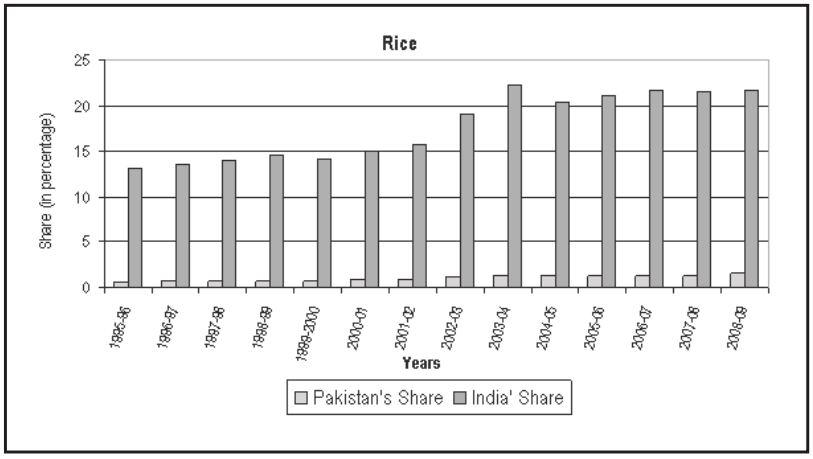
Productivity

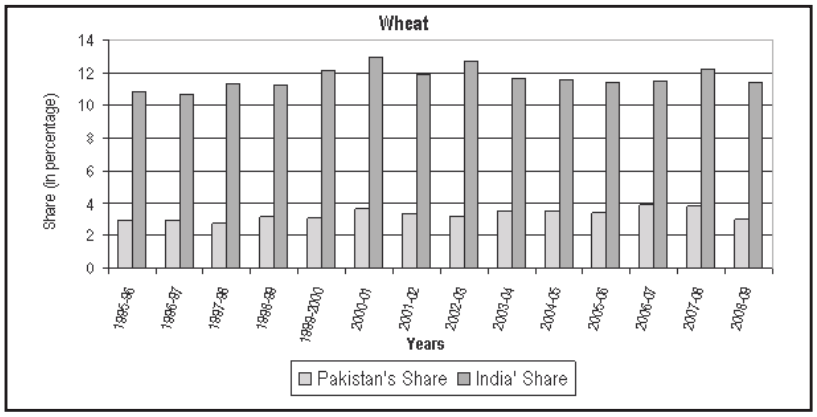
Table - 3 Common Major Crops Production Share of Pakistan and India in Their Respective World Crop Production, 1995-96 to 2008-09

