Economics of Pulse Cultivation in Punjab- A Case Study of Bathinda District

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Abstract
The present paper focus on the cost benefit analysis of pulse cultivation in Bathinda district of Punjab state. The data is empirically collected from 86 gram cultivating farmers and 102 moong cultivating farmers from five selected villages of Bathinda district situated in the heart of Malwa region. It is observed that gramleaflets yield higher gross returns under high yielding farming as compare to low yielding farming. The major determinants which affect both gross returns and profitability of a crop viz, yield, weighted price and cost are in favour sampled farmers under high yielding farming. In case of gram crop, higher yield rates and output-input ratio are the important indicators than weighted price and cost in explaining high profitability of sampled farmers under high yielding farming in comparison to farmers under low yielding farming. Further, higher efficiency and profitability per rupee investment on moong production under medium farming than large and small farming categories is observed.

Introduction
The progress made by the agriculture sector in the state of Punjab since adoption of Agriculture Development Model of 1966-67 is so well known that one need not cite any statistics to prove this point. The total foodgrain production in Punjab has significantly increased over the last few decades, especially in the post green revolution period. But the future may not hold the production possibilities realised earlier since these achievements are indeed creditable but there is no reason for complacency. Pulses which are an important part of farming household consumption losses its ground since the introduction of new technology. The production of pulses is not only stagnant but even decreasing in the state. The increase in productivity has been confined to cereals, but there has been declining trends in pulses productivity in the state. The high profitability of rice-wheat crop production compared to pulse production, provide incentives to the farmers for growing food crops in Punjab. Therefore, this is imperative to investigate the economics of pulse cultivation which is a great contributing factor to allocate area under the crop. In this backdrop, this paper is devoted to analyse the profitability of pulses in sampled Bathinda district of Punjab state.

Data Base and Methodology
For the fulfillment of objectives of the study two pulse crops namely Gram and Moong are selected on the basis of maximum production among pulses in Punjab state. The data is empirically collected from 86 gram cultivating farmers and 102 moong cultivating farmers from five selected villages named Pakka Kla, Gurthari, Mi Wala, Pathrala and Kot Shamir of Bathinda district of the Punjab state, located in the southern part of the state in the heart of Malwa region. The information about villages and sampled farmers is obtained from Krishi Vigwan Kendra of Bathinda district. The gram crop is further divided into two parts viz, gramleaflets and gram, the forms in which it is sold by the producer. The study relates to the year 2013-14.

In order to find out the profitability, output-input ratio and farm business income also called gross returns from a crop, concept of Cost A1 is used being the most important concept of cost of cultivation. All the costs and returns are computed on per acre basis as unit of analysis. Keep in view of significant difference in yield, the farming in is categorised into high yielding farming and low yielding farming.

For the purpose of analysis that follows, the Cost A1 is presumed to constitute combination of goods and services used to produce each of the products. The important
constituents of goods and services are value of seed (farm produced and purchased), value of seed treatment, value of fertilisers, value of chemical used viz., pesticides, fungicides, insecticides, herbicides and weedicides, value of diesel used during production process, value of human labour, value of irrigation, value of hired and owned machine labour, depreciation on farm tools and implements, farm buildings, farm machinery and irrigation structure, interest on working capital and other miscellaneous expenses.

**Results and Discussion**

The information about gross returns, surplus over cost and output-input ratio of gram leaflets is presented in Table 1. On the basis of analysis it is observed that gram leaflets yield higher gross returns under high yielding farming (Rs. 37255.04) as compared to low yielding farming (Rs. 20219.11). The major determinants which affects both gross returns and profitability of a crop viz, yield, weighted price and cost are in favour of sampled farmers under high yielding farming. Sampled high yielding gram leaflets farmers fetch higher surplus over Cost A1 i.e., Rs. 30627.53 whereas sampled low yielding gram leaflets farmers fetch Rs. 20219.11. Output-input ratio is another economic parameter which shows the profitability of a crop. It is observed from the table that as like surplus over cost A1 and gross returns, gram leaflets farmers under high yielding farming fetches higher returns from per unit input use. The output-input ratio is 5.62 in case of high yielding farming and 4.43 in case of low yielding farming under the study.

**Table 1**

Gross Returns, Surplus over Cost and Output-Input Ratio of Gram leaflets in Bathinda District
(Mean Values, Per Acre, Per Quintal, in Rs.)

