Account of Production Function and Productivity of Dates

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ABSTRACT

Dates are taken in to account one of major exports items in Iran during recent year. Therefore economizing production process of this yield can improve country exports power by desired utilization of production factors. Optimal allocation and productivity of date production factors have been investigated in Jahrom city in this study. In this context, 60 farmers were selected using random sampling method and data were by completing inventory in 1390. Cobb-Douglas, Transcendental and Tran slog production functions were estimated by applying Envies soft ware that finally Transcendental was determined as more suitable and superior function. The results indicated that phosphate, potash, pollen, cultivated regions, poison consumption, applying agricultural machinery are among studied inputs that had significant effect on dates production which the rate of phosphorus as a chemical fertilizer, pollen consumptions and cultivated regions must be increased and the rate of potassium as a chemical fertilizer must be decreased based on obtained results of these resources optimal allocation. Economizing suitable productions process can improve exports using production inputs: So measuring productivity is considered as an important approach in this study and optimal allocation is the use of available sources and facilitations.

INTRODUCTION

Increasing non oil productions contribution is one of major aims in the plans of country economic development (Iranian 20 year’s perspective document, 2009).

Major agricultural productions are taken in to account non oil productions of the country. Totally, the export of these productions and specially the exports of date production effect on exchange of country. Iran is a country that has great relative advantages by having many capabilities in this yield production. The yearly date production is about one million ton in our country. The rate of Iran date exports was 11 706 tons in 2005 and the value of every ton was 558.9 based on FAO statistics. Only 20 countries in the world produce dates according to FAO statistics. A bout 90% of date production of the world are related to some countries such as Iran, Arabia, Egypt, Iraq, Pakistan and Tunisia. Increasing productivity and agricultural efficiency are taken in to account as the most important problems of developing countries such as dates producers according to competitive economy by the of aim obtaining maximum profit (www.Fao.org).

It should be tried to use available efficient and optimal factors and sources according to the limitations of date’s production factors (Web, 2000).

The aim of action is to increase production current level of inputs consumption and this is the concept of productivity promotion in agriculture. Therefore it is necessary to investigate present situation for increasing productivity and it is necessary to perform more effective plans to reach desired situation and to find suitable setting for exporting this yield (Gilanipoor, 2005).

Various studies have been done in the section of agricultural in this direction:

Emadzadeh and et al (2002), in a study estimated the price of function and determined floor price for date production in Jahrom city. They concluded that if the farmers cultivated regions are reached to optimal level, the production price will decrease and also dates production has reducing yield as compared with against rate in Jahrom city and farmers production of the studied region is placed on AVC descending branch of curve.

Mehrabi and Gilanipoor (2005), obtained positive correlation between the size of farm and the level of efficiency and productivity by estimating production function and found positive correlation between farm size and efficiency and productivity level.
Web(2000) considered agricultural productivity for land inputs, human power, animals, agricultural machinery and fertilizer and land quality in the 110 countries in 1961-97 course and analyzed them economically. The results implied that these production factors are effective in agricultural productivity. Morgan (2003), Ramesh and Dasnapaty(2007), obtained similar results in their studies and the effect of production factors in the production level and productivity. Since Fars province is of the highest quality in the produced dates and is of the fourth place from production rate aspect and since Jahrom city is considered as the greatest and most famous dates producer in this province, so the present study has been performed to determine effective factors on above yield production process, productivity measurement, and to determine their allocation situation in Jahrom city.

MATERIALS AND METHODS

Place domain was date gardens in Jahrom city and the time period was in 1390 in this study. Statistical society included all of date farmer in Jahrom city which were chosen randomly. Inventories were completed by 60 farmers in Jahrom city to get required information. Firstly, production function was estimated to determine effective production factors to yield production in this study. Therefore transcendental function is more discussed because Cobb-Douglas, Transcendental and Translog production functions were estimated finally which transcendental production function was determined as superior function. Transcendental production function is an attempt that performed to obtain a function in 1950 that has similar features to production function of three region neoclassic. This function in the mode of \( N \) has following shape which is linear as compared with parameters.

1. The logarithmic form of this function is as follows:

\[ Y = \sum \lambda_i e^{x_i} \]

2. Productivity is considered as the ratio between determined production rate and production rate of one or several production factors.

\[ LnY_i = Ln\beta_0 + \sum \beta_j LnX_j + \sum \gamma_i \]

Partial productivity of production factors can be measured after measuring production function estimation. In general, partial productivity of production factors is the determined single input productivity without measuring the other effects of production inputs. Mean and final productivity standards are used to measure partial productivity. Mean productivity is the ratio of out put to one of inputs in the other words mean productivity is the same mean production for each input.

This standard is considered as in sufficient, because this standard do sent measure the effects of the other used factors in the production process, but however this standard is used to measure the efficiency of the determined factor.

3. Final productivity is considered as production change by increasing input rate. In fact the change of output is for the final variable unit in an input that is an input productivity is a final input production.

\[ AP_i = \frac{Y}{x_i} \]

4. The final productivity correlation will be as follows by considering transcendental function:

\[ MP = \frac{\Delta Y}{\Delta X} \]

5. Production tension is obtained from ratio \( \frac{MP}{AP} \). Each of tension is considered as a pure number that indicates the ratio between two percentages. According to this definition production tension equals with direct production change on input change percentage.

\[ MP = \frac{A_i}{X_i} + Y_i \]

6. Production tension is considered as a method for measuring the rate of production function reaction for the rate change input use. Production tension is between0, 1(1>EP>0) and so tension is more small so the production will have lower interaction from increasing respect. Production tension can be measured by correlation between AP and MP.

\[ EP = \frac{dY}{dX} \]

7. Below correlation can be used to measure optimal allocation of production factors that is finding necessary rate of input to maximize profit.

\[ EP = \frac{MP}{AP} \]
\( VMP = P_x \)

In this correlation \( VMP \) is final production value of \( x \) input and \( P_x \) is the price \( X \) input. Complete competition in the mark is optimal allocation when final production value equals with input price and if any it is not optimal allocation.

