

## Analytical Ascertainment of the Contribution of Area and Yield Towards Production of Cotton Lint in the Punjab Province

Muhammad Ashfaq<sup>1</sup>, Abdul Saboor<sup>1</sup> and Munawar Hussain<sup>2</sup>

<sup>1</sup>Faculty of Agricultural Economics and Rural Sociology,  
University of Agriculture, Faisalabad,

<sup>2</sup>Farm Water Management Program, Pakistan,

**Abstract:** Cotton, a cash crop, being major source of foreign exchange and domestic earnings takes a significant status in the development of the economy of Pakistan. Punjab province accounts for major contribution in cotton production and it has shown a tremendous increase in its production from 735 thousand bales in 1947-48 to 6628 thousand bales in 1998-99. During the same span of 52 years, area under cotton has increased from 2217 thousand acres to 5641.03 thousand acres with 154.44 per cent increase over the period. Per acre cotton yield has increased by 235 per cent i.e. 1.6 maunds 1947-48 to 5.36 maunds in 1998-99. The myopic view taken by statistical tools indicate that per cent contribution to change in total production of cotton owes a great extent to per acre yield than the area sown under cotton crop particularly during the last three decades. Though cotton production has shown a considerable increase but significant level of potential yet remains to be exploited by increasing per acre yield and more area under cultivation.

**Key words:** Cotton, lint

### Introduction

The economic bonanza of Pakistan owes a great extent to agriculture. A good chunk of our population has to depend on this important sector, either directly or indirectly. Besides providing the fuel of raw material to agro-based industries of Pakistan, it serves as an earning of foreign exchange though not sufficient to meet the high bills of imports of other consumer goods. Cotton is the major cash crop which has played a pivotal role in the development of Pakistan during the last fifty years. It occupies the second largest position in terms of production amongst all crops in the country. It is cultivated on 10 per cent of the cropped area, i.e. covering about 67 percent of the area under cash crops. It accounts for 11.7 per cent of value added in agriculture and 2.9 per cent of GDP. As against the target of 9.7 million bales, the size of cotton crop is estimated at 11.24 million bales in 1999-2000 i.e. 27 per cent higher than the last year. In addition to providing raw material to the local textile industry, the lint cotton is a major export item. The share of raw cotton, its products and by-products in total export earnings of Pakistan remained 59.1 per cent during the year 1998-99 (Government of Pakistan, 2000a).

A myopic look of the data collected from various sources published by government of Pakistan reveals that the trends of cotton lint production in the Punjab have been asymmetric. At present, Punjab produces annually about 6 to 7 million bales of fine raw cotton with good staple length (Government of Pakistan, 2000b). Since 1947-48 cotton lint production has increased much with a significant growth in its area and a visible breakthrough in yield per acre. Development of textile industry along with high population growth rate and emerging needs for foreign exchange have induced an increase in cotton demand in the country. It was noted that the increase in cotton lint production was due to increase in area under cotton and/or its enhanced yield. Due to strong competition among kharif crops for area, limited supply of canal water, various soil related problems and sensitivity to insect-pest attack, area under cotton is limited. Substitution amongst kharif crops may give rise to

increase in area under cotton but at the cost of shattering the cropping pattern of other important crops. Thus, presently the only available means to increase cotton production is to increase per acre yield.

The main objective of this paper is to analyze the contribution of area and yield towards increase in cotton lint production in the Punjab. An attempt has also been made to predict the viable parameters that will help to boost cotton production meeting the future needs of the country. The materials and method is in the second part of the paper, which is followed by results and discussion in part III. The conclusions are drawn in the final part of the paper.

### Materials and Methods

A fifty two years economic data regarding area, yield and production of cotton was dug out from the Economic Survey of Pakistan 1999-2000 and Agricultural Statistics of Pakistan, 1998-99, so as to see the trends of these variables overtime in the province. To minimize ambiguity in the statistics and to develop uniformity in the data, area was shown in thousand acres, yield in maunds per acre and lint production in thousand bales. Dividing the overall production of the year by the area of the corresponding year, yield per acre was calculated. Four years averaging procedure was adopted for area, yield and production, that is why data was taken from 1947-48 to 1998-99 only i.e. for 52 years which is divisible in four year periods.