<table>
<thead>
<tr>
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<tr>
<td>A.</td>
<td>High Yielding Farming</td>
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<td></td>
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<td>1.</td>
<td>Small*</td>
<td>13</td>
<td>65.50</td>
<td>624.94</td>
<td>6692.87</td>
<td>40933.57</td>
<td>34240.70</td>
<td>6.11</td>
</tr>
<tr>
<td>2.</td>
<td>Medium**</td>
<td>01</td>
<td>60.00</td>
<td>650.00</td>
<td>6408.30</td>
<td>39000.00</td>
<td>32591.70</td>
<td>6.08</td>
</tr>
<tr>
<td>3.</td>
<td>Large***</td>
<td>04</td>
<td>52.43</td>
<td>744.54</td>
<td>6457.99</td>
<td>39036.23</td>
<td>32578.24</td>
<td>6.04</td>
</tr>
<tr>
<td>Sub-total</td>
<td></td>
<td>18</td>
<td>57.06</td>
<td>652.91</td>
<td>6627.51</td>
<td>37255.04</td>
<td>30627.53</td>
<td>5.62</td>
</tr>
<tr>
<td>B.</td>
<td>Low Yielding Farming</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1.</td>
<td>Small</td>
<td>11</td>
<td>41.33</td>
<td>631.61</td>
<td>5963.62</td>
<td>26104.44</td>
<td>20140.82</td>
<td>4.38</td>
</tr>
<tr>
<td>2.</td>
<td>Medium</td>
<td>07</td>
<td>40.00</td>
<td>664.29</td>
<td>5770.52</td>
<td>26571.60</td>
<td>20801.08</td>
<td>4.60</td>
</tr>
<tr>
<td>3.</td>
<td>Large</td>
<td>00</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sub-total</td>
<td></td>
<td>18</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>36</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Source:** Field Survey, 2013-14.

**Note:** * Less than 2 Acres, **More than 2 Acres, But less than 4 Acres, ***More than 4 Acres.

The farming wise wise results depicts that under high yielding farming situation, maximum yield of gram leaflets is under small farming (65.50 quintal/acre) followed by medium farming (60.00 quintal/acre) and large farming (52.43 quintal/acre). The average weighted price is Rs. 624.94, Rs. 650.00 and Rs. 744.54 under small farming, medium farming and large farming respectively. It clearly proves that farmers under large farming get higher remunerative prices of the crop followed by medium and small farming. As already explained the cost structure shows higher production expenditure incurred under small farming (Rs. 6692.87) followed by large farming (Rs. 6457.99) and medium farming (Rs. 6408.30). It is important to note that on the basis of analysis of data it is found that there is no set of proper relationship of cost of production and farming size. In many cases such as depreciation, interest of working capital, use of machine labour etc. the lower cost benefits because of large size farming are observed under study. But no definite pattern of cost and farming size is found.
More so, as far as gross returns of granleaflets is concerned small farming ranks top followed by large farming and medium farming. The surplus over cost A1 is highest under small farming followed by medium farming and large farming. It shows that though the cost is found maximum under small farming and weighted price is lowest still surplus is highest means higher yield and output per unit of input became the supreme factor of profitability from granleaflets. The output input ratio is maximum under small farming followed by medium farming and large farming.

Under low yielding farming situation the yield rate is 41.33 quintal/acre and 40.00 quintal/acre under small farming and medium farming respectively. The weighted price is highest under medium farming (Rs. 664.29) followed by small farming (Rs. 631.61). Moreover, farmers under small farming incur higher cost expenditure as compared to medium ones i.e., Rs. 5963.62 and Rs. 5770.52 respectively. The gross returns are Rs. 26104.44 under small farming and Rs. 26571.60 under medium farming of granleaflets. The surplus over Cost A1 i.e., profitability of granleaflets is in favour of medium farming (Rs. 20801.08) followed by small farming (Rs. 20140.82). In this case the major determinants of profits are weighted price, Cost A1 and output per unit of input which are in favour of medium farming. The differences in yield rates among both categories is not adequate (note that yield rates are already very low as compared to high yielding farming) for profit differences.

