

ESTIMATION OF COST BANEFIT RATIO OF BT COTTON GROWERS IN DISTRICT KHANEWAL-PAKISTAN

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ABSTRACT: *This study has been designed to investigate the impact of BT cotton cultivation on the profitability of small, medium and larger farmers in terms of gross margin, net revenue and economic profit in district Khanewal, Punjab, Pakistan. For this purpose cost of various stages in the production technology, yield and prices of inputs and outputs has been collected to estimate the financial and economic returns of the farmers. Moreover, the benefit cost ratio has also been calculated for both economic and financial returns. Economic profit and gross margin depict the farmer's economic conditions. This study reveals that large farmers of Khanewal district earned more net revenue and gross margin as compared with Medium and small farmers of Khanewal district because of more inputs induction for the sake of more profitability. The analysis of Benefit Cost Ratio (BCR) illustrates that BCR with imputed cost is less than one in all the cases i.e. small, medium and large while it is more than one in the case of without imputed cost. It shows that farmers with imputed cost are unable to get profit. Financial analysis reflects that BCR is highest for small farmers followed by large farmers in the study area. It may be due to engagement of family members in all the operations of crop cultivation which results in saving of labor expenses.*

Key words: Yield, BCR, Gross margin, Net Revenue, Economic Profit.

INTRODUCTION

Though, agriculture share in gross domestic product (GDP) has declined from 53 percent in 1947 to 21.4 percent in 2013-14, yet it is considered a backbone of Pakistan's economy. Being the second largest sector of the economy about 44 percent labor force is engaged in this sector. Major crops include cotton, wheat, rice and sugarcane. It is not only the source of cheap raw material to local industry, but also a major source of foreign exchange earning of the national exchequer. Among the four main crops, cotton has a significant importance in terms of its share in national GDP [1].

Pakistan is the one of the main cotton producing countries. It is the 4th largest producer of cotton in the world with total production of 2.08 million tonnes in 2014. In terms of consumption, Pakistan is the 3rd largest consumer having total consumption of 2.49 million tonnes in 2014 [1]. China is the largest cotton producer which is producing 25% cotton of the world. USA is the second largest which is producing 19% cotton of the world, while India is on the third with 14%. USA is the main cotton exporter of the world as it exports 41% of the world's cotton exports and China is the main cotton importer as it imports 19% of the world's cotton imports [2].

Cotton crop has been under attack of various insects and pests. These not only cause the reduction in yield, but also a source of increase in the cost of production which results in decrease in profitability of the farmers. The intensification of pest attack was increasing since several years and due to this number of pesticide application was increasing. Farmers have to invest more to save their produce for the heavy load of pests. Besides decrease in profitability of the farmers, environmental concerns were increasing.

To overcome problems of cotton (attack of bollworms), BT cotton was adopted in recent years. Now a days, it is widely cultivated by different developed and developing countries of the world on 7.2 million hectares and these countries confirm remarkable results in the reduction of pesticides, insects, bollworms, fertilizers and increased in per acre yield [3].

BT cotton is one of the miracles which create an in-built mechanism of resistance against pests species especially bollworms which are the main damaging factors of cotton. Currently it is cultivated throughout the world for commercial purpose specially; Pakistan, India, China, United States, Mexico, Australia, South Africa, Argentina and Columbia. Many other countries want to adopt genetically modified cotton, but they are still observing the results of these varieties in the adopter's countries [4].

In the past, BT cotton was banned in Pakistan for commercial purpose because of its Due to certain disadvantages such as mealy bug, food security and cotton leaf curl virus (CLCV). Now Punjab Seed Council (PSC) and Federal Seed Certification and Registration Department (FSCRD) approved BT varieties for commercial purpose in Pakistan. On 23rd May 2013, Punjab Seed Council approved 15 new BT-cotton varieties which show that the government of Pakistan is now taking interest in genetically modified cotton. [5]. Genetically modified (GM) cotton varieties have changed the situation of agriculture sector regarding yield, income, lifestyle, etc. BT cotton cultivation has rapidly increased from 60% to 75% in Punjab while almost 80% in Sindh [6].

