



Full Length Research Article

CHANGE AND GROWTH RATE ANALYSIS IN AREA, YIELD AND PRODUCTION OF WHEAT IN ETHIOPIA

***Eyob Bezabeh, Tesfaye Haregewoin, Dejene Haile giorgis, Fitsum Daniel and Baye Belay**

Ethiopian Institute of Agricultural research, po.box 2003, Ethiopia, Addiss abeba

ARTICLE INFO

Article History:

Received 24th July, 2014
Received in revised form
25th August, 2014
Accepted 04th September, 2014
Published online 25th October, 2014

Key words:

Wheat,
Ethiopia,
Paired t-test and
Semi-log equation

ABSTRACT

The study measured the change and growth rate in area, production, and yield of wheat in Ethiopia based on secondary data during 1991/92-2012/13. Pared t-test was used to identify the significant change in area, production and yield of wheat between the periods 1991/92-2001/02 and 2002/03-2012/13. And semi-log model was applied to measure the compound annual growth rate of wheat for period I (1991/92 to 2001/02), period II (2002/03 to 2012/13) and the whole period (1991/92 to 2012/13). The results revealed that, yield and production of wheat increased satisfactorily from period I to period II. But area was not increased significantly. The compound growth rate in yield of wheat improved rapidly in period-II, whereas the growth rate in area and production decreased slightly. This shows us that increasing production through increasing the area may not be feasible without reducing the area share of other crops. Therefore to meet the growing demand of manufacturing industries, increasing the yield potential would be the solution in the long-run.

Copyright © 2014 Eyob Bezabeh et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Wheat is Ethiopia's one of the major staple and strategic food security crop. It is cultivated on 1,627,647.16 hectares of land and has the production of 34,347,061.22 quintals with productivity of 21.10 kg/ha in Ethiopia (CSA, 2013). Ethiopia is the second largest wheat producing country in Africa next to South Africa. Studies revealed that, currently bread wheat covers about 60% of the total wheat area from 15% in 1967 and a 40% in 1991, while durum wheat covers about 40% from an 85% in 1967 and a 60% in 1991 (Hailu *et al.*, 1991 and Alemayehu *et al.*, 2011). At present, it is the smallholder farmers (4.5 million holders on 1,426,000 ha) that produce most of the wheat production in Ethiopia comparing to the 8% contribution of the large state-owned farmers (124,000 ha of land). The production of wheat in the country is very insufficient to meet the increasing demand for food for the ever-increasing population. i.e Ethiopia's wheat production self sufficiency is only 75 percent and the remaining 25 percent wheat is imported commercially and through food aid (GAIN, 2014).

According to USAID country report, wheat is mainly grown in the central and southeastern highlands (Arsi, Bale and parts of Shoa are considered the wheat growing belt) during the main (Meher) rainy season (June to September) and harvested in October-November. Wheat is the second most consumed cereal in Ethiopia next to corn. It accounts for approximately 11 percent of the national calorie intake in the country (200kcal/day in urban areas / 310kcal/day in rural areas). It has versatile uses in making various human foods, such as bread, biscuits, cakes, sandwich, etc. Additionally, wheat straw is commonly used as a roof thatching material and as animal feed. (GAIN, 2014).

Objectives

- (i) To determine the growth rate of area, production, and yield of wheat.
- (ii) To measure the change in area, production and yield of wheat over the periods.

MATERIALS AND METHODS

The study was based on yearly time series secondary data on area, production and yield of wheat in Ethiopia. The secondary data were collected from published records and reports of the

***Corresponding author: Eyob Bezabeh**

Ethiopian Institute of Agricultural research, po.box 2003, Ethiopia, Addiss abeba

CSA, FAOSTAT and USAD. The study period was analyzed as a whole as well as by dividing it into period I (1991/92 to 2001/02) and period II (2002/03 to 2012/13). And the following semi-log trend function was used to find out the trend and estimate the growth rate of area, production and yield of wheat of Ethiopia.

