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Trends of relative price of DAP Fertilizer and Cereal Crops (Teff and Maize) in Ethiopia

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Abstract

This paper presents the price of DAP fertilizer in relation to the two most common cereal crops in Ethiopia (Teff and maize) from 1992 to 2011. The main objectives are (1) To analyze the price trend of DAP and its impact on cereal crops (Teff and Maize) and (2) To examine the major factors that affect the national market price of food crops. The data were collected from secondary sources mainly from Central Statistical Authority, Ethiopian Economic association and Agricultural input supply enterprise. The result indicates, in comparison to the price of the two major types of crops of the country, the price of fertilizer was rapidly increased during the given time span. Thus, farmers faces a big challenges to cover the price of the fertilizer they used by their own production.

Keywords: *Di-Ammonium phosphate, Fertilizer, Teff, Maize*

Introduction

Basically, Ethiopia is an agriculture export oriented country which contributes around 90 percent of the total export earnings of the country. Of the total GDP though agriculture accounts about 41.6 percent and employs about 83 percent of the labour force. The sector is dominated by about 11.7 million small land holders and they contribute about 95 percent of the national agricultural production while large farms contribute only 5 percent of the total agriculture production (MOA, 2011). This shows that the overall economy of the country and the food security of the majority of the population depend on small-scale agriculture. Hence, agricultural growth and production are the most important factors in the national economy.

The judicious use of Chemical fertilizer is very important in cereal production in Ethiopia. According to Ministry of Agriculture (Rashid *et al.* (2013)), production of cereals account for 90 percent of the country's total chemical fertilizer application. Oromia and Amahara national regional states accounted for 70 percent of total use of chemical fertilizers during 2005/2006–2010/2011. While other two major cereal-growing regions; Southern Nations, Nationalities, and Peoples' Region

(SNNPR) and Tigray National Regional State use only 10 and 3 percent, respectively.

This paper aims to analyze the relative price of DAP fertilizer and its use to increase the production of the most common cereal crops / teff and maize/ in Ethiopia . This entire success is passable due to relative price advantage of DAP. Fertilizer Di-Ammonium phosphate (DAP) and which are Urea are the two most widely adopted chemical (inorganic) fertilizers in Ethiopia. Though the rate of adoption is found to be the lowest among the smallholders, different researches findings have establish the fact that the increased use of modern fertilizer is one of the major determinants for the recent growth in maize production. Despite variations in the reported data, use of increasing overall modern chemical fertilizer is evident from time. For instance, according to IFPRI 2007, the usage of chemical fertilizer increased from 250,000 tons (21kg/hectare) in 1995 to 323,000 tonnes (32kg/hectare) by 2004, which is found to be a more rapid growth than the average for Sub-Saharan Africa (SSA) over the same period.

Objectives

1. To analyse the price trend of DAP and its impact on cereal crops (Teff and Maize).
2. To examine the major factors that affect the national market price of food crops.

Methodology

For the present study Relative Prices of Di - ammonium Phosphate and production of Teff and Maize cereal crops and market price in Ethiopian currency (Birr) was collected for the purpose of analysis. The data relation to price of per quintal of DAP fertilizer in cultivation of Teff and Maize seeds was collected from secondary sources at various agricultural marking prices during the period from 1992-2011. On the basis of D.A.P prices and production of Teff and maize crops for 20 years and average data of minimum and maximum was also computed for important cereal crops the effect of D.AP Fertilizer prices per quintal production comparison of two major crops and quantity of DAP fertilizer use and trends of prices during the given time span was also analysed .

The data about cereal crops were collected from secondary source mainly and DAP price information from Central statistical Authority , Ethiopian Economic Association and Agricultural input supply enterprise.