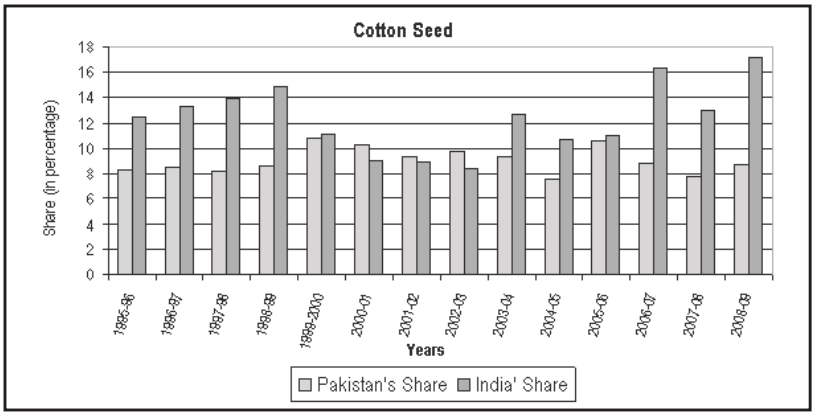
Years	Rice					Wheat					Cottonseed					Sugarcane				
	World	Pakistan		India		World	Pakistan		India		World	Pakistan		India		World	Pakistan		India	
	Production (000' tones)	Production (000' tones	World Share (%)	Production (000' tones)	World Share (%)	Production (000' tones)	Production (000' tones	World Share (%)	Production (000' tones)	World Share (%)	Production (000' tones)	Production (000' tones	World Share (%)	Production (000' tones)	World Share (%)	Production (000' tones)	Production (000' tones	World Share (%)	Production (000' tones)	World Share (%)
1995-96	550193	3447	0.63	72400	13.16	578764	17002	2.94	63000	10.88	57244	4783	8.35	7141	12.47	1147992	47168	4.11	259000	22.56
1996-97	569236	3967	0.70	77000	13.53	582689	16907	2.90	62100	10.66	54793	4686	8.55	7276	13.28	1226666	45230	3.69	282900	23.06
1997-98	580202	4305	0.74	81700	14.08	612380	16651	2.72	69400	11.33	56842	4686	8.24	7913	13.92	1241394	41998	3.38	277250	22.33
1998-99	563188	4333	0.77	82500	14.65	588842	18694	3.17	66300	11.26	51793	4485	8.65	7720	14.90	1252266	53104	4.24	289000	23.08
1999-2000	609902	4674	0.77	86100	14.12	587029	17856	3.04	71300	12.14	52844	5735	10.85	5910	11.18	1264749	55191	4.36	289000	22.85
2000-01	598243	5156	0.86	89500	14.96	583601	21079	3.61	75600	12.95	52928	5476	10.34	4788	9.05	1254209	46333	3.69	299000	23.84
2001-02	585148	4803	0.82	92300	15.77	575842	19024	3.30	68500	11.89	58378	5476	9.38	5250	9.00	1246845	43606	3.50	286000	22.94
2002-03	571076	6718	1.18	108900	19.07	573967	18227	3.17	72766	12.67	52802	5187	9.82	4450	8.42	1339425	48042	3.58	297208	22.18
2003-04	586248	7272	1.24	130400	22.24	557503	19183	3.44	65120	11.68	55515	5197	9.36	7040	12.68	1351902	52056	3.85	281600	20.82
2004-05	608496	7538	1.23	124420	20.44	324093	21612	3.46	72060	11.54	67375	5127	7.60	7200	10.68	1318178	53419	4.05	244800	18.57
2005-06	618224	8321	1.34	130513	21.11	631319	21277	3.37	72000	11.40	68298	7279	10.65	7500	10.98	1290556	47244	3.66	232320	18.00
2006-07	641080	8137	1.26	139137	21.70	605069	23520	3.88	69355	11.46	70879	6252	8.82	11568	16.32	1418745	44666	3.14	281172	19.81
2007-08	657414	8300	1.26	141134	21.46	611102	23295	3.81	74890	12.25	73145	5677	7.76	9480	12.96	1627451	54752	3.36	355200	21.82
2008-09	685013	10428	1.52	148260	21.64	689946	20959	3.03	78570	11.38	65985	5770	8.74	11305	17.13	1743093	63920	3.66	348188	19.97

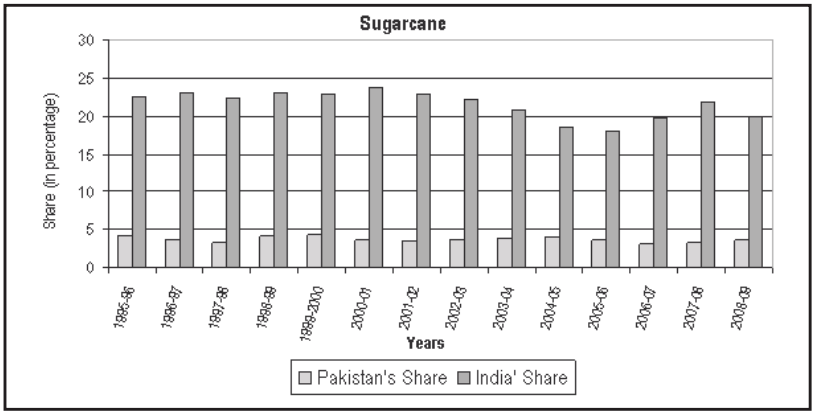
Source: Agricultural Statistics of Pakistan (various issues).