As for as the economic implications is concerned, this crop has the potential to reduce pesticide poisoning, labor cost and pest damages which can further enhance the socio-economic conditions of farmers [7].

Table 1. (a & b) Per Acre Cost Of Production Of BT Cotton In Khanewal District (Small Farmers) With And Without Imputed Cost.

a. Per acre cost of production of BT Cotton in Khanewal district (Small farmers) with Imputed Cost(in Rs)	
Ploughing cost	4376
Leveling cost	1010
Seed Bed preparation cost	1244
Seed Cost	1483
Sowing cost	651
FYM Cost & app. Charges	412
Fertilizer & app. Charges	8059
Irrigation & app. Charges	11611
Hoeing & Thinning	3276
Pesticides & app. Charges	8551
T.Picking Cost	12008
Harvesting of Sticks	1055
Labor cost	1626
Land Revenue (Aabiana+Maliana)	99
Land Rent	16557
Per acre cost of production	72018
b. Per acre cost of production of BT Cotton in Khanewal district (Small farmers) without Imputed Cost(in Rs)	
Ploughing cost	3271
Leveling cost	813
Seed Bed preparation cost	1028
Seed Cost	1483
Sowing cost	651
FYM Cost	0
Fertilizer cost	7500
Irrigation cost	10005
Hoeing & Thinning	0
Pesticides cost	7550
T.Picking Cost	12008
Harvesting of Sticks	0
Labor cost	0
Land Revenue (Aabiana+Maliana)	99
Land Rent	0
Per acre cost of production	44408

Table 1. (a & b) Per Acre Cost Of Production Of BT Cotton In Khanewal District (Small Farmers) With And Without Imputed Cost.

c. Per acre cost of production of BT Cotton in Khanewal district (Small farmers) with Imputed Cost(in Rs)	
Ploughing cost	4376
Leveling cost	1010
Seed Bed preparation cost	1244
Seed Cost	1483
Sowing cost	651
FYM Cost & app. Charges	412
Fertilizer & app. Charges	8059
Irrigation & app. Charges	11611
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Fertilizer cost	7500
Irrigation cost	10005
Hoeing & Thinning	0
Pesticides cost	7550
T.Picking Cost	12008
Harvesting of Sticks	0
Labor cost	0
Land Revenue (Aabiana+Maliana)	99
Land Rent	0
Per acre cost of production	44408

Table 2. (a &b) Per Acre Cost Of Production Of BT Cotton In Khanewal District (Medium Farmers) With And Without Imputed Cost.

a. Per acre cost of production of BT Cotton in Khanewal district (Medium farmers) with Imputed Cost(in Rs)	
Ploughing cost	4047
Leveling cost	1070
Seed Bed preparation cost	1410
Seed Cost	1771
Sowing cost	644
FYM Cost & app. Charges	599
Fertilizer & app. Charges	8976
Irrigation & app. Charges	11016
Hoeing & Thinning cost	2415
Pesticides cost & app.charges	9507
T.Picking Cost	14494
Harvesting of Sticks	1000
Labor cost	1543
Land Revenue (Aabiana+Maliana)	98
Management Charges	2617
Land Rent	14950
Per acre cost of production	76157
b. Per acre cost of production of BT Cotton in Khanewal district (Medium farmers) without Imputed Cost(in Rs)	
Ploughing cost	2374
Leveling cost	658
Seed Bed preparation cost	737
Seed Cost	1771
Sowing cost	644
FYM Cost	400
Fertilizer	7976
Irrigation	8361
Hoeing & Thinning cost	2415
Pesticides cost	9507
T.Picking Cost	14494
Harvesting of Sticks	0
Labor cost	1000
Land Revenue (Aabiana+Maliana)	98
Management Charges	0
Land Rent	0
Per acre cost of production	50435

Number of empirical studies such as [6-16] have also established significant impacts of BT cotton cultivation on profitability of growers.