Table 2 shows gross returns, surplus over cost and output-input ratio of gram in Bathinda district. The table clearly shows that the yield rate is 8.36 quintal/acre under high yielding farming and 7.21 quintal/acre under low yielding farming. The weighted price is Rs. 3791.07 and Rs. 3834.09 under high yielding farming and low yielding farming respectively. The cost structure shows highest cost under high yielding farming followed by low yielding farming i.e., Rs. 8220.08 and Rs. 7322.58 respectively. On an average a sampled farmer under high yielding farming fetches Rs. 31693.34 and under low yielding farming Rs. 27643.79 gross returns per acre. The surplus over Cost A1 under high yielding farming and low yielding farming is Rs. 23473.26 and Rs. 20321.21 respectively which shows that the profits are high under high yielding farming. The output-input ratio is 3.85 and 3.77 under high yielding and low yielding farming respectively.

It may be concluded that higher yield rates and output-input ratio are the important indicators than weighted price and cost in explaining high profitability of sampled farmers under high yielding farming in comparison to farmers under low yielding farming.

The farming wise analysis depicts that in high yielding farming the yield rate is maximum under small farming (9.13 quintals/acre) followed by large farming (8.37 quintals/acre) and medium farming (8.00 quintals/acre). On an average a sampled farmer sells the crop at Rs. 3927.50 under small farming, Rs. 3742.86 under medium farming and Rs. 3810.00 under large farming. The highest cost Rs. 8766.12 is incurred under small farming followed by Rs. 8189.00 under medium farming and Rs. 7902.67 under large farming which shows an inverse relationship between farm size and cost. The gross returns are highest under small farming followed by large farming and medium farming i.e., Rs. 35858.10, Rs. 31889.70 and Rs. 29942.88 respectively. Further, it is observed that farmers under small farming (Rs. 27091.98) fetch higher surplus over Cost A1 followed by farmers under large farming (Rs. 23987.03) and medium farming (Rs. 21753.88). The output-input ratio is 4.09, 3.66 and 4.03 under small farming, medium farming and large farming respectively. Therefore, from the profitability point of view, it may summarised that farmers under small farming fetches a fairly good amount of gross returns and surplus over Cost A1. Whereas, higher productivity, weighted price and output-input ratio became the prime factors than cost of cultivation in explaining greater profitability of gram.

### Table 2

Gross Returns, Surplus over Cost and Output-Input Ratio of Gram in Bathinda District
(Mean Values, Per Acre, Per Quintal, in Rs.)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description → Gram Area Categories</th>
<th>F</th>
<th>Yield (Qtl.)</th>
<th>Weighted Price</th>
<th>Cost A1</th>
<th>Gross Returns</th>
<th>Surplus over Cost A1</th>
<th>O/I at Cost A1</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>High Yielding Farming</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1.</td>
<td>Small*</td>
<td>08</td>
<td>9.13</td>
<td>3927.50</td>
<td>8766.12</td>
<td>35858.10</td>
<td>27091.98</td>
<td>4.09</td>
</tr>
</tbody>
</table>

**Note:** 
- Sl. No.: Serial Number
- Description → Gram Area Categories: High Yielding Farming
- F: Farm Size
- Yield (Qtl.): Yield Rate
- Weighted Price: Weighted Price
- Cost A1: Cost
- Gross Returns: Gross Returns
- Surplus over Cost A1: Surplus over Cost A1
- O/I at Cost A1: Output-Input Ratio

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Table 2 shows the detailed analysis of gross returns, surplus over cost and output-input ratio of gram in Bathinda district. The table highlights the profitability factors based on yield rates, weighted price, and cost structure among different farming categories.
As far as low yielding farming is concerned, the yield differences are observed negligible i.e., 7.21 quintals/acre under small farming and 7.20 quintals/acre under medium farming. The weighted price at which a sampled farmer sold out its produce is maximum under small farming (Rs. 3862.22) than medium farming (Rs. 3707.50). The cost analysis shows that sampled farmers under small farming incurred cost Rs. 7399.92 under small farming followed by Rs. 7005.10 under medium farming. Moreover, the gross returns are greater under small farming (Rs. 27846.61) as compare to medium farming (Rs. 26694.00) of gram crop. It is further observed that small farming fetches higher surplus over Cost A1 than medium farming i.e., Rs. 20446.69 and Rs. 19688.90 respectively. The output-input ratio is 3.76 under small farming and 3.81 under medium farming. Therefore, higher remunerative prices is the only indicator of greater profitability from gram crop under low yielding farming.