Bar Diagram - 3
Bar Diagram Showing Major Crops Production Share of Pakistan and India in their Respective World Crop Production, 1995-96 to 2008-09









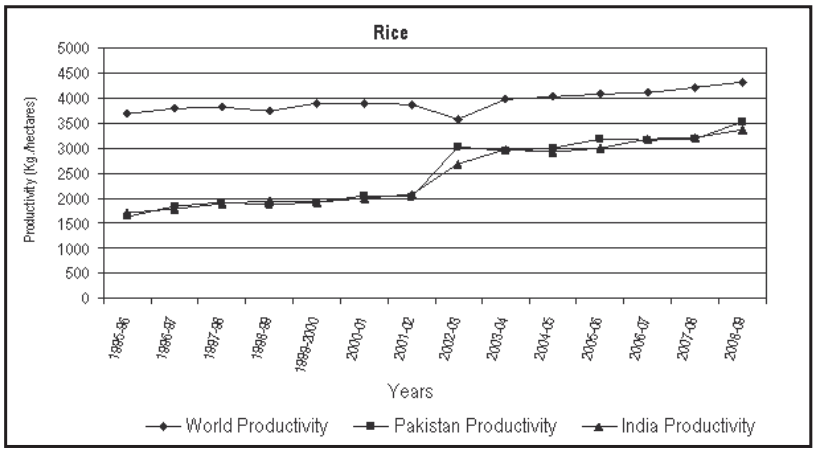
of implements, better control of flooded and draught land, and implementation of special programmes (especially in India) have played a vital role. India has low productivity per hectare of rice, wheat and cotton seed, as compared to world productivity per hectares (Table 4 and Figure 4). In most of the years India's productivity per hectares of wheat and sugarcane increased as compared to world productivity. This mainly

occurred due to the utilization of HYVs, timely rainfall and better utilization of new farm technologies. India is the second largest producer of sugarcane in the world. In Pakistan the productivity per hectares of cotton seed in

Years	Rice		Wheat				Cotton Seed			Sugarcane		
	World Productivity (kg./hectares)	Pakistan Productivity (kg./hectares)	India Productivity (kg./hectares)	World Productivity (kg./hectares)	Pakistan Productivity (kg./hectares)	India Productivity (kg./hectares)	World Productivity (kg./hectares)	Pakistan Productivity (kg./hectares)	India Productivity (kg./hectares)	World Productivity (kg./hectares)	Pakistan Productivity (kg./hectares)	India Productivity (kg./hectares)
1995-96	3689	3689	1622	2536	2081	2480	1683	1596	907	62672	46747	76923
1996-97	3786	3786	1835	2523	2018	2484	1582	1584	805	62741	46968	68169
1997-98	3823	3823	1912	2676	2053	2679	1688	1584	867	64099	43521	66487
1998-99	3747	3747	1870	2624	2238	2483	1561	1586	871	64423	50575	66919
1999-2000	3894	3894	1928	2762	2170	2593	1623	1962	675	65479	47780	71270
2000-01	3885	3885	2050	2737	2491	2759	1676	1871	890	65451	45883	70769
2001-02	3870	3870	2021	2714	2341	2740	1710	1960	596	64927	45385	70617
2002-03	3581	3581	3019	2673	2262	2762	1730	1735	578	65313	48056	67370
2003-04	3970	3970	2955	2869	2388	2617	1929	1676	903	65532	47323	61116
2004-05	4019	4019	2991	2906	2586	2640	1949	1715	828	65597	49692	59707
2005-06	4084	4084	3174	2845	2519	2717	1992	2280	850	65781	48907	61952
2006-07	4115	4115	3164	2857	2769	2619	2049	2033	1265	67973	49229	66928
2007-08	4214	4214	3192	2985	2716	2671	2176	1859	1019	70696	53209	72555
2008-09	4309	4309	3520	3086	2451	2802	2099	2046	1206	71510	51494	68877

Source: Agricultural Statistics of Pakistan (various issues).