**RESULTS AND DISCUSSION**

Production function called Transcendental was estimated by the method of ordinary least squares (OLS) that its result has been indicated in the Table 1.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>Statistics t</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width of the source</td>
<td>61/9</td>
<td>61/11</td>
<td>00/0</td>
</tr>
<tr>
<td>Logarithm of P fertilizer</td>
<td>02/0</td>
<td>78/0</td>
<td>43/0</td>
</tr>
<tr>
<td>Phosphorus fertilizer</td>
<td>003/0</td>
<td>5/4</td>
<td>0002/0</td>
</tr>
<tr>
<td>Logarithm of pollen</td>
<td>29/5</td>
<td>06/4</td>
<td>0002/0</td>
</tr>
<tr>
<td>Pollen</td>
<td>10/3-</td>
<td>77/3-</td>
<td>0004/0</td>
</tr>
<tr>
<td>Logarithm of potassium fertilizer</td>
<td>02/0-</td>
<td>99/0-</td>
<td>32/0</td>
</tr>
<tr>
<td>Potassium Fertilizer</td>
<td>002/0-</td>
<td>6/3-</td>
<td>0002/0</td>
</tr>
<tr>
<td>Logarithm of the area under cultivation</td>
<td>03/0-</td>
<td>18/1-</td>
<td>24/0</td>
</tr>
<tr>
<td>Cultivation</td>
<td>03/0-</td>
<td>18/1-</td>
<td>24/0</td>
</tr>
<tr>
<td>Pesticide</td>
<td>12/1</td>
<td>86/4</td>
<td>0002/0</td>
</tr>
<tr>
<td>Machine Agricultural</td>
<td>19/1</td>
<td>65/2</td>
<td>01/0</td>
</tr>
<tr>
<td>A R (1)</td>
<td>64/0</td>
<td>49/5</td>
<td>0002/0</td>
</tr>
</tbody>
</table>

Significance level: 000/0 ratio Watson Camera: 2/2 \( R^2 = 0/75 \)

The value of \( R^2 \) (coefficient of determination) indicates that 75% of rate production changes is justified by present variables in the model. The pattern examined from co linearity, self-correlation and variance disparity aspect. The presence of self correlation was confirmed and therefore it was tried to its removing.

According to Table 1 about quality variables it should be mentioned that the poison consumption and agricultural machinery have direct and positive correlation with the rate of dates production, that is the farmers that have used chemical poisons to fight pests and weeds, have had more the rate of dates yield production and also some farmers that have used agricultural machinery in their palm grove, they have had higher production function. Mean productivity is considered as produced yield for one consumptive input unit. The numbers of mean factors productivity have been shown in the table2.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Phosphorus chemical fertilizer</th>
<th>Potassium fertilizer</th>
<th>Pollen</th>
<th>Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest Average productivity</td>
<td>93646698</td>
<td>104000000</td>
<td>83/14223</td>
<td>539/4901</td>
</tr>
<tr>
<td>Interest Marginal productivity</td>
<td>6/281348</td>
<td>9/207701-</td>
<td>79/63943</td>
<td>71/22726</td>
</tr>
<tr>
<td>Traction</td>
<td>96/1244</td>
<td>65/1266-</td>
<td>27/4057</td>
<td>44/1</td>
</tr>
<tr>
<td></td>
<td>47/3</td>
<td>15/2-</td>
<td>27/5</td>
<td>26/5</td>
</tr>
</tbody>
</table>

According to study findings, mean productivity of chemical fertilizer as phosphorus, potassium, pollen inputs and cultivated regions are as follows respectively: 93646698, 104000000, and 14223. 83 and 4901.539. It means that in average 281348.6 kg.s dates yield are produced by using each kilogram of phosphorus but 207701.9 kilograms dates yield are reduced by consuming each kilogram of potassium as a chemical fertilizer. About pollen input, also in average 14223.83 kilograms of dates yield are produced by using each pollen cluster and also 4901.53 kilograms of dates yield are produced for each hectare of cultivated region.

Final productivity of added dates yield rate is according to kilogram for each input consumption input that has been indicated in the Table 2.

According to study findings, the final inputs productivity of pollen, potassium and phosphorus as chemical fertilizers and cultivated regions are as follows respectively: 22726.71, 63943.79, 9.207701, and 281348.6. It means that 281348.6 kilograms are added to dates production by consuming each kilogram phosphorus but the consumption of potassium is very high and by this chemical fertilizer, the date production is decreased and it should be mentioned that the rate of potassium consumption must be reviewed.

63943.79 kilograms are added to dates production by consuming each pollen cluster and 22726.71 kilograms are added to dates production for each hectare of cultivated regions.
The sum of partial tensions incorporate general production tension. This rate was 11.85, therefore yield is ascending as compared with scale it means that if all of mentioned input is increased up to 1%, so the rate of yielded date production will increase more than the percentage of inputs changes.

Conclusion and suggestions:
According to positive correlation between the rate of poison consumption and the use of agricultural machinery with the rate of dates production, it is suggestions that the office of agricultural organization promotion should proceed to use poisons for fighting pests and plants diseases of palm grove and to apply agricultural machinery and new technologies in the steps of dates production growth and cultivation.

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