The study follows the earlier work of Qureshi, *et al.* (1993) for calculating contribution of area and yield towards production of cotton.

The procedure is given as under:

Period refers to four year average area, yield and production.

Percentage change in area is calculated using the following formula (Andersen, 1982).

$$\{(X_{t_1} \div X_{t_0}) - 1\} 100$$

where

$X_{t_0}$  = Average area for time "t<sub>0</sub>" which is the period in column (1) in Table 1

# Ashfaq et al.: Analytical ascertainment of the contribution of area and yield towards production

**Table 1: Contribution of Area and Yield to Total Production of Cotton Lint in the Punjab, (1947-1999)**

Time Period		Percent Change			Percent Contribution to change in total Production of Cotton	
$t_0$	$t_1$	Area	Yield	Prod.	By Area	By Yield
1947/48-1950/51	1951/52-1954/55	14.98	13.16	27.36	57.81	42.19
1951/52-1954/55	1955/56-1958/59	5.88	2.33	9.34	63.66	36.34
1955/56-1958/59	1959/60-1962/63	-5.04	14.77	14.56	-37.97	137.97
1959/60-1962/63	1963/64-1966/67	21.03	-13.86	37.14	60.42	39.58
1963/64-1966/67	1967/68-1970/71	16.36	48.28	24.43	62.48	37.52
1967/68-1970/71	1971/72-1974/75	13.23	8.53	22.58	61.09	38.91
1971/72-1974/75	1975/76-1978/79	-9.75	-24.8	-28.65	30.40	69.60
1975/76-1978/79	1979/80-1982/83	14.18	32.94	52.06	31.63	68.37
1979/80-1982/83	1983/84-1986/87	9.18	37.44	56.12	19.75	80.25
1983/84-1986/87	1987/88-1990/91	20.92	40.50	66.61	37.21	62.79
1987/88-1990/91	1991/92-1994/95	13.11	-2.64	10.17	127.08	-27.08
1991/92-1994/95	1995/96-1998/99	4.52	-16.64	-12.86	-32.11	132.11

$X_{t_1}$  = Average area for time " $t_1$ " which is the period in column (2) in Table 1

Percentage change in yield was calculated using the same formula as shown above except that average yield is used in place of average area.

Percentage change in production is calculated using the same formula as shown above except that average production is used in place of average area/yield.

Percentage contribution of area to change in total production is computed using the formula (Andersen, 1982).

$[\Delta \text{Log } X \div \Delta \text{Log } P] 100$

$\Delta \text{Log } X = \text{Log of area in time } t_1 - \text{log of area in time } t_0$

$\Delta \text{Log } P = \text{Log of production in time } t_1 - \text{log of production in time } t_0$

Percentage contribution of yield to change in total production is computed using the same formula as in "e" except that

$\Delta \text{Log } X = \text{Log of yield in time } t_1 - \text{log of yield in time } t_0$

## Results and Discussion

The logarithmic analysis reveals that percentage change in area, yield and production for the time period 1947-50 to 1951-54 was 14.98, 13.16 and 27.36 respectively. The contribution of area and yield to change in total production was 57.81 and 42.19 per cent respectively as shown in Table 1. During early fifties yield almost remained stagnant around 2.3 md/acre (Niaz, 1969). During the two time periods between 1955-58 and 1959-62 percentage change in area, yield and production was - 5.04, 14.77 and 14.56 respectively whereas per cent contribution of area and yield towards change in total production was - 37.97 and 137.97 respectively. Similarly for the time period 1959-62 to 1963-66 area and yield contributed to production at the rate of about 60.42 and 39.58 per cent respectively. Per acre yield increased from a level of 2.4 mds during 1960-61 to 3.1 mds in 1966-67. Similar results were obtained for the period 1963-64 to 1974-75. The yield enhancement during this span of time clearly reflects the fruits of green revolution. An average increase of about 29 per cent in cotton yield was observed during six years time period with the introduction of high yielding varieties (Afzal, 1992). Construction of link canals, installation of tube wells coupled with more mechanized cultivation increased cotton acreage and sure

water supply, fertilizer application and new varieties provided an impetus to yield and acreage of cotton (Abdullah, 1972). The estimates of the period 1971-74 to 1975-78 indicate that contribution of area and yield to change in total production remained 30.40 and 69.60 per cent respectively. In 1973 floods and in 1976 low cotton prices and heavy rains at the time of sowing resulted in decreased acreage under cotton (Afzal, 1992).