Objectives of Study:

Followings are the main objectives of this study

1. To calculate the cost of production of BT growers.
2. To estimate the net revenue, gross margin and BCR of BT cotton growers.
3. To recommend policy guidelines.

MATERIAL AND METHODS

Data:

Stratified sampling methodology has been used to collect the data from Khanewal district. Data has been collected through a well-designed questionnaire. From the district two tehsils; Mian Channu and Kabirwala tehsil are selected and from each tehsil 5 village are taken randomly. From each village a sample of 8 farmers comprising of small (farmers having land <12 acres), medium (≥ 12 but < 25 acres) and large farmers (farmers having land ≥25 acres) are selected randomly. Three small, three Medium and two Large farmers from each village of Mian channu and Kabirwala tehsils were taken. Thus a total of 80 farmers are interviewed for this study.

Statistical Tool:

After entering the data on all necessary inputs and outputs, cost of production, total revenue, gross margin, economic profit, business profit and benefit cost ratio (BCR) are calculated. Their formulas are as under;

Total revenue (TR) = output produced per acre * price of output.

Gross margin (GM) = TR- Total Variable cost (TVC)

Economic profit = TR – [explicit cost + implicit cost]

Business profit = TR – [explicit cost]

Benefit cost ratio (BCR) = Economic profit/TC (When imputed cost is taken)

Benefit cost ratio (BCR) = Business profit/TVC (When imputed cost is not taken)

RESULTS AND DISCUSSION

Table 1 (a) and (b) show the per acre cost of production with imputed and without imputed cost respectively for small farmers in district Khanewal. Per acre cost of production with opportunity cost is estimated Rs. 72018 while it is Rs. 44408 without imputed cost for small farmers in district Khanewal.

In case of medium farmers per acre average cost of production with imputed and without imputed cost is calculated as Rs.76157 and Rs. 50435 respectively. While large farmer’s cost of production with and without imputed cost has been estimated Rs. 93641 and Rs. 62461 respectively.

Analysis reveals that average cost of production is highest on larger farmers followed by medium farmers. It is obvious as larger farmers usually do not face the problems of unavailability of fertilizer, pesticides, quality seed, water and credit availability for the use of the inputs on their lands. It has been observed that small farmers have to face the problem of financial constraints for the purchase of necessary

Table 3. (a & b) Per Acre Cost Of Production Of BT Cotton In Khanewal District (Large Farmers) With And Without Imputed Cost.

a Per acre cost of production of BT Cotton in Khanewal district (Large farmers) with Imputed Cost(in Rs)	
Ploughing	4196
Leveling	1311
Seed Bed	1229
Seed Cost	1313
Sowing	702
FYM Cost	665
Fertilizer	10582
Irrigation	13926
Hoeing & Thinning	2512
Pesticides	12083
T.Picking Cost	16295
Harvesting of Sticks	1000
Labor cost	4327
Land Revenue	100
Management Charges	2622
Land Rent	20778
Per acre cost of production	93641
b Per acre cost of production of BT Cotton in Khanewal district (Large farmers) without Imputed Cost(in Rs)	
Ploughing	2453
Leveling	1151
Seed Bed	867
Seed Cost	1314
Sowing	702
FYM Cost	665
Fertilizer	10582
Irrigation	9410
Hoeing & Thinning	2512
Pesticides	12083
T.Picking Cost	16295
Harvesting of Sticks	0
Labor cost	4327
Land Revenue (Aabiana+Maliana)	100

Management Charges	0
Land Rent	0
Per acre cost of production	62461

Table 4. (a & b): Per acre TR, Gross Margin & Economic Profit of Bt Cotton in Khanewal District (small farmers) With and Without Imputed Cost.