A Research done by the team of researchers in IFPRI (2013) on the trend of chemical fertilizer application in Ethiopia revealed that there has been an increasing improvement some prominent in both trend of cropped area and fertilized area. The Cropped area has increased from about 7.0 million hectare in 2003/04 to 9.7 million hectare by 2010, and found to be 38.6 percent of growth, where as fertilized area has more than doubled from 1.12 million hectare to 2.31 million hectare during the same period. The study further revealed that more teff cultivated area covered with chemical fertilizer use than any other cereal crops in all the cereal growing regions except SNNPR. At the national level, Teff cultivated area has consistently improved and accounted for more than 40 percent of area chemical fertilizer use. In 2010/11 of the 2.31 million hectare covered under chemical fertilizers, and about

981,000 hectare was allocated to Teff, cultivation which is almost 75 percent more than the maize cultivated area or wheat cultivated area . It may be seem to be counterintuitive that farmers are using more chemical fertilizer in a low-yielding crop like Teff. However, this is consistently found with the fact that Teff prices have been increasing in real terms for many years. As a result, price has become more favourable relatively for Teff cultivation and chemical fertilizer usage than to other cereals.

In addition, due to easy storage and long shelf life, farmers attach some intrinsic values to Teff crop. On the other hand, fertilizer use in other cereals (barley, sorghum, rice, and millet) has been minimal relatively that of the three major cereals and the land allocated to them. Since 2003/04, about 2.6 million hectare, i.e about 35 percent of the total cropped area, has been allocated to these cereals; but only about 4 percent of the cultivated area is covered with chemical fertilizers. Thus the economics of chemical fertilizer use in these non-tradable cereal crops has not been favourable (IFPRI 2013).

Teff is an indigenous cereal major stable food crop and the origin of the first domesticator of the Unique crop (VaviloV1951). It is usually cultivated as a mono crop grown in uplands at middle elevation between 1800 and 2200 meters above sea level and in regions that have adequate rainfall compared to other cereals. . It is also an important crops among the most valuable crops for multiple cropping systems such as double and triple cropping systems It is estimated that Teff made up about 20 percent of total cultivated area in Ethiopia covering about 2.7 million hectors. About 6.3 million farmers cultivate this crop and an average productivity is estimated as of 1.28 and 1.31 tonnes per hectare. Teff is primarily grown for its grain that is used for preparing Injera , a spongy flat bread, which is a staple and very popular in the national diet and also valued for its fine straw for animal feed. The straw is used mixed with mud for building construction purposes for most of Ethiopians (Doris, 2002).

In Ethiopia, there are three types of Teff; white, Black/red/ and Mixed. According to agricultural transformation agency in, 2011 about 75% of the Teff produced is supplied to the market whereas; the remaining 25% is used for home consumption and seeds. Usually the white colour Teff products are supplied to the market, and the local variety, red Teff, is mostly used for household consumption (ATA, 2011; p, 21).

Maize is the second most important crop it's covered about 15 percent of total cultivated area, Maize production is 16. 1 million tons (CSA) – 2012) and estimated as 17 % of the total grain cropped area (CSA 2012). Ethiopia is the fourth largest maize producer next to South Africa, Nigeria, and Egypt (USDA, 2007) Maize is mainly used for food and seed purpose. The straw is also used for construction and domestic fuel.

The result indicates, in comparison to the price of the two major cropped area of the country areas, and restricted to the price of chemical fertilizer was formed to be rapidly increased during the given time span. By considering this the analysis of the market price of white Teff grain to make out the relative price of DAP. The overall analysis task is done and presented in