Similarly for the time periods 1975-78 to 1979-82 contribution of area and yield to change in total production was 31.63 and 68.37 per cent respectively. During the period 1979-82 and 1990-91, area and yield contributed to change in total production was found to be almost in the same ratio (Table 1). From 1979 to 1982 cotton output reached a high level as a result of increased acreage under cotton, increased support price, increased use of pesticides, fertilizer and high yielding varieties (Afzal, 1992). During 1987-90 to 1991-94, cotton area, yield and production showed an increase of 13.11, - 2.64 and 10.17 per cent respectively. Contribution of area and yield towards change in total cotton production remained 127.08 and - 27.08 per cent respectively. Finally for the period 1991-94 and 1995-98 contribution of area and yield towards change in total cotton production remained -32.11 and -132.11 per cent respectively. Cotton production decreased drastically during 1992-93, 1994 and 1995 due to infestation of crop with Cotton Leaf Curl Virus, rains, floods. During the last four period, the increase in cotton production is mainly due to an increase in the area because of shifting of sugarcane area into cultivation of cotton crop and less attack of insects, pests/diseases on the crop (Government of Pakistan, 1999).

Since 1971 more than 60 per cent increase in total production of cotton lint owes to an enhancement of per acre yield except during the period between 1987-1990 to 1991-94 which depicted negative contribution of yield towards cotton production because of the prevalence of cotton leaf curl virus during that particular period. There is no denying in the fact that since independence cotton crop has achieved a remarkable break-through in terms of yield per acre. The world statistics of 1982-83 shows that per acre yield of cotton in Pakistan was below the world's average by 22 per cent. But at the end of sixth plan period it was well above that level. At present, progressive farmers in the cotton-belt obtain per acre yields three to four times greater than that of the national average i.e. 6.95 maunds per acre. Though cotton production has shown a considerable increase but at the

same time a significant amount of the potential yet remains to be exploited. The gap between progressive farmer and national average yield represents the undiscovered treasure-island at the current level of technologies and policies. Highest priority, therefore, should be accorded to bridge such a gap so that we could be able to produce enough to cater the future needs of our flourishing textile industry and foreign exchange. This is, in fact, a tempting challenge for scientists, researchers, planners, policy makers and politicians how to raise productivity of the cotton in the country. Sooner the challenge is met, better the agrarian economy tends towards progress and prosperity.

### References

- Abdullah, M., 1972, Production, Utilization and Marketing of Cotton in Pakistan. *Cotistics*, P.C.C.C. 149: 1-11.
- Afzal, M. I., 1992, Pakistan Cotton: Experience and Achievements. *Cotistics*, Pakistan Central Cotton Committee, Karachi.
- Andersen, P. P., 1982, Agriculture Research and Technological Development. Long man. Inc., NY, USA.
- Government of Pakistan, 1999, Economic Survey of Pakistan 1998-99, Finance Division, Economic Adviser's Wing, Islamabad.
- Government of Pakistan, 2000a, Economic Survey of Pakistan 1999-2000, Finance Division, Economic Adviser's Wing, Islamabad.
- Government of Pakistan, 2000b, Agricultural Statistics of Pakistan, Ministry of Food, Agri. and Cooperatives, Food and Agri. Division, (Economic Wing), Islamabad.
- Niaz, S. M., 1969. Trends in Cotton Production during last 10 years. *Cotistics*, 11: 167-70, P. C. C. C, Karachi.
- Qureshi, K. A., A. Buland, Aslam, M. Amanullah and H. Amjad, 1992, Contribution of Area and Yield of Total Wheat and Maize Production in Pakistan-An Analysis, *Pak. J. Agri. Sc.* Vol., 29, No. 2.