Figure - 4 Productivity per Hectare of Common Major Crops of Pakistan and India with Respective Crops World Productivity per Hectare, 1995-96 to 2008-09



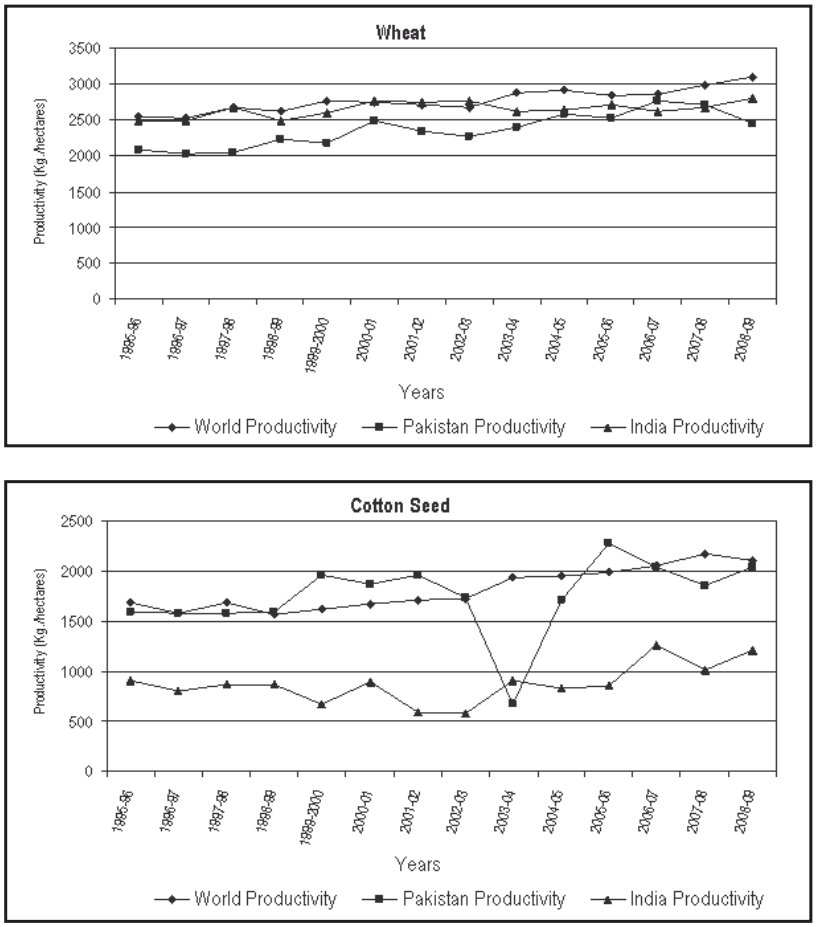
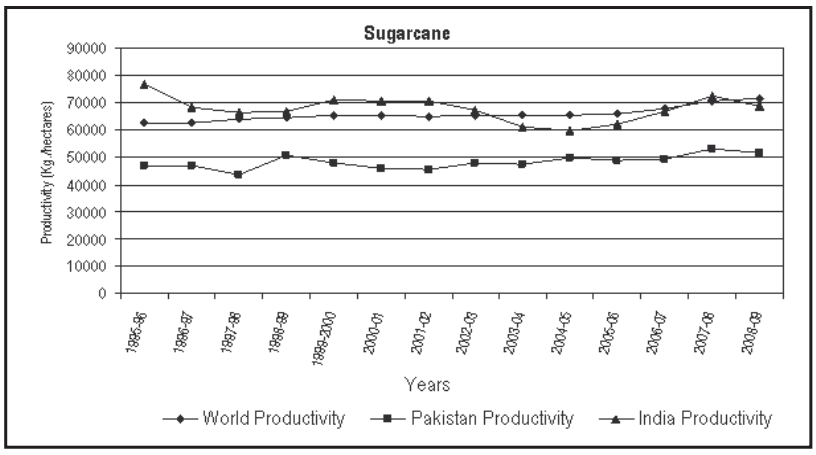


Figure - Productivity per Hectare of Common Major Crops of Pakistan and India with Respective Crops World Productivity per Hectare, 1995-96 to 2008-09



some of the years increased as compared to world cottonseed productivity. India's productivity per hectares of wheat and sugarcane is more as compared to Pakistan's productivity per hectares of these crops. Pakistan has more productivity per hectares of cottonseed as compared to India. Some of the yeas the productivity per hectare of rice was more as compared to India's productivity per hectare of this crop.