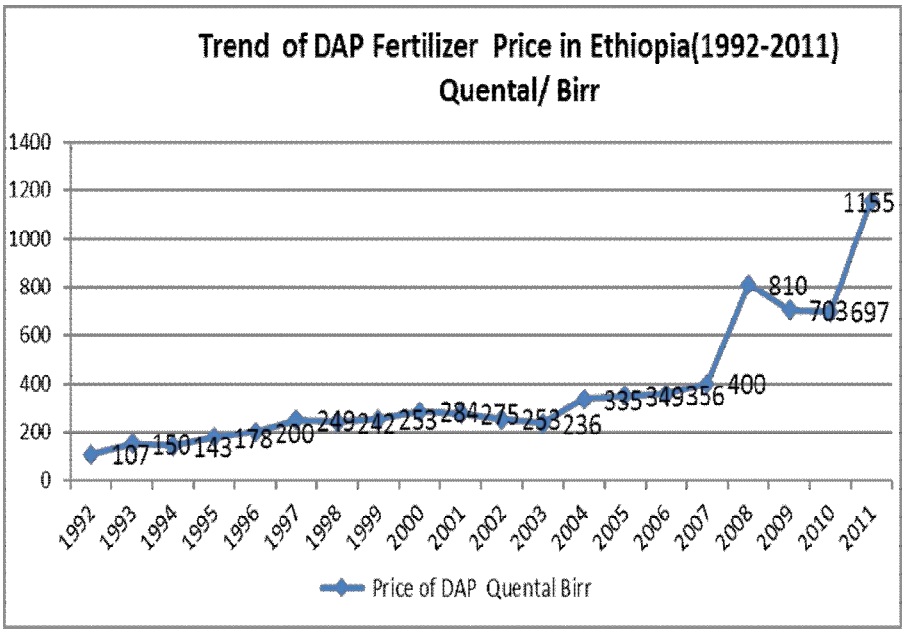
the following table The first column is the year wise breakdown and the next three column, indicates the price of DAP, Teff and Maize respectively and the remaining two column represents the relative price of DAP with Teff and Maize.

Table. 1. Market Prices of DAP, Teff and Maize per Quintal – 1992 to 2011.

Year	Price of DAP/ Quental/ Birr	Price of Teff/ quintal/ Birr	Price of Maize Quental Birr	DAP / Teff/ birr	DAP /Maize/Birr
1992	107	--	--	--	--
1993	150	--	--	--	--
1994	143	174	86	0.82	1.66
1995	178	176.47	80.32	1.01	2.21
1996	200	164	75	1.22	2.67
1997	249	149	76	1.67	3.28
1998	242	182	91	1.33	2.66
1999	253	200.59	113.38	1.26	2.23
2000	284	204	98	1.39	2.89
2001	275	137.83	31.42	1.99	8.75
2002	253	144	57	1.76	4.44
2003	235.9	195	95	1.21	2.48
2004	335	215	95	1.56	3.53
2005	349.45	235	114	1.49	3.06
2006	356.45	277	129	1.29	2.97
2007	400	180	103.89	2.22	3.85
2008	810.15	484	241	1.67	3.36
2009	703.35	805	336	0.87	2.09
2010	696.55	719	244	0.97	2.85
2011	1155	672	236	1.72	4.89
Min	107	137.935	31.421	0.82	1.66
verage	368.79	295.232	127.890	1.399	3.326
Max	1155	805	336	2.22	8.75

Source: 1. Economic Association; Ethiopian Economic policy research institute, 2010, statistical data base. (Price of DAP from 1992 –2002 E.C)

2. Agricultural input supply enterprise (price of DAP from 2003 – 2011 E.C) CSA, annual reports on producer's price of agricultural products. (Prices of Teff and Maize from 1994 -2011)