Table 3 demonstrates the gross returns, surplus over cost and output-input ratio of moong in Bathinda district. The examination of table reveals that the yield rate is 5.04 quintals/acre under high yielding farming and 4.20 quintals/acre under low yielding farming. On an average a sampled farmers sold out moong produce at Rs. 5640.61 per quintal under high yielding faring and at Rs. 5554.06 per quintal under low yielding farming. As far as cost is concerned it is highest Rs. 8193.85 and lowest Rs. 6852.17 under high yielding farming and low yielding farming respectively. The maximum gross returns from moong is under high yielding farming (Rs. 28428.67) than low yielding farming (Rs. 23327.05). From the profitability point of view, high yielding farming is found to be most remunerative as compare to low yielding farming. On an average a sampled moong farmer under high yielding farming obtained Rs. 20234.82 surplus over Cost A1 per acre. This surplus is Rs. 16474.88 per acre under low yielding farming which is quite low. The output-input ratio is 3.47 and 3.40 under high yielding farming and low yielding farming respectively.
It clearly depicts that despite of higher cost of moong cultivation, relatively high productivity, weighted price and higher efficiency in using inputs indicating comparative advantage goes in favour of high yielding farming in comparison with low yielding farming.

After examining the overall profitability and remunerativeness of moong, it is essential to investigate the situation prevailing in different farming situations in the study area. It is found that under high yielding farming the highest productivity is observed under medium farming (5.18 quintals/acre) followed by small farming (4.97 quintals/acre) and large farming (4.94 quintals/acre). It shows that inverse relationship between farm size and productivity got weakened. The negative relation may hold in certain cases but not everywhere and not at all times. Medium farming category of farmers fetches maximum gross returns from moong cultivation followed by small farming and large farming category. The gross returns are Rs. 29281.97, Rs. 27956.25 and Rs. 27855.77 under medium farming, small farming and large farming category. The remuneration in terms of surplus over cost shows that farmers under medium farming yields higher amount of surplus over cost followed by large farming and small farming categories. More so, medium farming shows higher output-input ratio at Cost A1 followed by large farming and small farming. This indicates the higher efficiency and profitability per rupee investment on moong production under medium farming than large and small farming categories.

Under low yielding farming, the yield rate is high under medium farming than small farming i.e., 4.42 quintals/acre and 4.09 quintals/acre respectively. The weighted price at which the farmers are ready to sell their produce is also observed highest under medium farming than small farming category. The cost analysis shows that the farmers under small farming incurred higher cost (Rs. 6890.59) in comparison with farmers under medium farming (Rs. 6467.36). Moong gives maximum gross returns and remuneration to the medium farming category of farmers. This indicates that comparative advantage goes in favour of large operational holding under moong crop. The output-input ratio is highest under medium farming than small farming i.e., 3.80 and 3.30 respectively indicating higher productive efficiency and better utilisation of resources under medium farming.

On the basis of above analysis it is suggested that the yield of gram and moong crop can increase by application of scientific methods of cultivation viz, seed treatment of crop, use of insecticides, pesticides and fungicides. The awareness regarding the proper application of these inputs should given under kisan training programmes and during kisan melas.

More so, as far as allocation of area under gram and moong crop in the district is concerned the short duration varieties of sampled crops should not only be developed but the awareness regarding its use should also provided through advertisement so that farmers can cultivate these crops during the lag period between two main crops. For instance, in our study it is investigate that in case of moong crop in Bathinda district, many sampled farmers allocate area under the moong to fill the gap between harvesting and sowing period of wheat-paddy cycle respectively. The wheat is sown in November and mature in March. But this is not possible to sow paddy before June - the date announced by Punjab government. So in between the left time (March-June) the short duration variety of moong is grown on farm by many farmers because during this time period the land is unutilised and the farmer took decision to cultivate moong. This supplementary increase in the farm income will also provide an incentive to farmers to allocate more area under pulse crops.

**Conclusion**

The study concluded that higher productivity, weighted price and output-input ratio became the prime factors than cost of cultivation in explaining greater profitability of gram. More so, despite of higher cost of moong cultivation, relatively high productivity, weighted price and higher efficiency in using...
inputs indicating comparative advantage goes in favour of high yielding farming in comparison with low yielding farming.

References