Compound Growth Rates Of Area, Production And Productivity Of Major Crops Of Pakistan And India

The annual compound growth rates of area, production and productivity have been estimated by using equation (1).

Pakistan

Table 5 shows that the production growth of rice significantly increased at the rate of 4.93 per cent per annum, wheat at 2.82 per cent per annum, cotton seed at 1.95 per cent per annum and sugarcane at 2.55 per cent per annum. The increase in the production growth of rice, wheat and sugarcane were due to increase in its area and productivity both but increase in its productivity contributed more as compared to increase in its area. While for cottonseed area and productivity both contributed equally. This clearly shows that new farm technology, favorable price incentive, better irrigation facilities, HYVs, and suitable climatic conditions have played a vital role in increasing the productivity growth.

Table - 5 Compound Growth Rates of Area, Production and Productivity of Major Crops in Pakistan and India, 1984-85 to 2008-09

Crops	Pakistan			Pakistan		
	Area	Production	Productivity	Area	Production	Productivity
Rice	1.44 (11.60)*	4.93 (11.59)*	3.49 (9.16)*	0.33 (4.40)*	3.90 (15.11)*	3 .57 (12.43)*
Wheat	0.60 (8.51)*	2.82 (16.59)*	2.22 (14.87)*	0.72 (7.71)*	2.39 (13.32)*	1.66 (10.97)*
Cottonseed	0.99 (6.77)*	1.95 (5.56)*	0.97 (3.09)*	0.96 (5.95)*	0.98 (1.47)	0.16 (0.27)
Sugarcane	1.17 (5.52)*	2.55 (9.12)*	1.38 (11.05)*	1.72 (8.16)*	0.50 (0.41)	0.68 (3.71)*

Note: * Significant at 1% level. Figures in parentheses are t values.

India

As shown in Table 5, the production growth rate of rice significantly increased at the rate of 3.90 per cent per annum and wheat at 2.39 per cent per annum. The increase in the production growth of rice and wheat was due to increase in its area and productivity but productivity contributed more than area. The increase in the productivity growth rate of sugarcane was mainly due to increase in its area growth rate rather than production growth rate. The significant increase in cottonseed area was insignificantly contributed by production and productivity growth rate. The increase in the productivity growth rate

of rice and wheat was mainly due to good monsoon rainfall, better irrigation facilities, HYVs, and utilization of new farm technologies. Excessive rains and unexpected cyclones storms damaged the crop of cotton seed. There is a need to increase the production and productivity growth rate of cottonseed and sugarcane. This can be done through better price policy, agricultural credit, HYVs and better technology.

Comparison Of Growth Rates Of Area, Production And Productivity Of Crops For Pakistan And India

Table 5 clearly indicates that area growth rate of rice and cottonseed of Pakistan increased by more percentage per annum as compared to India. Similarly the area growth rate of wheat and sugarcane increased by more percentage for India as compared to Pakistan. As far as production and productivity growth rate are concerned it increased by more percentage for all the crops of Pakistan as compared to Indian crops.

Growth in productivity per hectares of any crop tells us that how far the farmers are utilizing new farm technologies in order to increase the production of the crop(s). It means that technology-based growth in productivity, favorable price incentives, better irrigation facilities, better and timely use of fertilizer and tractor, HYVs, utilization of new farm technologies, and good research and extension services played a vital role in increasing the productivity per hectare of all the crops of Pakistan. The production and productivity per hectare growth rate of crops clearly shows an edge to Pakistan over India.