Trend of DAP Fertilizer Price in Ethiopia(1992-2011)
Quental/ Birr
1400
1200
1000
800
600
400
200
0
107
150
143
178
200
249
242
253
284
275
253
236
335
349
356
400
810
703
697
1155
1992
1993
1994
1995
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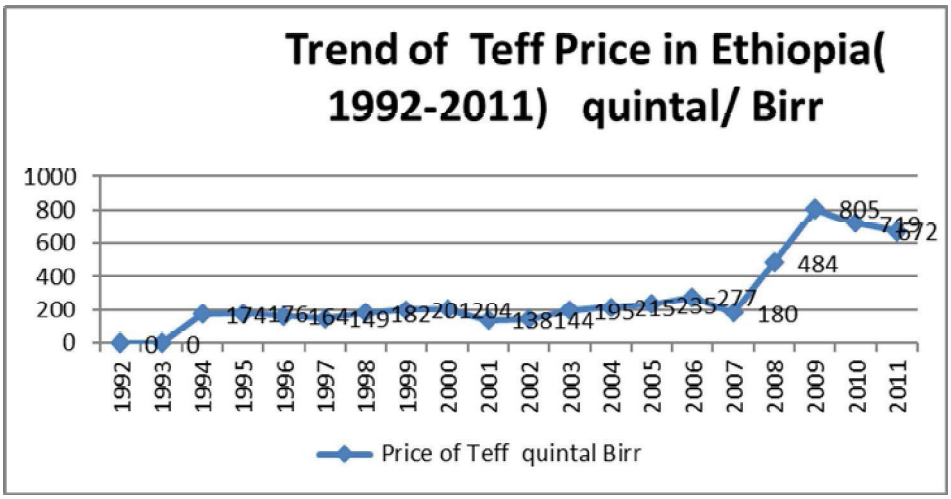
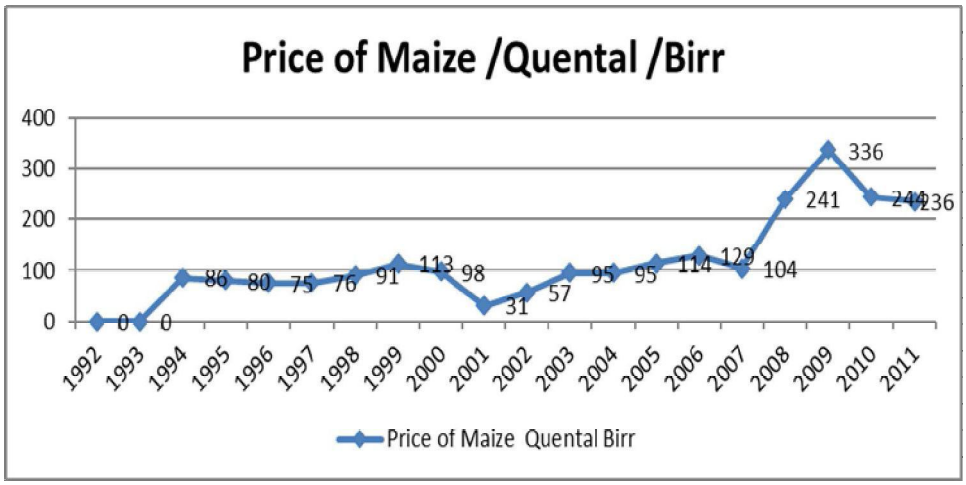
2005
2006
2007
2008
2009
2010
2011
Price of DAP Quental Birr


Trend of Teff Price in Ethiopia(1992-2011) quintal/ Birr
1000
800
600
400
200
0
0
0
174
176
164
149
182
201
204
138
144
195
215
235
277
180
484
805
719
672
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
Price of Teff quintal Birr



Discussion and interpretation of results

During the 20 years period (1992- 2011) DAP price per quintal was recorded lowest as 107 birr in 1992 and , highest 1155 birr in 2011 and average is estimated as 368 .792 birr , per quintal of teff price was recorded lowest as 137.935 birr in 2001 and highest as 805 birr in 2009 and average being 295.232 . and lowest price for maize was recorded as 31.421 birr in 2001 and highest in 336 birr in 2009 , and average being 127.890 birr were recorded.

When we interpret the ratio in 1994, in order to buy one quintal of DAP fertilizer the farmers sold 0.82 quintal of teff or 1.66 quintal of maize. In 1995 the ratio of DAP to teff is 1.01, and this indicates at this time 1 quintal of DAP and 1.01 quintal of Teff are equal, and the maximum ratio of DAP and teff was recorded in 2007 that is 2.22, and this means in order to buy one quintal of DAP fertilizer the farmers sold 2.22 quintal of teff and for maize it occurs in 2001, as this time one quintal of DAP is equals to 8.75 quintals of maize. All of the rest of the ratios are interpreted in this way. As the table indicate, in most of the years the ratio increases, that means the price of teff and maize was increased in during lower rate from the increment of DAP fertilizer price. For this market price variation of both cereals and fertilizer, appear to the depended on different political, social, economic and environmental factors.