$$\ln yt = a + bt + e$$

Where y = dependent variable (area, yield and production); t = trend over specific period, b = coefficient of trend; ln = natural logarithm; and e = error term. Here, the coefficient of trend (b) measures the constant proportional or relative change in y for a given absolute change in the value of time t. Therefore the compound annual growth rate (CAGR) can be taken as: CAGR = exp (b) -1

On the other hand to identify the significant change in area, production, and yield between two periods, the paired t-test was used.

$$t = \frac{(\bar{X}_1 - \bar{X}_2) - a}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

Where,

\bar{X}_1 = mean value of period 1 and \bar{X}_2 = mean value of period 2
A is the mean of the difference between the two paired observations
 S_i^2 is sample variance and n is sample size.

RESULTS AND DISCUSSION

If we take a look at table 1, it may be observed that the area under wheat in Ethiopia recorded annual growth rate of 11% during period I, when production increased at a rate of 9.5% and yield witnessed a negative growth rate during the same period. During the period II, the area under wheat increased at a rate of 3.7%, while yield and production increased at a rate of 5.4% and 9.3% respectively. The yield of wheat increased at a rate of 3.3%, whereas production and the area recorded the growth rate of 6.3% and 2.8% respectively during the overall period.

Table 1. Growth in area, yield and production in percent

	area	production	yield
Period I	11**	9.5**	-1.4*
Period II	3.7*	9.3**	5.4**
Over all period	2.8*	6.3**	3.3**

*= significant at 5% and **= significant at 1%

Change in area, production and yield of wheat over the periods

Wheat production and yield increased from period-I to period-II significantly at 1% and 5% level of significance respectively.

Table 2. Change in area, production and yield of wheat

Measurement	Mean		t-value	P(T<t) two-tail
	Period I	Period I		
Area (1000ha)	7.081	7.240	-1.791	.103
Production (1000mt)	7.193	7.756**	-7.104	.000
Yield (mt/ha)	.113	.5172*	-4.970	.001

Source: Authors estimation

The increase in area from period-I to period-II was not significant. So the area of wheat is not increased from period-I to period-II satisfactorily.

Conclusion

The compound growth rate analysis indicated that the area under wheat crop has decreased over the time. But, the production of wheat during period II was increased due the corresponding increase in per hectare yield of wheat crop. Increasing production through increasing the area may not be feasible without reducing the acreage under other crops. Therefore to meet the growing demand of manufacturing industries, increasing the yield potential would be the solution in the long-run.

REFERENCES

Alemayehu Seyoum Taffesse, Paul Dorosh and Sinafikeh Asrat. 2011. Crop Production in Ethiopia: Regional Patterns and Trends. Development Strategy and Governance Division, International Food Policy Research Institute, Ethiopia Strategy Support Program II, Ethiopia. ESSP II Working Paper No. 016.

CSA (Central Statistics Agency). 2013. Agricultural Sample Survey 2012/2013 (2005 E.C.). Volume I. Report on Area and Production of Major Crops (Private Peasant Holdings, Meher Season). Statistical Bulletin 532, Addis Ababa

Chandran, K. P. and Prajneshu, 2004. Computation of growth rates in agriculture: Nonparametric regression approach. *Journal of the Indian Society of Agricultural Statistics*, **57**: 382-392.

FAO (Food and Agriculture Organization of the United Nations).

Global Agricultural Information Network (GAIN). 2014, Report: ET1401, Addis Ababa: USDA.

Hailu Gebre-Mariam, Tunner, D.G, and Mengistu Huluka, eds. 1991: wheat research in ethiopia: a historical perspective. Adiss Abeba: IAR/CIMMYT

Rehman, F., I. Saeed and A. Salam. 2011. Estimating growth rates and decomposition analysis of agricultural production in Pakistan: pre and post sap analysis. *Sarhad J. Agric.* 27(1): 125-131

USAID (United States Agency for International Development). 2010. Staple Foods Value Chain Analysis. Country Report, Ethiopia. Addis Ababa