Association Between Growth In Major Crops Area And Productivity In Pakistan And India

For clear understanding of the growth scenario, we discuss the association between growth in crops area and productivity (Table 6). All crops under study were classified into four types of association on the basis of growth rates of area and productivity. AA-positive growth rate of area associated with positive growth rate of productivity. This would indicate that one crop is either replacing other crop or is grown in the newly cultivated area and the overall productivity of crop(s) increased. AB-positive growth rate of area associated with negative growth rate of productivity. BA-negative growth rate of area associated with positive growth rate of productivity. This would indicate that one major crop area has been replaced by other major crop or

Table - 6 Association between Growth in Major Crops Area and Productivity in Pakistan and India 1984-85 to 2008-09

Types of Association	Pakistan	India
AA: Positive area positive productivity	Rice, Wheat, Cottonseed, Sugarcane	Rice, Wheat, Sugarcane, cotton seed
AB: Positive area negative productivity	NIL	NIL
BA: Negative area positive productivity	NIL	NIL
BB: Negative area negative productivity	NIL	NIL

Source: Taken from Table 5.

has gone out of cultivation and the productivity on the remaining area has increased. BB-negative growth rate of area associated with negative growth rate of productivity. It can seen from the Table that in AA category all the crops (rice, wheat, cottonseed and sugarcane) are falling for Pakistan and India.

We have also presented maximum and minimum productivity/yield rates per hectare of major crops of Pakistan and India in Table 7. The table concludes that the percentage difference in productivity rate of rice (56.59 per cent) is maximum and sugarcane (33.18 per cent) is minimum for Pakistan while in India it is rice (59.55 per cent) and sugarcane (23.91 per cent).

5. Conclusion and Policy Implications

The study analyzed and compared the growth rates of area, production and productivity of common major crops of Pakistan and India from 1984 85 to 2008 09. The study reveals that in Pakistan the increase in the production growth rate of rice, wheat and sugarcane were due to increase in its area and productivity, but increase in its productivity contributed more as compared to increase in its area, while for cotton seed, the area and productivity both contributed equally. This was due to favorable price incentives, better utilization of technologies, better irrigation facilities, rising level of chemical fertilization application and HYVs etc. The study also confirms that in India the increase in the production growth rate of rice and wheat was due to increase in its area and productivity but productivity contributed more than area. The increase in the productivity growth rate of sugarcane was mainly due to increase in its area growth rate rather than production growth rate. The significant increase in cotton seed area was insignificantly contributed by production and productivity growth rate. The increase in the productivity growth rate of rice, wheat and sugarcane for India was mainly due to better monsoon rainfall, easy process of getting agricultural credit, HYVs and better utilization of new farm technologies. The study also confirms that area growth rate of rice and cottonseed of Pakistan increased by more percentage per annum as compared to India. The study also concludes that the area growth rate of wheat and sugarcane increased by more

percentage for India as compared to Pakistan. As far as production and productivity growth rate are concerned, it increased by more percentage for all the crops of Pakistan as compared to Indian crops.

6. Policy Implications

- The study reveals that in Pakistan there is a need to increase the productivity growth rate of rice, wheat, cotton seed and sugarcane more because it is very difficult to increase the area of the crop due to heavy loss from water logging and salinity. The productivity growth rate can be increased by utilizing new farm technologies widely adapted to the agroclimatic conditions, favorable price incentives, extended irrigation system, timely application of fertilizer and pesticides, HYVs and better management services.

- The study also shows that in Pakistan the area growth rate of rice, wheat, cotton seed and sugarcane is not increasing. The government needs to apply current scientific methods in order to control water logging and salinity. Irrigation facilities also need to be increased.

- The study reveals that Indian farmers should increase the growth rate of area, production and productivity of cottonseeds and sugarcane. The decrease in these crops production growth was mainly due to excessive rains in Punjab and unexpected cyclonic storms in Andhra Pradesh. The increase in these crops production growth can be through favorable price incentives and timely as well as required monsoon rainfall.

- The study also reveals that in India, the crops production mainly depends upon monsoon rainfall. Climate is uncertain therefore the Indian government needs to improve their irrigation facilities. This can be done by making more dams and through installation of more tube-wells.

- The Indian farmers also need to increase the cropped area of most of their crops. Uncultivated land should be made cultivable with the help of new farm technologies (tractor and bulldozers).

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