a. Per acre TR, Gross margin & Economic profit of BT Cotton in Khanewal District (Small farmers) with Imputed Cost (in Rs)	
Per acre yield (in maund)	39
Average price/maund	2850
TR	111150
Av. Variable cost	53835
Gross Margin	57315
Eco Profit	39042
BCR	0.54
b. Per acre TR, Gross margin & Economic profit of BT Cotton in Khanewal District (Small farmers) without Imputed Cost (in Rs)	
Per acre yield (in maund)	39
Average Price/maund	2850
TR	111150
Av.variable cost	44408
Gross Margin	66742
Business Profit	66742
BCR	1.50

inputs. Small farmers have to face the problem of both affordability and accessibility as well

Benefit Cost Ratio has been estimated for all categories. Benefit cost ratio (BCR) takes into account the amount of monetary gain realized by performing an economic activity versus the amount it costs to execute the economic activity. The higher the BCR the better the investment is. General rule of thumb is that if the benefit is higher than the cost, the activity is a good investment. Table 4, 5 and 6 reveal that benefit cost ratio BCR with imputed cost is less than one in all the cases i.e. small, medium and large while, it is more than one in without imputed cost. It means that farmers do not get nominal profit if imputed cost is included in total cost. BCR is highest for small farmers followed by large farmers. It may be due to engagement of all family members in all the operations of crop cultivation. So they save labor expenses for all operations. This result is contrary to the result of [17]. It may be due to the fact

Table 5. (a &b): Per acre TR, Gross Margin & Economic Profit of Bt Cotton in Khanewal District (medium farmers) With and Without Imputed Cost.

a. Per acre TR, Gross margin & Economic profit	
Per acre yield	41
Average rate/maund	2850
TR	116850
Av. Variable cost	57047
Gross Margin	59803
Eco Profit	40693
BCR	0.53
b.Per acre TR, Gross margin & Business profit of BT Cotton in Khanewal District (Medium farmers)	
Per acre yield	41
Average rate/maund	2850
TR	116850
Av. Variable cost	49435
Gross Margin	67415
Business Profit	66415
BCR	1.34

Table 6. (a &b): Per acre TR, Gross Margin & Economic Profit of Bt Cotton in Khanewal District (Large farmers) With and Without Imputed Cost.

a. Per acre TR, Gross margin & Economic profit of BT Cotton in Khanewal District (Large farmers)	
Per acre yield	50
Average rate/maund	2850
TR	142500
Av. Variable cost	65914
Gross Margin	76586
Eco Profit	48859
BCR	0.52
b.Per acre TR, Gross margin & Business profit of BT Cotton in Khanewal District (Large farmers) without Imputed Cost (in Rs)	
Per acre yield	50
Average rate/maund	2850
TR	142500
Av. Variable cost	58134
Gross Margin	84366
Business Profit	80039
BCR	1.38

that they estimated the BCR for non-Bt cotton crop and for Multan district.

CONCLUSION AND RECOMMENDATIONS

The study concludes that cost of production of large farmers is quite high as compared with small and medium farmers. It is high because of more use of inputs by large farmers in Khanewal district. In the study area small farmers of Khanewal district having less revenue, while more business profit (due to less average variable cost) as compared with medium farmers. Large farmers of Khanewal district having more total revenue, gross margin, economic profit and also business profit as compared with small and medium farmers. Moreover, table 4, 5 and 6 reveals that BCR ‘with imputed cost is’ less than one in all the cases i.e. small, medium and large while it is more than one in without imputed cost. It means that farmers do not get profit if imputed cost is included in total cost. BCR is highest for small farmers followed by large farmers. It may be due to tengagement of all family members in all the operations of crop cultivation. So they save labor expenses. Moreover, BCR with imputed cost shows that it is less than one which indicates that farmers are actually not getting the returns of their all efforts which they put forward in cultivating the cotton crop. It may be due to many factors such as low average yield, high inputs cost, sub-standard inputs and low prices of their product as compare to international prices. Therefore, in order to further increase in yield of BT cotton especially for small and medium farmers the above factors must be rectified along with the availability and accessibility of modern technology. Moreover, the government should ensure the availability of

true to type Bt seed varieties. For this purpose seed testing facilities should be established at-least at tehsil level.

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