In 1993 the country had begun to rebuild itself from severe drought but had been further got a set back by Eretria's secession. The national average price of both teff and maize do not show any significant downward or upward trend until the end of 2000 (World Bank, 2007).

According to Shahidur Rashid(2011), in 2001 and 2002 farmers adopted new technology and there is a favorable weather condition, as this time the country harvested two consecutive years of bumper crops. However, the blessing of the technology did not improve the wellbeing of the farmer's household. A few years earlier when production boomed; maize prices collapsed and farmers those produce maize allegedly

did not find it profitable to harvest their maize crops (Shahidur Rashid, 2011; p, 12). When we see the situation, the price of teff reduced from 204 birr/quintal in 2000 to 137.835 in 2001 and maize also decline from 98 birr per quintal in 2000 to 31.421 birr per quintal in 2001. In late 2005 and early 2006 Ethiopian great market started exhibiting quite a different trend. Despite the three consecutive years of good harvests prices of major cereals increased sharply. This sharp rise in cereal price was a major concern for the government and its development partners and the government temporarily instituted food rationing in major urban centers (Shahidur Rashid, 2011; p, 12).

The World Bank also commissioned a study to analyze the situation. The study indicates Ethiopia's level of poverty, weaknesses in market, and recurrence of production shocks, the role of food aid in managing emergencies is perhaps inevitable. Thus the issue has been planning food aid imports and distributions in ways that minimize their adverse effects. The rule of thumb in food aid planning is that, higher the domestic production the lower the imported food aid, however, historical data suggested that quite the opposite to this has happened in Ethiopia. This is particularly true in 2002, the year of the cereal market collapse, when food aid inflow jumped to 1.2 million tons, compared to about 300,000tons of 2001 (World bank, 2007).

In 2008, Ethiopia faced multiple challenges, inflation begin to accelerate in the country, and there was significant increase in the price of both food and non – food items (World Bank, 2011; p, 4). In addition to the high inflation, widening trade deficit, low foreign exchange reserves, the 2008 *belg* rains failed and at this time Ethiopia had recorded one of the highest food price inflation rates in the world (World Bank, 2011). when we check this from the above table, in 2008 the price of one quintal teff is 484 birr, due to the above factors in 2009 as this one quintal teff could sold by 805 birr and also the price of maize was increased from 241 birr per quintal in 2008 to 336 birr per quintal in 2009. However In 2010 the price of cereal crops reduced from the previous year, essentially due to the introduction in the market of 822,000 tons of government imported wheat to be sold at subsidized prices to low income households in several urban areas. The availability of this subsidized wheat in almost all markets has also contributed to the stabilization of prices of other cereal crops (FAO, 2010; p, 21). When we see the result from the table the price of teff was reduced to 719 birr per quintal in 2010 from 805 birr per quintal in 2009 and the price of maize also reduced to 244 birr per quintal in 2010 from 336 birr per quintal in 2009.

Conclusion

Regarding to the volatile situation of food price in Ethiopia, Shahidur Rashid, 2010 identify three key factors. The first factor was that the growth in money supply far exceeded the overall economic growth in the country. This clearly implies strong inflationary pressure and price increment of cereal crops. The second most important factor behind is an over-estimation of cereal production. The final factor that caused domestic prices to rise was the balance of payment crisis. Historically, Ethiopia has subsidized gasoline prices in order to promote market (Shahidur Rashid, 2010; p, 8-9). Regarding to the price of DAP fertilizer, as we observe from the table in the last

twenty years it increases faster than the incremental rate of the two cereal crops (Teff and maize) and it needs further investigations. But, when we conduct interview with the manager of agricultural input supply enterprise, he responded that the price of fertilizer as depends on the international market; when this market provide fertilizer in lower price to the enterprise distributes with lower cost and vise. The variation of DAP price also sometimes related to lack of ports and inland storage facilities and truces (World Bank, 2011).

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